WJEC GCSE APPLICATIONS OF MATHEMATICS

MATHS



EXAM QUESTION PACK

UNIT 2 FOUNDATION TIER 4362 PAPERS

STEMUP

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

S16-4362-01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications
FOUNDATION TIER

P.M. THURSDAY, 16 June 2016

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**8**	
3.	**4**	
4.*(a)(b)*	**6**	
4.*(c)*	**5**	
5.	**3**	
6.	**8**	
7.	**2**	
8.	**5**	
9.	**6**	
10.	**3**	
11.	**5**	
12.	**9**	
13.	**8**	
Total	**80**	

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ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

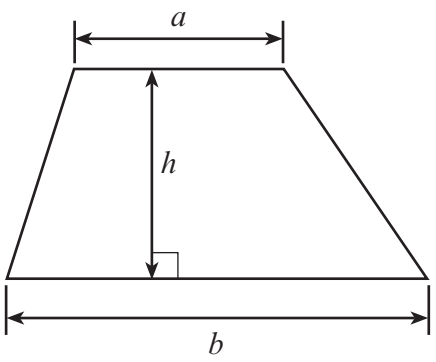
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **6**.

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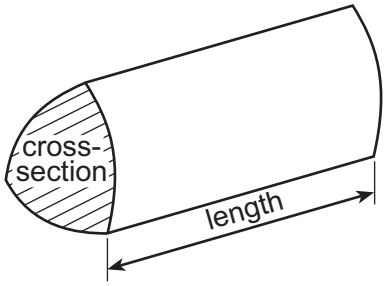
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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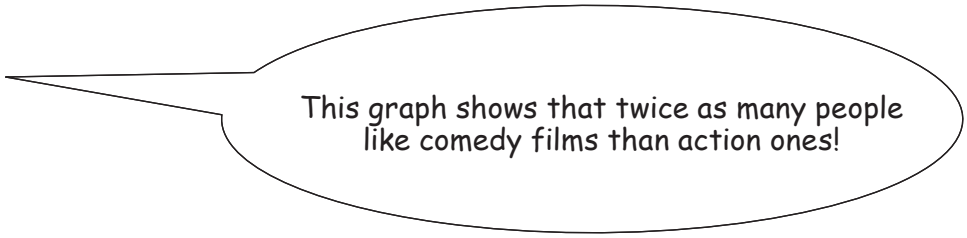
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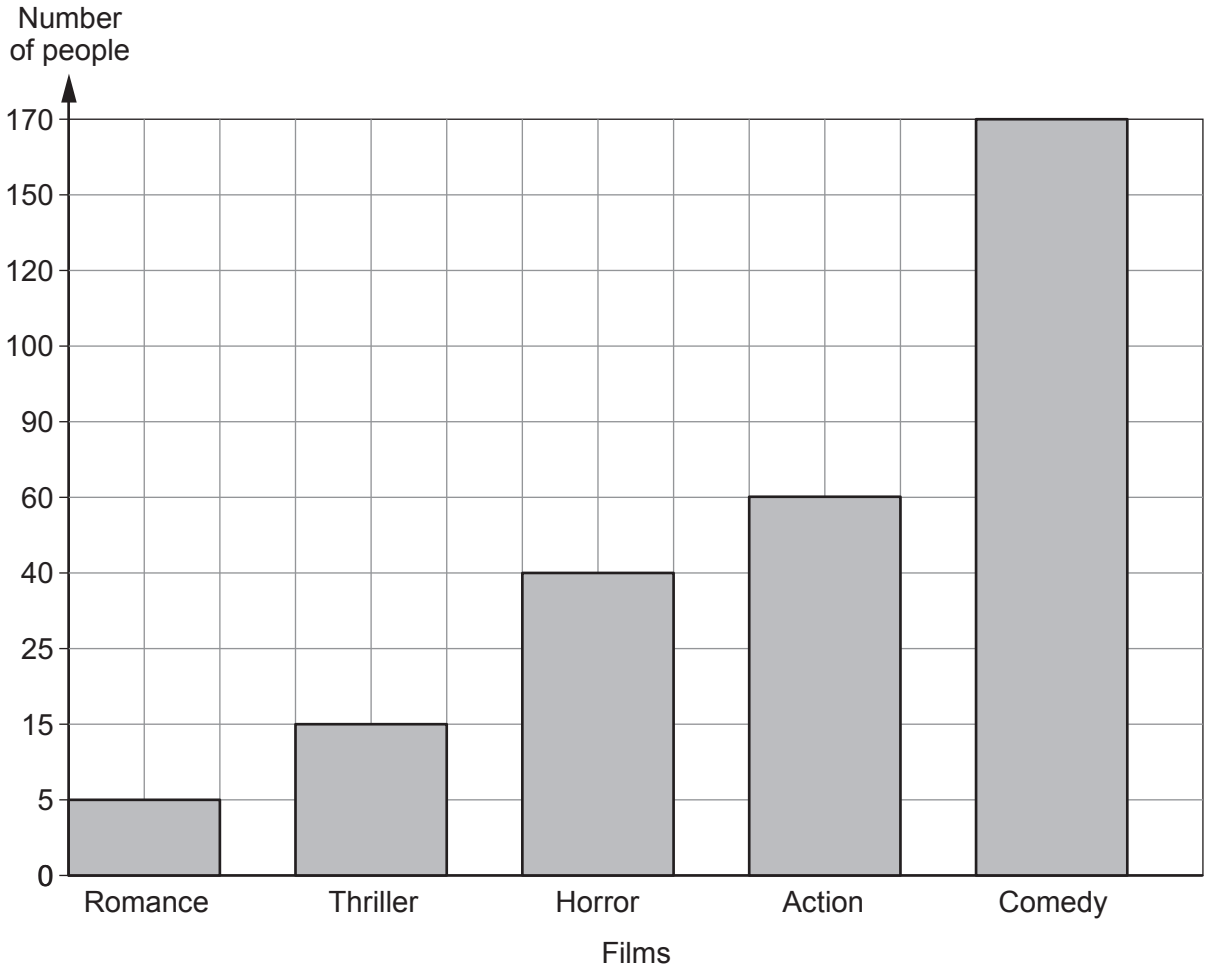
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1. *(a)* In a magazine, Owen saw the following graph about the different types of film that people like.

He told his friend:





Owen's statement is incorrect.
What is wrong with the graph that has led Owen to make his statement? [1]

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(b) Owen asks 40 people which type of film they like.
The choices are romance (R), thriller (T), horror (H), action (A) and comedy (C).
His results are as follows:

C	C	A	A	T	H	R	H	R	T
H	C	T	C	T	C	H	C	A	A
C	H	H	C	A	T	R	C	C	T
T	R	C	T	H	T	H	C	R	R

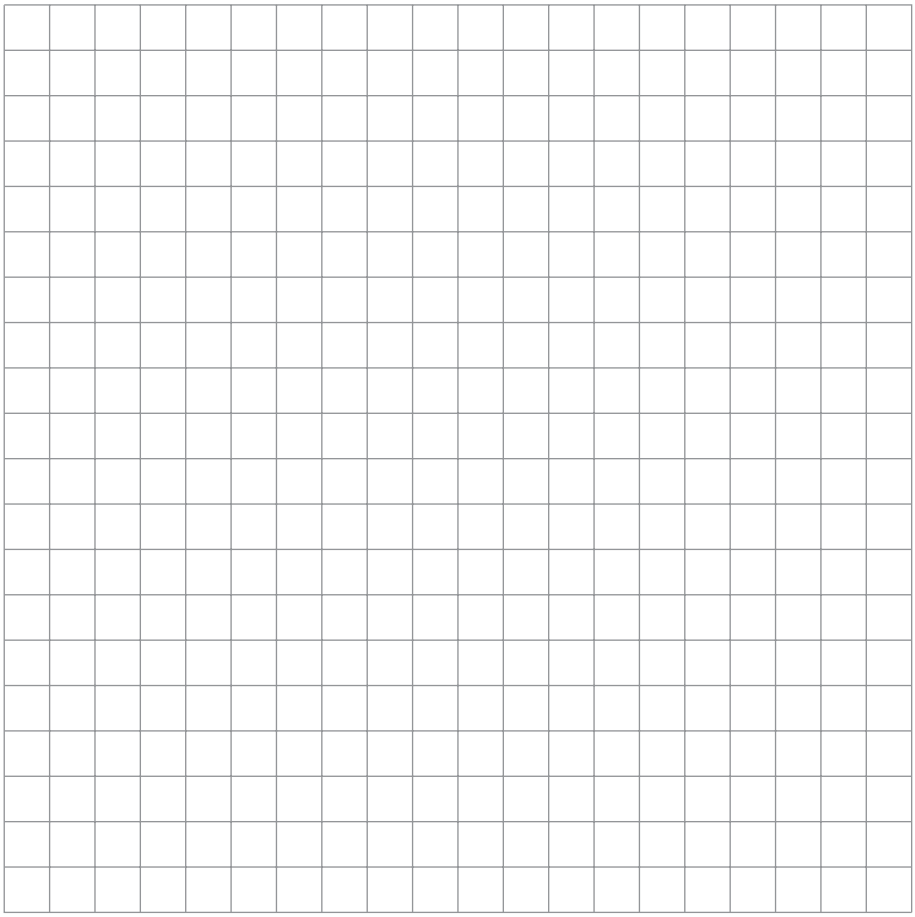
Use the data to draw a suitable bar chart on the squared paper below. [6]

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(c) Complete the following sentence. [1]

Owen's results show that the number of people who liked ..... is twice the number of people who liked ..... .

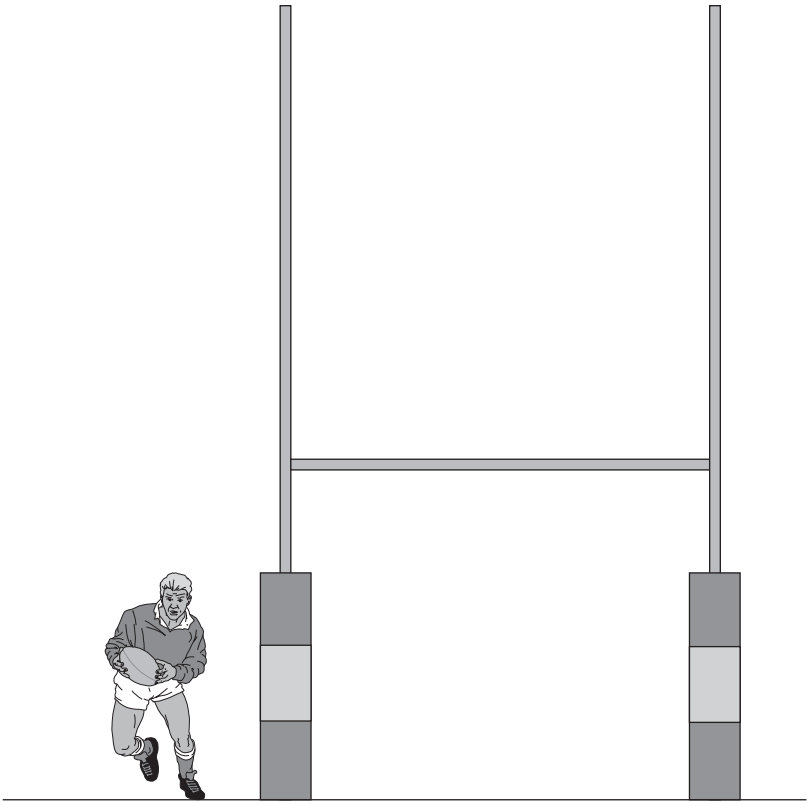
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2. *(a)*



The picture above shows a rugby player next to a set of rugby posts.

Write down an **estimate** for the actual height of a rugby player.

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Write down an estimate for the **actual height** of the set of rugby posts.
You must show all your working. [4]

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(b) In a local rugby club, the coach was asked about 4 different measurements.

Circle the appropriate quantity that you think the coach should give for each measurement. [4]

Average length of a rugby ball	30 cm	30 m	30 km	30 mm
Average weight of a rugby ball	440 kg	440 mg	440 tonnes	440 g
Width of a rugby pitch	70 km	70 mm	70 m	70 cm
Area of a rugby pitch	8400 cm^2	8400 m^2	8400 mm^2	8400 km^2

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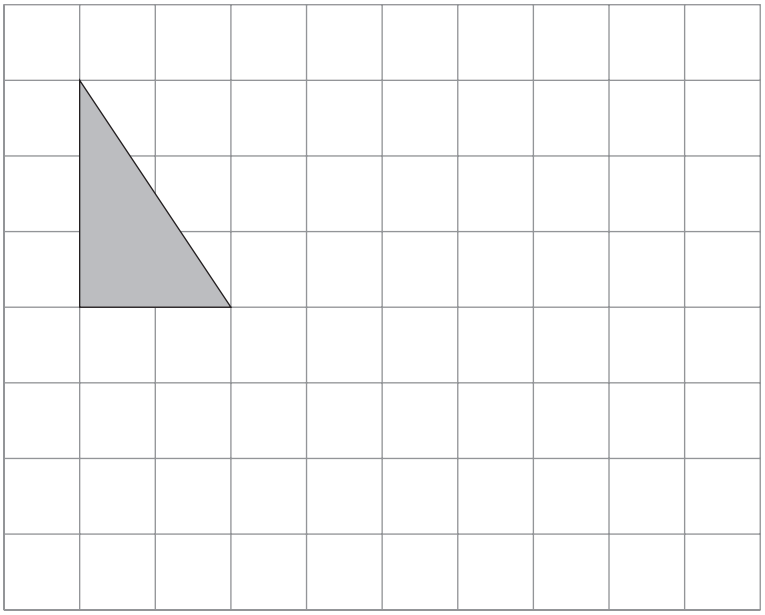
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3. Davinda has been asked to explain the difference between congruent and similar shapes.

(a) Draw a shape that is congruent to the shape given below.
Write a sentence to explain what congruent shapes are. [2]

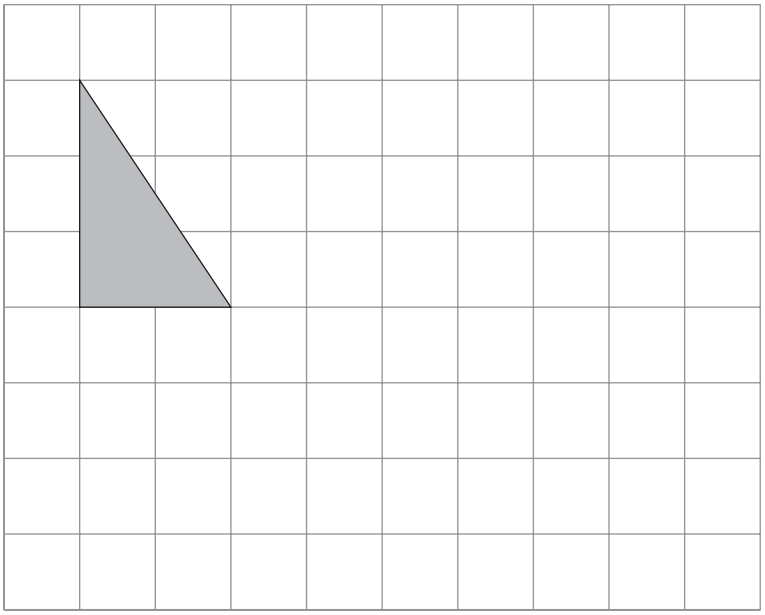


Explanation .....

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(b) Draw a shape that is similar but not congruent to the shape given below.
Write a sentence to explain what similar shapes are. [2]



Explanation .....

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4. Graham's Garage sells different car wheels.

(a) A selection of them is shown below.

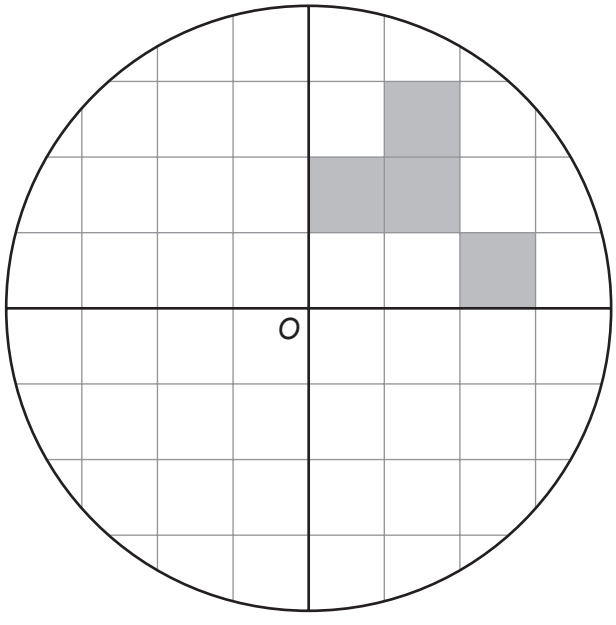
Wheel 1	Wheel 2	Wheel 3
		

Graham notices that the wheels have rotational symmetry.
Complete the table stating the order of rotational symmetry for each of the wheels shown. [3]

Wheels	Wheel 1	Wheel 2	Wheel 3
Order of rotational symmetry			

(b) Graham wants to design a sign for his garage.

Shade 12 more squares on the diagram below so that the design has rotational symmetry of order 4 about the centre *O*. [3]



6

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(c) Graham gets 3 quotes from different companies for the cost of making the sign for his garage.
Each company charges £95 but offers different discounts.

The discounts are given below for each company.

Simon's Signs

Get
12% discount
off of all signs

Signs R Us

Discount

$\frac{1}{10}$ off all prices

Signs & Symbols

We offer 15 pence off every £1 spent

(i) Calculate the discount that each company gives.
Write your answers in the table below.

Show all your working. [4]

	Simon's Signs	Signs R Us	Signs & Symbols
Actual discount	£	£	£

(ii) Based on these quotes, which company should Graham choose to make his sign and why? [1]

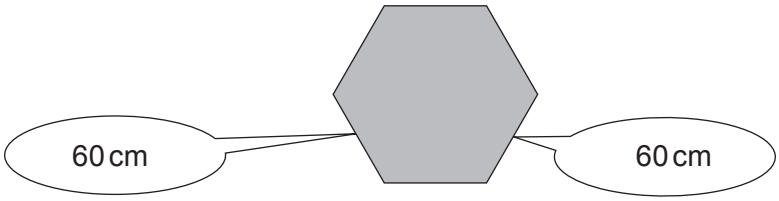
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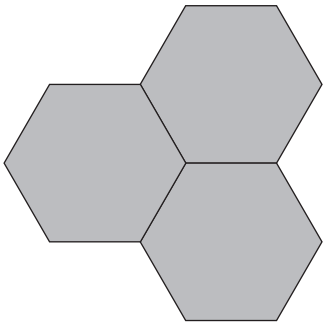
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5. Rugs can be made in the shape of regular hexagons.
Some rugs have a border put on the **outer** edges to stop the material from fraying.

The length of the border on each **outer** edge of the following rug is 60 cm.



Three of the above regular hexagonal rugs are stitched together to make a larger rug.



Eleven metres of edging have been bought.
How much edging will be left over after the border has been put on to the outer edge of the larger rug? [3]

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6. *You will be assessed on the quality of your written communication in this question.*

Liz wants a new smartphone.
She compares two offers.

Offer 1:
Her current mobile service provider has the following deal for the smartphone and contract that she wants.



No upfront cost

£39 a month

2000 mins 5000 texts 2 GB

24 months contract

Offer 2:

Buy the handset from the Internet for £539 and have a SIM card only deal from your mobile service provider

Liz needs to have at least 2000 minutes and 5000 texts with only 2 GB of data allowance.

She finds out the following information on SIM card deals:

Monthly payment	Mins	Texts	Data
£10/month	1000	3000	500MB
£12.50/month	1500	5000	2GB
£12.50/month	2000	3000	2GB
£15/month	3000	5000	2GB
£20/month	3000	5000	3GB
£22.50/month	3000	unlimited	4GB

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Compare the costs of the two offers, over a 24 month period, and advise Liz which option she should choose.
You must show all your working. [8]

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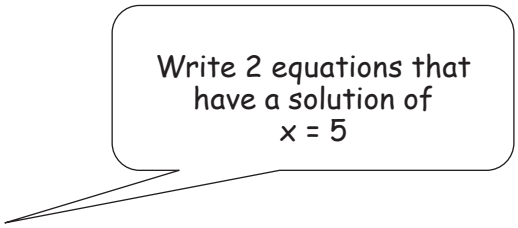
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7. Jacob's teacher gives him the following homework task:



Write 2 possible equations that Jacob could use in his homework. [2]

Equation 1:

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Equation 2:

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8. A supermarket sells 500 g pots of natural yogurt for £1.50 each.

During the first week of April, the supermarket has a special offer on this yogurt.



Buy 1 pot and get a 2nd pot for half price!

Two weeks later, the price of the same 500 g pot of natural yogurt is still the same but the supermarket changes the offer to:

Buy 2 pots and get a 3rd pot free!

Keenan always buys six 500 g pots of this natural yogurt for his restaurant.
Which would have been the better offer?
You must show all your working. [5]

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Turn over.

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9. Dennis plans to build a large toy box with a lid.
A sketch of the toy box is shown below.
It is in the shape of a cuboid.

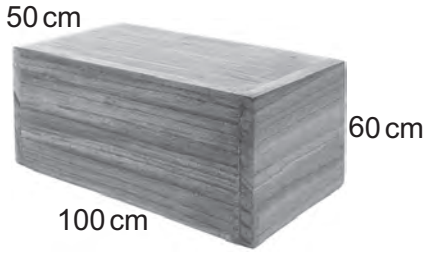


Diagram not drawn to scale

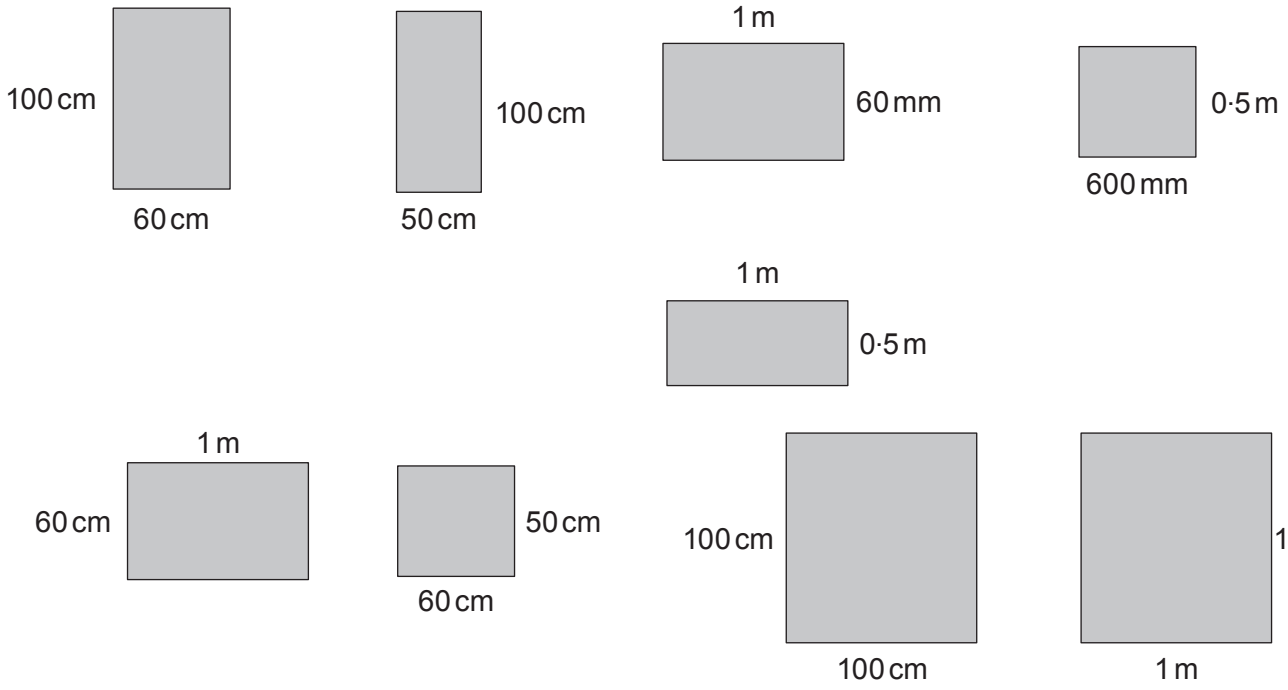
(a) What is the volume of the toy box?
State the units of your answer. [3]

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(b) Dennis has some wooden panels ready to make the toy box.
These are shown below.
Tick each of the panels that Dennis will need to use to make the toy box. [3]



Diagrams not drawn to scale

6

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10. Approximately 1000 bikes are stolen every day across England and Wales.



AlliedWheels Insurance insists that insurance policy holders spend 9% of the value of their bike on purchasing two locks:

- a D-lock for the frame, and
- a flexible lock for the wheels.

Lili's bike is worth £349.
Her bike is insured by *AlliedWheels Insurance*.

Which two of the following locks should she buy to **exactly** satisfy her insurance company's conditions?
You must show all your working. [3]

D-locks			
 Lock 1 £16.34	 Lock 2 £17.25	 Lock 3 £14.67	 Lock 4 £20.45
Flexible locks			
 Lock 5 £12.34	 Lock 6 £15.07	 Lock 7 £6.45	 Lock 8 £4.56

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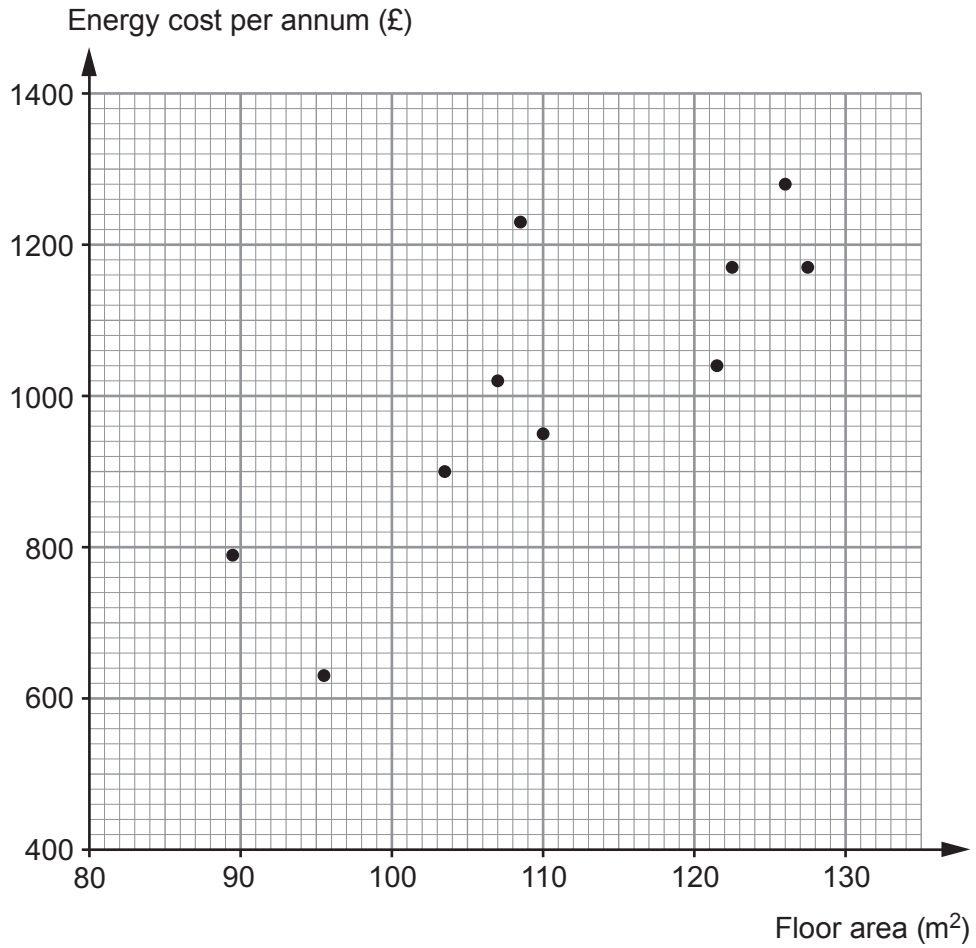
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11. Rowena and Wilf each collected information about the floor area of a number of flats in different villages and the related energy cost per annum.

They each displayed their information in a scatter diagram.

Rowena's scatter diagram

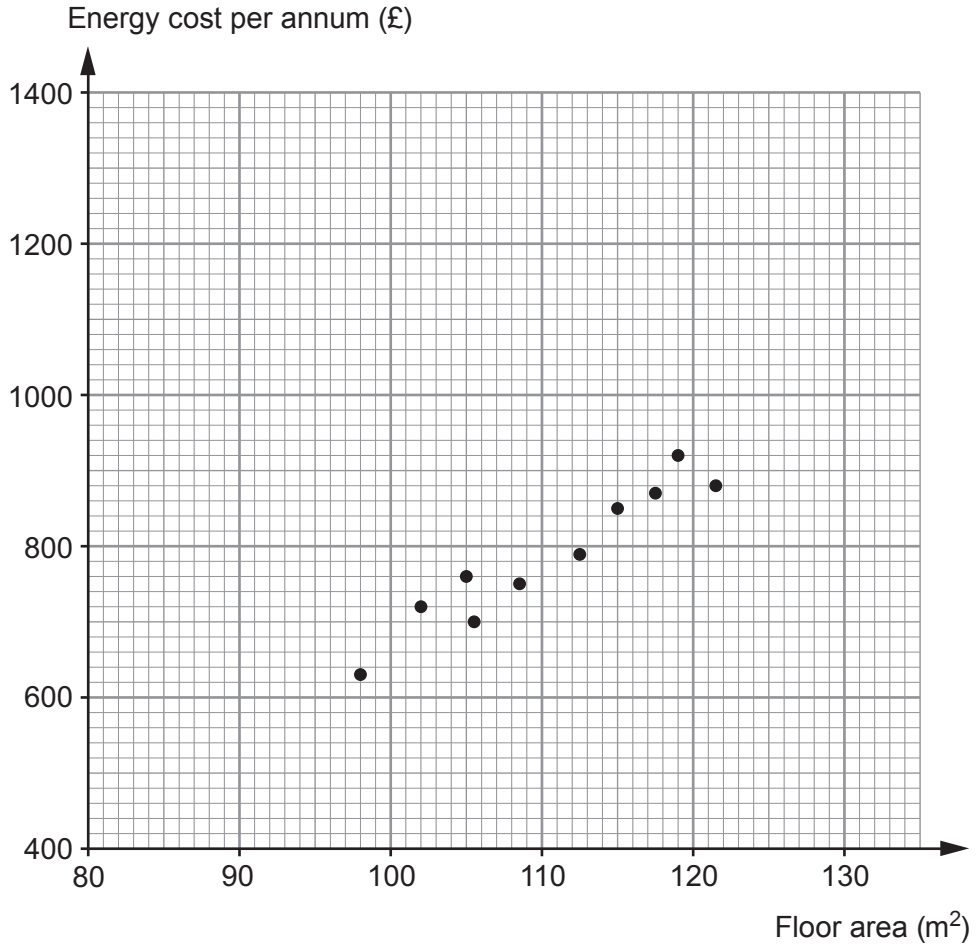


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Wilf's scatter diagram



(a) By considering the information collected by both Rowena and Wilf, what is the floor area of the flat with the highest energy cost? [1]

..... m^2

(b) Who drew the scatter diagram showing the strongest correlation?

Rowena ☐ Wilf ☐

You must give a reason for your answer. [1]

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(c) Draw, by eye, a line of best fit on Rowena's scatter diagram. [1]

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(d) *Heat-in* is a company that installs insulation.
Heat-in makes the following claim.

> Make huge savings on your heating bills by insulating your flat.

Heat-in has insulated the flats in only one of these villages.
One of the scatter diagrams shows flats that have been insulated by *Heat-in*.

(i) Whose scatter diagram is this more likely to be?
You must give a reason for your answer. [1]

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(ii) A newspaper headline says:

> The smaller your flat, the more you save by insulating it.

From the information in the scatter diagrams, would you suggest this headline is possibly true or not?
You must give a reason for your answer. [1]

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12. *(a)* Tents leave different shapes on the grass when packed away.



(i) Lowri's tent leaves the shape of a rectangle on the grass.
The length of Lowri's tent is twice its width.
The width of her tent is 2·3 m.

Tom's tent leaves the shape of a square on the grass.

The perimeter of the shape, left on the grass, by each of their tents is the same.

Calculate the length of the shape left by Tom's tent. [3]

(ii) Dewi's tent leaves a circular shape on the grass.
The radius of the shape is 1·8 m.
Calculate the area of the shape left by Dewi's tent. [2]

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(b)

CAMPING AFON



Camping Afon is due to publish a summary about people and their camping holidays in their annual report.
Five thousand *Camping Afon* customers are asked the 3 questions below.

> Camping questions
>
> 1. How old are you?
> 2. Do you own a tent?
> 3. How many camping holidays have you had this year?

A data-collection sheet is to be used to collect the data.

(i) Design a data-collection sheet that could be used to collect the customers' responses.
You must plan to group the data as appropriate. [3]

(ii) Why is grouping data useful when collecting data? [1]

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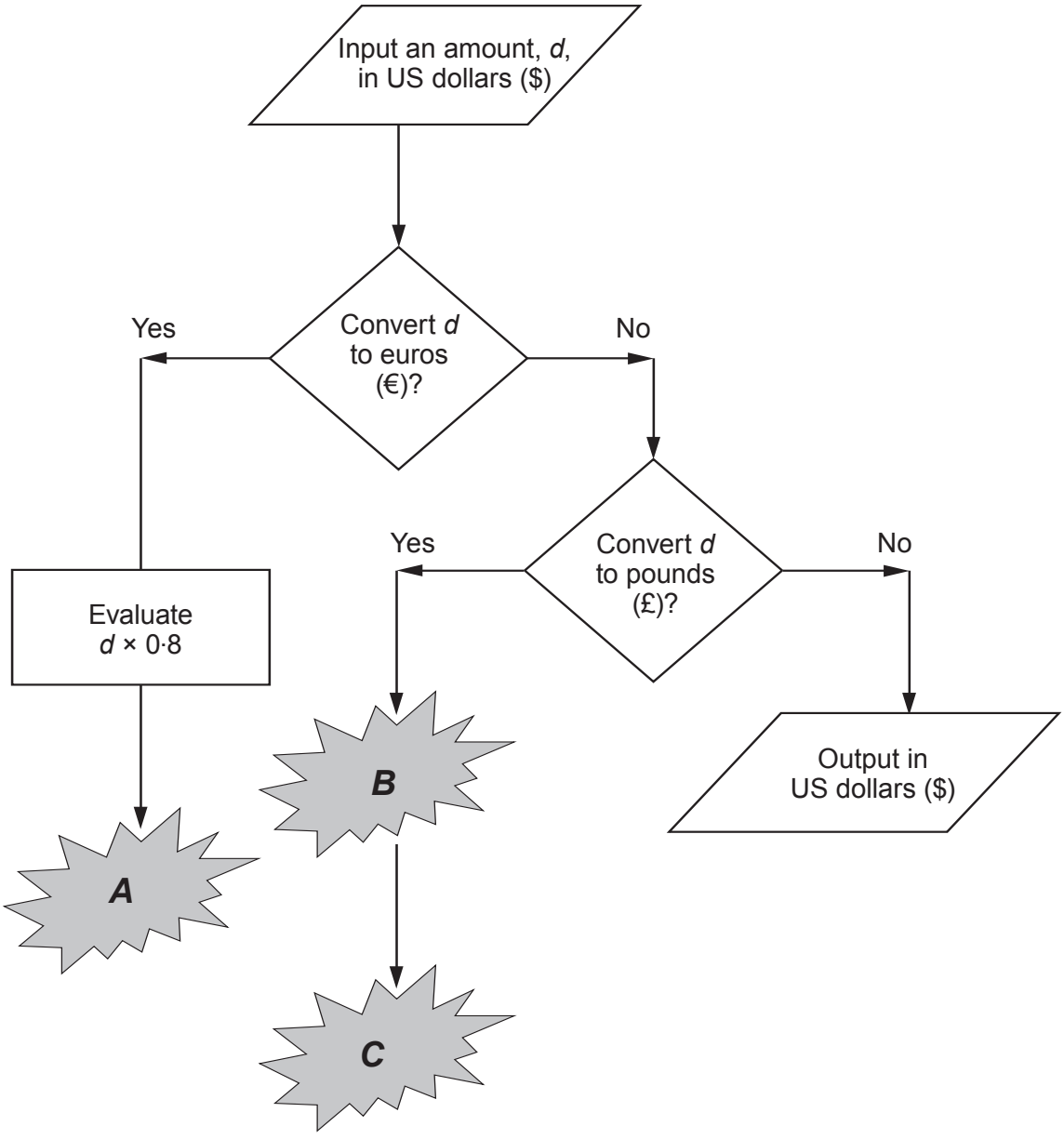
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13. The following is a section of a flowchart.



The exchange rates from US dollars ($) to pounds (£) and euros (€) are

$1 = £0.62
$1 = €0.80

(a) What would this section of a flowchart be used for? [1]

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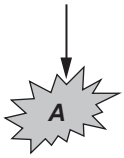
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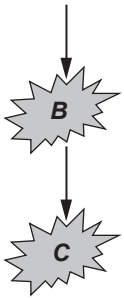
(b) There is a missing flowchart symbol indicated by



Draw the missing flowchart symbol and complete with an appropriate statement. [2]



(c) There are two missing flowchart symbols indicated by



Draw the two missing flowchart symbols and complete with appropriate statements. [3]





(d) Calculate the number of dollars that would be converted to €280. [2]

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END OF PAPER

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GCSE MARKING SCHEME

SUMMER 2016

GCSE MATHEMATICS LINKED PAIR APPLICATIONS
UNIT 2 FOUNDATION
4362-01

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

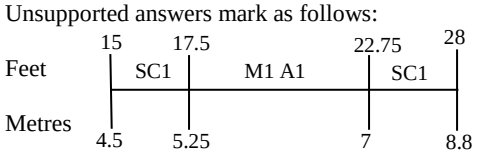
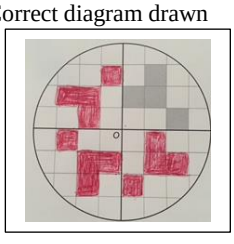
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APPLICATIONS OF MATHEMATICS
UNIT 2 (FOUNDATION TIER) SUMMER 2016

Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
1. (a) Suitable explanation given making reference to the use of a non-uniform scale.	E1	Eg “the bars look as though one is twice the other but the frequencies do not say that”, “because twice 60 is 120 and the graph shows 170”, "the scale is wrong, doesn't go up by the same amount", “missed out some numbers from the 5 times table”, “not in times table”, “has switched intervals of numbers”, “go up in a mix of numbers, they are not in order”. Award E0 for statement such as "graph is misleading" only.
(b) Romance 6, Thriller 9, Horror 8, Action 5, Comedy 12	B2	May be inferred from their bar chart. B1 for any 3/4 correct frequencies.
Both axes labelled.	B1	Eg 'frequency' OR ‘number of people’ along one axis and Romance, Thriller, Horror, Action, Comedy along the other axis (or on the bars), anywhere within the base of the corresponding bar
Uniform scale starting from zero	B1	If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. **Condone frequency numbers alongside square instead of at the top of the squares.**
All bars correct heights and same widths. The five bars can be in any order.	B2	FT their frequencies throughout. FT if no scale on vertical axis but an implied uniform scale has been applied. If no scale allow one square to represent 1. B1 for any 3 or 4 correct bars OR B1 for correct heights with inconsistent widths OR B1 for correct heights but bars not complete or a correct vertical line graph drawn. If no frequencies given in their working, penalise -1 for each incorrect frequency for their bars up to -4 (First and last B2 marks) If no marks for 1st & last B2 marks, award SC1 for all correct tallies shown.
(c) Comedy AND Romance	B1	Must be in the correct order. FT “their frequencies” provided 1 mark has been gained from the initial B2 in (b).
	8	

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Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
2. (a) Man 1.5m – 2.2m or 5ft – 7ft (to allow for tall rugby players) (Man 3(cm) rugby posts 10.5(cm) (±2mm)) Multiplying factor = 3.5 Height of rugby posts = man's estimate × their SF (3 to 4) = *correct answer for their figures* If B0 (for 2nd B mark), M0, A0 Award SC1 for answers which: • only give man's height as 3cm (±2mm) **and** height of rugby posts between 10 and 11 cm **OR** • give a proper attempt at 'dividing' the height of the rugby posts into equal parts. *Possible 1st B1 awarded too.*	B1 B1 M1 A1	Units must be seen 3.5 may be implied by working eg 3 lots of 3cm plus 1.5cm FT their man's estimate AND scale factors 3 to 4 inc For this A1 we need correct units (feet or metres) either explicitly shown or implied by their figures. Unsupported answers mark as follows:  *Possible 1st B1 awarded too.*
(b) **30 cm** | 30 m | 30 km | 30 mm 440 kg | 440 mg | 440 tonnes | **440 g** 70 km | 70 mm | **70 m** | 70 cm 8400 cm^2 | **8400 m^2** | 8400 mm^2 | 8400 km^2	B1 B1 B1 B1 8	
3. (a) Congruent shape drawn Correct explanation given (b)Similar shape drawn Correct explanation given	B1 E1 B1 E1 4	Shape can be drawn in any orientation. Eg "Congruent shapes are exactly the same (shape and size)." Shape can be drawn in any orientation. A correct enlargement is required. Eg "Similar shapes are (the same shape but) a different size", "looks the same but would be bigger", "(same shape but) smaller (or bigger) than the original one", "same shape but different size" Do not accept "similar shapes have a slight difference from the original". If B0 for similar shape drawn, award E1 if a full correct explanation given with reference to the same shape but different size.
4 (a) Wheel 1 | Wheel 2 | Wheel 3 4 | 6 | 3 (b) Correct diagram drawn 	B3 B3 6	Award B1 for each. Award B2 for 2 sections drawn correctly OR for all 3 correct L shapes. Award B1 for 1 section correctly drawn OR for 2 correct L shapes OR for all 3 single squares drawn correctly.

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Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
(c)(i) 12/100 × (£)95 OR 0.15 × (£)95	M1	Or equivalent e.g. reduced price is 88% or 0.85 of (£)95.
(£)11.4(0) ISW AND = (£)14.25 ISW	A2	Award A1 for each.
(£)9.5(0) ISW	B1	If no A or B marks, award SC1 for all 3 answers (= (£)83.6(0), (£)85.5(0), (£)80.75). The 1st or last of these implies M1.
(ii) Choose Signs & Symbols as it offers the biggest discount	E1 5	Accept choose signs & symbols as it will be the cheapest to buy. FT correct interpretation of their discount provided 3 values are given.
5. 1100 - 12 × 60 or 11 - 12 × 0.6 380 (cm) or 3.8 (m)	M2 A1 3	Award M1 for 12 × 60 or 12 × 0.6 or 720 or 7.2 If units are given they must be with the correct answer. *If no marks awarded, award SC2* *for 1100 - 18 × 60 = 20 (cm)* *OR* *1100 - 15 × 60 = 900 (cm) = 200 (cm)* *OR* *equivalent in metres.* *If no marks awarded, award SC1* *for sight of 1100 - 18 × 60* *OR* *1100 - 15 × 60* *OR* *equivalent in metres* *OR* *(18 × 60 =)1080 (cm)* *OR* *(15 × 60 =) 900 (cm)*

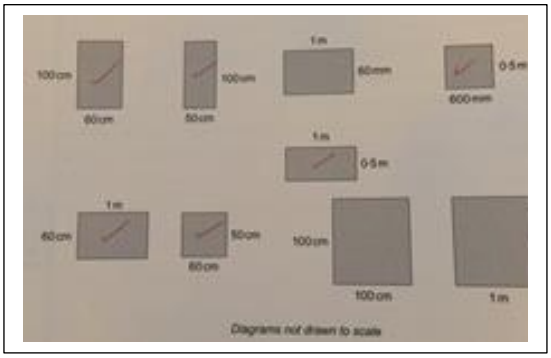
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Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
6. Offer 1 (Mobile phone provider cost): 24 × (£)39 (£)936 Offer 2: Identifying equivalent mins/texts/memory deal of £15 Buying handset cost and SIM only deal: (£)539 + 24 × (£)15 (£)899 Explanation given based on their figures QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps **AND** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps **OR** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 B1 M1 A1 E1 QWC 2 8	May be clearly implied in working. May be seen in stages. Ignore any other sim-only deals calculated. If M0 gained, award SC1 for any other 'sim-only deal + handset' correctly evaluated. CAO Eg "Overall cheaper for Liz to buy offer 2", "not much difference but rather than spend a lot of money in one go, is easier to do offer 1 and pay monthly", " offer 2 as it's cheaper and she gets more minutes", "offer 2 gets more minutes" FT 'their (£)936' and 'their (£)899' provided both M1s awarded or M1 SC1 awarded. QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
7. 2 correct equations that have a solution of $x = 5$	B2 2	Award B1 for each correct equation with a solution of $x = 5$ Allow $2 + 3 = x$ or $x = 10/2$ i.e. any numerical operation that equates to 5. Do not accept $5 = x$ or $1x = 5$
8. 1st offer: ((£)1.50 + (£) 0.75) × 3 (£)6.75 2nd offer: [(£)1.50 + (£)1.50 + free pot] × 2 (£)6 Better buy is the 2nd offer	 M1 A1 M1 A1 E1 5	*Alternative* *(1 + ½) × 3* *4 ½ pots* *(1 + 1 + 0) × 2* *4 pots* FT "their derived (£)6.75" AND "their derived (£)6" provided at least M1 has been awarded. Be aware of other methods of comparison. If no marks awarded, award SC1 for engaging correctly with **both** offers e.g. through use of diagrams or lists of costs.

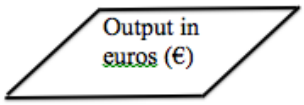
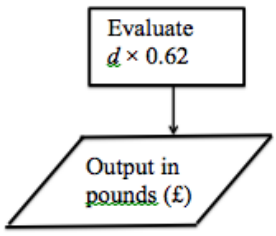
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Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
9. (a) $60 \times 100 \times 50$ 300 000 ISW cm^3	M1 A1 U1	Alternative method $0.6 \times 1 \times 0.5$ 0.3 m^3 Penalise -1 for incorrect subsequent working after awarding M1 A1 U1 eg 300000 cm^3 = 3000 m^3
(b) All 6 correct wooden panels identified with no incorrect ones.  	B3 6	Award B2 for : 6 panels correct and 1 incorrect OR 5 panels correct and 0 or 1 incorrect OR 4 panels correct and 0 incorrect Award B1 for : 4 panels correct and 1 or 2 incorrect OR 3 panels correct and 0 or 1 incorrect OR 2 panels correct and 0 incorrect
10. 0.09 × 349 or equivalent (£)31.41 AND any choice of 1 D & 1 flexible lock Lock 1 AND lock 6 selected	M1 A1 A1 3	Needs to show attempt to price 1 D and 1 flexible lock Accept 'Lock 1 and 2(nd) flexible lock' provided it is clear that 2(nd) refers to a flexible lock
11. (a) 126 (m^2)	B1	
(b) Wilf's scatter graph selected with a reason, e.g. 'Wilf, the points are closer together', 'Wilf, points not spread as much', 'Wilf's graph as most points show as area increases so does the energy cost', 'Wilf's as Rowena's is more random'	E1	Do not accept 'Wilf as it has the strongest (positive) correlation' Allow 'Wilf's is a more obvious correlation', 'Wilf's is a better correlation'
(c) Straight line of best fit on Rowena's scatter diagram following the trend with some points above and below the line	B1	Do not accept a line passing through (80, 400), the line of best fit must intersect the vertical >£400 and ≤ 800 when area = $80m^2$
(d)(i) Wilf's scatter diagram selected with a reason, e.g. 'Wilf's as costs are lower', 'Wilf's as no high costs', 'Wilf's because (for the same area) the heating costs (per annum) are much lower'	E1	Accept reference to 'costs fallen', 'Wilf's shows lower results (for energy bills)', 'Wilf's costs are put lower' Allow 'Wilf's as the highest costs are greater on Rowena's scatter diagram'
(ii) States or implies that headline is (possibly) not true with a reason, e.g. 'not true, larger flats save more', 'no, costs fall more for the larger flats', 'not necessarily true as the smallest flat in both have roughly the same costs' 5	E1	Do not accept 'true' unless unambiguously contradicted by the reason given Accept 'they **may be** the same' with a valid reason Accept answers based on the gradient of the line

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Applications of Mathematics Unit 2 Foundation Tier	Mark	Comments
12(a)(i) Lowri: perimeter (2.3+2.3+4.6+4.6 =) 13.8 (m) Tom: length 13.8÷4 3.45 (m)	B1 M1 A1	FT 'their sum of 4 measurements' ÷ 4 If no marks, award SC1 for sight of 4.6(m) or 6.9(m) *Alternative:* *(2.3 + 4.6) ÷2* *M2* *3.45 (m)* *A1*
(ii) Dewi: area $\pi \times 1.8^2$ Answer in the range 10.17 to 10.183 or 10.2 (m^2)	M1 A1	
(b)		If inequalities are used they must be correct.
Age: Use of non-overlapping groups (at least 3) and no gaps in groups for ages	B1	Need not start at 0 or 1, e.g. first group 15 – 25 etc. Do not accept e.g. 'Under 16, 17 to 25, 26 to 34, 35 or over' (because there is no 16), or '0 - 16, 17 – 25, 26 – 34, 34+' (as 34 has two options)
Tent owner: 'Yes' and 'No' options	B1	Ignore including 'other' or 'renting' or similar
Number of holidays: Use of non-overlapping groups (at least 3) and no gaps in groups given, or list of numbers to indicate (if not starting at 0, it should start at 1)	B1	
(ii) Reason, e.g. 'helps summarise', or 'smaller number of categories to manage', or 'can't list them all', or 'easier to see trends', or 'easier to read'	E1 9	Accept 'easier to compare', 'narrows the data options'
13. (a) Example, 'conversion of dollars', 'exchange dollars to € (and/or £)'	E1	Accept statement converting $ to £ or converting $ to € Allow 'converting money', or converting $ to $, or 'converting to £ or €'
(b) Parallelogram symbol Statement, e.g. 'Output in euros', 'amount in €'	B1 B1	Accept 'euros' or '€' alone provided inside a parallelogram For B2: 
(c) Rectangle followed by a parallelogram	B1	
1st statement, e.g. 'Evaluate $d \times 0.62$'	B1	Allow '$(d) \times 0.62$'
2nd statement, e.g. 'Output in pounds', 'amount in £'	B1	Accept 'pounds' or '£' alone provided inside a parallelogram For B3: 
(d) 280 ÷ 0.8 350 (US$)	M1 A1 8	

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Surname	Centre Number	Candidate Number
Other Names		0

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4362/01

W16-4362-01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications

FOUNDATION TIER

A.M. WEDNESDAY, 20 January 2016

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**5**	
2.	**4**	
3.	**3**	
4.	**6**	
5.	**11**	
6.	**4**	
7.	**9**	
8.	**13**	
9.	**8**	
10.*(a)*	**7**	
10.*(b)*	**4**	
11.	**6**	
Total	**80**	

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ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

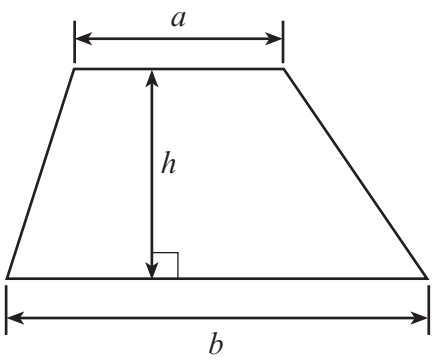
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **7**.

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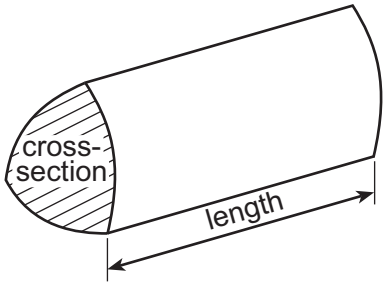
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



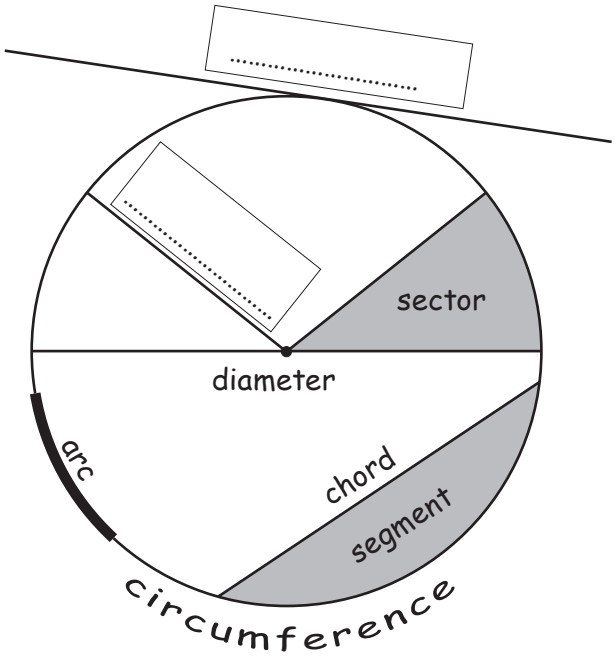
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1. A printing company is designing an information leaflet about the parts of a circle.
Most of the parts of the circle have been labelled.
Two lines have not yet been named.

(a) Complete the information leaflet for the printing company. [2]



(b) The designer of the information leaflet notices that there is a relationship between two straight lines in the circle.
Complete the statement for the designer. [1]

The ..... is twice the length of the .....

(c) Tommy, who works at the printing company, is unsure of the difference between a chord and a segment.
Explain fully the difference between a chord and a segment of a circle. [2]

Chord

.....

.....

.....

Segment

.....

.....

.....

5

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2. Shakoor is asked to conduct a survey about the colour of mobile phone covers.

(a) Shakoor believes that the main colours are black, white, pink and blue.

Design a data collection sheet that Shakoor could use to collect the data. [3]

(b) Give one disadvantage of Shakoor using the data collection sheet. [1]

.....

.....

.....

.....

4

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3. Tick (✓) a box to show whether each statement is **true** or **false**. [3]

	True	False
A suitable length for a football pitch is 100 cm.		
The weight of a small bag of crisps is approximately 35 grams.		
The amount of orange juice in a carton could be 1 litre.		
The typical area of a bedroom floor is 12 square km.		
The average speed of a person walking along the coastal path in Wales could be between 30 and 40 km/hour.		

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3

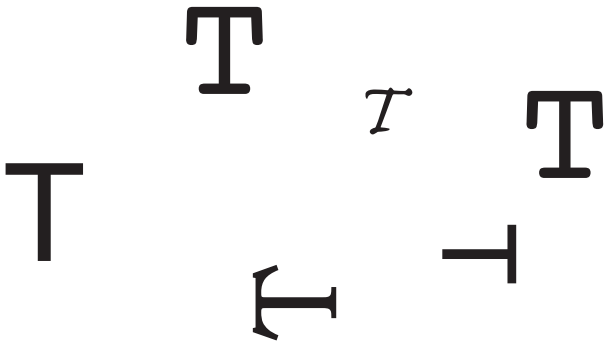
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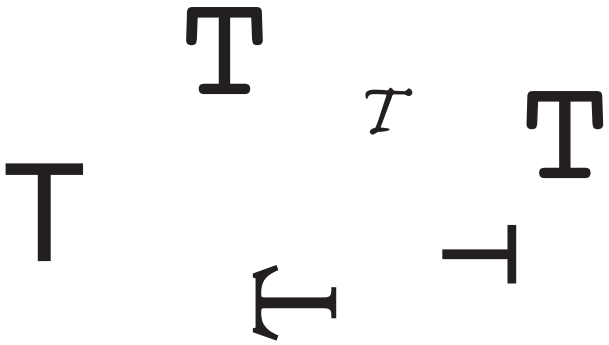
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4. *(a)* Some of the letters below are in the same font.

(i) Circle the letters that are similar but not congruent. [1]



(ii) Circle the letters that are congruent. [1]

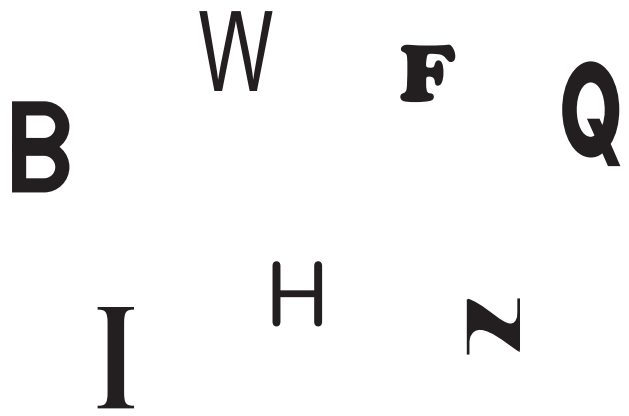


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(b) Letters using different fonts are shown below.



Write the letters in the correct boxes. [4]

	Rotational symmetry	No rotational symmetry
Reflection symmetry		
No reflection symmetry		

6

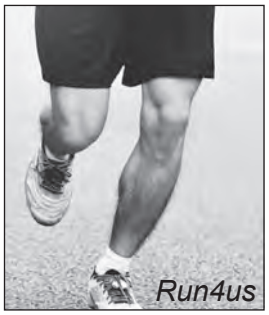
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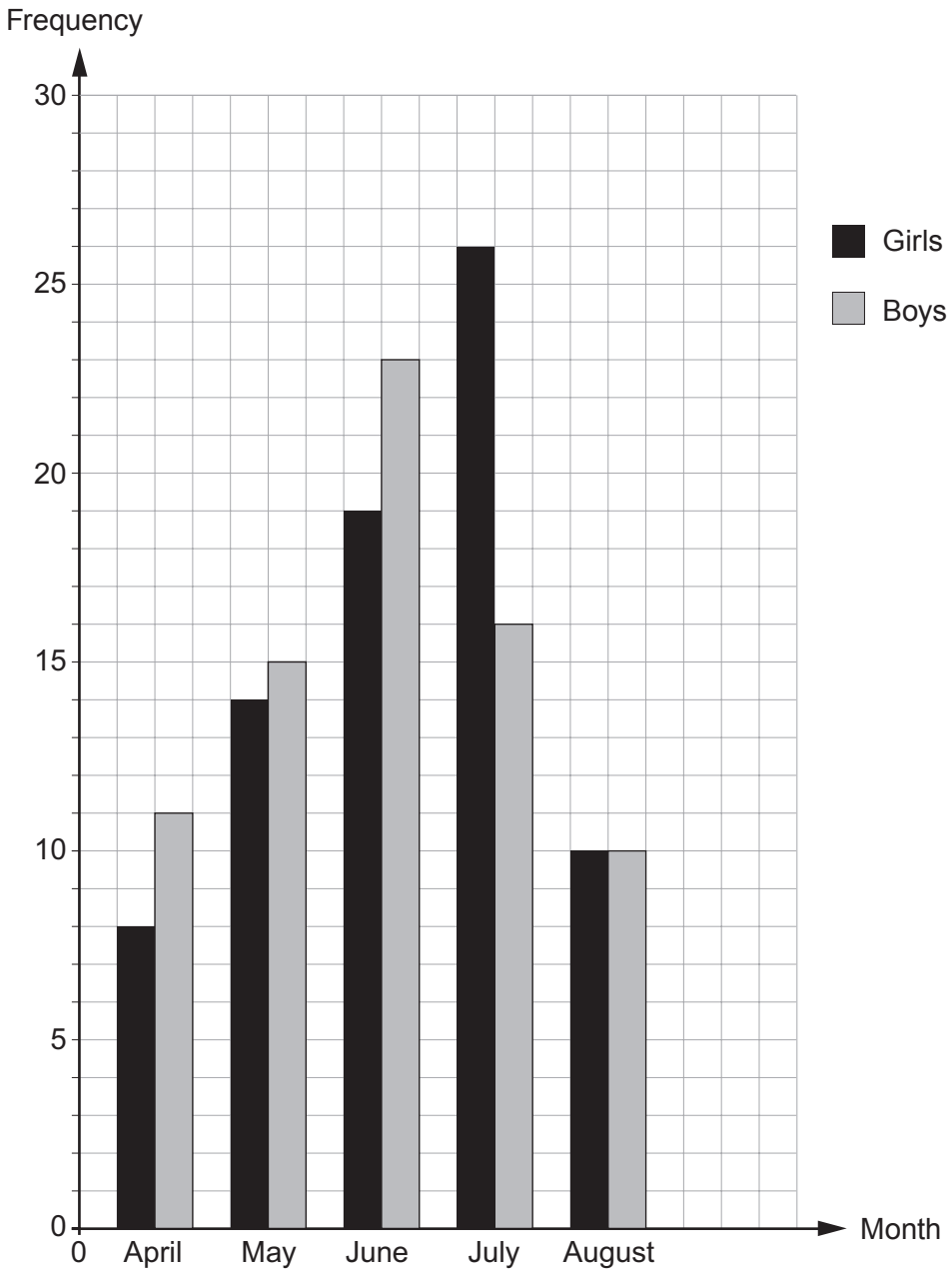
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5.



A local running club, *Run4us*, organised a race for children once every month from April to September.
The bar chart shows the numbers of girls and boys who took part in the races for each of the months from April to August.



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(a) How many boys took part in the race in June? [1]

.....

(b) In which month did the lowest number of girls take part in the race? [1]

.....

(c) Two of the months had the same number of children taking part in the race.
What were the two months? [2]

.....

.....

.....

.....

..... and .....

(d) One of the children, James, says:

"There are more boys than girls taking part in the races as more of the bars for the boys are higher than those for the girls."

Is James correct? You must show your working. [2]

.....

.....

.....

.....

(e) There are 36 girls and 33 boys in the running club.
In September, the running club had their final race of the season.
$\frac{3}{4}$ of the girls and $\frac{1}{3}$ of the boys took part in the race.
Complete the bar chart for September. [5]

.....

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6. Alison has been studying algebra.
She has been setting up and solving equations and inequalities.
She has 2 questions to complete as part of her homework.

Set up and solve each of the following for Alison.

(a) 7 times a number n is the same as 28. [2]

.....

.....

.....

.....

(b) 6 plus a number c is less than 15. [2]

.....

.....

.....

.....

4

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7. *You will be assessed on the quality of your written communication in this question.*





When planning a holiday to Barcelona, the Carson family are considering taking an open top bus tour of the city.

The Carson family look on the internet in order to compare prices.
They find 2 different bus companies: *Barcelona Bus Turístic* and *Barcelona City Tour*.
For both companies, tickets can be bought for either one day or two days.

Children pay a reduced price if they are between the ages of 4 and 12 years.
Children under the age of 4 travel for free.

The ticket prices for *Barcelona Bus Turístic* are given in pounds (£) .
The ticket prices for *Barcelona City Tour* are given in euros (€).

The costs are advertised as follows:

Barcelona Bus Turístic

One-day ticket	
Adults	£23.50
Child	£14
Two-day ticket	
Adults	£30.50
Child	£17.50

Barcelona City Tour

Adults:	
1 Day	€27
2 Day	€35
Children:	
1 Day	€16
2 Day	€20

The Carson family consists of Mr and Mrs Carson, Owen who is 10 years old and Alys who is 3 years old.
They decide to buy tickets for two days.

The exchange rate on the day the Carson family are looking at the prices is £1 = €1.24.

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Which bus company works out to be the cheaper for the Carson family?
State by how much it is cheaper, giving your answer in euros.
Show all your working. [9]

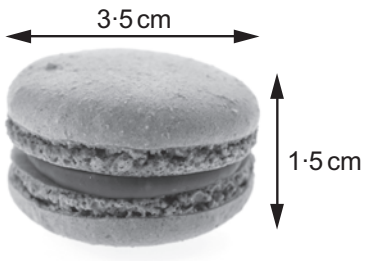
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8.







A macaroon is a small circular cake.

Sometimes macaroons are placed in layers so that they lie flat within a box, as shown in the picture above.

Macaroons, each with a diameter of 3·5 cm and a depth of 1·5 cm, are placed in a new box.

The box, shown below, is in the shape of a cuboid.

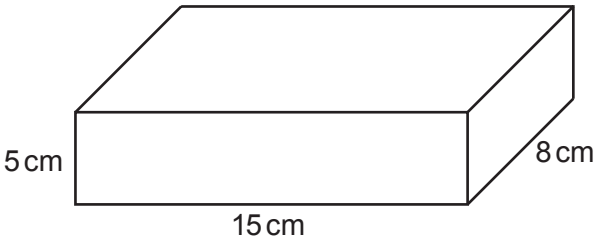


Diagram not drawn to scale

(a) A plastic sheet is placed between each layer of macaroons.
The plastic sheet has a depth of 1 cm.

How many macaroons can fit into the box? [5]

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(b) Calculate the volume of the box.
Write down the units of your answer. [3]

.....

.....

.....

(c)



(i) Cedric buys a box of macaroons as a birthday present for a friend.
He decides to wrap the box in a ribbon with a bow on top, as shown in the diagram above.
Cedric has either pink or green ribbon to choose from.
He has 80 cm of pink ribbon and 90 cm of green ribbon.
He must have enough ribbon to have a 20 cm bow on top of the box.
Could Cedric use either colour of ribbon?
Give a reason for your answer.
Show all your working. [3]

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(ii) A roll of ribbon costs £6 for 300 cm.
How much does the length of ribbon that Cedric uses to wrap the box cost? [2]

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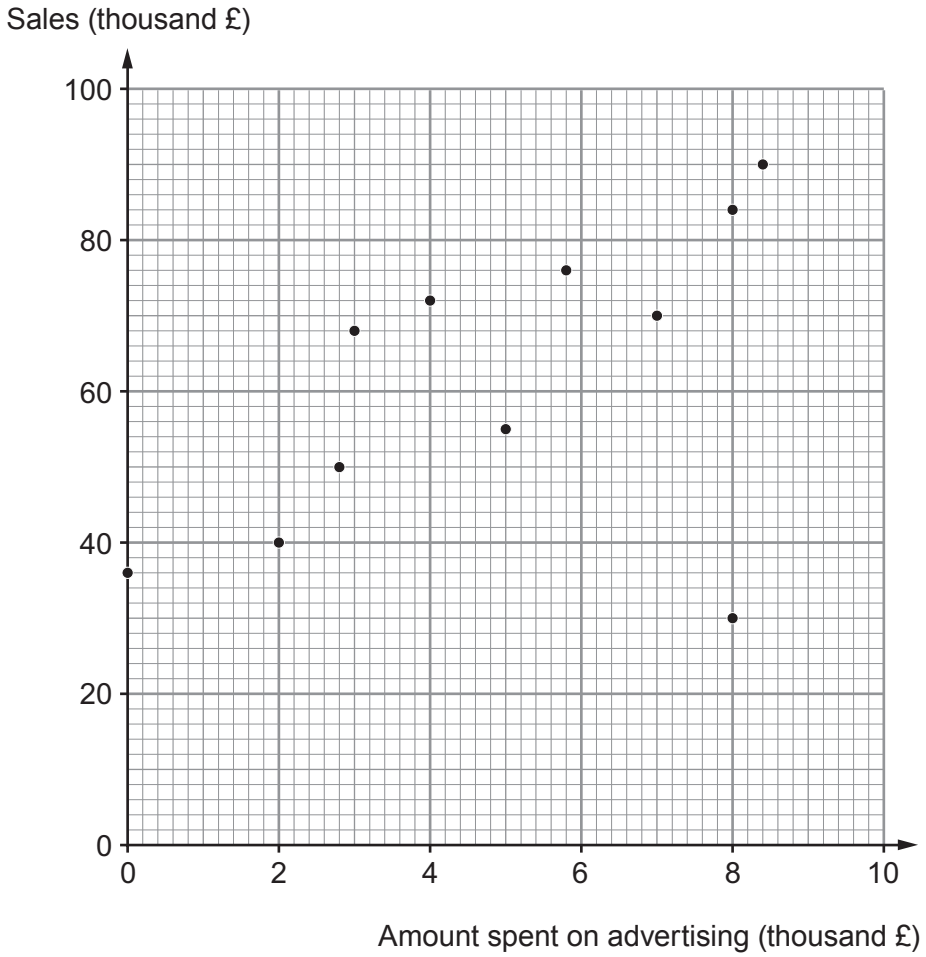
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9. Many shampoo companies spend money on advertising.
Rita has asked 11 companies to tell her the **amount spent on advertising (thousand £)** and the **sales (thousand £)** for their shampoo during the previous month.

She has displayed her findings in a scatter diagram, shown below.



(a) One company did not spend on advertising.
What is the sales figure for this company? [1]

.....

(b) One company was very disappointed with their sales figure, given the amount that they spent on advertising.
Which company do you think this might be?
Indicate your answer on the scatter diagram and write down the amount they spent on advertising and their sales figure. [2]

Amount spent on advertising = ...

Sales figure = ...

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(c) Ignoring the point you indicated in *(b)*, draw a line of best fit for the other points on the scatter diagram. [1]

(d) For a typical company selling shampoo, complete the following sentence.

For every £1 spent on advertising, the company expects an additional

£..... in sales of shampoo.

You **must** show your calculation. [2]

Calculation for this answer:

.....

.....

.....

.....

(e) Rita is investigating if it is worth spending money on advertising shampoo.

(i) What conclusion could she draw so far from her investigation? [1]

.....

.....

.....

.....

(ii) What should Rita do to improve her investigation? [1]

.....

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.....

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8

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10. *Island Boots* sells pairs of boots online and through mail order.



(a) *Island Boots* keeps a spreadsheet to help track the sales of different sized boots.

A partially complete section of the spreadsheet is shown below.

	A	B	C	D	E	F	G
1			Sales				
2	Boot style	Price £	Size 5	Size 6	Size 7	Size 8	Total sales (£)
3	*Arabel*	25.00	2	3	6	4	375
4	*Carba*	42.00	0	0	8	6	...
5	*Kata*	32.50	1	...	5	6	650
6	*Yara*	18.50	...	...	6	2	407
7							Overall total sales (£)
8							.....

(i) Complete the cells **G4** and **D5**. [2]

.....

.....

(ii) The same number of size 5 *Yara* boots are sold as size 6 *Yara* boots.
Complete cells **C6** and **D6**. [3]

.....

.....

.....

.....

(iii) Write down a formula that could be used to calculate the value in **G3**. [2]

G3 = ...

7

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(b) Yesterday, the manager recorded the number of pairs of boots that needed to be sent to different customers in Europe and America.
The stem-and-leaf diagram shows the information.

Europe		America
	2	0 2 3
2 0	1	1 1 2 2 2
6 2 2 2 1 1 1 1 1	0	2 2 3 4 5

Key: 2 | 1 | 2 represents 12 pairs of boots

3 represents 23 pairs of boots

(i) Complete the following table. [3]

	Median	Range	Mode
Europe			
America			

.....

.....

.....

.....

.....

.....

(ii) The manager of *Island Boots* says,

"Looking at the average sales, I think the boots sent to America are going to shops for selling to customers, but the boots sent to Europe are for customers buying for themselves."

Do you think the manager is definitely correct?
You must give a reason for your answer. [1]

.....

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4

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11. Laces are made using a mix of 40% nylon and 60% polyester.
A pair of laces, of length 60 cm, weighs 8 g and costs 80p.



Another pair of the same style of laces is of length 96 cm.

(a) How much should a 96 cm pair of laces cost? [3]

(b) How many grams of **nylon** are there in a 96 cm pair of laces? [3]

6

END OF PAPER

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GCSE MARKING SCHEME

JANUARY 2016

APPLICATIONS OF MATHEMATICS
UNIT 2 - FOUNDATION TIER
4362/01

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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GCSE APPLICATIONS OF MATHEMATICS
UNIT 2 - FOUNDATION TIER

MARK SCHEME – JANUARY 2016

<table>
<tr><th>Applications Unit 2 Foundation Tier January 2016</th><th></th><th>Comments</th></tr>
<tr><td>1. (a) tangent labelled correctly
Radius labelled correctly
(b) “ The <u>diameter</u> is twice the length of the <u>radius</u>”
(c) Correct explanation of what a chord is.

Correct explanation of what a segment is.</td><td>B1
B1
B1
E1

E1

5</td><td>Accept unambiguous incorrect spellings

For B1 both words must be in the correct place
Eg “the chord is a (straight) line from one side of a circle to the other.”

Eg “the region (or area) between a chord and the circle (outside)”.</td></tr>
<tr><td>2. (a) Frequency/tally table set up, labelled with colours, tallies and frequency (or equivalent). Colours listed correctly.

(b) A disadvantage</td><td>B3

E1

4</td><td>Accept other colours also listed and/or use of “other”.
Award B2 for frequency/tally table set up, labelled with colours and either tallies or frequency (or equivalent).

Award B1 for an attempt at setting up a frequency/tally table.

Eg “he may record one colour in the wrong section”, “there could be other colours”, “easy to make a mistake”, “people may not want to answer”, “it is time consuming”, “it doesn’t give full details”, “ you won’t know what colours it is for other”, “not everyone has a case for their phone”.
Accept consideration of where the data is to be collected.
Ignore incorrect disadvantages if a correct one is seen.</td></tr>
<tr><td>3.
False
True
True
False
False</td><td>B3

3</td><td>Award B2 for any 4 correct
Award B1 for any 3 correct</td></tr>
<tr><td>4. (a) (i) T and ⊣ selected (circled) as similar letters

(ii) T and T selected (circled) as congruent letters
(b)

<table><tr><th></th><th>Rotational symmetry</th><th>No rotational symmetry</th></tr><tr><td>Reflection symmetry</td><td>H I</td><td>B W</td></tr><tr><td>No reflection symmetry</td><td>N</td><td>F Q</td></tr></table></td><td>B1

B1

B4

6</td><td>

Award B3 for 6 correctly placed letters.
Award B2 for 4 or 5 correctly placed letters.
Award B1 for 2 or 3 correctly placed letters.

Letters placed in more than one box are marked as incorrect.</td></tr>
</table>

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Applications Unit 2 Foundation Tier January 2016		Comments
5. (a) 23	B1	
(b) April	B1	Do not accept 8
(c) April 8 + 11 = 19 May 14 + 15 = 29 June 19 + 23 = 42 July 26 + 16 = 42 August 10 + 10 = 20	M1	Award M1 for attempt to add at least 3 months.
June and July	A1	
(d) Girls = 77 AND Boys = 75 OR accept difference of 2 or -2	B1	
No, stated or implied, as there are more girls than boys.	E1	Dependent on attempt to add girls and add boys
(e) ¾ × 36 or 1/3 × 33	M1	Award A1 for either 27 or 11.
27 and 11	A2	Answers may be seen on the diagram.
Bars drawn to a height of 27 and 11	B1	FT bars for "their 27" and "their 11"provided at least M1 awarded. Allow wider bars for first B1 only. Allow bars drawn in incorrect order for first B1.
Bars drawn in correct order (Girls then boys), September labelled and correct width.	B1	
	11	
6. (a) $7n = 28$ or equivalent	B1	
$n = 4$	B1	Answer only award B0, B1. Accept embedded answers
(b) $6 + c < 15$ or equivalent	B1	
$c < 9$	B1	Answer only award B0, B1. Accept embedded answers
	4	

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Applications Unit 2 Foundation Tier January 2016		Comments
7. (Barcelona Bus Turistic) 2 × (£)30.50 + (£)17.50	M1	*Be aware of individual values changed to other currency*
= (£)78.5(0)	A1	
(Barcelona City Tour) 2 × (€)35 + (€)20	M1	FT if same number of adults and children used in first M1
= (€)90	A1	*If M0 A0 M0 A0 awarded, award SC1 for (2 × 23.5(0) + 14 =) (£)61 and SC1 for (2 × 27 + 16 =) (€)70 from using the costs of the one day tickets.*
(Barcelona Bus Turistic in euros)		
78.5(0) × 1.24	M1	FT "their 78.5(0) *Alternative method 78.5(0) - 90 ÷ 1.24 M1*
= (€)97.34	A1	*= (£)5.92 A1* *(5.92 × 1.24 =) €7.34 B1*
Barcelona City Tour is cheapest by €7.34	B1	FT their derived values in euros
Look for • spelling • clarity of labels • the use of notation (watch for the use '=' "£" being appropriate)	Q W C 2	
QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer		QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
	9	

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Applications Unit 2 Foundation Tier January 2016		Comments
8. (a) 15 ÷ 3.5 or 8 ÷ 3.5 4(.2857…) and 2(.2857) Number of layers given as 2 16 (macaroons)	M1 A2 B1 B1	*Answers may be given on a diagram* Award A1 for either 4(.2857…) or 2(.2857) FT "their 4" × "their 2" × 2 or 3 layers provided M1 awarded.
(b) 5 × 15 × 8 600 cm^3	M1 A1 U1	 Independent mark
(c)(i) 5 + 5 + 5 + 5 + 15 + 15 + 8 + 8 + 20 86 (cm)	M1 A1	 CAO
No, can only use green ribbon (as do not have enough pink ribbon)	E1	FT their derived 86(cm) *Alternative markscheme.* *(5 + 5 + 5 + 5 + 15 + 15 + 8 + 8 = 66(cm))* *Award M1 for 80 – 66 OR 90 – 66* *Award A1 for 14 AND 24 CAO* *Award E1 for correct statement such as "Can only use green." FT their derived 14 and 24.* *If M0, A0, Award SC1 for* *(4 × 15 + 2 × 8 + 2 × 5 + 20 =) 106 (cm)* *OR* *(4 × 8 + 2 × 15 + 2 × 5 + 20 =) 92 (cm)* FT their derived 86(cm) for correct interpretation for E mark.
(ii) (£)6 ÷ 300(cm) × 86(cm)	M1	FT their derived 86(cm). If units given they must be the correct units. *Alternative method* *600(p) ÷ 300(cm) × 86(cm)* *OR (£)6 ÷ 3(m) × 0.86(m)* *OR 600(p) ÷ 3(m) × 0.86(m)*
(£)1.72 or 172(p)	A1	FT equivalent difficulty *Note for use of 90 (cm)* *(£)6 ÷ 300(cm) × 90(cm) M1* *(£)1.8(0) or 180(p) A1*
	13	
9(a) (£)36000 or (£)36 thousand	B1	B0 for 36
(b) Advertising (£) 8 000 or (£)8 thousand AND Sales (£) 30 000 or (£)30 thousand (and indication on the scatter diagram)	B2	B1 for 8 AND 30 or appropriate indication on the diagram
(c) Line of best fit with appropriate trend shown	B1	
(d) Use of their gradient of the line of best fit Gradient answer in the range (£)5 to (£)8	M1 A1	 When indication on the diagram or working seen, allow SC1 for an answer derived from use of ratio or proportion sales : advertising for any point (other than company (b)) or a point on the line of best fit, or sales £1000s / advertising £1000s
(e) (i) Conclusion, e.g. 'yes selling more the more money spent', 'don't know as only 11 companies asked', 'yes, as there is positive correlation'	E1	Allow 'a product may not be successful if not advertised'
(i) (ii) Next step, e.g. 'gather more data', 'ask more companies'	E1	Do not accept 'ask more people' as this is about shampoo companies, so this standard answer to data questions is insufficient unless accompanied by further relevant detail
	8	

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Applications Unit 2 Foundation Tier January 2016		Comments
10(a)(i) G4 588 D5 8	B1 B1	
(ii) 407 ÷ 18.5(0) (= 22) (22 – 6 – 2)÷2 7	M1 m1 A1	FT 'their 22' if M1 awarded CAO *Alternative:* *407 - 8 × 18.5(0) (=407 – 148 = 259) M1* *(259 ÷ 18.5(0)) ÷ 2 (=14÷2) m1* *FT 'their 259' if M1 awarded* *7 CAO A1*
(iii) (G3 =) B3 * (C3 + D3 + E3 + F3) or equivalent	B2 7	B1 for 25 * (C3 + D3 + E3 + F3) or for B3 * C3 + D3 + E3 + F3 or for an appropriate expression with 1 error
10(b)(i) (ii) Statement, e.g. 'no, it may seem that way because each customer in America buys a lot of boots', 'could be, but it's only based on one day', 'no, as both America and Europe have orders as single digits (as well as in the 10s), 'no, as Americans just buy more boots',	B3 E1 4	B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries Allow 'yes (it seems that way) as many customers in Europe buy 1 pair whilst someone in America bought 23 pairs' – there must be a Europe / America comparison. Allow 'yes (it seems that way), as the average for America is much higher' WITH either a reasonable attempt to calculate both means OR with reference to the medians
11(a) 60:96 considered, e.g. sight of 96/60 or 1.6 80 × 96 ÷ 60 or equivalent 128(p) or (£)1.28 (b) (96cm laces weigh 8 × 1.6 or 8 × 96/60 =) 12.8 (g) 0.4(0) × 12.8 5.12 (g of nylon)	M1 m1 A1 B1 M1 A1 6	*OR (60cm is 80p,1cm is) 80/60 (=1.3(33…p)* *OR 96cm costs 80 + 36×80÷60* CAO If units are given they must be correct FT their '×1.6', FT their derived 12.8g CAO *If no marks, SC1 for (0.4×8 =) 3.2(g)*

Median	Range	Mode
Europe	2	11	1
America	11	21	12

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

S15-4362-01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications
FOUNDATION TIER

P.M. THURSDAY, 11 June 2015

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**5**	
2.*(a)*	**4**	
2.*(b)*	**7**	
2.*(c)*	**5**	
3.	**3**	
4. *(a)(b)*	**2**	
4.*(c)(d)*	**8**	
4.*(e)*	**9**	
5.	**3**	
6.	**9**	
7.	**6**	
8.	**6**	
9.	**6**	
10.	**2**	
11.	**5**	
Total	**80**	

4362
010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

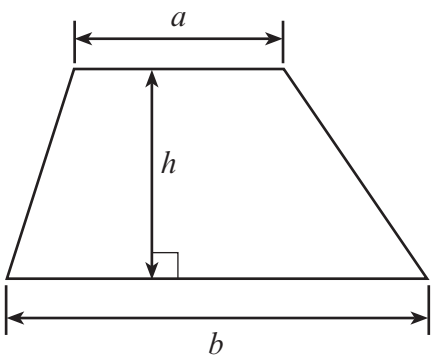
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **4***(e)*.

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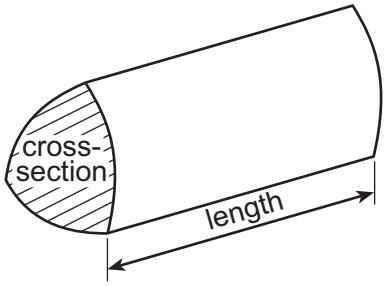
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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1. Sara took part in the RSPB's *Big Garden Birdwatch* where the numbers of different types of birds are counted in a garden for an hour.

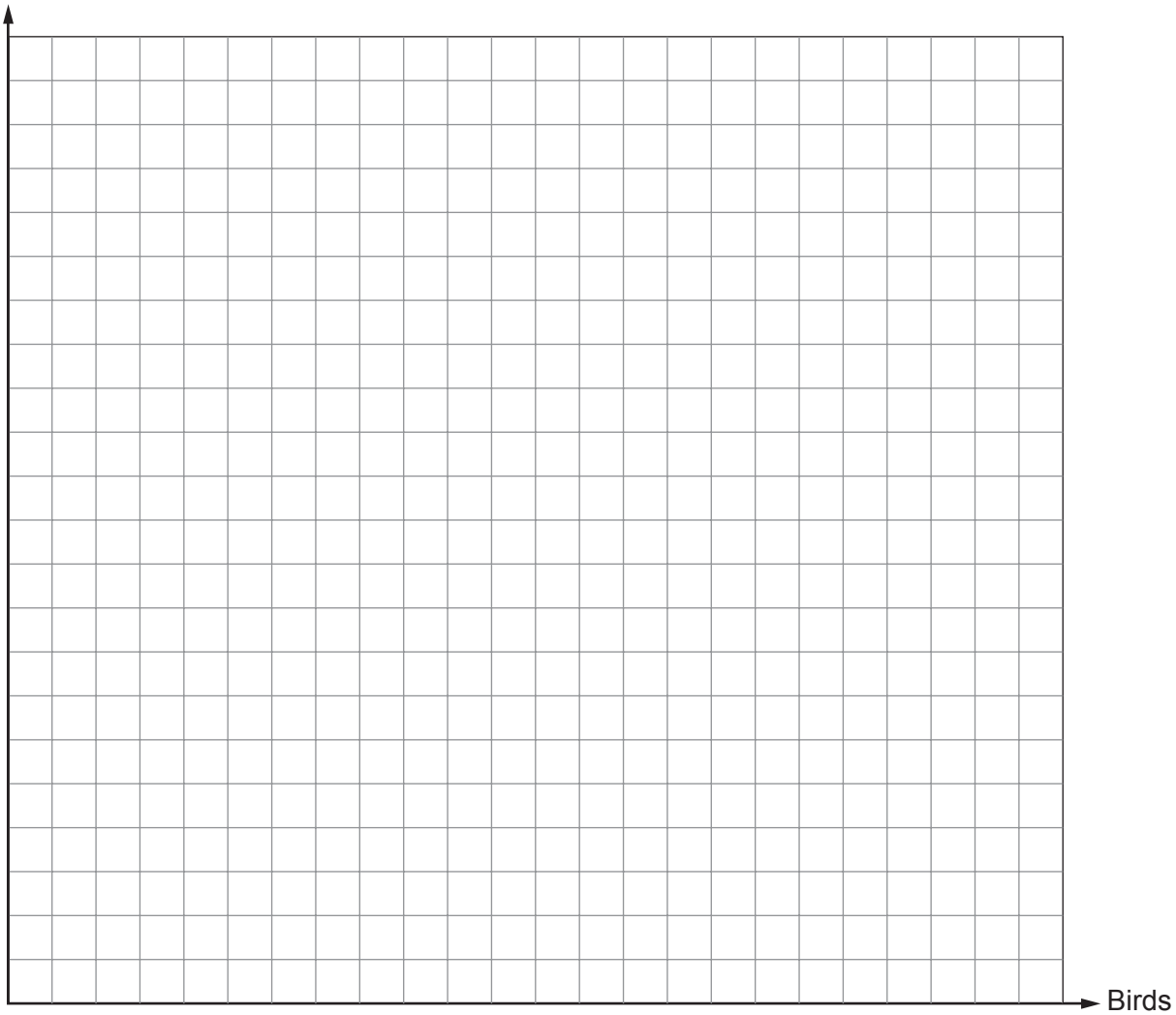


Here are Sara's results:

Type of bird	Sparrow	Pigeon	Blackbird	Robin
Frequency	13	8	9	5

(a) Draw a bar chart to display this information. [4]

Frequency



(b) Complete the following sentence with the types of bird. [1]

The total number of ..... and ..... counted in Sara's garden is the same as the number of ..... counted.

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Turn over.

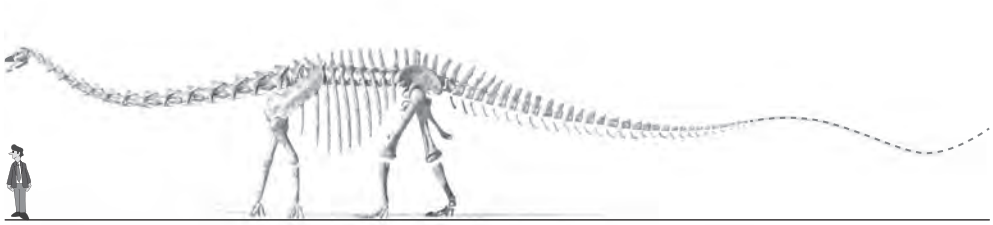
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2. Sean and Annie visit the Natural History Museum.

(a) Whilst at the museum, they visit the central hall where the *Diplodocus* dinosaur is on display. Sean tries to estimate the length of the dinosaur.



Write down an estimate for the **actual height** of a man. .....

Using this estimate for the height of the man, estimate the **actual length** of the *Diplodocus* dinosaur.
You must show all your working. [4]

.....

.....

.....

.....

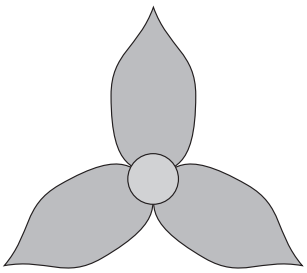
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4

(b) Annie is interested in symmetry in nature.

(i) Draw all the lines of symmetry on each of the pictures below. [3]





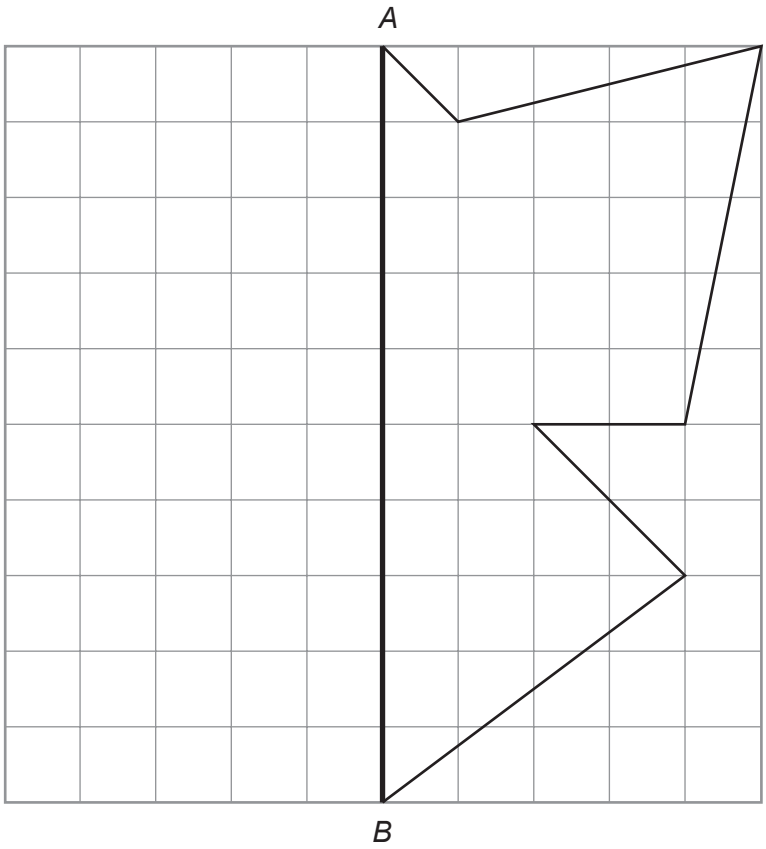
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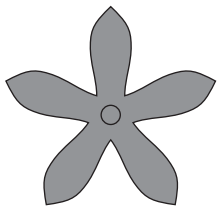
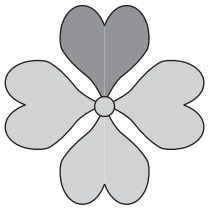
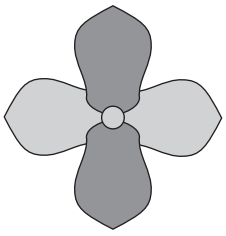
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(ii) Annie visits the wildlife garden at the Natural History Museum and is amazed by the symmetry of the butterflies. She draws part of a sketch of a butterfly.

Complete Annie's sketch using *AB* as the line of symmetry. [2]



(iii) In the wildlife garden, Annie notices that some of the flowers have rotational symmetry.

		
Flower A	Flower B	Flower C

In the table below, write down the order of rotational symmetry of each of the flowers shown. [2]

Flower	A	B	C
Order of rotational symmetry			

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(c) The table shows the number of visitors to the museum each year from 2010 to 2013.

Year	Number of visitors
2013	5 289 685
2012	4 891 692
2011	4 712 197
2010	4 388 944

(i) Find the difference between the number of visitors in the years 2010 and 2013. [1]

.....

(ii) Sean said that the total number of visitors to the museum from 2010 to 2013 was 20 million, correct to the nearest million.
Is Sean correct?
Give a reason for your answer. [2]

.....

.....

.....

.....

(iii) When looking at the data, the customer-relations manager of the museum rounds the figures correct to 2 significant figures.
Write the number of visitors for the year 2013 correct to 2 significant figures. [1]

.....

(iv) In a particular month, there were 400 612 visitors to the museum.
Write this number in words. [1]

.....

.....

5

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3. Pria was given 3 equations to solve.

$a + 9 = 2$ $\quad$ $3b = 240$ $\quad$ $c - 5 = -1$

Solve the 3 equations for Pria. [3]

- $a + 9 = 2$

- $3b = 240$

- $c - 5 = -1$

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4. Owen and Nia are having a new kitchen.
They plan to buy a long section of units to place against one wall and a free-standing centre island.



The kitchen designer creates a floor plan for Owen and Nia's kitchen.
The measurements for kitchens are usually given in mm.

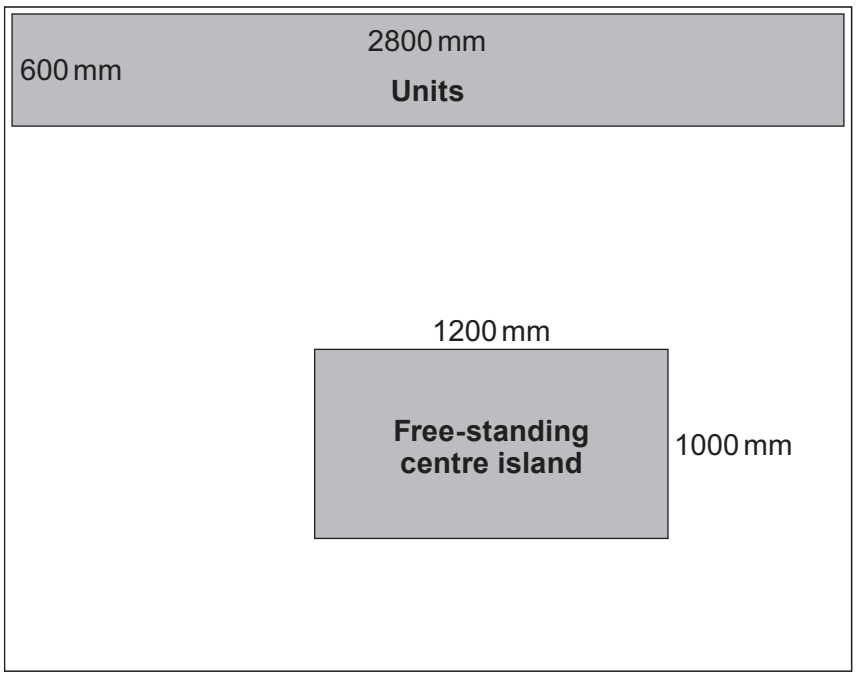


Diagram not drawn to scale

(a) Change 600 mm to cm. [1]

.....

(b) Change 2800 mm to m. [1]

.....

.....

2

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(c) Owen and Nia need to know the total area of the floor **covered** by the units against the wall and the free-standing centre island.
Calculate this area.
State the units of your answer. [5]

(d) The free-standing centre island requires an edging strip to go around the outside.
The edging strips can be bought in rolls of length 2 m, 5 m, 10 m or 50 m.
The cost per metre is the same for each roll.
Which length of roll would be the best option for Owen and Nia to buy?
Show all your working and give a reason for your answer. [3]

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(e) *You will be assessed on the quality of your written communication in this part of the question.*

Owen and Nia look into buying their kitchen.
They need to buy:

- kitchen cabinets and worktops for £3200,
- electrical goods for £2649,
- sink and drainer for £250.

A local kitchen fitter charges £1200 but can offer them a discount of 10% for his work.
An electrician charges £600.
A plumber has a £40 call out fee and then charges £25 per hour.
The plumber needs 2 hours to complete his work.

A large kitchen company says they charge £8000 for everything including fitting.

Should Owen and Nia choose the large kitchen company to fit their kitchen?

Give a reason for your answer.
You must show all your working. [9]

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5. A numeracy test is marked out of 40.
The marks for a class of 24 pupils are shown below.

11	24	35	31	9	17	27	23
39	18	27	5	34	25	21	15
36	12	12	7	40	22	3	19

(a) Represent the marks for the class in a stem and leaf diagram. [2]

(b) Which of the following shows how to calculate the range of the numeracy test marks?
Circle your answer. [1]

19 – 11 = 8 40 – 9 = 31 40 – 3 = 37 40 – 24 = 16

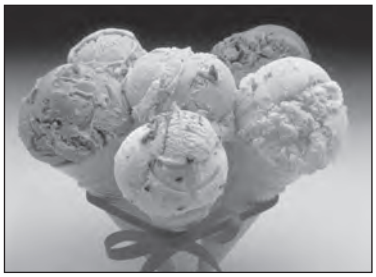
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6. One sunny Sunday morning, the owner of *Lizzy's Ices* ice cream van recorded the number of ice-cream sales.

Flavour of ice cream	Number sold
Vanilla	22
Strawberry	17
Chocolate	12
Banana	15
Toffee	6



(a) Draw a pie chart to represent the number of ice-cream sales made by *Lizzy's Ices*. You should show how you calculate the angles of your pie chart. [4]

Working:

.....

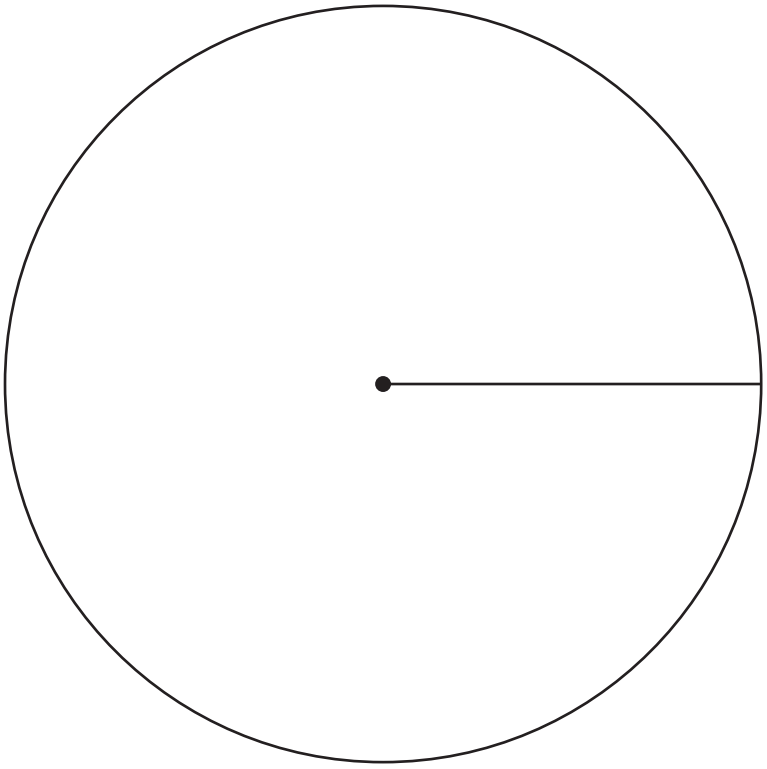
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(b) On the same Sunday morning, another ice-cream van, *Cameron's Cones*, sold 90 ice creams.
Of these 90 ice creams, 18 were chocolate flavour.
Who sold the higher proportion of chocolate flavour ice creams?
You must show your working. [5]

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7. Lois lives in Llandudno.
She is changing some pounds into other currencies before going on holiday in Europe.

The exchange rates are displayed below.

Exchange £1 for	
1.48 SF	Swiss francs
1.20 €	euros
5.04 Zl	Polish zloty

(a) Calculate how much Lois would receive in exchanging each of the following.

(i) £450 exchanged for Swiss francs. [2]

.....

.....

..... Swiss francs

(ii) £300 exchanged for Polish zloty. [2]

.....

.....

..... Polish zloty

(b) How many pounds will Lois have to exchange to receive 363.60 euros? [2]

.....

.....

£ .....

6

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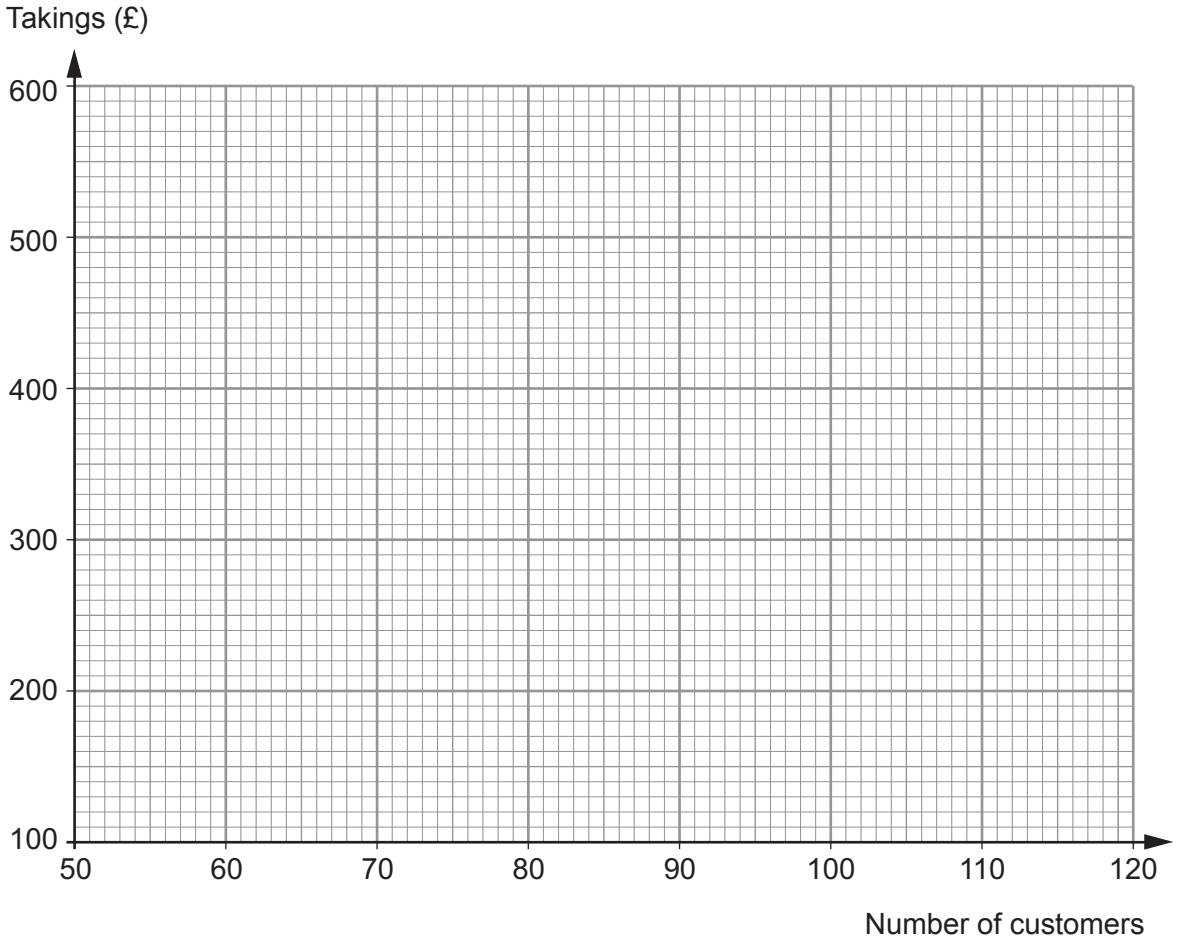
Examiner only

8. Every Monday for 6 weeks, the number of customers entering a juice bar and the takings of the juice bar were recorded.
The takings were recorded correct to the nearest £10.

The table below shows the results.

Number of customers	104	82	120	64	70	118
Takings (£)	480	390	560	290	310	530

(a) On the graph paper below, draw a scatter diagram of these results. [2]



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(b) Draw, by eye, a line of best fit on your scatter diagram. [1]

(c) Estimate the takings for a Monday when there are 95 customers. [1]

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(d) Approximately how much does a customer spend, on average, in the juice bar on a Monday? [2]

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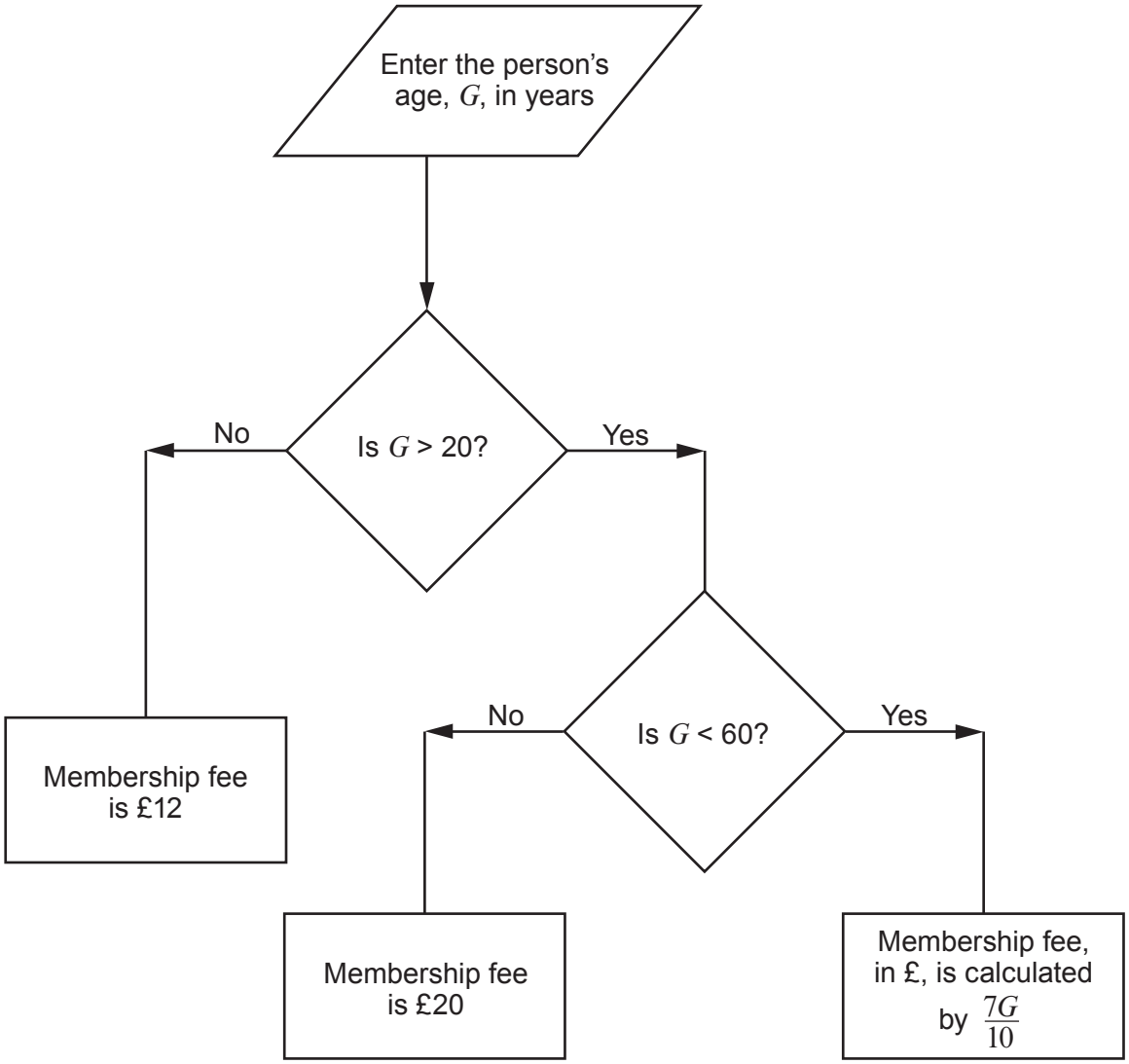
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9.



The following section of a flowchart is used to find the membership fee for a snooker club.



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(a) Use this section of the flowchart to find the membership fee for each of the following people.

Donald, aged 20 [1]

.....

Dawn, aged 16 [1]

.....

Shiona, aged 52 [2]

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(b) Shiona, aged 52, has a younger brother Marc, aged 42.
How much **less** does Marc have to pay to be a member of the snooker club than his sister Shiona? [2]

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10. A retail index number is calculated by looking at increases or decreases in price over a period of time.
A loaf of bread that cost £1.60 on 1st January last year, costs £2.00 on 1st January this year.



The index number for this year's cost of a loaf of bread, based on last year's cost, is calculated as follows:

$$\text{Index number} = \frac{2.00}{1.60} \times 100$$

$$= 125$$

The index number for this year's cost of bananas, based on last year's cost, is 140.



(a) Has the cost of bananas increased more or less steeply than the cost of a loaf of bread? You must give a reason for your answer. [1]

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(b) For this year's costs, are you able to tell from the information given whether 1 kg of bananas is cheaper or more expensive than a loaf of bread?
You must give a reason for your answer. [1]

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11. Derek wants to have a rectangular metal gate made for his driveway.

The gate must be 2·8 m wide and 1·5 m high.
The gate is to be made using 7 thin metal rods.
The four horizontal rods are parallel.
The diagonal rod ensures that the gate remains strong.

Derek draws a sketch of his design.

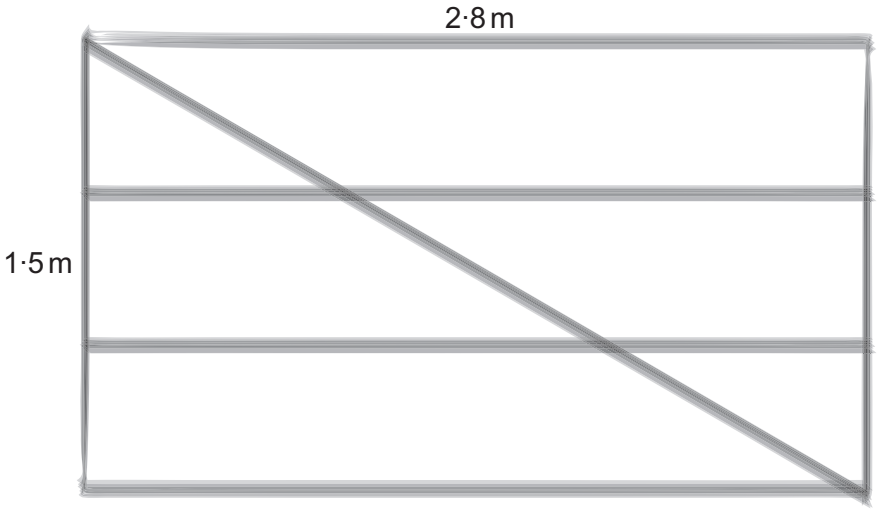


Diagram not drawn to scale

Calculate the **total** length of the 7 rods needed to make Derek's gate. [5]

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END OF PAPER

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

W15-4362-01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications

FOUNDATION TIER

A.M. WEDNESDAY, 21 January 2015

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.(a)	**8**	
2.(b)(c)	**4**	
2.(d)(e)	**8**	
3.	**10**	
4.	**4**	
5.	**9**	
6.	**5**	
7.	**5**	
8.	**5**	
9.	**5**	
10.	**8**	
11.	**5**	
Total	**80**	

4362 010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

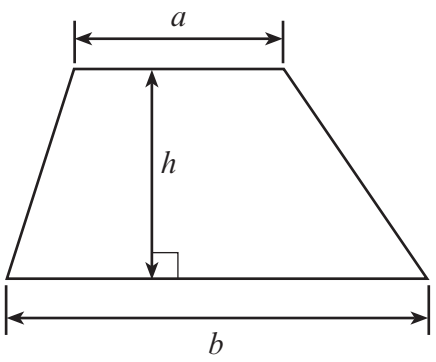
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **5***(b)*.

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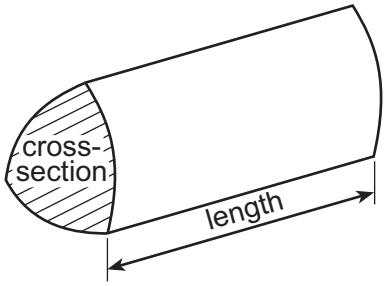
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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Examiner only

1. Ahmed, Bethan, Caroline and Doug are playing a game with the ten cards shown below.

1	2	5	6	8	9	16	17	18	20

Each player picks up two of the cards.
No card is shared by any of the players.

The numbers on:

- Ahmed's cards add up to 25
- Bethan's cards multiply to give 54
- Caroline's cards divide to give 9
- Doug's cards subtract to give 11.

Work out which cards each person has. [4]

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The numbers on:

Ahmed's cards are ..... and .....

Bethan's cards are ..... and .....

Caroline's cards are ..... and .....

Doug's cards are ..... and .....

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4

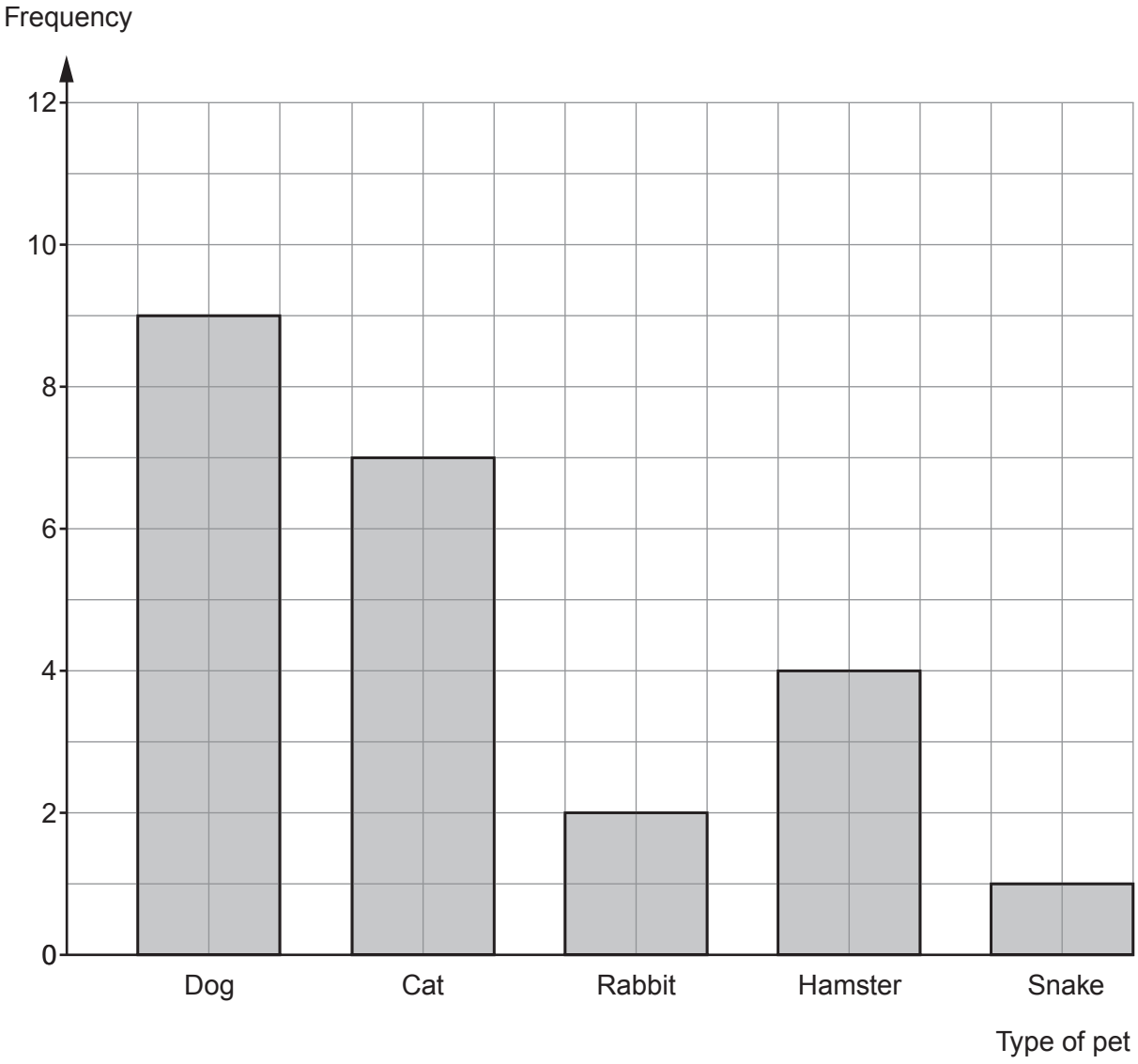
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2. *(a)* The bar chart below shows the pets that a vet examined in one morning.



(i) How many cats did the vet examine? [1]

.....

(ii) How many pets did the vet examine in total? [2]

.....

.....

(iii) Which type of pet was examined most often? [1]

.....

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(iv) The vet wishes to display the information on the previous page as a pictogram. In the space below, draw a pictogram to represent the number of each type of pet the vet examined that morning. [4]

Key:

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8

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(b) Mrs Harris cannot drive and needs to take her dog, Spot, to the vet's surgery.
She catches a bus at 9:35 a.m. and gets off the bus outside the surgery at 10:22 a.m.
How long did the bus journey take? [1]

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(c) After seeing the vet, Mrs Harris needs to go to *Pets R Us* to buy supplies for Spot.
She decides to use a taxi company.
The diagram shows the roads and distances between the surgery and *Pets R Us*.

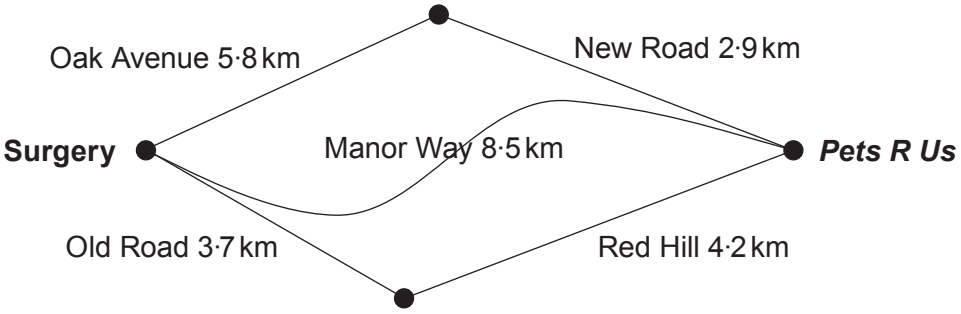


Diagram not drawn to scale

Mrs Harris asks the taxi driver to use the shortest route.
Work out the shortest route the taxi driver can use.
You must write down the route and its distance. [3]

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4

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(d) At *Pets R Us* Mrs Harris buys pet supplies for Spot.
The cost of the goods are shown below.

			
Dog Basket £29.99	**Flea Spray £5.99**	**Dog Treats £2.49**	**Large Dog Bowl £7.00**

(i) Complete the bill for Mrs Harris. [4]

Goods	Quantity	Cost
Dog Basket	1	£
Flea Spray	3	£
Dog Treats	5	£
Large Dog Bowl	1	£7.00
	Total Cost	£

(ii) Mrs Harris has a store discount card for *Pets R Us* which entitles her to a 5% discount.
How much discount does Mrs Harris receive?
Give your answer correct to the nearest penny. [3]

.....

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(e) When Mrs Harris arrives home she tells Mr Harris about an offer she saw for a new dog collar for Spot in *Pets R Us*.
She says the offer was:

Buy a 40 metre dog collar for £10.99



What do you think is wrong with what Mrs Harris said to Mr Harris? [1]

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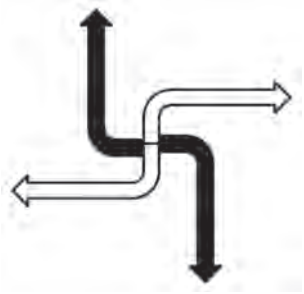
3. Sarah and Matthew decide to wallpaper some of the rooms in their new home. They look at a variety of designs and notice that they contain different shapes.

(a) Some of the designs they like are shown below.

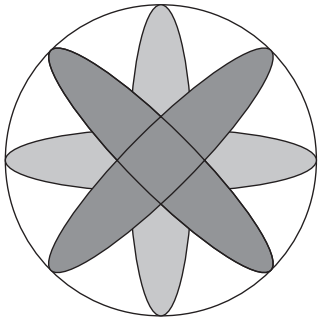
A



B



C



D



(i) In the table below, write down the order of rotational symmetry of each of the above designs. [3]

Shape	**A**	**B**	**C**	**D**
Order of rotational symmetry				

(ii) Sarah believes that all the designs have at least one line of symmetry.
Is Sarah correct?
Give a reason for your answer. [1]

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(iii) Which design has 4 lines of symmetry? [1]

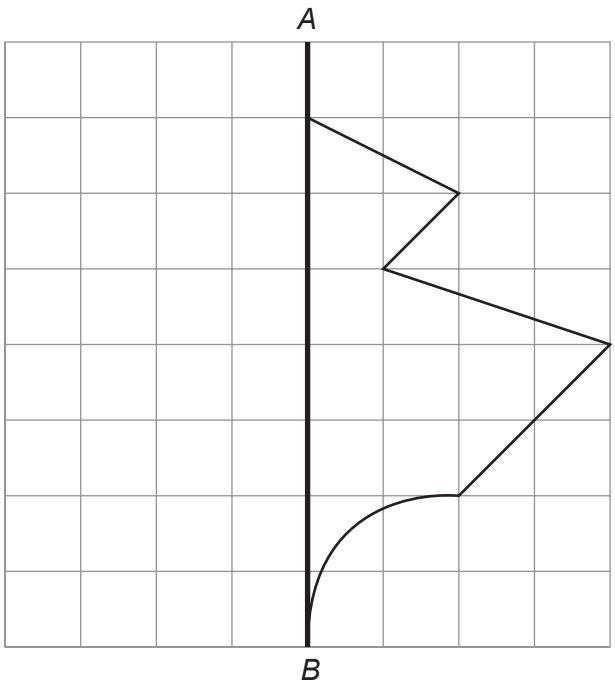
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(b) Sarah decided to start a design of her own.
Complete Sarah's design using *AB* as the line of symmetry. [2]



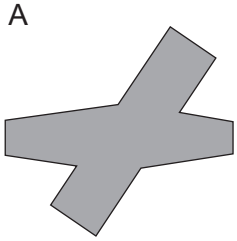
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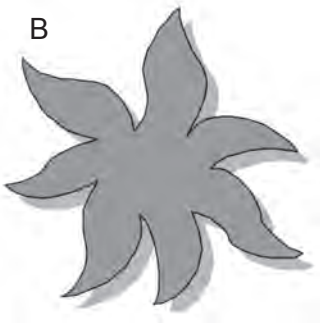
Examiner only

(c) On one wall, Sarah and Matthew wanted to have stencils of different shapes. Below is a selection of shapes that they looked at.

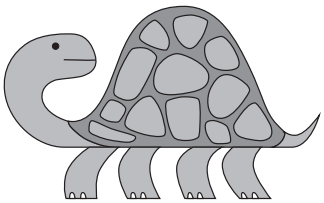
A



B



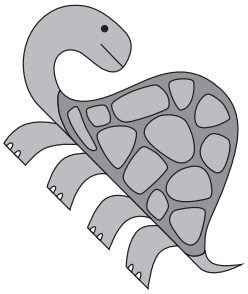
C



D



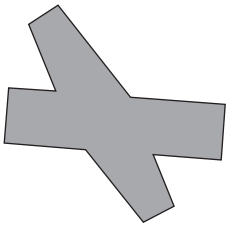
E



F



G



H



They noticed that some of the shapes were congruent and some were similar. Select 6 shapes to complete the following statements. [3]

Shape ..... is **congruent** to shape .....

Shape ..... is **congruent** to shape .....

Shape ..... is **similar** to shape .....

10

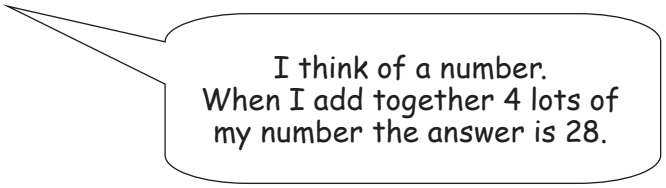
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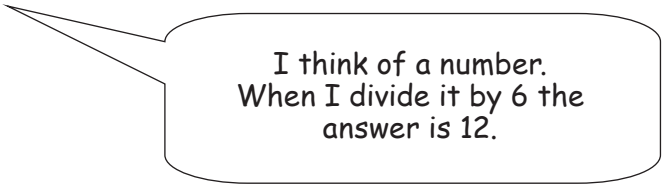
4. Megan and Ellis play a game called "I think of a number".

(a) Megan says



Set up an equation, using the information that Megan has given.
Use the letter n for the number that Megan thought of.
Solve your equation to find the value of n. [2]

(b) Ellis says



Set up an equation, using the information that Ellis has given.
Use the letter m for the number that Ellis thought of.
Solve your equation to find the value of m. [2]

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4

Turn over.

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Examiner only

5. Catrin sees an advertisement on the Internet, shown below, for the racing bike she wants to buy.

The Internet company offers a discount of $\frac{1}{10}$ off the price shown.



(a) Calculate the discounted price of the racing bike. [2]

.....

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(b) *You will be assessed on the quality of your written communication in this part of the question.*

Catrin decides that she will buy a racing bike from her local bike shop instead.
The bike she wants to buy costs £925.

She has saved £470 towards the cost of buying this racing bike.

Catrin earns £600 per week.
She is able to save 20% of the amount she earns each week.

How many weeks will it take Catrin to save for the racing bike?
You must show all your working. [7]

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6. The diagram below shows the pattern of tiles on a kitchen wall.

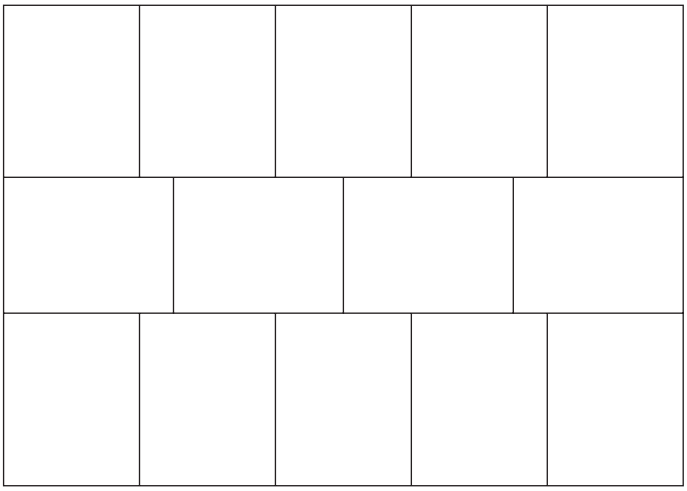


Diagram not drawn to scale

Each tile in the pattern is exactly the same.
Each tile has a width of 12 cm.

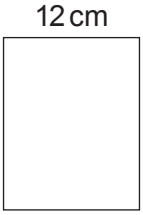


Diagram not drawn to scale

Find the total area of these tiles on the kitchen wall. [5]

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7. Lloyd has been given 2 identical boxes, each in the shape of a cuboid, to store his collection of toy cars.



Each cuboid has length 50 cm, width 30 cm and height 40 cm.

(a) Find the total volume of the 2 boxes. [3]

(b) Lloyd has another box with a volume of 140 000 cm^3.

$1cm^3 = 1\,ml$

$1000ml = 1$ litre

Change 140 000 cm^3 into litres. [2]

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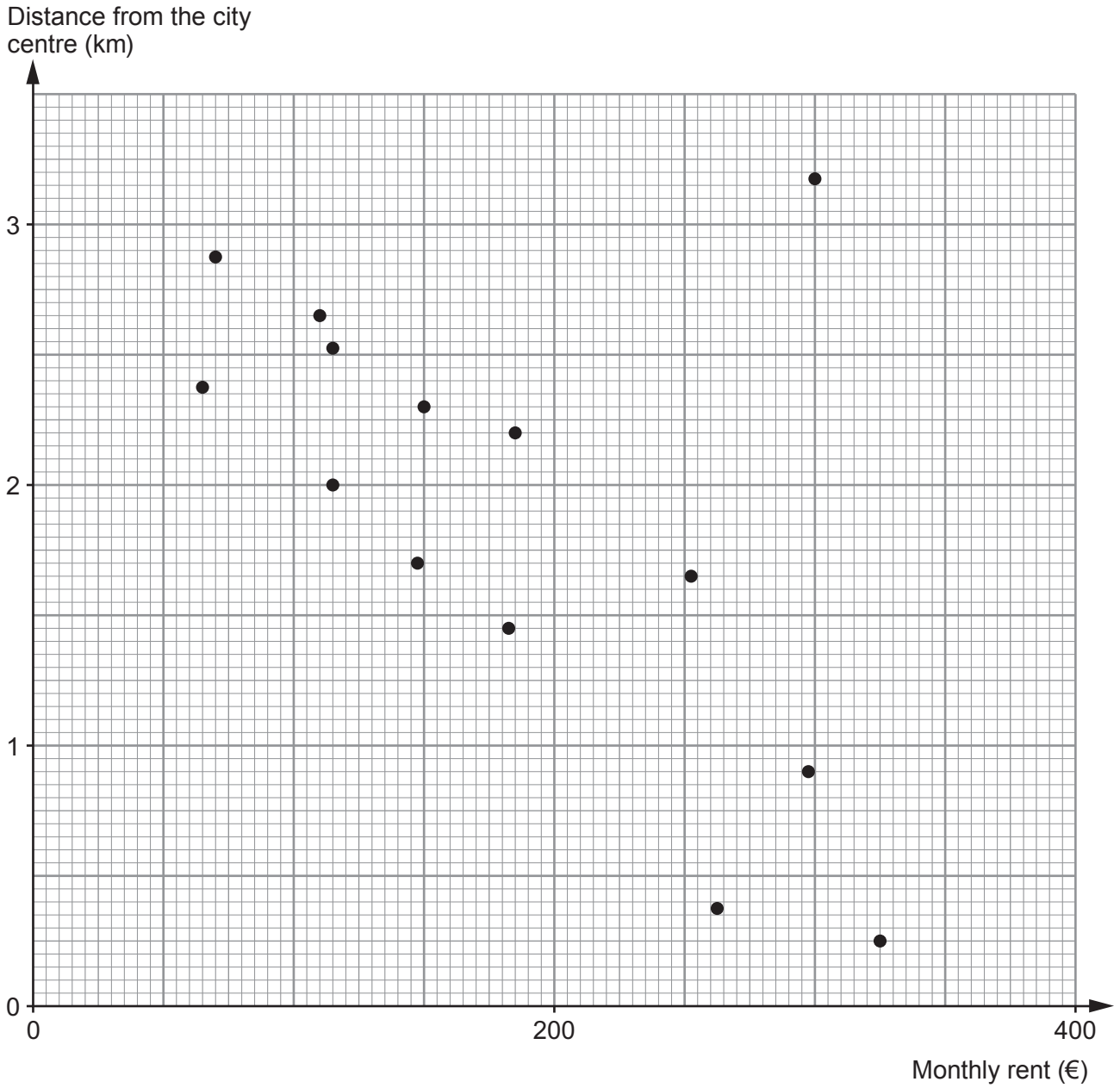
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8. The scatter diagram displays data for furnished, two-bedroom apartments in a European city. It shows the monthly rental cost and the distance the apartment is from the city centre.



(a) How much is the monthly rental cost for the most expensive apartment? [1]

..... €

(b) How much is the monthly rental cost for the apartment furthest away from the city centre? [1]

..... €

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(c) One of the apartments represented on the scatter diagram is a luxury apartment with electronic sound systems and computerised equipment.
Can you tell with certainty, from the scatter diagram, which is the luxury apartment?
You must give a reason for your answer. [1]

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(d) Draw, by eye, a line of best fit on the scatter diagram. [1]

(e) Use your line of best fit to estimate the monthly rental cost for a furnished, two-bedroom apartment 1·25 km from the city centre. [1]

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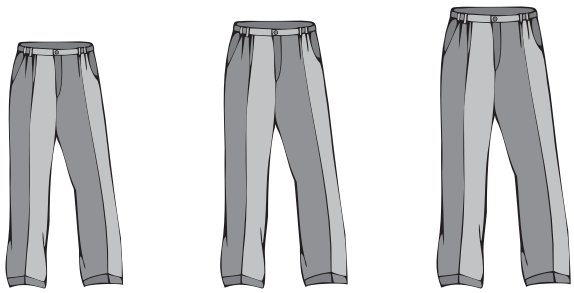
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9. Men's trousers can be bought in different sizes: small, medium and large.



The chart below gives measurements for the different sizes of trousers.

Waist measurement, in centimetres correct to the nearest cm	Waist measurement, converted into inches correct to the nearest inch	Size
66 cm to 74 cm	26 inches to ..... inches	Small
75 cm to 90 cm	..... inches to 35 inches	Medium
91 cm to ..... cm	36 inches to 49 inches	Large

1 inch is approximately 2·54 cm

(a) Fill in the missing values in the table above. [3]

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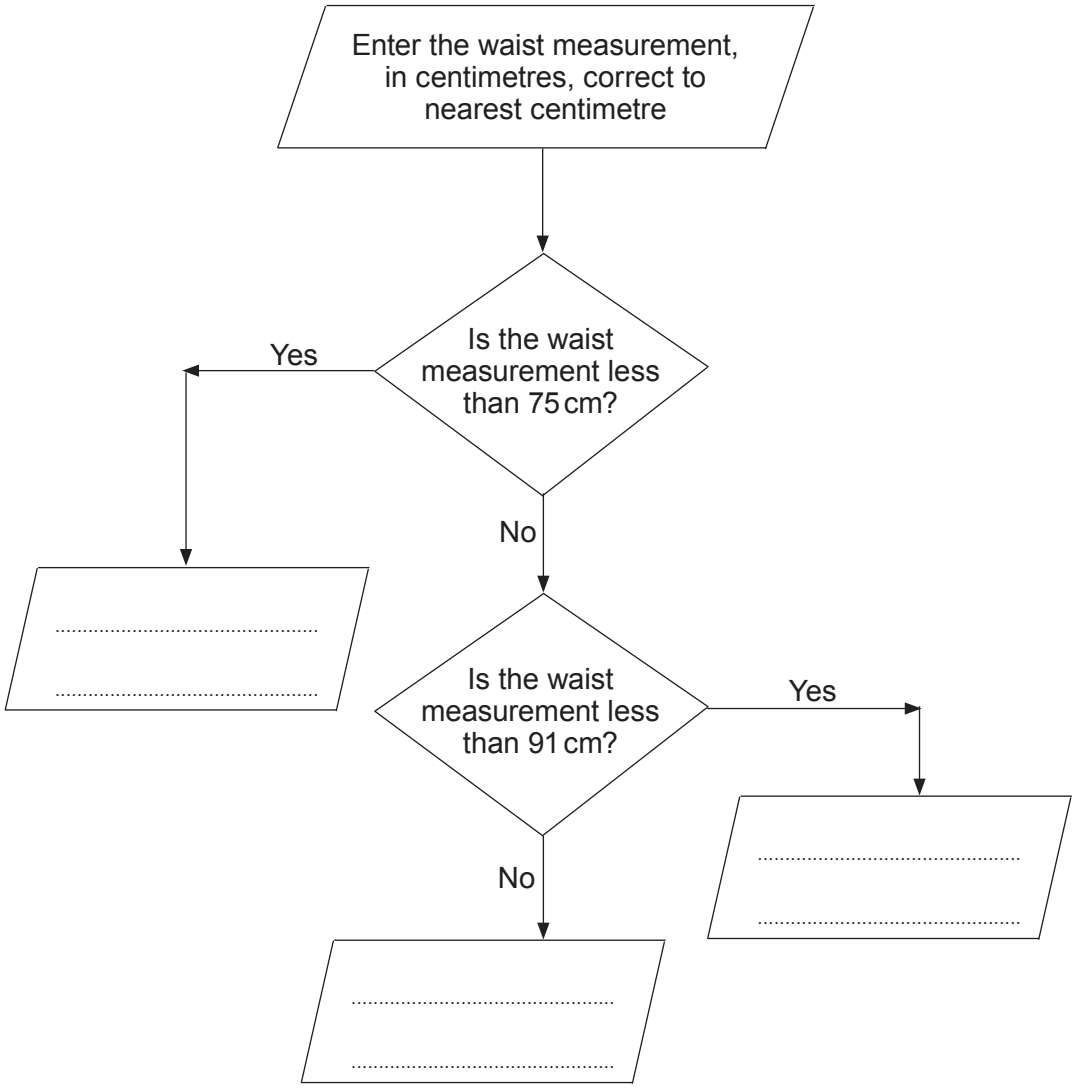
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(b) The following section of a flowchart is used to find which size trousers to buy.



Complete the three empty output boxes in the flowchart above. [2]

5

Examiner only

10. Dewi is going on holiday to China.

He has found the following rates for exchanging pounds sterling (£) and Chinese yuan (CYN), at a local exchange bureau.

Buying Chinese yuan (CYN)	£1 buys 9.28 CYN
Selling Chinese yuan (CYN)	9.42 CYN buys £1

The exchange bureau has all the possible sterling coins and notes.
Dewi knows that the exchange bureau only sells and buys CYN notes and that no coins are available or accepted.

The bureau has many of the following CYN notes.



(a) Dewi has £460 to buy Chinese yuan.

Calculate
- the maximum number of CYN Dewi can buy, and
- how much, to the nearest penny, this will cost him.

You must show all your working. [5]

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(b) It would cost Dewi £100 to buy 928 CYN.
Dewi states that he will lose money when he changes any CYN notes that he buys back into pounds.
How much would Dewi lose in changing 928 CYN back into pounds? [3]

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11. Tommy plays maths games on his computer.
He keeps a record of his scores for each of *AddU*, *High5s* and *Tri-angle* in a spreadsheet.
The maximum scores are shown in the section of Tommy's spreadsheet shown below.

	A	B	C	D	E	F	G	H
1	**Maths game**	**Maximum score for each game**	**Game 1**	**Game 2**	**Game 3**	**Game 4**	**Total score**	**Total score as a percentage**
2	*AddU*	20	12	10	6	14	42	52·5
3	*High5s*	4	4	3	3	2	12	75·0
4	*Tri-angle*	10	6	4	7	6	23	57·5

Write down a formula that could be used in the spreadsheet to calculate the entries for the following cells. [5]

G2

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H2

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2015

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Unit 1 Foundation Tier	1
Unit 1 Higher Tier	4
Unit 2 Foundation Tier	8
Unit 2 Higher Tier	11

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APPLICATIONS UNIT 2
FOUNDATION TIER

<table>
<tr><th>Applications Unit 2 Foundation Tier
January 2015</th><th>Mark</th><th>Comment</th></tr>
<tr><td>1. Accept the pairs in any order

Ahmed's cards are 8 and 17
Bethan's cards are 6 and 9
Caroline's cards are 18 and 2
Doug's cards are 16 and 5</td><td>B4

4</td><td>For 4 marks, no cards should be repeated

Ignore repeats if B4 not awarded.
If all four marks not awarded then award B1 for each correct pair of cards, up to a maximum of 3 pairs of cards (B3) OR award B1 for each alternative correct pair.
eg
A: 20 & 5 or 16 & 9
C: 9 & 1
D: 20 & 9 or 17 & 6</td></tr>
<tr><td>2.(a)(i) 7
(ii) 9 + 7 + 2 + 4 + 1
23
(iii) Dog
(iv) Labels of animals
key provided
All correct using their key</td><td>B1
M1
A1
B1
B1
B1
B2

8</td><td>
Attempt to add at least 3 frequencies

If no key given, award B0 here only
FT their intended key. Award B1 for 3 or 4 correct using their key</td></tr>
<tr><td>2.(b) 47 (minutes)
(c) 3.7 + 4.2 OR 5.8 + 2.9 (=8.7)
Shortest distance 7.9 (km)

(shortest route is) from surgery via Old Road then Red Hill to Pets R Us</td><td>B1
M1
A1

E1

4</td><td>Do not accept 47 hours

FT provided M1 awarded
Intention of the route must be clear e.g. via Old Road or Old Road then Red Hill. May be indicated on the diagram.</td></tr>
<tr><td>(d)(i)
<table><tr><th>Goods</th><th>Quantity</th><th>Cost</th></tr><tr><td>Dog Basket</td><td>1</td><td>£29.99</td></tr><tr><td>Flea Spray</td><td>3</td><td>£17.97</td></tr><tr><td>Dog Treats</td><td>5</td><td>£12.45</td></tr><tr><td>Large Dog Bowl</td><td>1</td><td>£7.00</td></tr><tr><td></td><td>Total Cost</td><td>£67.41</td></tr></table>
(ii) 5/100 × (£)67.41
(£)3.3705
(£)3.37 ISW
(e) Suitable explanation given implying 40 metres for a dog collar is far too big or the units should be cm.</td><td>

B1
B1
B1

B1

M1
A1
B1
E1

8</td><td>

CAO
CAO
CAO

FT if at least one B1 awarded. Award B4 for only an answer of £67.41

FT 'their £67.41'

FT 'their 3.3705' if unrounded answer is seen.
Do not accept explanations that may be based on a lead.</td></tr>
<tr><td>3. (a)(i)
<table><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>1</td><td>2</td><td>4</td><td>1</td></tr></table>
(ii) No and explanation given that shape A and/or B does not have any lines of symmetry.
(iii) C
(b) Correct reflection drawn

(c) A and G or E and C
E and C A and G

B and D</td><td>B3

E1

B1
B2

B1
B1

B1

10</td><td>Award B3 for all correct, B2 for 3 correct, B1 for 2 correct. Condone consistent use of 0 or none instead of 1. (I.e. both must be 0 or none for the mark to be awarded.)

Accept "No" being implied

B1 for straight edges correct, B1 for curve

Accept letters in either order in (c)

If the 2 previous B1 marks have not been awarded, award SC1 for an answer of A & G OR E & C in the last part instead of B & D</td></tr>
</table>

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Applications Unit 2 Foundation Tier January 2015	Mark	Comment
4. (a) $4n = 28$ (n =) 7 (b) $m/6 = 12$ (m =) 72	 B1 B1 B1 B1 4	*If no equation shown but answers given award B0 B1in each part.* Accept $28 = 4n$ or $n + n + n + n = 28$ or $n = 28/4$ or equivalent Accept embedded answers for this B1. Accept $m \div 6 = 12$ or $12 = m/6$ or $m = 12 \times 6$ or equivalent Accept embedded answers for this B1
5.(a) (Cost of bike) 1100 – 1/10 × 1100 OR 9/10 × 1100 (£)990 (b) (Save each month) 20/100 × 600 (£)120 (Number of weeks) (925 - 470) ÷ 120 3.(79..) Conclusion given that it will take 4 weeks Look for • spelling • clarity of labels • the use of notation (watch for the use "=, +, -, ×, ÷, £" being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer	M1 A1 M1 A1 M1 A1 A1 Q W C 2 <

Applications Unit 2 Foundation Tier January 2015	Mark	Comment
8. (a) 325 (euros) (b) 300 (euros) (c) Idea of scatter not showing which apartment is which so there is uncertainty, e.g. 'Suggest perhaps the apartment costing 300€, ≈3.2km from the centre may be the luxury apartment but there is not information to tell us this on the scatter diagram' (d) Suitable line of best fit, in appropriate direction with points above and below the straight line drawn (e) Accurate reading **from their line of best fit**	B1 B1 E1 B1 B1 5	 Must show uncertainty in the response Intention of straight line Tolerance within a small square
9. (a) 74 / 2.54, 75 / 2. 54 or 49 x 2.54 All 3 correct answers in the table 29 (inches) 30 (inches) 124 (cm) (b) All 3 correct entries, (buy) small (buy) medium (buy) large	M1 A2 B2 5	 A1 for correct unrounded answers, (29.13… 29.52…… 124.46…..) OR for 29 and 30 OR for 124 (or allow 125 from converting backwards) B1 for any 1 or 2 correct entries
10. (a) (Change into CYN) 460 × 9.28 (No coins, so can buy only) 4268 (CYN) (Cost to Dewi for 4268 CYN is) 4268 ÷ 9.28 (£) 459.91 (b) 928 ÷ 9.42 (£)98.51(38…) (Loss) (£) 1.49	M1 A2 M1 A1 M1 A1 B1 8	 A1 for an answer of 4268.8 (CYN) or 4269(CYN) *If no marks, then SC1 for an answer of 4333 (using incorrect rate & rounding down)* FT their whole number of CYN An answer of 459.91379… implies M1, A0 FT '100 – their 98.51' provided M1 awarded
11. (G2 =) C2 + D2 + E2 + F2 OR (G2=)sum(C2:F2) (H2=) 100*G2 / (4*B2) OR 100* (C2 + D2 + E2 + F2) / (4*B2)	B1 B4 5	 Award B3 for the fraction, i.e.*100 omitted but otherwise correct, or if 1 minor slip in the formula (not for omitted *4), e.g. missing bracket(s) or a missing term, (condone × for * and ÷ for /) Award B2 for 2 errors, e.g. 100* G2 / 4*20 (missing () and use of 20 not B2), or 100* (C2 + D2 + E2 + F2) / B2 (missing 4* and ()) Award B1 for 3 errors e.g. G2 / 4*20 or (C2+D2+E2+F2) / 4*20 or G2 / 80 or (C2+D2+E2+F2) / 80

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APPLICATIONS UNIT 2
HIGHER TIER

Applications Unit 2 Higher Tier January 2015	Mark	Comment
1(a) 325 (euros) (b) 300 (euros) (c) Idea of scatter not showing which apartment is which so there is uncertainty, e.g. 'Suggest perhaps the apartment costing 300€, ≈3.2km from the centre may be the luxury apartment but there is not information to tell us this on the scatter diagram' (d) Suitable line of best fit, in appropriate direction with points above and below the straight line drawn (e) Accurate reading **from their line of best fit**	B1 B1 E1 B1 B1 5	 Must show uncertainty in the response Intention of straight line Tolerance within a small square
2(a) 74 / 2.54 75 / 2. 54 or 49 x 2.54 All 3 correct answers in the table 29 (inches) 30 (inches) 124 (cm) (b) All 3 correct entries, (buy) small (buy) medium (buy) large	M1 A2 B2 5	 A1 for correct unrounded answers, (29.13… 29.52…… 124.46…..) OR for 29 and 30 OR for 124 (allow 125 from converting backwards) B1 for any 1 or 2 correct entries Allow use of the appropriate range of measurements as the indication of size
3(a) (Change into CYN) 460 × 9.28 (No coins, so can buy only) 4268 (CYN) (Cost to Dewi for 4268 CYN is) 4268 ÷ 9.28 (£) 459.91 QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps **AND** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps **OR** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer (b) 928 ÷ 9.42 (£) 98.51(38…) (Loss) (£) 1.49	M1 A2 M1 A1 QWC 2 M1 A1 B1 10	 A1 for an answer of 4268.8 (CYN) or 4269(CYN) *If no marks, then SC1 for an answer of 4333 (using incorrect rate & rounding down)* FT their whole number of CYN An answer of 459.91379… implies M1, A0 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. FT '100 – their 98.51' provided M1 awarded For B1 the answer must be to the nearest penny.

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Applications Unit 2 Higher Tier January 2015	Mark	Comment
4(a) Volume = $\pi \times 23^2 \times 125$ Answers in the range 207.6 to 207.8(…) or 208 (litres)	M1 A2	Ignore place value changes for '23' and '125' Accept 66.125 π A1 for answers in the range 207600 to 207822 or 208000(cm^3) or 207 (litres) or 66125 π *If no marks, award SC1 for use of 46 for radius giving) approximately 831 litres*
(b) 150 × 4500 × …… = 1.2 million	B1	Ignore errors for their 1.2 million providing unambiguous.
Cost per litre 1 200 000 ÷ (150 × 4500) (£)1.78	M1 A1	Calculation that could lead to a correct answer, may be shown in stages Do not accept 1.2 million ÷ (150 × 4500) for M1 unless answer of 1.7(777….) Accept 1.77(77…). If units are given they must be correct.
(c) Either (100 ×) 1000/1700 or 1000 × 159 ÷ 1700 or equivalent 58.8(%) or 59(%) Answers in the range 93.5(..litres) to 94(.. litres)	B1 B1 B1	FT their % provided initial B1 awarded Accept unsupported answer or an answer provided no inappropriate working is seen for B3
	9	
5(a) (G3 =) C3 + D3 + E3 + F3 OR (G3=) sum(C3:F3)	B1	
(H3=) 100*G3 / (4*B3) OR 100* (C3 + D3 + E3 + F3) / (4*B3)	B4	Condone × for * and ÷ for / Award B3 for the fraction, i.e.*100 omitted but otherwise correct, or if 1 minor slip in the formula (not for omitted *4), e.g. missing bracket(s) or a missing term. Award B2 for 2 errors, e.g. 100* G3 / 4*30 (missing () and use of 30 not B3), or 100* (C3 + D3 + E3 + F3) / B3 (missing 4* and ()) Award B1 for 3 errors e.g. G3 / 4*30 or (C3+D3+E3+F3) / 4*30 or G3 / 120 or (C3+D3+E3+F3) / 120
(b) G3 27 AND G4 23 (7+6+3+11)/(4 × 30) (×100) H3 22.5 H4 57.5 F5 4 AND G5 8	B1 M1 A1 B1 B1	FT their G4×100÷40 correct to 1dp CAO
	10	
6(a) 11 (b) (£)62 (c)	B1 B1	

	Median in £	Range in £	Mode in £
Jenkins	46.5(0)	35	32
Hollow Electric	47	34	48

	B4	All entries correct OR B3 for 5 correct entries B2 for 3 or 4 correct entries B1 for 1 or 2 correct entries
(d) Shows understanding that median (and range) similar, mode for Hollow Electric indicates more expensive, accept conclusion Jenkins cheaper or that the two makes are quite similar	B1	FT their table provided at least B2 previously awarded B0 if range considered as an average. Allow conclusion from their correct calculation of means: Jenkins 511 ÷12 = 42.5833… Hollow Electric 482 ÷ 11 = 43.8181…
	7	

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Applications Unit 2 Higher Tier January 2015	Mark	Comment
7. 6B + 5C = 116 AND 4B + 8C = 138	B2	B1 for either equation FT provided at least 1 equation is correct
Method to solve, e.g. equal coefficients with an appropriate attempt to subtract the equations	M1	Allow 1 slip in non equated variable
Correct first value	A1	
Method to find the second variable	m1	FT from their first value
Correct second value with indication showing order, such as completing the table, e.g. Ben (£)8.5(0) per hr, Ceri (£)13(.00) per hr	A1 6	Unsupported answers gain no marks
8(a)(Length) 6.2 × 2.4/4 or equivalent 3.7(2 cm)	M1 A1	Ignore any incorrect place value with '2.4' and '6'
(Area) 8.9(28cm^2)	A1	(2.4×3.72 = 8.928) FT 'their 3.72 × 2.4' correctly evaluated provided M1 awarded
(b) Explains he is incorrect, e.g. 'Leo is wrong it has reflection (symmetry)' or 'the original does not have (rotational) symmetry'	E1 4	Must mention the reflection (symmetry) of the new OR that the original does not have (rotational) symmetry. Allow if incorrect is stated or implied with a correct reason provided no more than one incorrect statement is given
9(a) b)5600 × 1.85/100 or 5600 × 0.0185 (= 103.60)	B1	May be embedded in further calculation
$(1 + 0.0185)^{15} \times 5600$	M1	OR sight of a full cumulative method for at least 13 years
(£) 7372(.308954…)	A1	Accept correct evaluation from at least 13years cumulative (e.g. 13years gives (£)7106(.8..) to (£)7107) *B1 and SC1 for depreciation 4231.97…, but no FT*
Conclusion, e.g. 'Yes (he will have more than he needs)'	E1	FT interpretation provided B1 and M1 awarded *If M0 awarded and simple interest used with interest shown or implied as over (£)1400 for 14 or 15 years award SC1 or with conclusion 'Yes' award SC2.* *If also stated that using compound interest the amount will be greater award SC3*
(b) (AER% =) $100\left(1 + \frac{2.15}{100 \times 12}\right)^{12} - 100$ OR $100(1 + 2.15 \div (100 \times 12))^{12} - 100$ = 2.17(…..%)	B4	For B4 condone missing brackets in the denominator if the answer correct. Award B3 for correct formula (including brackets in the denominator) but incorrect answer between 1 and 5 inclusive. Award B2 for correct formula and answer not between 1 and 5. Award B1 for one error in the formula e.g. missing brackets, 2000 not 100, a 12 missing, 0.0215 used.
Advise, e.g. 'Greenash as more interest (at 2.18%p.a.)'	E1 9	FT their appropriate interpretation provided at least B2 awarded and APR for Greenash is 2.18%.

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Applications Unit 2 Higher Tier January 2015	Mark	Comment
10. Plot 1 Opposite side = 25 × sin 37 Opposite side 15(.04537…metres) Adjacent side = 25 × cos 37 Adjacent side = 19.9658…metres or 20 (metres) Perimeter Plot 1 (25 + 15 + 20 =) 60 (metres) Plot 2 unknown^2 = 36^2 - 25^2 unknown length 25.9(036.. metres) or 26(metres) Perimeter Plot 2 (25 + 36 + 26=) 87 (metres) Plot 3 Strategy, considers fraction of a circle OR sight of 2×π×36 Arc = 2× π × 36 × 22.5/360 Answers between 14 (metres) to14.14…(metres) inclusive Perimeter Plot 3 (36 + 36 + 14 =) 86 (metres)	M2 A1 M2 A1 B1 M1 A1 B1 S1 M1 A1 B1 14	M1 for sin37 = opposite side/25 M1 for cos37 = adjacent side/25 Accept rounded or truncated to 19.97 or 19.96 or 19.9 or 20.0 *Alternative 3 marks once opposite or adjacent side found are:* *$25^2 - opp^2 = adj^2$ or $25^2 - adj^2 = opp^2$* *Substitution of 25 and their(FT) appropriate measurement M1* *opp^2 =226.36… or opp=√226.36… or adj^2 = 398.6(3…) or adj = √398.6(3…) or FT with their appropriate measurement A1* *Opposite or adjacent as before or FT A1* FT provided at least 1 method mark for each stage of Plot 1 working has been awarded FT provided at least M1 for Plot 2 awarded OR equivalent to 72π or a fraction (percentage) of 72π in working An answer of 226.(.. metres) implies S1 only (Allow 9pi/2) FT provided at least S1 awarded for Plot 3 <u>Do not penalise not rounding each perimeter to the nearest metre more than once, i.e. first B0 then FT to allow unrounded for further B marks</u>
11(a) G + B < 4000 0.3(0)G + 0.2(0)B > 960 (b) Line G + B= 4000 shown Line 0.3G + 0.2B=960 shown Region between the lines indicated (left hand end only) (c) **Using their graph** to show Ifor's point outside the region with 'No' in the table **Using their graph** to show Simone's point inside the region with 'Yes' in the table	B1 B1 B1 B1 B1 B1 B1 7	*If no marks, then SC1 for G+B…4000 AND (0.)3(0)G +(0.)2(0)B…960, with the gaps here both being inequalities* FT from their inequalities if possible Accept FT from either line correct but for a similar region **MUST** be a FT from their (non spurious) graph in (c) Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly
12. Sight of 297.5 and 302.5 (litres) AND 239 and 241 (seconds) (Least) 297.5/241 1.23 (litres per second) (Greatest) 302.5/239 1.27 (litres per second)	B2 M1 A1 M1 A1 6	B1 for any 2 of these FT their litres and seconds provided neither 300 nor 240 used, and appropriately > or < these values *If neither A mark awarded, then SC1 for unrounded or truncated answers (greatest 1.26569… AND least 1.2344…)*

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Applications Unit 2 Higher Tier January 2015	Mark	Comment
13. (a)(i) Carli index $\left(\frac{\frac{1.02}{0.92}+\frac{0.93}{0.91}+\frac{0.92}{0.90}+\frac{0.94}{0.94}}{4}\right)\times 100$ 103.8(2239…)	 M1 A2	*Ignore irrelevant missing zeros for pence throughout* Correct formula and substitution A1 for 4.15(289…)(÷4 ×100)
(ii) Dutot index $\left(\frac{\frac{1.02+0.93+0.92+0.94}{4}}{\frac{0.92+0.91+0.90+0.94}{4}}\right)\times 100$ 103.8(147..)	M1 A2	Correct formula and substitution, both ÷4 may be omitted, however if ÷3 shown in the formula M0 A1 for 3.81/ 3.67 (×100) or 0.9525/ 0.9175 (×100)
		If no marks then • *for answers from inverting substitution, SC1 for Carli 96.46… or 96.5, and SC1 for Dutot 96.325…* • *for answers from showing ÷3, SC1 for Carli 138.3… or 138.4.., and SC1 for Dutot 103.8..(or 104 from 1.27÷1.22(33…)*
(b) 3.8(%) AND 3.8(%)	B1	FT for their difference from 100 provided at least 1 mark awarded in each of (a)(i) and (a)(ii) Accept any indication of this knowledge
(c) Indicates that the division by the number of supermarkets on the numerator and the denominator are common and can be cancelled or omitted	E1	(Allow in words)
	8	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications
FOUNDATION TIER

A.M. THURSDAY, 19 June 2014

1 hour 30 minutes

4362
010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

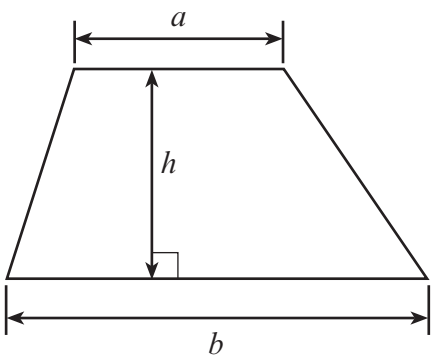
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**9**	
3.	**4**	
4.	**5**	
5.	**4**	
6.	**4**	
7.	**7**	
8.	**7**	
9.	**4**	
10.	**6**	
11.	**7**	
12.	**9**	
13.	**8**	
Total	**80**	

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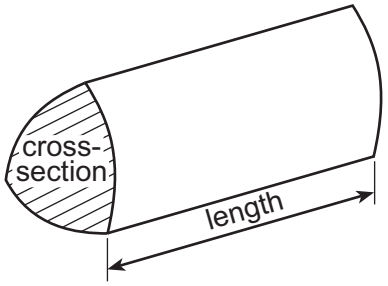
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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Examiner only

1. Elina carried out a survey of 30 people to find out which vegetable, from a choice of cabbage, peas, broccoli and sprouts they liked the most.
Her results are as follows.

Cabbage	Cabbage	Peas	Peas	Sprouts	Sprouts
Peas	Cabbage	Peas	Sprouts	Peas	Peas
Broccoli	Sprouts	Cabbage	Sprouts	Peas	Peas
Peas	Peas	Peas	Cabbage	Sprouts	Cabbage
Cabbage	Peas	Cabbage	Broccoli	Broccoli	Peas

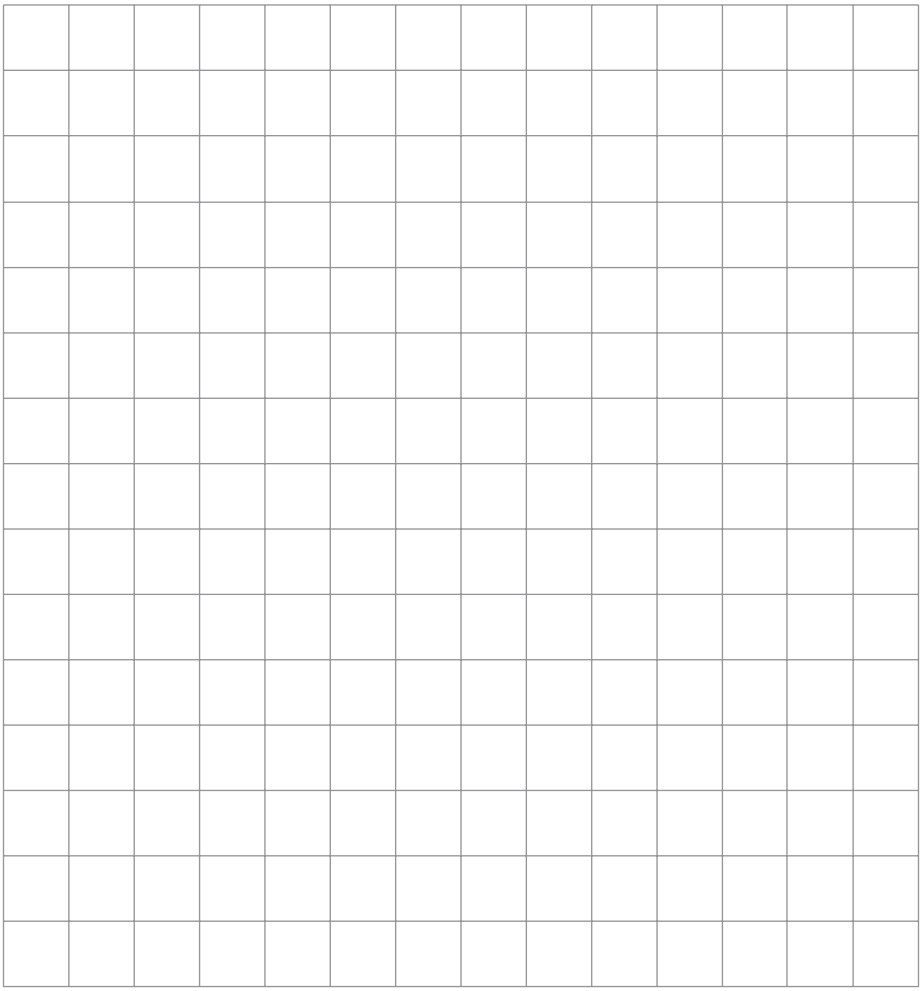
Use the data to draw a suitable bar chart on the squared paper below. [6]

.....

.....

.....

.....



4362 010003

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Examiner only

2. *You will be assessed on the quality of your written communication in this question.*



A fashion store buys 200 bracelets for £6.30 each.
The store sells 60% of the bracelets for £9.99 each.
The remaining bracelets are later sold at a reduced price of £3.98 each.
How much profit or loss did the fashion store make?
You must show all your working. [9]

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3.



The above picture shows a car outside a house.

Write down an **estimate** for the **actual height** of the car .....

Write down an **estimate** for the **actual height** of the house.
You must show all your working. [4]

.....

.....

.....

.....

.....

.....

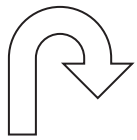
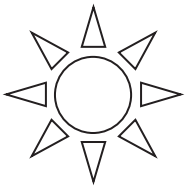
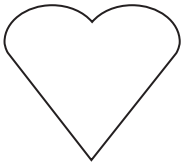
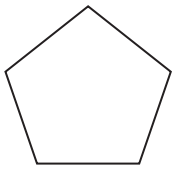
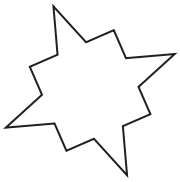
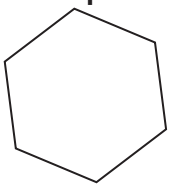
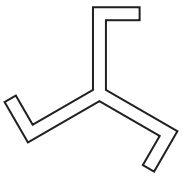
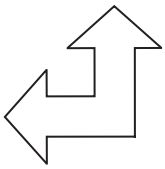
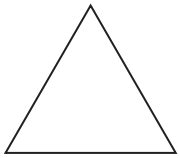
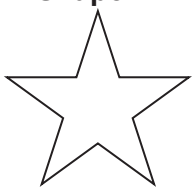
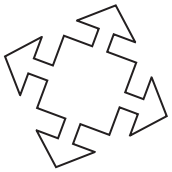
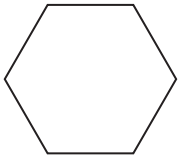
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4. In a game, Carwyn is asked to select pairs of shapes from the cards given below.

Shape A 	**Shape B** 	**Shape C** 	**Shape D** 	**Shape E** 
Shape F 	**Shape G** 	**Shape H** 	**Shape I** 	**Shape J** 
Shape K 	**Shape L** 	**Shape M** 	**Shape N** 	**Shape P** 

He must select his shapes using given conditions. [5]

Condition 1: Select a pair of shapes that have rotational symmetry of order 3.

Shape ..... and Shape .....

Condition 2: Select a pair of shapes that have exactly 4 lines of symmetry.

Shape ..... and Shape .....

Condition 3: Select a pair of shapes that are congruent.

Shape ..... and Shape .....

Condition 4: Select a pair of shapes that are similar but not congruent.

Shape ..... and Shape .....

Condition 5: Select a pair of shapes that do not have rotational symmetry.

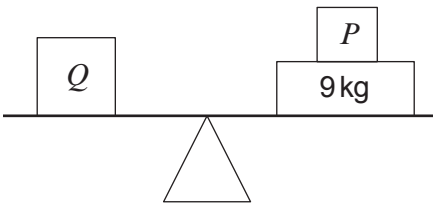
Shape ..... and Shape .....

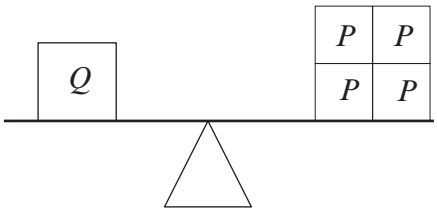
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5. Packages P and Q balance as shown in the diagrams below.





Find the weight of package P and the weight of package Q. [4]

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6. In a sports club, a fitness coach was asked about 4 different measurements.

Circle the appropriate quantity that you think the coach should give for each measurement. [4]

Weight of a man	900 g	900 kg	90 mg	90 kg
Length of a rugby pitch	122 cm	122 m	122 mm	122 km
Capacity of a bottle of water	75 cl	75 litres	75 cm^3	7·5 litres
Speed of a sprinter over 100 metres	90 km/hr	9 mph	9 m/s	90 m/s

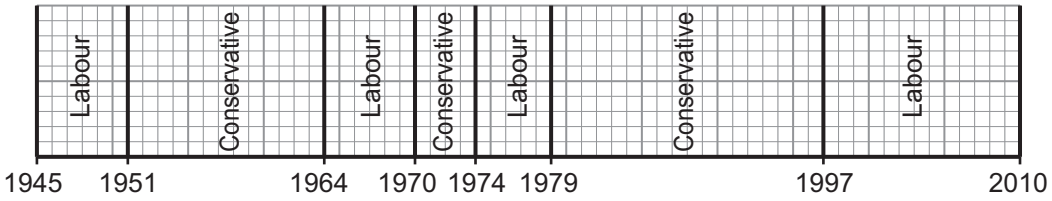
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7. Anna is interested in the political parties which have governed the UK.

The time line shows the election years in which there was a change in the political party in government in the UK from 1945 to 2010.



(a) Which political party governed the UK [1]

- from 1945 to 1951, ...
- in 1973? .....

(b) Use the time line above to find the total number of years that each political party was in government between 1945 and 2010. [3]

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Conservative: ..... years Labour: ..... years

(c) For what fraction of the total number of years shown in the time line did Labour govern the UK? [2]

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(d) In the UK, there is no specific date during the year for holding an election. Explain how this could affect your answers in parts *(b)* and *(c)*. [1]

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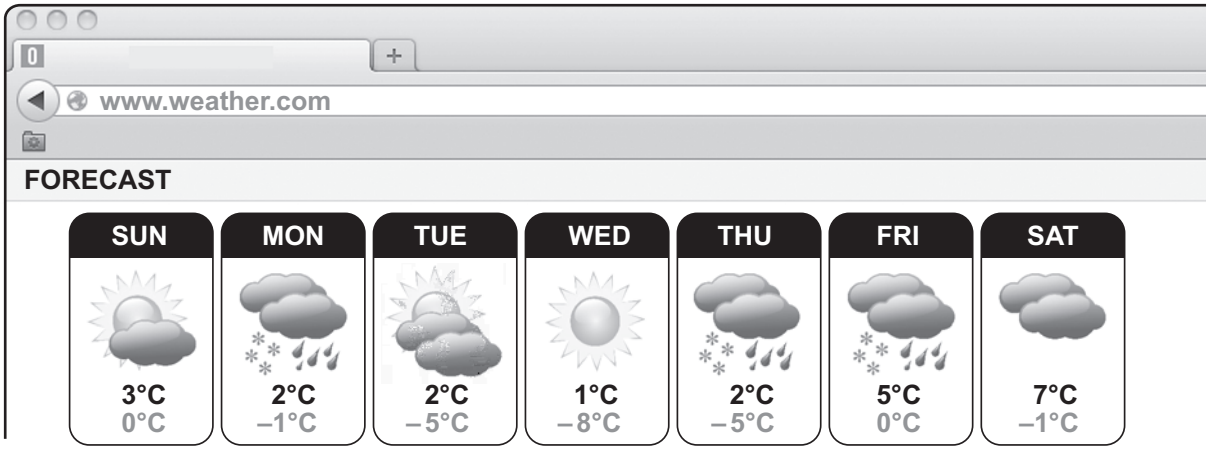
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8. Jessie went to Canada on a snowboarding holiday.



(a) A website shows the weather forecast for the highest and lowest daily temperatures for the week in Canada.



(i) What is the lowest temperature shown for the week? [1]

.....

(ii) What is the difference between the highest and lowest temperatures shown for the week? [1]

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(b) (i) Before going on holiday, Jessie changed £800 into Canadian dollars ($).
The exchange rate was £1 = $1.59.
How many dollars did she receive? [2]

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(ii) Whilst on holiday she paid $456 for a lift pass to go snowboarding.
Use the same exchange rate to calculate the value of the lift pass in pounds.
Give your answer to the nearest pound. [3]

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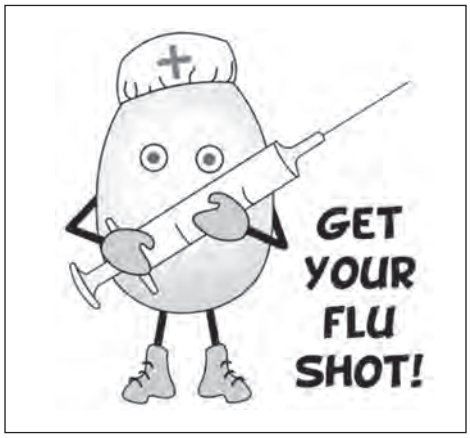
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9.



Doctors recommend that you should have a flu vaccination if you:

- are over the age of 65 or
- are a diabetic or
- have a chest condition or
- are pregnant.

Use the table to decide which of the following people should or should not have the flu vaccination.

Personal details
Denise is 12 years of age and is a diabetic.
Jack is an old-aged pensioner who suffers from bronchitis, which is a chest condition.
David is a 43 year old fitness instructor.
Alys is expecting her first child at the age of 27.

You must:

- consider **each** person;
- give a reason why **each** person should or should not have the flu vaccination.

Write your answers in the table below. [4]

	Should have flu vaccination? Yes or No	**Reason**
Denise		
Jack		
David		
Alys		

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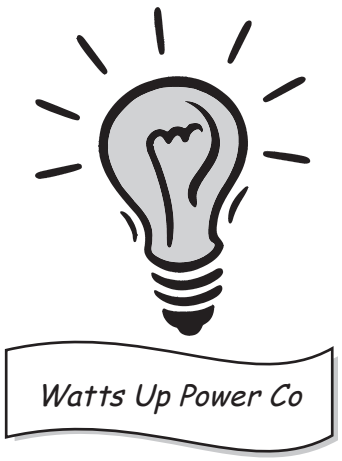
10. The company *Watts Up Power Co* supplies electricity to Mr Davies.

The company charges 24.7 pence per unit of electricity used and 31 pence per day.

Mr Davies' electricity meter readings at the beginning and at the end of a 92 day period were 13488 and 14399 respectively.

Calculate how much the company charges Mr Davies in total for the 92 day period.
Give your answer correct to the nearest penny.

You must show all your working. [6]



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11.

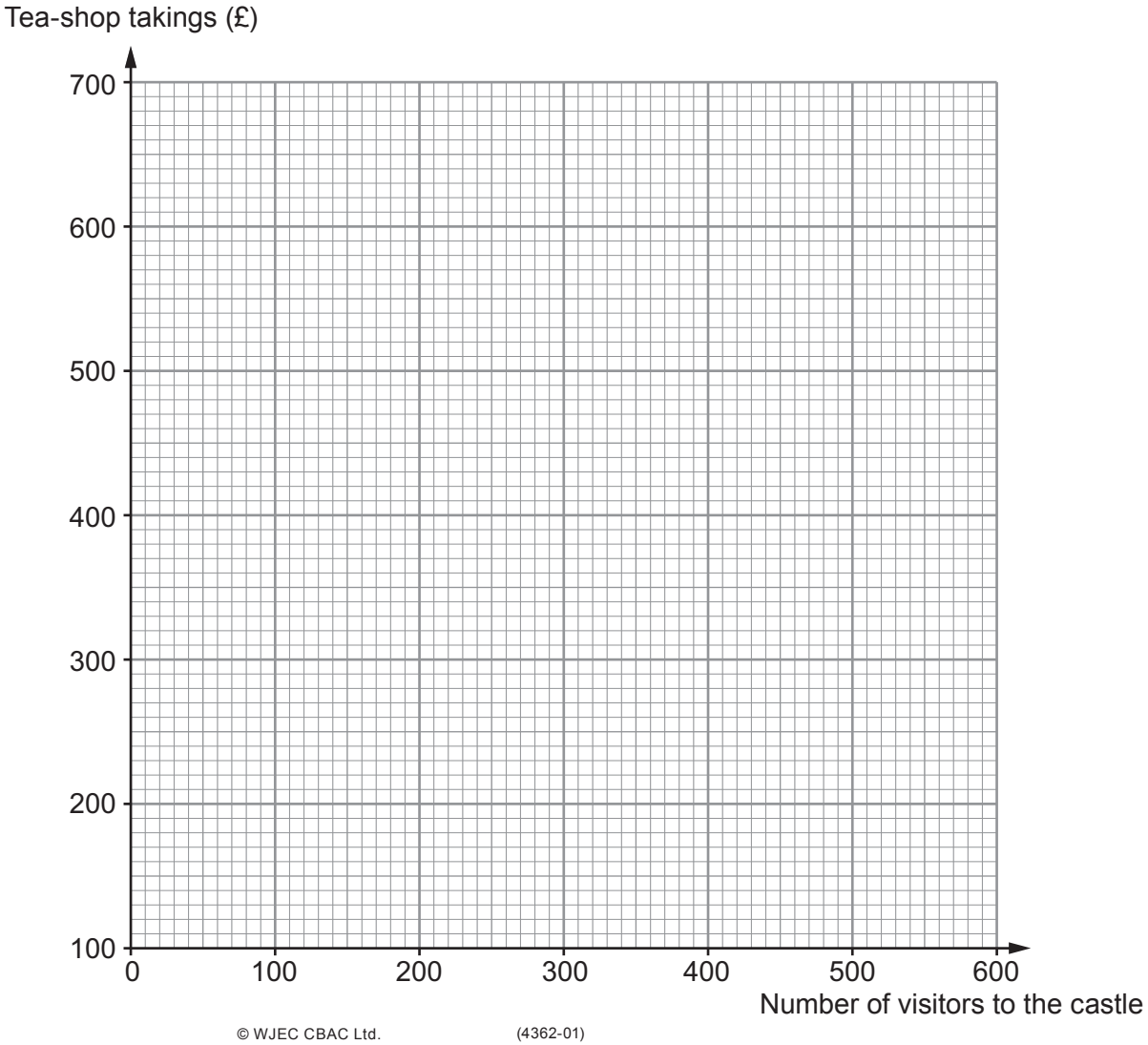


The manager of a tea-shop at a castle kept some records every day for 7 days.
The manager recorded:

- The number of visitors to the castle.
- The total money taken at the tea-shop.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of visitors to the castle	120	180	400	320	460	550	420
Tea-shop takings (£)	150	230	500	380	560	660	490

(a) On the graph paper provided, draw a scatter diagram of these results. [2]



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(b) Draw, by eye, a line of best fit on your scatter diagram opposite. [1]

(c) Describe the correlation between the number of visitors to the castle and the tea-shop takings. [1]

.....

(d) The manager of the tea-shop states,

'My records tell me that each visitor to the castle spends more than £1 each at the tea-shop.'

(i) Explain why the manager might have come to this conclusion. [2]

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(ii) The statement is not necessarily true.
Explain why this statement may not be true. [1]

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12.





(a) Selwyn used a stem-and-leaf diagram to record the prices of two makes of suitcases on display in a luggage shop.
Selwyn's stem-and-leaf diagram is shown below.

Subidas		Dinkey
7 1	8	1 5
6	7	2 5
8 7	6	1 6 7
6 3	5	4 4 4
6 2 2 1	4	5

Key: Subidas 3 | 5 means £53
Dinkey 5 | 4 means £54

(i) What is the price and make of the most expensive suitcase? [1]

Price: £ .....

Make: .....

(ii) Complete the following table. [4]

	Median in £	Range in £	Mode in £
Subidas			
Dinkey			

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(iii) On average, which make of suitcase is the more expensive?
You must give a reason for your answer. [1]

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(b) The luggage shop owner has illustrated, in a pictogram, the number of suitcases sold in a week.



Key:  is 20 suitcases

(i) Selwyn looks at the pictogram and says,

'The number of suitcases sold on Sunday was 40% higher than the number of suitcases sold on Wednesday.'

Is Selwyn correct?
You must show all your working to justify your answer. [2]

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(ii) Looking at the pictogram again, Selwyn says,

'More money was spent on buying suitcases in this shop on Sunday than on any other day.'

Is Selwyn correct?
You must give a reason for your answer. [1]

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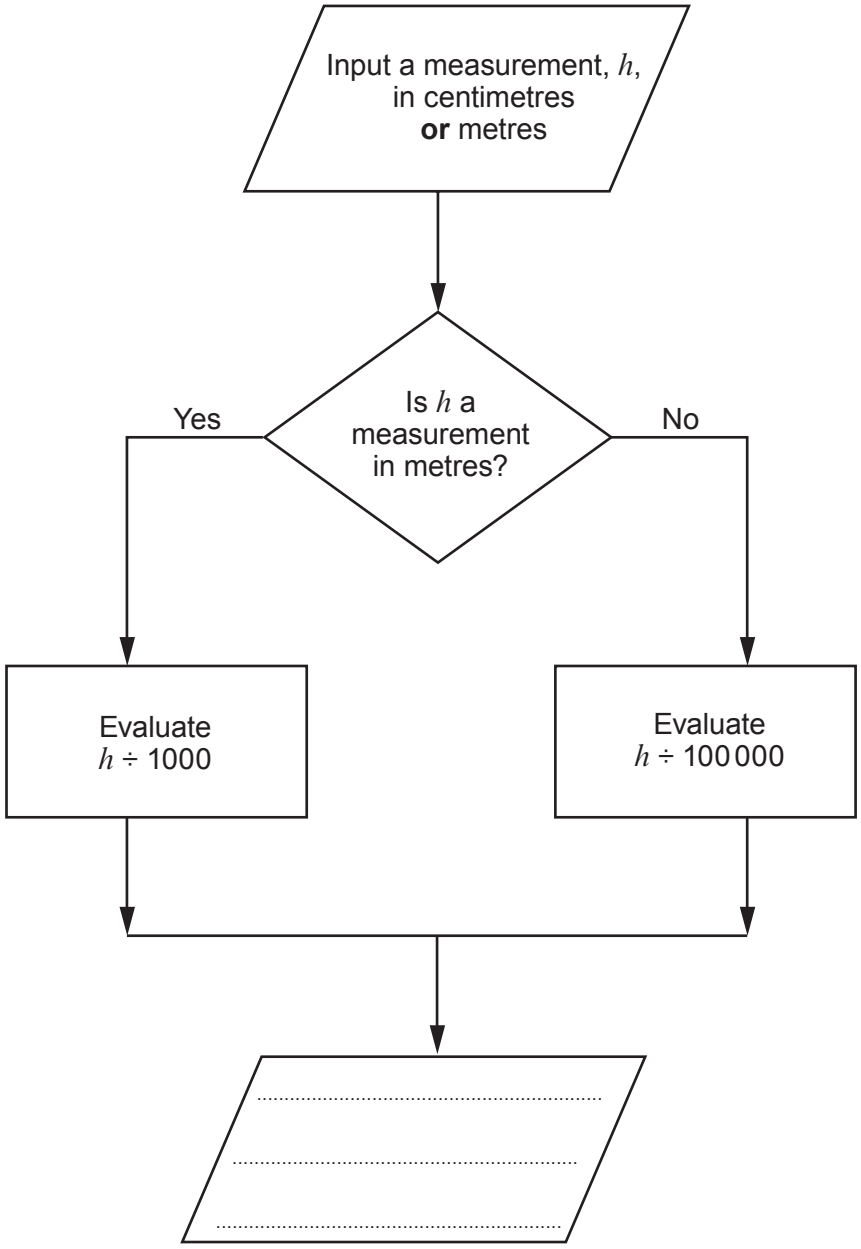
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13. *(a)* The following is a section of a flowchart.



What would this section of the flowchart be used for?
Give an example of what might be written in the output box. [2]

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(b) In the box below construct a section of a flowchart that would:

- Allow input of whole numbers
- Add 1 to any odd number
- Not change even numbers
- Allow the output of only even numbers. [6]

END OF PAPER

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2014

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2014 examination in GCSE APPLICATIONS OF MATHEMTICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 1 - Foundation Tier	1
Unit 1 - Higher Tier	5
Unit 2 - Foundation Tier	10
Unit 2 - Higher Tier	15

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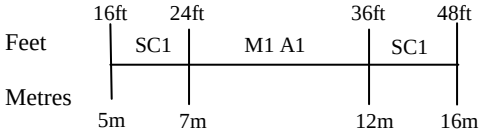
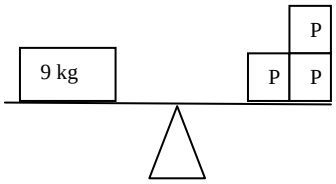
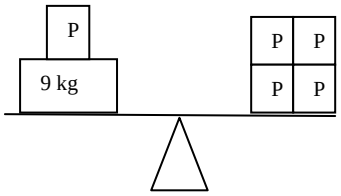
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UNIT 2 (FOUNDATION TIER)

Applications Unit 2 Foundation Tier June 2014	Mark	Comment
1. Cabbage 8, Peas 13, Sprouts 6, Broccoli 3	B2	May be inferred from their bar chart. B1 for any two/three correct frequencies. If frequencies score 0, then give B1 for all 4 correct tallies.
Both axes labelled, e.g. frequency or number of people along one axis and Cabbage, Peas, Sprouts, Broccoli along the other axis (or on the bars), anywhere within the base (inc) of the corres. bar AND uniform scale for the frequency axis starting at 0.	B2	B1 if no scale but allow one square to represent 1 OR B1 if not labelled as 'frequency' or similar. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. **<u>Condone frequency numbers alongside square instead of at the top of the squares.</u>**
Four bars at correct heights (bars must be of equal width). Can be in any order.	B2 6	FT their frequencies throughout. FT their scale. B1 for any 2 or 3 correct bars on FT.
2. (Cost of bracelets) (200 × 6.30) (£)1260 (number of bracelets sold at higher price) 60/100 × 200 120 (sale of 120 bracelets) (120 × (£)9.99 =) (£)1198.8(0) (sale of 80 bracelets) (80 × (£)3.98 =) (£)318.4(0) (sale of all 200 bracelets) (£)1517.2(0) (Profit of) (£)257.2(0)	B1 M1 A1 B1 B1 B1 B1	FT 'their 120' FT 200 –' their 120' but not 120 FT 'their 120 × (£)9.99' + 'their 80 (but not 120) × (£)3.98' FT 'their 1260' AND 'their 1517.2(0)'
Look for • Spelling • Clarity of text explanation • the use of notation, watch for the use of '=', '£', 'pence' being appropriate For QWC2 labels, appropriate use of '=' and units (£) must be evident. QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	QWC 2 9	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

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Applications Unit 2 Foundation Tier June 2014	Mark	Comment
3. (b) Car 4ft to 6ft OR 1.2m to 2m Car 2.5(cm) house 15(cm) Multiplying factor = 6 OR Multiplying factor if door used = 3.75 (allow 3.7 – 3.8) Height of house = Car's estimate × their SF (4 to 8) OR height of house = Door's estimate × their SF (1.75 to 5.75) = *correct answer for their figures* For B0(or B1), B0, M0, A0 <u>Award SC1 for answers which:</u> • only give car's height as 2.5 cm **and** height of house as 15 cm **OR** • proper attempt at 'dividing' the height of the house into equal parts.	B1 B1 M1 A1 4	 FT if height of door is used to estimate the height of the house instead of height of car. Door 4(cm) house 15(cm) FT their car's estimate AND scale factors 4 to 8 inc Correct units (feet or metres) must be seen at least once to get the final A1 Unsupported answers mark as follows (Candidates may be awarded the first B1 mark too): 
4. H and L F and N G and P B and K Any 2 shapes from A, C, D and I	B1 B1 B1 B1 B1 5	Order of letters not important
5. Two numbers or letters such that Q – P = 9 or Q = 9 + P Two numbers or letters such that Q = 4P P = 3 (kg) Q = 12 (kg)	 B1 B1 B1 B1 4	*Alternative method* For B2 first diagram OR P + P + P = 9  OR for B1 second diagram OR P + 9 = P + P + P + P 
6. (a) Weight of a man 90 kg Length of a rugby pitch 122 m Volume of a bottle of water 75 cl Speed of a sprinter over 100 metres 9 m/s	B1 B1 B1 B1 4	

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Applications Unit 2 Foundation Tier June 2014	Mark	Comment
7. (a) Labour AND Conservative (b) Conservative OR Labour 13 + 4 + 18 OR 6 + 6 + 5 + 13 Conservative 35 (years) Labour 30 (years) (c) $^{30}/_{65}$ (ISW) (d) Explanation relating to number of years not being exact.	B1 M1 A1 A1 B2 B1 7	 Answers of 35 for Conservative or 30 for Labour implies M1 FT 65 – 'their Conservative' or FT 'their Labour'. FT 'their conservative + Labour' as denominator. There must be a consistent FT for numerator and denominator, e.g. if Labour given as 29 and answer given as 29/65 award B1 only. B1 for denominator of 65 or B1 for numerator of 30 in a fraction less than 1. Award B1 for 30 out of 65 OR 0.46(1538461) E.g. 'One year could be May, another year in December' OR '1945 to 1951 could be anything from 5 to 7 years' OR 'could be at different times within a year'.
8. (a) (i) -8(˚C) (ii) 15(˚C) (b) (i) 800 × 1.59 ($) 1272 (dollars) (ii) 456 ÷ 1.59 = (£)287	B1 B1 M1 A1 M1 A2 7	Do not accept Wednesday Accept -15(˚C). *Watch for answer to greatest daily range of 9(˚C)* Award A1 for (£)286(.7924528)
9. **P son** / **Should have flu vaccination? Yes or No** / **Reason** Denise / Ye / Is a diabetic Jack / Yes / Is over 65 and/or has a chest condition David / No / Does not meet any requirements or equivalent, OR gives at least 2 reasons for not having the flu jab. Alys / Yes / Is pregnant	B4 4	Award B1 for each correct response and valid reason. Award SC2 for ALL CORRECT reasons with ALL INCORRECT Yes/No. If no marks awarded, award SC1 for Yes, Yes, No, Yes
10. (Units used =) 911 (cost of units =) 911 × 24.7 (÷ 100) (£)225.017 or 22501.7(p) (Charge for days =) (£)28.52 or 2852(p) (Total =) (£)253.537 or 25353.7(p) (Total bill =) (£) 253.54 or 25354(p)	B1 M1 A1 B1 B1 B1 6	CAO FT their number of units if subtraction has taken place. Accept (£)225.02 or 22502(p) If B0 M0 A0 awarded, award SC1 for correct evaluation of their number of units × 24.7 (÷100) FT their figures. Accept rounded or truncated but no mix of units Answer must be rounded correct to the nearest penny. FT any answer that requires rounding and has been rounded correctly and units have not been mixed. If units are given, they must be correct. *Penalise once only for incorrect use of units.*

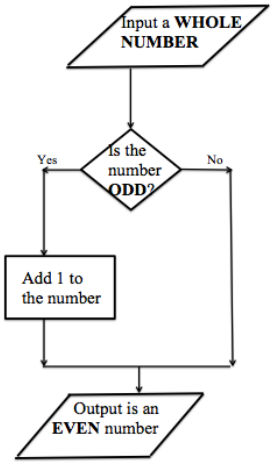
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Applications Unit 2 Foundation Tier June 2014	Mark	Comment
11. (a) All 7 points plotted correctly, not joined	B2	B1 for at least 3 correct plots not joined, or all points plotted correctly but joined
(b) Reasonable straight line of best fit by eye, some points above and below	B1	Do not accept through intersection of the axes
(c) Positive	B1	Accept appropriate descriptions
(d)(i) Example of 'takings' ÷ 'number of visitors' or decision to **compare takings with number of visitors**	B1	
Manager might think 'takings' ÷ 'number of visitors' is valid which always gives a result >£1, or comparison with **conclusion that takings is always greater than number of visitors**	E1	
(ii) Explanation, e.g." 'takings' ÷ 'number of visitors' is not valid because **some visitors may not even visit the tea shop,** (so they spend £0, also some visitors may spend a lot less than £1 and other spending much more than £1)"	E1	Or states that 'takings' ÷ 'number of visitors' is not valid Accept 'some visitors may not spend anything in the tea shop', also accept a reason based on some people spending <£1 and some >£1.
	7	
12. (a)(i) 87 AND Subidas	B1	Do not accept indication on the diagram unless 87 seen
(ii) Median in £ / Range in £ / Mode in £ Subidas: 56 / 46 / 42 Dinkey: 66 / 40 / 54	B4	Median, mode and range correct, OR B3 for 4 or 5 correct entries B2 for 3 correct entries B1 for 1 or 2 correct entries
(iii) **Dinkey** with a valid reason, e.g. refers to the skew of the stem-and-leaf diagram, or compares the modes or medians	E1	Do not accept reason based on range Accept responses where means have been calculated and compared (59.9 & 64.9) Accept comparison of the totals (659 & 714) Do not accept 'On average, Dinkey', as a repeat of the question, however average 'Dinkey because their averages are higher'
(b)(i) 50 × 1.40 (=70) or 2.5 × 1.40 (=3.5) or 90÷1.40 (=64.2857…) or 4.5÷1.40 (=3.2142…) or equivalent	B1	
'Not correct' stated or implied with correct interpretation of their appropriate calculation	E1	Depends on B1 *Alternative:* *Sunday = 90 and Wednesday = 50 leading to either 90/50 or 40/50 B1* *which indicates 80% more sold on Sunday rather than 40% E1* Do not accept 100 × 50/90 = 55.55..% is incorrect, hence B0 'Wednesday sales 55.5…% of Friday sales', is incorrect, hence E0
(ii) Notices that the pictogram is number of cases not prices/costs	E1	Accept 'no' as implied within a suitable explanation
	9	

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Applications Unit 2 Foundation Tier June 2014	Mark	Comment
13. (a) Example, 'output is the measurement in km', or 'conversion to km'	E2	Must have engaged with change of units for E2. E1 for correct but vague responses, e.g. 'measurements are smaller', 'changing units', 'changing measurements' Allow E1 for 'change to metres' or for the idea that is involves conversion
(b) Correct flowchart with appropriate symbols Accept equivalent ways For example,  	B6	Ignore if start/stop 'rounded rectangle' missing. Accept shapes not drawn using a ruler. Mark as follows: B1 Shape of boxes –Decision boxes shown as rhombus, non-decision boxes as rectangle, input/output boxes shown as parallelograms B1 for including entry of a **whole number** B1 for correct use of **'is it odd?'** or equivalent question B1 **Yes/No** labelled to appropriate next step B1 for following on from odd numbers to '**add 1**' B1 Bringing back together **and** including 'output of even number' or 'output number' *Do not accept flowchart based on checking numerically only without being generic, although it may be possible to award B1, B0, B0, B1, B0, B0*
	8	

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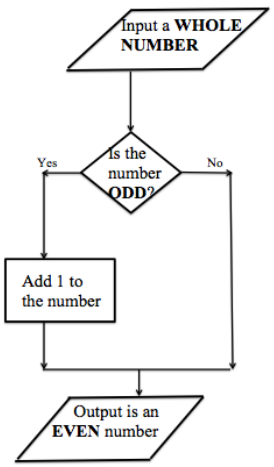
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UNIT 2 (HIGHER TIER)

Applications Unit 2 Higher Tier June 2014	Mark	Comment
1. 1 Pyramid Cubit — **25.027** inches, 3dp. 1 Pyramid Inch — **2.543** cm, 4 sig. fig.	B2 B2 4	B1 for sight of 25.0(2711688) rounded or truncated B1 for sight of 2.5(42755075008) rounded or truncated *If no marks SC1 for evidence of 25×1.001(08…) AND 2.54 × 1.001(08…)*
2(a)(i) (=) B2 + C2 or sum(B2:C2) or sum(B2,C2)	B1	Or equivalent through percentage
(ii) (=) 100 * B3/D3 or 100 * B3/(B3+C3) or equivalent correct alternatives	B2	B1 for sight of B3/D3 or through MR 100 * C3/D3 Accept × for *, and ÷ for /
(b) (Total carbohydrate in 360g pack is) 64.5 × 360÷100 (Number of bars found by) ÷15.48 (Number of bars) 15 (bars)	M1 M1 A1	Method may be shown in either order *Alternative method:* *(Weight of one bar is)* *15.48 × 100÷64.5 (=24g) M1* *(Number of bars)* *360 ÷24 M1 FT 'their 24'* *(Number of bars)* *15 (bars) A1*
Look for: • Calculations linked to text • Units given as appropriate, g or 'bars' • Spelling • Final statement QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps **AND** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps **OR** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(c) (Carbohydrate =) 85 × 64.5(0) ÷100 54.8 or 54.82 or 54.83 or 55 (g)	M1 A2 11	A1 for 54.825
3(a) All 7 points plotted correctly, not joined	B2	B1 for at least 3 correct plots not joined, or all points plotted correctly but joined
(b) Reasonable straight line of best fit by eye, some points above and below	B1	Do not accept through intersection of the axes
(c) Positive	B1	Accept appropriate descriptions
(d)(i) Example of 'takings' ÷ 'number of visitors' or decision to **compare takings with number of visitors** Manager might think 'takings' ÷ 'number of visitors' is valid which always gives a result >£1, or comparison with **conclusion that takings is always greater than number of visitors**	B1 E1	
(ii) Explanation, e.g." 'takings' ÷ 'number of visitors' is not valid because **some visitors may not even visit the tea shop,** (so they spend £0, also some visitors may spend a lot less than £1 and other spending much more than £1)"	E1 7	Or states that 'takings' ÷ 'number of visitors' is not valid Accept 'some visitors may not spend anything in the tea shop', also accept a reason based on some people spending <£1 and some >£1.

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Applications Unit 2 Higher Tier June 2014	Mark	Comment
4(a)(i) 87 AND Subidas	B1	Do not accept indication on the diagram unless 87 seen
(ii)	B4	Median, mode and range correct, OR B3 for 4 or 5 correct entries B2 for 3 correct entries B1 for 1 or 2 correct entries
(iii) **Dinkey** with a valid reason, e.g. refers to the skew of the stem-and-leaf diagram, or compares the modes or medians	E1	Do not accept reason based on range Accept responses where means have been calculated and compared (59.9 & 64.9) Accept comparison of the totals (659 & 714) Do not accept 'On average, Dinkey', as a repeat of the question, however average 'Dinkey because their averages are higher'
(b)(i) 50 × 1.40 (=70) or 2.5 × 1.40 (=3.5) or 90÷1.40 (=64.2857…) or 4.5÷1.40 (=3.2142…) or equivalent	B1	
'<u>Not correct</u>' stated or implied with correct interpretation of their appropriate calculation	E1	Depends on B1 *Alternative:* *Sunday = 90 and Wednesday = 50 leading to either 90/50 or 40/50 B1* *which indicates 80% more sold on Sunday rather than 40% E1* Do not accept 100 × 50/90 = 55.55..% is incorrect, hence B0 'Wednesday sales 55.5…% of Friday sales', is incorrect, hence E0
(ii) Notices that the pictogram is number of cases not prices/costs	E1	Accept 'no' as implied within a suitable explanation
	9	
5(a) Example, 'output is the measurement in km', or 'conversion to km'	E2	Must have engaged with change of units for E2. E1 for correct but vague responses, e.g. 'measurements are smaller', 'changing units', 'changing measurements' Allow E1 for 'change to metres' or for the idea that is involves conversion
(b) Correct flowchart with appropriate symbols Accept equivalent ways For example,  	B6	<u>*Ignore if start/stop 'rounded rectangle' missing.*</u> Accept shapes not drawn using a ruler. <u>Mark as follows</u>: B1 Shape of boxes –Decision boxes shown as rhombus, non-decision boxes as rectangle, input/output boxes shown as parallelograms B1 for including entry of a **<u>whole</u> number** B1 for correct use of **'is it odd?'** or equivalent question B1 **Yes/No** labelled to appropriate next step B1 for following on from odd numbers to '**add 1**' B1 Bringing back together **and** including 'output of even number' or 'output number' *Do not accept flowchart based on checking numerically only without being generic, although it may be possible to award B1, B0, B0, B1, B0, B0*
	8	

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Applications Unit 2 Higher Tier June 2014	Mark	Comment
6(a)(… the) cost of a sandwich in pence AND (… the) cost of a drink in pence	B2	Do not accept 'sandwiches' and 'drinks' need 'cost'('price') and unit 'pence' B1 if correct (cost) but 'in pence' omitted, or for either statement correct, or for '*sandwiches in pence and drinks in pence'* B0 for 'sandwiches' and 'drinks'
(b) Method, e.g. equal coefficients Correct first variable Method to find 2nd variable, e.g. substitution Correct second variable	M1 A1 m1 A1	Allow 1 slip in non-equalised variable $x = 180$ or $y = 90$
(c) Idea that £1.68 is 112% Start of a correct method 1(.)68/1(.)12 (×100 ×10) 1 box costs (£)15	B1 M1 A1 9	For the division of correct digits, not place value An answer of (£)1.5(0) implies B1, M1, A0
7(a)(i) (diagonal base^2 =) $230^2 + 230^2$ diagonal base^2 = 105800 or diagonal base = $\sqrt{105800}$	M1 A1	diagonal base = 325.269…., ½ diagonal base = 162.63… or $115\sqrt{2}$
path^2 = (½ diagonal base)^2 + 146^2 path^2 = 47766 or path = $\sqrt{47766}$ Path 218.6 or 218.5(543…) (m)	M1 A1 A1	FT ½ their diagonal base, but not 230 or 115 Must be for correct ½ diagonal base used Accept 218 or 219 from correct working *Alternative for the 1st 3 marks:* *path² = 115² +115² +146²* *M3* *OR* *115² +115²* *OR 115² +146²* *M1* *= 26450* *OR* *= 34541* *A1* *path^2 = 26450 + 146^2 OR path^2 = 34541 + 115^2* *M1*
(ii) tan e = 146/ '½diagonal' or sin e = 146/path or cos e = '½diagonal'/path e = 41(.9…°) or 42(°)	M1 A2	FT throughout for their '½ diagonal' and their 'path' for M1 only CAO. A1 for e = $\tan^{-1}0.8977…$ or $\sin^{-1}0.668…$, or $\cos^{-1}0.744…$
(b) 7/15.4 = x/17.6 or x = 17.6 ÷ 2.2 or equivalent (side on smaller triangle x =) 8 (cm) y = 2.2 × 11 or y/11 = 15.4/7 or equivalent (side on larger triangle y =) 24(.2 cm)	M1 A1 M1 A1 12	For a correct first step For a correct first step
8(a) Line $d+p = 25$ drawn correctly Line $3d+2p= 60$ drawn correctly The correct region indicated	B1 B1 B1	FT their inequalities for similar region provided at least 1 line is correct
(b) Any correct point from the correct region, using whole numbers only	B1 4	FT from 2 lines with at least one line drawn correctly and similar region Do not accept *p*(lates) = 0
9. Considering (1 dollar =) 1÷ 1.29(= 0.7751938 euros) Considering(1 dollar =) 1 ÷ 1.61 (= £0.62111801…) Realising (£)1 ÷ 1.61 = 1÷ 1.29 (euros) ((£)1 = 1.61 × 1÷ 1.29 =) 1.24(8 euros) OR 1.25(euros)	B1 B1 M1 A1 4	Award B1, B1, M1 for sight of 1.61 ÷1.29
10. Π × 1.8^2 × 142/360 OR Π × 3.6^2 × 142/360 Π × 3.6^2 × 142/360 - Π × 1.8^2 × 142/360 Answer 12(cm^2) or answers in the range 12.03 to 12.05 (cm^2)	B1 M1 A1 3	Seen in working Or equivalent

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Applications Unit 2 Higher Tier June 2014	Mark	Comment
11(a) $5.2/100 \times 450$ or 0.052×450 or $23.4(0)$ $(1 + 0.052)^4 \times 450$	B1 M1	May be embedded in further calculation Method of adding on different amounts , 4 year period, following attempts to calculate 5.2% Example of working without truncation or rounding: *(450+23.4(0) =473.4(0)* *473.4(0) + 24.6168 = 498.0168, 498.01 or 498.02* *498.0168 + 25.8968736 = 523.9136736* *523.9136736 + 27.24351.. = 551.15718…)* *Accept 551.15(7….)* *B1 and SC1 for depreciation 363.45(099..), but no FT for a conclusion* *Simple interest answer of 543.6(0) is awarded only the B1*
(£) 551.16	A1	
Conclusion, e.g. 'Yes as more than £550'	E1	FT from their compounded amount provided M1, and FT from simple interest from an answer of 543.6(0) being < 550
(b)(i) 0.068 (ii) Greater AND a reason, e.g. 'interest is accumulated through the year (each three months)'	B1 E1	CAO
(iii) Use of $n = 4$ $(1 + 0.068/4)^4 - 1$ AER 6.98(%)	B1 M1 A2	Correct substitution in the formula given A1 for 0.06975373… rounded or truncated, or incorrect rounding or truncation of the AER percentage. Mark final answer (box takes priority)
(iv) Explanation, based on need for fair comparison of interest rates	E1 11	Allow 'percentage of interest paid annually', must mention 'year' or 'annual'
12(a)(i) All 5 plots accurate (taking into account accuracy difficulty of plotting) AND joined with a curve	B3	B2 for plots generally accurate for the first 2 seconds with an attempt at the others, but not joined by a curve (or joined by straight lines), OR B1 for (2500,) 1875, 1406.25, 1054.6(875), 791.0(15625) or (2500,) 1875, 1406, 1055 (or 1054), 791 (or 790) *SC1 for (2500) 625, 156.25, 39.0625, 9.76.. plotted AND joined with a curve*
(ii) From their graph	B1	
(b) $f = m \times 3^5/4^5$ or $f = 243m/1024$ or $f = m \times 0.75^5$ or $f = m \times 0.237304687$	B3 7	B2 for an expression, or $f = m/4^5$, $f = m/1024$, $f = m \times 0.25^5$, or $f = m \times 0.0009765625$, or equivalent OR B1 for evidence of m **repeatedly** being multiplied by: ¾, divided by 4 or multiplied by 0.75 or 0.25 i.e. more than once, OR sight of or 243/1024 or 0.237304687 or 1024 or 0.0009765625

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Applications Unit 2 Higher Tier June 2014	Mark	Comment
13(a)(i) $3000 \div 60$ $= 50$ l/min. or 50 litres per minute	M1 A1	 Units must be given for A1 Accept 50 bottles/min
(ii) 3000×12 or 36000 3.6×10^4	M1 A1	 If no marks SC1 for 7.2×10^4
(b)(i) Use of: Cylinder + hemisphere = $\pi r^2 h + \frac{2}{3}\pi r^3$ Use of 1 litre = 1000ml or 1litre = $1000cm^3$ Realising $1000 = \pi \times 4^2 \times h + \frac{2}{3} \times \pi \times 4^3$	B1 B1 S1	 Accept use of 1 instead of 1000, and 8 instead of 4. Mark for the idea of how h can be found, but may have errors in substitution.
$h = \frac{1000 - \frac{2}{3} \times \pi \times 4^3}{\pi \times 4^2}$	M1	For the isolation of h. Accept FT for equivalent level of difficulty, e.g. with 1 instead of 1000, 8 instead of 4. Not for accuracy, for isolation, which may be seen in parts.
Height of cylinder, 17.2 (cm) Answers in the range 17.2 to 17.24(cm)	A1	CAO. Accept 17.3 as rounding up is appropriate Only accept 17(cm) from correct working
Overall inside height 21.2(cm) or 21(cm)	B1	FT 'their 17.2' + 4 correctly evaluated provided at least B1, S1 and M1 awarded in (i)
(ii) Reason, e.g. 'may not be able to fill to the top', 'measurements may be at lower bounds', 'need an air gap at the top of the bottle'	E1 11	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications

FOUNDATION TIER

A.M. THURSDAY, 23 January 2014

1 hour 30 minutes

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010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**14**	
2.	**4**	
3.	**4**	
4.	**4**	
5.	**9**	
6.	**20**	
7.	**2**	
8.	**6**	
9.	**6**	
10.	**11**	
Total	**80**	

The number of marks is given in brackets at the end of each question or part-question.

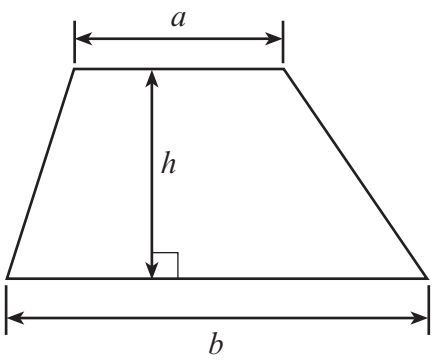
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **6***(a)*.

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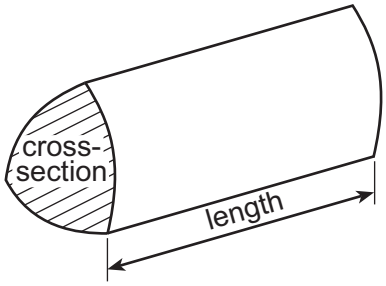
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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Examiner only

1. Chris is planning a charity bike ride.



(a) Chris has to buy some new equipment so that he can take part in the bike ride.

He sees the following items on the Internet.

Pair of Shorts £40.50 	Pair of Gloves £22.49 	Water Bottle £6.12 
Pair of Shoes £79.95 	Helmet £56.50 	Sunglasses £20.79 

(i) Chris buys a pair of gloves, 3 water bottles, a pair of shoes and 2 pairs of shorts. Complete the following table to show his bill for these items. [4]

Item	Cost
Pair of gloves	£22.49
3 water bottles	£
Pair of shoes	£
2 pairs of shorts	£
Total	£

(ii) The Internet company gives Chris a 5% discount of his total bill. How much discount does the company give Chris? [2]

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(iii) How much does Chris pay for his items after the discount has been given? [1]

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(b) The bike ride has 4 stages.

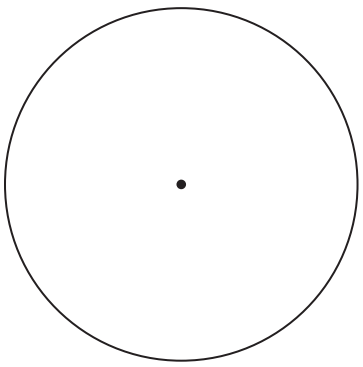
Stage 1: Cardiff to Swansea
Stage 2: Swansea to Aberystwyth
Stage 3: Aberystwyth to Brecon
Stage 4: Brecon to Cardiff

The distances, in km, between the places are shown in the following table.

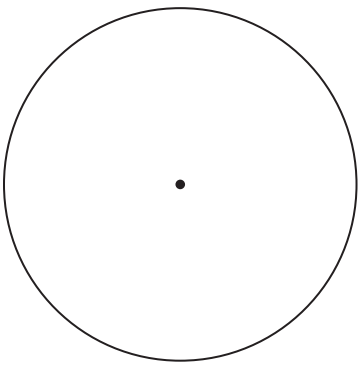
Cardiff			
66	**Swansea**		
188	121	**Aberystwyth**	
67	70	102	**Brecon**

Calculate the total distance of the bike ride. [2]

(c) The wheels of Chris' bike have spokes.
Each spoke is in the position of a radius.
The name of the manufacturer of the tyres is on the arc of the tyre.
Draw a radius and an arc on the circles below. [2]



Radius



Arc

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(d) All the people who entered the charity bike ride had to state the type of bike that they would be riding. The results are shown below.

Type of bike	Number of people	Frequency
Mountain	𝍸	3
Touring	𝍸 ||	7
Road	𝍸 𝍸 |	11
Hybrid	||||	4

Use this data to draw a suitable bar chart on the squared paper below. [3]



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2.



The above picture shows a train.

Write down an **estimate** for the actual height of a door. .....

Using this estimate for the height of a door, estimate the **actual length** of the train.
You must show all your working. [4]

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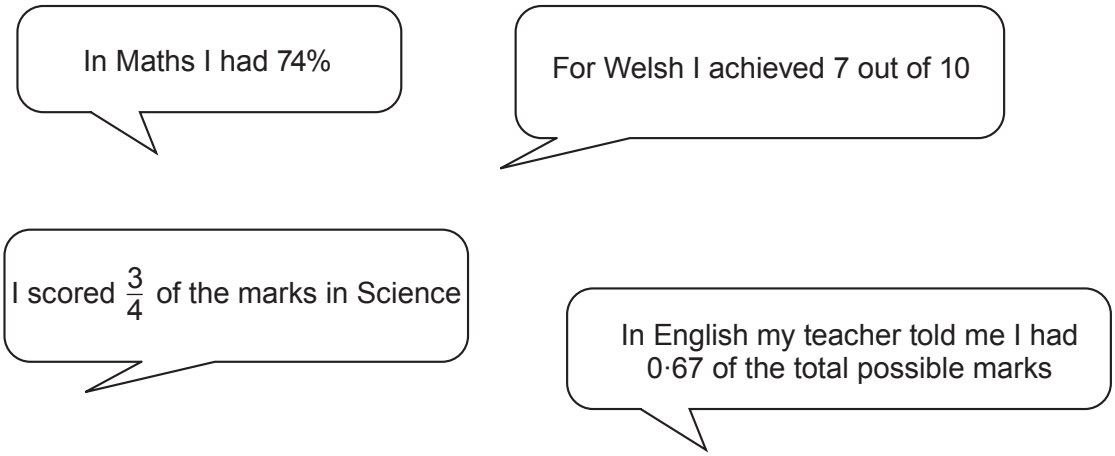
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3. At the end of term, Rhys had tests in four of his subjects.
This is what he said about his results.



(a) For Rhys to compare all of his results he needs to write them as percentages.
Change his results into percentages and complete the table below. [3]

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Subject	Result as a percentage
Mathematics	74%
Welsh	
Science	
English	

(b) In what subject did Rhys have the highest percentage? [1]

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4. *(a)* **Set up** an equation and **solve** it to find the value of x. [2]

When 15 is added to x, the answer is 21.

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(b) **Set up** an equation and **solve** it to find the value of y. [2]

When y is multiplied by 3, the answer is 27.

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5. Joseph went on a 7 day skiing holiday to Sweden.



(a) Before going on holiday, Joseph changed £700 into Swedish kroner (kr).
The exchange rate was £1 = 11 kr.
In Sweden he spent 6194 kr.
Using the same exchange rate, find how much money, in £, he brought home.
Give your answer correct to the nearest penny. [6]

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(b) The mid-day temperature, on the ski slope, was recorded over the seven days of Joseph's holiday.

The recorded temperatures for six of those days are shown below.
The mid-day temperature on Thursday was 3°C colder than on Wednesday.

(i) Complete the table for Thursday. [1]

Day	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Mid-day Temperature°C	–9	–7	–2	–1	1		–5

(ii) Which day had the lowest mid-day temperature? ..... [1]

(iii) What was the difference between the highest and lowest mid-day temperatures? [1]

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6. The North Western Spa Hotel has a sport and leisure complex.



(a) You will be assessed on the quality of your written communication in this part of the question.

The sport and leisure complex offers four types of membership.

Membership	Joining Fee	Cost
Type A	£50	£34.99 per month
Type B	None	£39 per month
Type C	£30	£30 per month for the first 3 months, then £37.99 each month
Type D	None	One payment of £449 for the year

Annie wishes to join the sport and leisure complex for a year.

- Calculate the cost of each type of membership for a year.
- What type of membership is the cheapest for Annie?
- What possible disadvantage could there be with Annie choosing the cheapest type of membership?

You must show all your working. [9]

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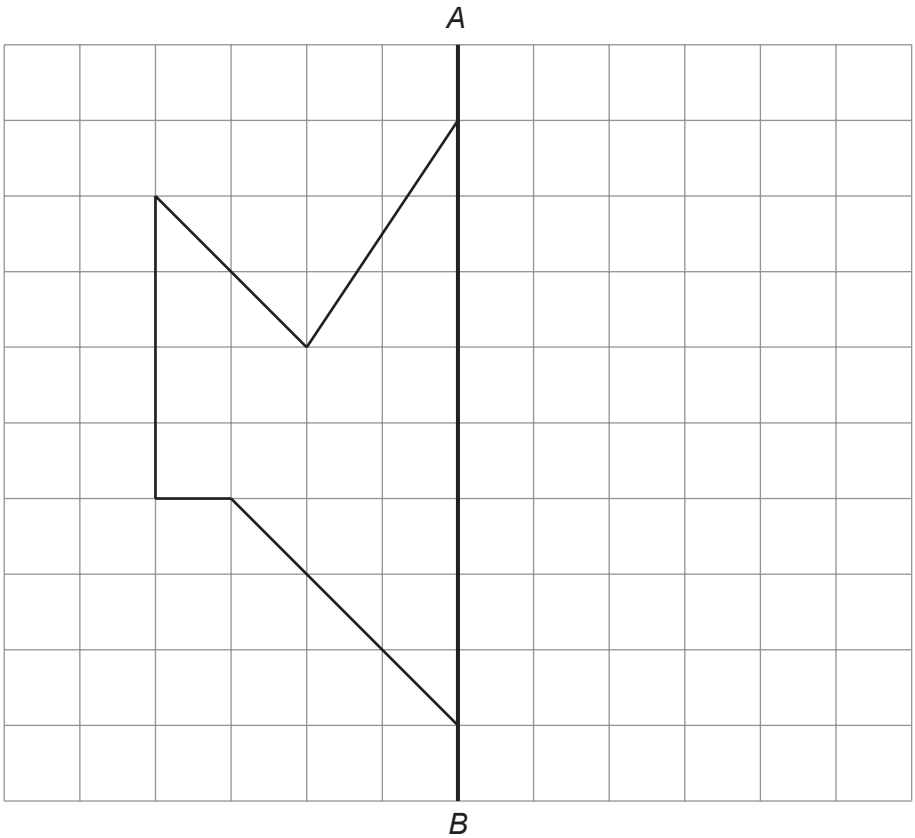
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(b) The hotel has decided to create a new logo that has a line of symmetry. Complete the new logo so that *AB* is the line of symmetry. [2]



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(c) The hotel records the number of members who use the sport and leisure complex from Monday to Friday during the morning in one particular week.
The following table shows this data.

Day	Number of members
Monday	62
Tuesday	56
Wednesday	38
Thursday	30
Friday	54

Draw a pie chart to illustrate these results.
You should show how you calculate the angles of your pie chart. [4]

Working:

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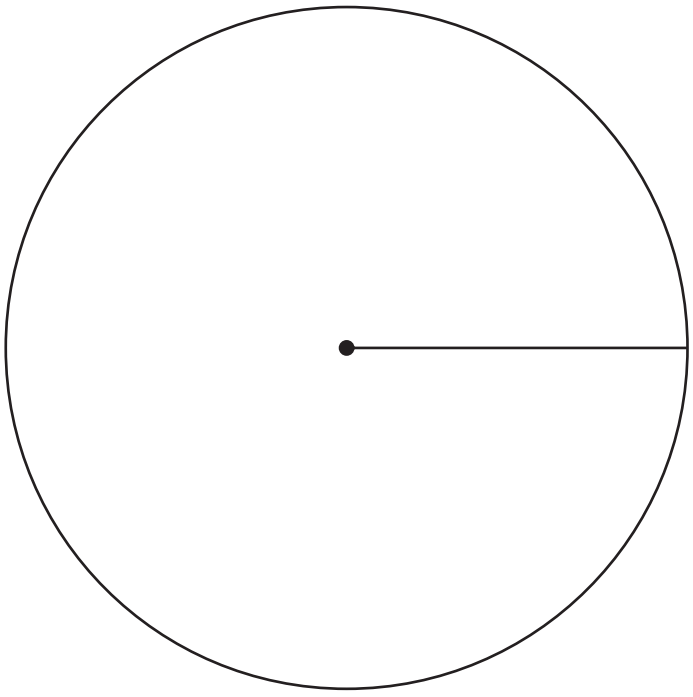
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(d) Bath salts, for the hotel rooms in the North Western Spa Hotel, are packaged in boxes. Each box is in the form of a cube with all edges 5 cm in length.

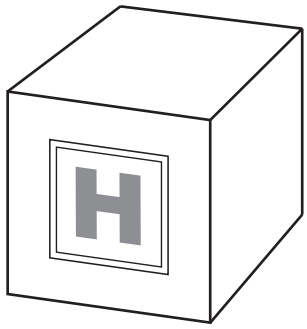


Diagram not drawn to scale

These boxes of bath salts are kept in storage containers.
Each storage container is in the shape of a cuboid with internal measurements 20 cm by 15 cm by 30 cm.

What is the maximum number of boxes of bath salts that can fit into a storage container? You must show all your working. [5]

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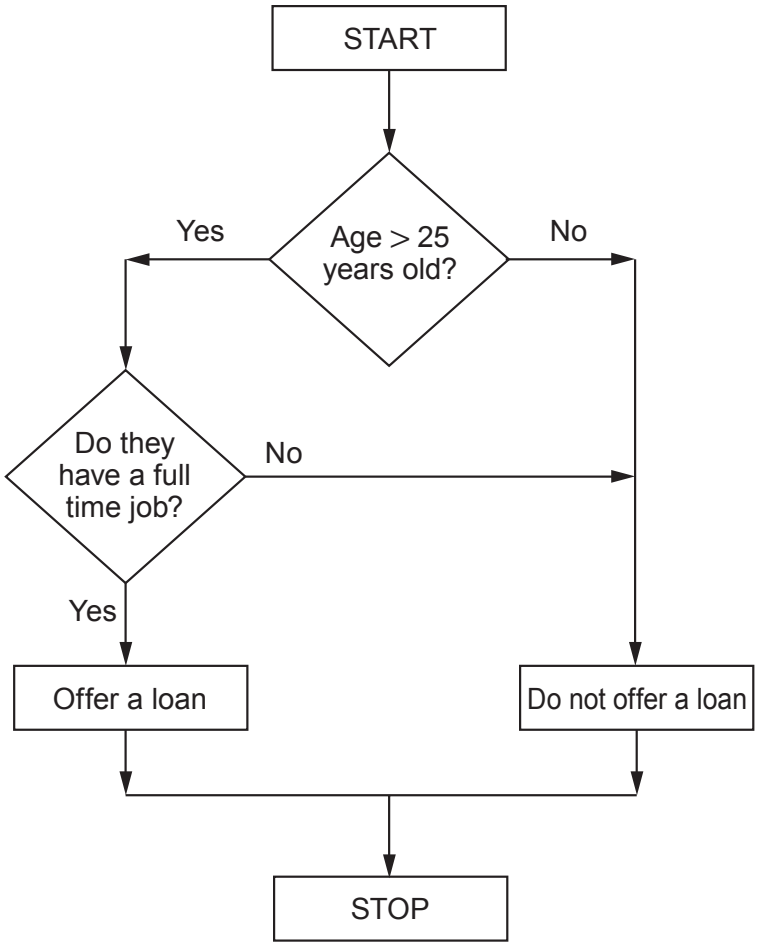
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Turn over.

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7. A bank uses this flowchart to decide if a customer would be offered a loan.



Which of the people below would **NOT** be offered a loan by the bank? [2]

- Mr Roberts, aged 45 working one evening per week as a salesman
- Miss Evans, aged 25 working full time as a nurse
- Mr Thomas, aged 26 working full time as a mechanic
- Miss Abbott, aged 26 working part time as a plumber
- Mr Brett, aged 86 retired
- Miss White, aged 42 working full time as a teacher

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8.

Ingredients to make
4 pancakes



55 g plain flour
1 egg
100 ml milk
37·5 ml water
25 g butter

Useful information, metric and imperial units:

4 ounces is approximately 110 g
25 ml of milk or water is approximately 1 fluid ounce

(a) Using the recipe shown above, calculate the quantity of plain flour needed to make 48 pancakes. **Give your answer in ounces.** [3]

(b) Jerry works in a school kitchen.
She uses the recipe information for pancakes shown above.
She has measured out the plain flour, milk and butter and placed them with the eggs in a large bowl.
Jerry measures out 150 fluid ounces of water to add to her other pancake ingredients in the bowl.
How many pancakes is Jerry making? [3]

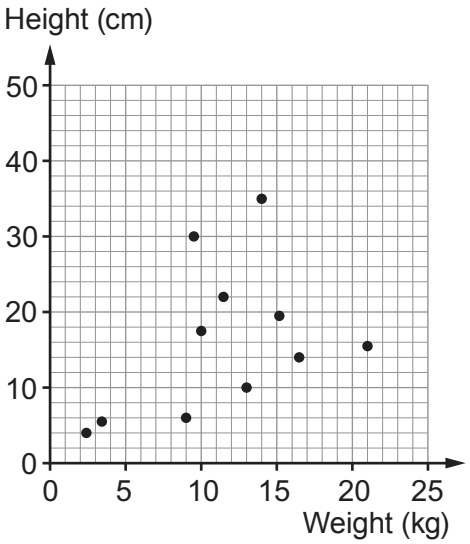
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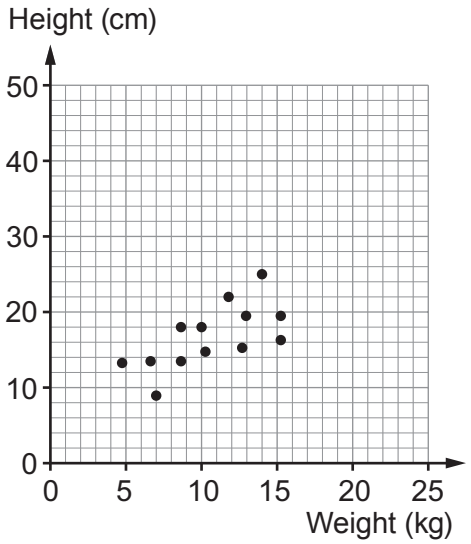
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9. Bethany and Michelle have both completed a project about pets.
They weighed and measured the heights of a number of pets.
They each drew a scatter diagram showing their results.

Bethany's scatter diagram



Michelle's scatter diagram



(a) One of the girls' scatter diagrams shows weights and heights of pet cats, dogs and hamsters.
The other girl's scatter diagram shows weights and heights of only pet cats.

Which of the girls, Bethany or Michelle, considered only pet cats?
Give a reason for your answer. [1]

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.....

(b) Draw a line of best fit, by eye, on Michelle's scatter diagram. [1]

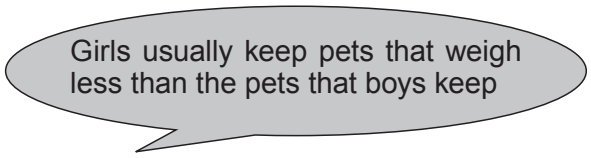
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(c) Carl also completed a project about pets.
He decided to weigh all his friends' pets.

Carl says



The stem-and-leaf diagram shows the results of Carl's survey.

Weight of boys' pets (kg)		Weight of girls' pets (kg)
2 1	4	
1 1	3	2
3 2 1	2	2 3 5 9 9
5 3	1	1 3 4 6 8
8 7 4 2 2 2	0	7 9

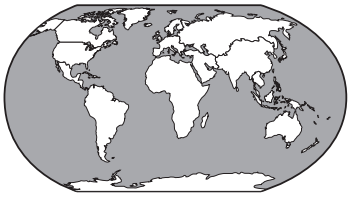
Key: Boys' pets 3 | 2 means 23 kg
Girls' pets 3 | 2 means 32 kg

By finding each of the mode, median and range for the weights of the boys' pets and the weights of the girls' pets, decide if Carl is correct.
You must show all your working and give a reason for your decision. [4]

Examiner only

10.

FREE-WORLD TRAVEL



(a) *Free-world Travel* is due to publish a summary report about people and their holidays in their newsletter.
One hundred *Free-world Travel* customers are completing a short questionnaire about their holidays as shown below.

Holiday questionnaire

1. What is your age? .....
2. How many holidays have you had this year? .....
3. How many days have you spent on holiday in total this year? .....
4. What type of holiday do you prefer? .....

A data-collection sheet is to be used to summarise the data.

(i) Design a data-collection sheet that could be used to summarise the customers' responses.
You must plan to group the data when appropriate. [4]

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(ii) Why is grouping data useful when collating data? [1]

.....

.....

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.....

(b) *Free-world Travel* charges each customer £130 for travel insurance.
Last month, *Free-world Travel* had 6000 customers.

Free-world Travel has previously noticed that 80% of its customers buy holiday insurance.
Of these customers, approximately 30% claim on their travel insurance.
Free-world Travel typically pays out between £400 and £500 for each claim.

Free-world Travel needs to estimate how much profit or loss they are likely to make from travel insurance last month.
Calculate this estimate.
You must show all your working. [6]

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END OF PAPER

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2014

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

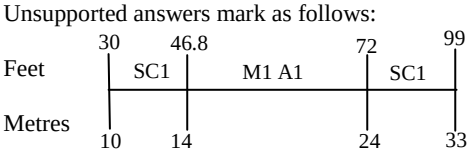
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 2 Foundation Tier	10
Unit 2 Higher Tier	14

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APPLICATIONS UNIT 2
FOUNDATION TIER

Applications Unit 2 Foundation Tier January 2014	Mark	Comment
1. (a)(i) 18.36 79.95 81(.00) 201.8(0) (ii) $\frac{5}{100}$ × 'their 201.8(0)' (£)10.09 (iii) (£)191.71 (b) 66 + 121 + 102 + 67 356 (km) (c) Correct indication of Radius Arc (d) Labels on both axes Uniform scale on vertical axis All bars correct	B1 B1 B1 B1 M1 A1 B1 M1 A1 B1 B1 B1 M1 A1 14	 FT if no more than one error FT their total from(i) Accept rounded or truncated answers to 2dp from FT FT "their 201.8(0)" – "their 10.09" provided of equivalent difficulty CAO. Ignore incorrect units. Bars must have correct heights and equal widths
2. Door 6ft to 9ft OR 1.8m to 3m Door 1.5 (cm) train 11.7 - 12 (cm) (±2mm) Multiplying factor = 7.5 - 8 Length of train = Door's estimate × their SF (5 to 11) *= correct answer for their figures* Award SC1 for answers which: • only give door's height as 1.5cm **and** length of train between 11.7 and 12 cm (±2mm) **OR** • a proper attempt at 'dividing' the length of the train into equal parts.	B1 B1 M1 A1 4	 FT their door's estimate AND scale factors 5 to 11 inc For this A1 we need correct units (feet or metres) either explicitly shown or implied by their figures. Unsupported answers mark as follows: 
3. (a) (b) Science	B3 B1 4	Award B1 for each correct answer FT their completed table of percentages in (a)
4. (a) $x + 15 = 21$ (x =) 6 (b) $3y = 27$ (y =) 9	B1 B1 B1 B1 4	Accept $15 + x = 21$ or $21 = 15 + x$ or $21 - 15 = x$ or equivalent but not $x = 6$ Accept embedded answers for this B1. Accept $3 \times y = 27$ or $y \times 3 = 27$ or $y = 27/3$ but not $y = 9$ Accept embedded answers for this B1

Subject	Result as a %
Mathematics	74(%)
Welsh	**70(%)**
Science	**75(%)**
English	**67(%)**

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Applications Unit 2 Foundation Tier January 2014	Mark	Comment
5.(a) 700 × 11 = 7700 (kr) Left 1506 (kr) 1506 ÷ 11 = (£)136.91	M1 A1 B1 M1 A2	 FT "their 7700" FT "their 1506" provided not 6194 Award A1 for (£)136.90(9090…) or (£)137 *Alternative marksheme* *6194 ÷ 11 M1* *= (£)563.09 A2 Award A1 for 563.0909….* *700 – 563.09 M1* *(£)136.91 A2* *Award A1 if answer not to nearest penny*
(b)(i) (Thursday) -2 (°C) (ii) Saturday (iii) 10(°C)	B1 B1 B1 9	 Do not accept -9 Accept -10. FT from their Thursday temperature if lowest or highest.
6. (a) (Type A =) (£)50 + 12 × (£)34.99 = (£)469.88 (Type B =) (12 × (£)39 =) (£)468 (Type C =) (£)30 + 3 × (£)30 + 9 × (£)37.99 = (£)461.91 (Cheapest =) type D Suitable explanation e.g " She could get injured and would lose all the money if she doesn't go" "a lot of money to lose if she doesn't enjoy it or doesn't go regularly" "easier to pay in instalments" " a lot of money in one go" " she has to pay £449 in one payment" etc Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £ being appropriate) Notes: QWC2 requires words throughout the response not just connected to the final answer. QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 B1 M1 A1 B1 E1 QWC 2	 FT their calculations FT provided a suitable explanation given QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b) Correct diagram	B2	B1 for complete shape with only 1 incorrect vertex or for sight of all correct vertices (may be joined incorrectly or not joined at all)
(c) 4 or 5 angles correct and correctly labelled. 4 or 5 angles correct, labels not fully correct. 2 or 3 angles correct and correctly labelled. 2 or 3 angles correct, labels not fully correct. 1 angle correct and correctly labelled.	B4 OR (B3) (B3) (B2) (B1)	Use the correct overlay and allow ±2°. Correct labels (Words NOT the frequency OR angle) 4 correct labels are enough. If only B1 is scored for the diagram and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks.

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Applications Unit 2 Foundation Tier January 2014	Mark	Comment
OR If 0 OR 1 for their diagram or no diagram. 360/240 Angles are 93, 84, 57, 45, 81. (d) For intention to divide all dimensions by 5 4, 3 & 6 4 × 3 × 6 72	 (M1) (A1) M2 A1 M1 A1 20	If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 1.5° gets the M1 OR SC1 for all the correct percentages 25.8%, 23.3%, 15.8%, 12.5%, 22.5% M1 for intention to divide 1 or 2 of the dimensions by 5 FT their 4, 3 & 6 provided at least two of 4, 3 & 6 are correct *Alternative method* *Volume of box* 5^3 *OR Volume of container* $20 \times 15 \times 30$ *M1* $125\ (cm^3)$ *A1* $9000\ (cm^3)$ *A1* *Number of boxes* $9000 \div 125$ *M1** $= 72$ *A1* ** FT provided at least one of the volumes is correct*
7. Indicates: Mr Roberts, Miss Evans, Miss Abbott, Mr Brett	B2 2	Accept any unambiguous indication B1 for at least 3 correct and no more than 1 incorrect
8. (a) Use of ×48÷4 or ×12 OR realising 55g is 2oz (12 × 55) ÷110 × 4 OR 2 × 12 OR equivalent correct calculation 24 (ounces) (b) 150 fl oz = 150 × 25 (ml) (=3750 ml) 1 pancake 37.5/4 (= 9.375) ml water OR notices 3750 is 100 × amount given in the recipe (3750/9.375 OR 100 × 4 =) 400 (pancakes)	B1 M1 A1 M1 M1 A1 6	(2 oz for 4 pancakes, so 2 × 12) OR 3750÷37.5 = 100
9. (a) Choice and reason, e.g. 'Michelle because of correlation', 'Michelle because no very short animals' (b) Line of best fit on Michelle's scatter diagram (c) Statement, e.g. 'Carl **not** correct as both the mode and the median are greater for girls' pets', 'Carl not correct as the mode for girls is greater and the range is not helpful'	E1 B1 B3 E1 6	Accept 'all close together' Appropriate direction with some points above and below the straight line B2 for 4 or 5 correct B1 for 2 or 3 correct *Ignore any extra calculations of the means.* Accept statement which includes the means Depends on previous award of at least B2 Statement must include reference to mode, or median (and range) Accept 'Carl is not correct as the girls' mode is higher', 'Carl is not correct as the girls' median is higher' Accept 'Carl is correct as the range is greater and the medians are similar', must refer to median **and** range

	Mode	Median	Range
Boys' pets	(0)2	15	40
Girls' pets	29	18	25

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Applications Unit 2 Foundation Tier January 2014	Mark	Comment
10.(a)(i)		Throughout (a) at least 3 response groups or response options are needed as appropriate, any given groups must not overlap or have gaps
Age: Use of non-overlapping groups and no gaps in groups for ages	B1	
Number of holidays: Use of non-overlapping groups and no gaps in groups given, or list of numbers to indicate (need not start at 0)	B1	
Number of days: Use of non-overlapping groups and no gaps in groups not exceeding 365 days	B1	
Type of holiday: List some types (perhaps with option for others), e.g. beach, city break, camping, activity, ..	B1	
(ii) Reason, e.g. 'helps summarise', or 'smaller number of categories to manage', or 'can't list them all'	E1	
(b) (Value of insurance sales =) 6000 × 0.8 × 130	M1	
(£) 624000	A1	
(Number of customers claiming =)	M1	
6000×0.8×0.3(=1440)	B1	Must be a single value
(Typical claim taken as £)450	m1	FT 'their 450' between 400 and 500 inclusive
(Amount paid out in claims 1440 ×450 = £) 648000	B1	Do not accept 24000
Loss and (£)24000 or –(£)24000		FT provided M1, M1, m1 awarded Use of 400 gives 48000 profit, 500 gives 96000 loss, the final 3 marks are then B0, m1, B1 *If 400 & 500 (or 2 other extreme amounts)both considered and then summarised, with equivalent working then all of the final 3 marks may be awarded.*
	11	

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APPLICATIONS UNIT 2
HIGHER TIER

Applications Unit 2 Higher Tier January 2014	Mark	Comment
1. Indicates: Mr Roberts, Miss Evans, Miss Abbott, Mr Brett	B2 2	Accept any unambiguous indication B1 for at least 3 correct and no more than 1 incorrect
2(a)(i) Suitable explanation demonstrating knowledge that the size must be increased to be identical (ii) Suitable explanation demonstrating knowledge that similar means same shape / angles, e.g. 'not the same shape', 'one is in italics' (b) States, e.g. 'turn around through half turn', 'turn upside down' (c) Use of either 5/7 or 7/8 5/7×7/8 5/8 (=35/56) or equivalent	E1 E1 E2 B1 M1 A1 7	e.g. ' double the size', 'enlarge' Do not accept if response implies that they must be the same size Accept 'Rotation (through) 180°' E1 for either turn / rotation or half turn / 180° Do not accept 'flipped' unless 2 appropriate stages are described Accept 0.625 Mark final answer If no marks, SC1 for (2/7 × 1/8 =) 2/56 or in decimals *Alternative:* *1 – (2/7 + 5/7 × 1/8) B1, M1*
3(a) Choice and reason, e.g. 'Michelle because of correlation', 'Michelle because no very short animals' (b) Line of best fit on Michelle's scatter diagram (c) Statement, e.g. 'Carl **not** correct as both the mode and the median are greater for girls' pets', 'Carl not correct as the mode for girls is greater and the range is not helpful'	E1 B1 B3 E1 6	Accept 'all close together' Appropriate direction with some points above and below the straight line B2 for 4 or 5 correct B1 for 2 or 3 correct *Ignore any extra calculations of the means.* Accept statement which includes the means Depends on previous award of at least B2 Statement must include reference to mode, or median (and range) Accept , for example 'Carl is not correct as the girls' mode is higher' Accept 'Carl is correct as the range is greater and the medians are similar', must refer to median **and** range
4(a) Use of ×48÷4 or ×12 OR realising 55g is 2oz (12 × 55) ÷110 × 4 OR 2 × 12 OR equivalent correct calculation 24 (ounces) (b) 150 fl oz = 150 × 25 (ml) (=3750 ml) 1 pancake 37.5/4 (= 9.375) ml water OR notices 3750 is 100 × amount given in the recipe (3750/9.375 OR 100 × 4 =) 400 (pancakes)	B1 M1 A1 M1 M1 A1 6	(2 oz for 4 pancakes, so 2 × 12) OR 3750÷37.5 = 100
5(a) 1220.18 ÷ 1.69 (= 722 (litres)) AND ÷ 4.55 (= 158.681319… (gallons)) AND × 42.9 6810 (miles) (b)Appropriate use of either 1 litre = $1000cm^3$ or $1m^3 = 1000000cm^3$ or $1m^3 = 1000$litres or similar 80 × 1000 ÷ 1000000 or 80 ÷ 1000 or equivalent 0.08 (m^3)	M3 A2 B1 M1 A1 8	Complete method ((1220.18÷1.69)÷4.55)×42.9 M2 for any 2 of the 3 operations suitable, other omitted or incorrect, OR M1 for 1220.18÷1.69, or 42.9÷4.55, or 4.55÷42.9, or 1.69×4.55 A marks depend on M3 A1 for 6807(.42857… miles) or correct from premature approximation

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Applications Unit 2 Higher Tier January 2014	Mark	Comment
6(a)(i) Age: Use of non-overlapping groups and no gaps in groups for ages Number of holidays: Use of non-overlapping groups and no gaps in groups given, or list of numbers to indicate (need not start at 0) Number of days: Use of non-overlapping groups and no gaps in groups not exceeding 365 days Type of holiday: List some types (perhaps with option for others), e.g. beach, city break, camping, activity, .. (ii) Reason, e.g. 'helps summarise', or 'smaller number of categories to manage', or 'can't list them all'	 B1 B1 B1 B1 E1	Throughout (a) at least 3 response groups or response options are needed as appropriate, any given groups must not overlap or have gaps
(b) (Value of insurance sales =) 6000 × 0.8 × 130 (£) 624000 (Number of customers claiming =) 6000×0.8×0.3(=1440) (Typical claim taken as £)450 (Amount paid out in claims 1440 ×450 = £) 648000 Loss and (£)24000 or –(£)24000 Look for • spelling • clarity of text explanations and/or labels • the use of notation (watch for the use of '=', £, % being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 M1 B1 m1 B1 QWC 2 13	Must be a single value FT 'their 450' between 400 and 500 inclusive Do not accept 24000 FT provided M1, M1, m1 awarded Use of 400 gives 48000 profit, 500 gives 96000 loss, the final 3 marks are then B0, m1, B1 *If 400 & 500 (or 2 other extreme amounts)both considered and then summarised, with equivalent working then all of the final 3 marks may be awarded.* QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

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Applications Unit 2 Higher Tier January 2014	Mark	Comment
7(a) 19225/(34400+3100) OR 12540/(26850+2760) 19225/(34400+3100) × 100 AND 12540/(26850+2760) × 100 June stated or implied AND With sight of 51(.2666… %) AND 42(.35… %) (b) $50000 – 3.2 \times 10^4$ or equivalent 1.8×10^4 (c) 24.3(0)×100/135 or 24.3(0)÷1.35 (£)18 (d) $1.7\times10^4 + 1.7\times10^4\times2$ $+ 1.7\times10^4\times2\times2 +$ $1.7\times10^4\times2\times2\times2$ Or equivalent (£) 2.55 $\times10^5$	M1 m1 A1 M1 A2 M1 A1 B2 B2 12	 A1 for 18000 OR $15 \times 1.7 \times 10^4$ B1 for sight of $1.7\times10^4\times2\times2\times2$ or equivalent for the 4th month B1 for 255000 or 25.5×10^4 or 2.5×10^5 from correct working
8(a) P = ns (b) Correct set up for eliminating one variable First variable's value Method to find second variable, FT from their first value Second variable's value	B1 M1 A1 m1 A1 5	Accept P = s×n Allow 1 error in the non equated variable g = 2 and h = 1/2 Award all 4 marks for unsupported correct answers
9.Sight of 305 (litres) Sight of 59.5 (seconds) 305/59.5 5.126 (litres/second)	B1 B1 M1 A1 4	 FT for their max litres (>300) / min time (<60) not 300/60 **Must be rounded to 3dp**

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Applications Unit 2 Higher Tier January 2014	Mark	Comment
10(a) Explains that 'interest is compounded'	E1	
(b)(i) (4.8 ÷ 12 =) 0.4%	B1	
(ii) 200×1.003^5	M1	
(£)203.02 or (£)203.01	A2	A1 for (£)203.01805… or 203 from compound working *Alternative method* *B1 for a correct 0.3% but not 3%* *M1 For the overall method (5 stages of adding different 0.3%).* *Accept inappropriate rounding or truncation for M1only, A0* *(Calculation:* *200* *0.60* *200.60* *0.60(18)* *201.20(18)* *0.60(36054)* *201.805405* *0.60541622* *202.410821* *0.60723246* *203.018053)* Do not ignore subsequent working, penalise -1 If no marks, then SC1 for Simple Interest (£)203.00
(iii)(F3=) (1 + D2 ÷ 100) × B2 or B2 × D2 ÷ 100 + B2 or equivalent	B2	Accept / for division , * for multiplication and ^ for index B1 for evidence of D2÷100, or D2×B2, or 1.012×B2, or 1.012×400 or equivalent B0 for 404.8(0)
(F14=) $(1 + D2 \div 100)^{12} \times B2$ or equivalent	B2	Accept cell E14 for indication of '12'. B1 for sight of power 12 linked to cell D2, or for $(1 + D2 \div 100)^x \times B2$, or (1+D2/100)^12*B2, or (1+D2/100)^E14*B2, or equivalent
	9	or for their formula for F3 with appropriate index provided equivalent difficulty
11(a) r ≥ 5 and c < 2r and 30r + 4c ≤ 300	B4	B3 for any 2 correct inequalities B2 for any 1 correct inequality with at least one other inequality only inaccurate due to incorrect symbol (>, ≥, <, ≤) B1 for any 1 correct inequality, **or** B1 for at least two inequalities only inaccurate due to incorrect symbol (>, ≥, <, ≤)
(b) Line r = 5 drawn correctly	B1	
Line c = 2r drawn correctly	B1	FT their inequalities if possible
Line 30r + 4c = 300 drawn correctly	B1	
The region indicated	B1	CAO
(c) 8 rugs and 15 cushions (giving 8×30 + 15×4)	M1	
(£)300	A1	FT their graph provided at least B2 in (b) 300 alone, without the number of rugs and cushions is M0, A0
	10	

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Applications Unit 2 Higher Tier January 2014	Mark	Comment
12. 5400 = ½ × 9.6 × … × 3(00) …. = (5400 × 2) ÷ (9.6 × 3(00)) or equivalent 3.75 (cm) hypotenuse^2 = 9.6^2 + 3.75^2 hypotenuse = √106.2(225) 10.3(… cm) Confirmation note completed: (9.6 cm), 3.8 (cm), 10.3(cm) and 300(.0 cm)	M1 M1 A1 M1 A1 A1 B1 7	Accept with 3 or 300 Rearrangement Accept 3.7, 3.8 or 4 FT from correct working FT 'their 3.75' provided at least M1 previously awarded Use of 3.7, 3.8, 4 gives 105.85, 106.6, 108.16 Use of 3.7, 3.8, 4 gives 10.288…, 10.32…, 10.4 FT provided all M marks awarded Accept 10.4 instead of 10.3 if FT from appropriate working. *N.B. Confirmation note must be completed for this B1, do not accept seen in working* *If no marks, SC1 for use of their height correctly within Pythagoras' Theorem*
13. Form and use a right angled triangle with base 55cm and height 50 cm Tan x = 50/55 42(°) or 42.3(°)	S1 M1 A3 5	 Or alternative FULL method A2 for 42.27….(°) A1 for tan^{-1} 0.909… or tan^{-1} (50/55)
14. Volume = volume outer cone– volume inner cone = 1/3 × π × 17^2 × 47 - 1/3 × π × 15^2 × 45 3.62 (litres)	S1 M2 A3 6	Accept for their incorrect volumes, but must come from 3D substitution M1 for 1/3 × π × 34^2 × 47 - 1/3 × π × 30^2 × 45 A2 for 3.619… (litres), 3.622…(litres), 3620 (cm^3) or FT from M1 to 14.5 (litres) A1 for answers between 3619 (cm^3) and 3622.7 (cm^3) inclusive or FT from M1 to 14.48(litres), 14.49(litres) or 14500(cm^3) *If no marks, SC1 for both volume expressions or use of 16 and 46 as appropriate within one volume expression*

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications FOUNDATION TIER

A.M. THURSDAY, 20 June 2013

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **6***(a)*.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**15**	
2	**4**	
3	**5**	
4	**5**	
5	**4**	
6	**16**	
7	**6**	
8	**4**	
9	**5**	
10	**9**	
11	**3**	
12	**4**	
TOTAL MARK		

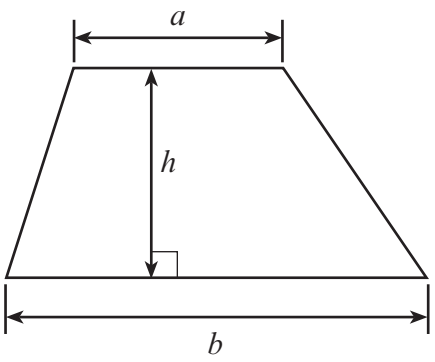
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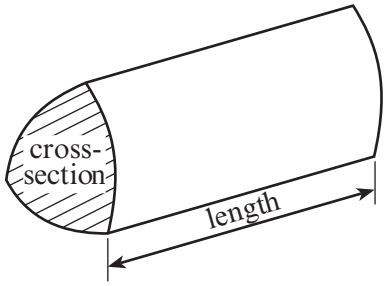
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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1. Maurice runs the French Café.
He wants to place an order for the goods that he sells.
The costs of the goods are shown below.

		
Croissants 10 pence each	Cheese £6.92	Pain au chocolat 32 pence each
		
Coffee £1.52	Bread 99 pence each	Jam £1.24

(a) (i) Complete the order for Maurice to find the total cost of the goods.

Goods	Quantity	Cost
Croissants	15	£ 1.50
Cheese	1	£
Pain au chocolat	10	£
Coffee	4	£ 6.08
Bread	10	£ 9.90
Jam	5	£
	TOTAL COST	£

[4]

(ii) The company, which supplies Maurice's goods, offers him a discount of 15% of the total cost of his order.
How much discount does he receive?

.....

.....

[2]

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(b) Maurice sells the pains au chocolat for 62 pence each.
Melodie has £5 to buy as many pains au chocolate as she can from Maurice.

(i) How many pains au chocolat can Melodie buy?

.....

.....

.....

[2]

(ii) How much change will she receive?

.....

.....

.....

[1]

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(c) The following table shows the number of drinks that Maurice sold on a Saturday morning.

Drink	Tea	Coffee	Fizzy Drink	Orange Juice	Bottled water
Number sold	12	16	20	7	11

Draw a graph or chart to display this information. [4]

(d) Maurice knows that 7 boxes of bottled water will cost him less than £65.

What is the greatest possible cost of one box of bottled water?
Give your answer to the nearest pound.

.....

.....

[2]

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2. Every week, Sarah does her family shopping on the Internet. She has to be careful to order things in the correct quantities.

The following table shows the items and quantities that Sarah has ordered.

Place a '✕' by the items that do not appear to have a sensible quantity and a '✓' by those that do. Two have been completed for you.

Item	Quantity	✕ or ✓
Orange juice	2 litres	✓
Mushrooms	50 kilograms	
A bag of sugar	1 kilogram	
Tomato sauce	350 litres	
Potatoes	5 grams	✕
Large chocolate bar	100 grams	
Bottle of vinegar	250 millilitres	
Butter	500 grams	
Milk	4 litres	
Washing-up liquid	500 litres	

[4]

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3. Gethin wants to organise a mountain walk in the Brecon Beacons with his 3 friends Chloe, Robert and Martyn during 2014.

He has the following information:

- He (Gethin) can only go on a Sunday;
- Chloe cannot go during the last 4 months of the year;
- Martyn works on the first 3 Sundays of each month;
- Robert cannot go during the school holidays;
- All his friends agree that the months of November, December and January are unsuitable for the walk.

The calendar shown on the opposite page is for 2014.

The school holidays are represented by 

What would be the **latest date** that they could all go for the mountain walk?

[5]

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2014

January

Su	M	Tu	W	Th	F	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

February

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

March

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

April

Su	M	Tu	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

May

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June

Su	M	Tu	W	Th	F	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

July

Su	M	Tu	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August

Su	M	Tu	W	Th	F	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

September

Su	M	Tu	W	Th	F	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October

Su	M	Tu	W	Th	F	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

December

Su	M	Tu	W	Th	F	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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4. A gardener wishes to place new fencing around his rectangular vegetable garden.

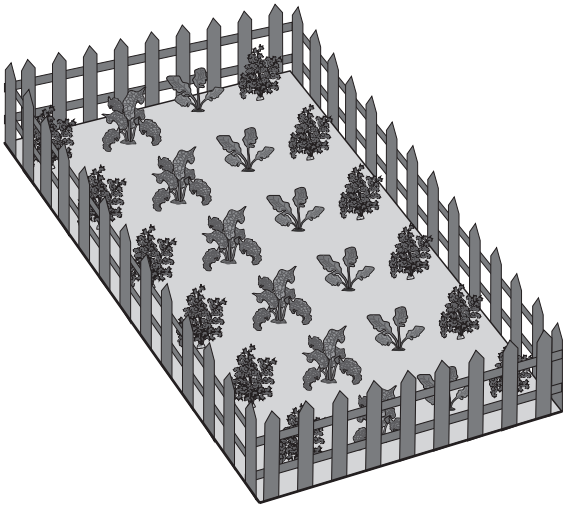


Diagram not drawn to scale

The garden is 12 metres long and 9 metres wide.
Each fence panel is 3 metres long and costs £21.98.
Find the total cost of the fence panels for the rectangular vegetable garden.

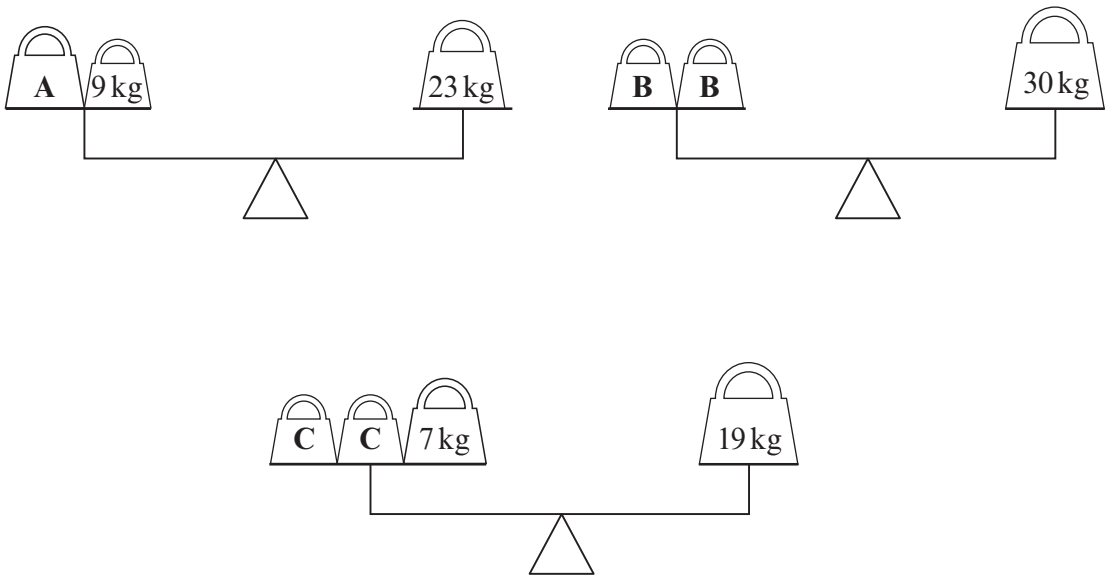
[5]

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5. Each diagram represents a balance with the total weight on each side being equal.
Find the value of **A**, **B** and **C**.



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.....

A = ... kg **B** = ... kg **C** = ... kg

[4]

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Turn over.

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6. *(a) You will be assessed on the quality of your written communication in this part of the question.*

The table below shows the room-only costs for a 7-night holiday to Menorca, Spain.

The table shows different arrival dates for August.

Arrival date	Price per adult (£)	Price per child Aged 5-16 (£)
August 1, 8	486	203
August 3, 10, 17	498	219
August 15, 22	512	226
August 24	475	199

Supplements **Price per person per night**		
	Sea view	£4
	Bed and breakfast	£8
	Half board	£18
	All Inclusive	£25

All children under the age of 5 go free and do not have to pay for any supplements.

- Mr and Mrs Edwards book a 7-night holiday to Menorca for themselves and their 3 children.
- Their three children are aged 13, 8 and 4.
- They decide to book the holiday with an arrival date of 10 August.
- They have chosen to book rooms with a sea view.
- They also decide to have the all-inclusive package for the whole family.

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Showing all your working, calculate the total amount that they pay for their 7-night holiday.

[10]

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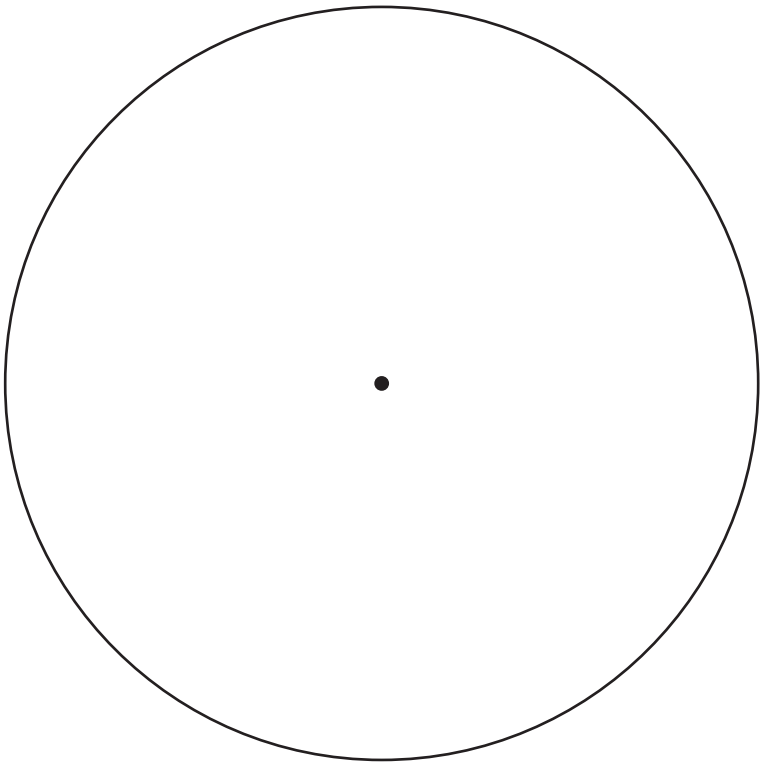
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(b) The holiday company records the number of families that stay at certain hotels in Menorca. The following table shows these hotels and the number of families that stayed there during the week commencing 10 August.

Hotel	Viva Menorca	Hamilton Hotel	Fiesta Hotel	Sol Menorca
Number of families	62	54	40	84

Draw a pie chart to illustrate these results.
You should show how you calculate the angles of your pie chart.



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[4]

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(c) The holiday company performs the following calculation to work out the percentage of hotel rooms that were occupied.

$$\frac{635 \times 100}{200 + 180 + 75 + 225}$$

Calculate this percentage, giving your answer correct to 1 decimal place.

.....

.....

.....

.....

[2]

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7. A gold bar in the shape of a cuboid has dimensions 20 cm by 8 cm by 4·5 cm.

The gold bar is melted down to make small cubes of sides 2 cm.

How many of these small cubes can be made from the gold bar?

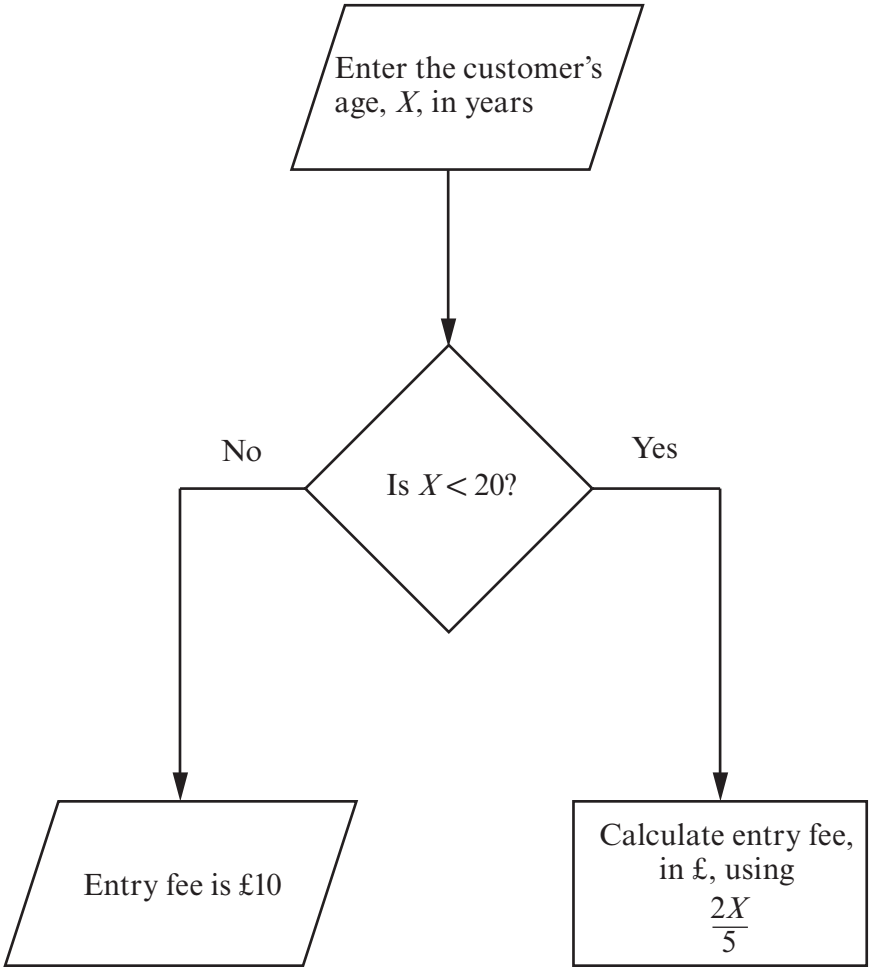
[6]

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8. The following section of a flowchart is used to find the entry fee for an Aqua Park.



Use this section of the flowchart to find the Aqua Park entry fee for each of the following customers.

Howard, aged 20

.....

.....

Betty, aged 10

.....

.....

Charlie, aged 6

.....

.....

[4]

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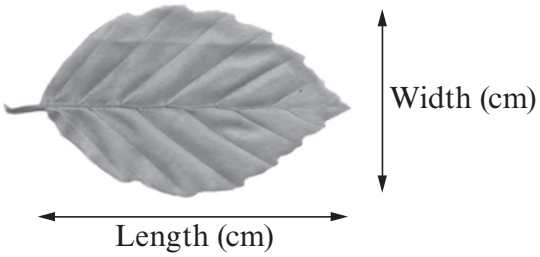
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9. Billy and Shaun both completed a survey.
They collected leaves from a number of trees and decided to measure them.

They agreed on the following decisions.

- The length of the leaf does not include the stem.
- The width of the leaf is measured at the widest section of the leaf.



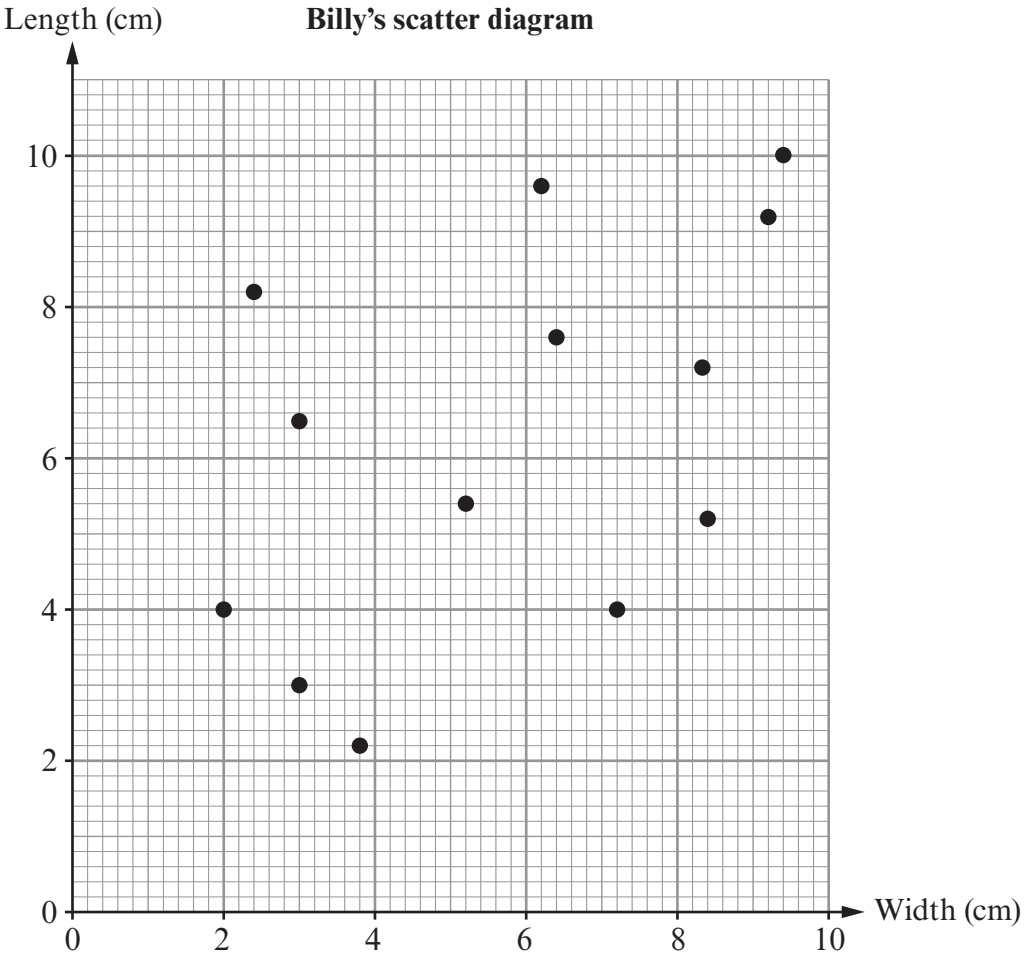
(a) Why have they both agreed on these decisions about measuring the leaves?

.....

.....

[1]

(b) Billy measured the length and width of each leaf he had collected.
Shaun did the same with his leaves.
They displayed the lengths and widths of their own leaves on separate scatter diagrams.
Billy's scatter diagram is shown below and Shaun's scatter diagram is shown opposite.

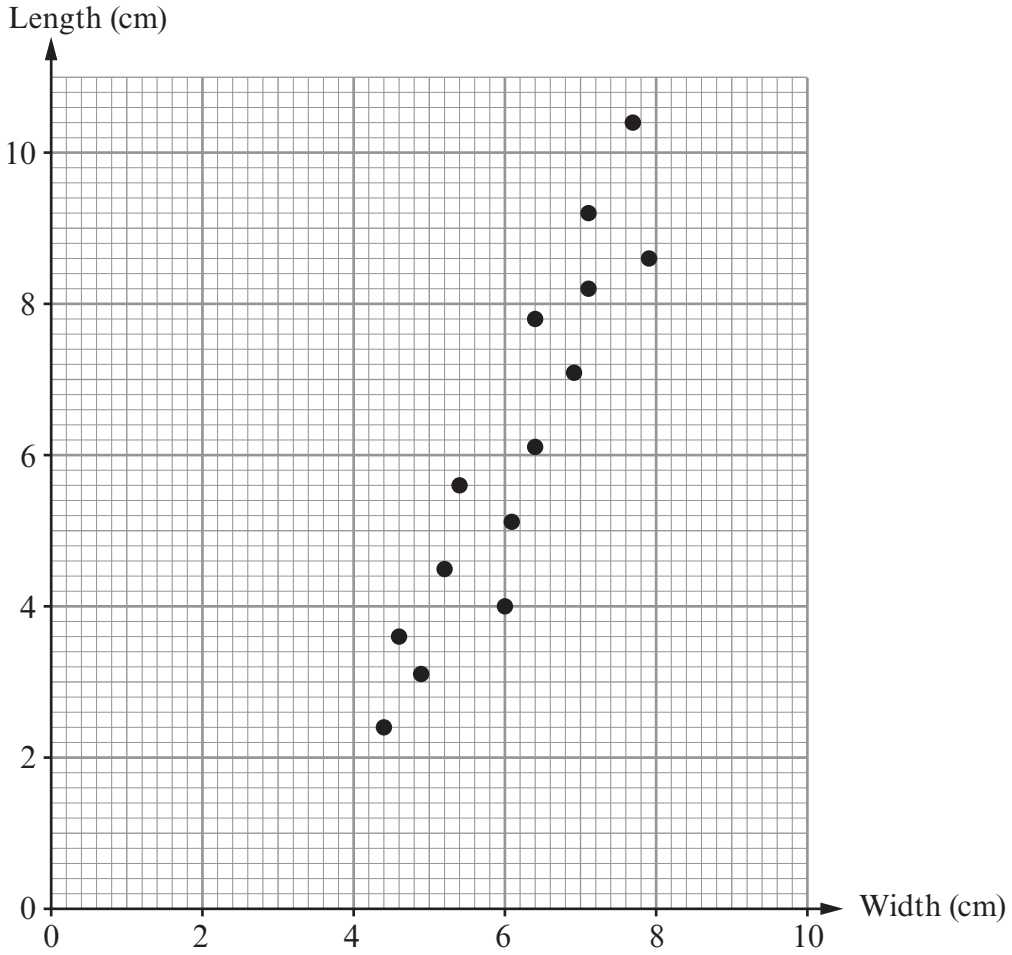


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Shaun's scatter diagram



(i) Who found the longest leaf? .....

Write down the length of this leaf. ..... cm [1]

(ii) One of the two boys collected leaves from a variety of trees.
Who was this, Billy or Shaun? Give a reason for your answer.

.....

.....

.....

[1]

(iii) Draw, by eye, a line of best fit on Shaun's scatter diagram. [1]

(iv) Shaun realises he has one more leaf that he has not included on his scatter diagram.
The leaf is damaged in such a way that Shaun cannot measure its width.
The leaf is of length 8·5 cm.
Write down a reasonable estimate for the width of this leaf.

Width ..... cm

[1]

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10. Laura has her own car.

During April

- Laura drove a total distance of 560 miles in her car.
- Her car's fuel consumption was 37·8 mpg (miles per gallon).
- Petrol cost £1.48 per litre.

(a) Given that 1 gallon is approximately 4·55 litres, calculate the cost of the petrol that Laura used during April.
You must show all your working.

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.....

[5]

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(b) (i) Laura spent 10 hours 45 minutes driving during April.
Calculate the average speed of Laura's car for the distance driven during April.
Give your answer in miles per hour.

.....

.....

.....

.....

[3]

(ii) Select which of the following best describes the roads on which Laura travelled during April.

You must give a reason for your answer.

A: Mainly small narrow country lanes
B: Mainly inner city roads with lots of traffic lights
C: Mainly motorways and dual carriageways
D: Mainly steep mountain routes with many sharp bends
E: Mainly roads with speed limits of 30 mph

Reason:

.....

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.....

.....

[1]

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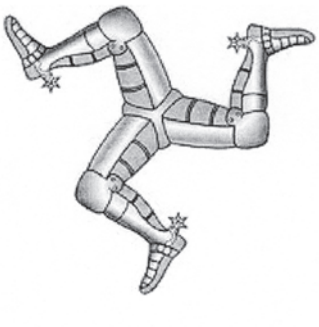
11. A plate manufacturer wishes to design a pattern to be printed on a new circular dinner plate. They consider three possible designs as shown below.



Rings



Petals



Legs

The new design must satisfy the following criteria.

Given that

n = the number of lines of symmetry

r = the order of rotational symmetry

then $n > 2$ and $r - n = 0$

Complete the following table.

Design	n	r	Satisfies the criteria? Yes or No
Rings			
Petals			
Legs			

.....

.....

.....

[3]

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12. *Abbiford Computers* sells computer systems.
Their customers are Internet businesses and town centre shops.
All customers are given access to a helpline when they are setting up a new computer system.
Abbiford Computers carried out a survey to find the number of times each customer called the helpline.
The stem-and-leaf diagram shows the results of the survey.

Internet businesses		Town centre shops
1	4	
	3	
3	2	2 3 5 7
5 3	1	1 4 4 6 8
7 4 3 3 2 2 2	0	7 9

Key: Internet businesses 3 | 2 means 23 calls
Town centre shops 1 | 8 means 18 calls

(a) Complete the following table.

	Median	Range	Mode
Internet businesses			
Town centre shops			

.....

.....

.....

.....

[3]

(b) The director of *Abbiford Computers* states to the helpline manager,

"41 calls is not good enough. We need to provide better help for the Internet businesses buying computer systems from us."

How do you think the helpline manager should respond to the Director's statement?

.....

.....

.....

[1]

END OF PAPER

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2013

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT 2 (FOUNDATION TIER)

Applications Unit 2 Foundation June 2013		Final
1.(a)(i) Goods / Quantity / Cost Croissants 15 £1.50 Cheese 1 **£6.92** Pain au chocolat 10 **£3.2(0)** Coffee 4 £6.08 Bread 10 £9.90 Jam 5 **£6.20** TOTAL COST **£33.8(0)**	B1 B1 B1 B1	CAO CAO CAO FT. Award B4 for only an answer of £33.8(0)
(ii) 15/100 × 'their 33.8(0)' (£)5.07 ISW	M1 A1	FT from (a) An unsupported answer of £28.73 gets SC1 FT from (a) for SC1
(b)(i) 5 ÷ 0.62 (8.0645...)	M1	Or equivalent.
Buys 8 pain au chocolate (ii) Change = 4(pence)	A1 B1	Or equivalent. FT £5 –' their 8' × 0.62 B0 for £4 or 0.04p. Accept £0.04p *Watch for **misread** of 32p instead of 62p in (c) (5 ÷ 0.32 = 15(.625) can buy 15. There will be 20 pence change)*
(c) Labels of drinks Uniform scale starting from zero and labelled or key provided All correct heights and widths	B1 B1 B2	May use bar chart or pictogram Award B1 for 3 or 4 correct OR B1 for correct heights with inconsistent widths. FT if no scale on vertical axis but a uniform scale has been applied.
(d) (1 box <) 65/7 (£)9	M1 A1	Award M1 for (£)9.28(57...) or (£)9.29 or (£)9.3(0)
	15	
2. Item / Quantity / X or ✓ Orange juice 2 litres (✓) Mushrooms 50 kilograms **X** A bag of sugar 1 kilogram ✓ Tomato sauce 350 litres **X** Potatoes 5 grams (X) Large chocolate bar 100 grams ✓ Bottle of vinegar 250 millilitres ✓ Butter 500 grams ✓ Milk 4 litres ✓ Washing-up liquid 500 litres **X**	B4 4	Award B4 for all 8 correct responses Award B3 for 6 or 7 correct responses Award B2 for 5 correct responses Award B1 for 4 correct responses

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3. Identifying/sight of when Chloe can(/cannot) go Identifying/sight of when Gethin can go Identifying /sight of when Martyn can(/cannot) go Identifying common dates – 23rd Feb, 23rd & 30th March, 22nd & 29th June Latest date = 29th June	 B1 B1 B1 B1 B1 5	*Look at calendar for indication throughout the question* e.g. Sept, Oct, Nov, Dec crossed out Look for focus on Sundays (26th Jan), 23rd Feb, 23rd & 30th March, 27th April, 25th May, 22nd &29th June, 27th July, 24th & 31st Aug, 28th Sept, 26th Oct, (23rd Nov & 28th Dec) Sight of common dates triggers 1st 4 marks Award full marks for an unsupported correct answer
4. (Perimeter=) 12 + 9 + 12 + 9 = 42 (m) Number of panels (42 ÷ 3 =) 14 Cost 14 × (£)21.98 (£)307.72	M1 A1 B1 M1 A1 5	 FT their perimeter FT their number of panels *Alternative method: dividing by 3 to get no.of panels on 1 side B1* *4 + 3 + 4 + 3 M1* *(Number of panels =)14 A1* *Cost 14× (£)21.98 M1* *(£)307.72 A1* *Award SC3 for unsupported answer of (£)153.86*
5. A = 14 B = 15 2C = 12 C = 6	B1 B1 M1 A1 4	

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6. (a) (Cost of Adults=) 2 × 498 (£)996 (Cost of children=) 2 × 219 (£)438 Sea View 4×4×7 or All Inclusive 4×25×7 (£)112 (£)700 (Total cost=) (£)2246	M1 A1 M1 A1 M1 A1 A1 B1	*Penalise any <u>consistent</u> misreads of dates and number of children -1 each* FT provided at least 2 M1 marks awarded *An answer of £1550 gets M1 A1 M1 A1 M0 A0 B1*
Look for • spelling • clarity of labels • the use of notation (watch for the use '=' "£" being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer	Q W C 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b) 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram.</u>	B4 OR (B3) (B2) (B1) (B1)	Use the correct overlay and allow ±2°. Correct labels (Words NOT the frequency OR angle) 3 correct labels are enough. If only B1 is scored for the diagram and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded.
360/240 Angles are 93, 81, 60, 126. (c) 93.4(%)	(M1) (A1) B2 16	(1 is) 1.5° gets the M1 OR SC1 for all the correct percentages 25.8%, 22.5%, 16.7%, 35%. Award B1 for 93.(38235....).

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7. Volume of bar $20 \times 8 \times 4.5$ $= 720\ (cm^3)$ Volume of cube 2^3 $= 8\ (cm^3)$ Number of cubes $720 \div 8$ $= 90$	M1 A1 M1 A1 M1 A1 6	FT their bar and cube provided M2 awarded *Alternative method* *Attempt to divide all dimensions by 2 M2* *10 & 4 A1* *2.25 A1* *$10 \times 4 \times 2.25$ M1 FT if M2 awarded* *90 A1*
8. Howard (£)10 Betty $2/5 \times 10$ OR Charlie $2/5 \times 6$ (£) 4 (£)2.4(0)	B1 M1 A2 4	A1 for each correct answer
9. (a) Reason e.g. 'fair comparison', 'doing survey the same way' (b) (i) Name: Shaun Length in range 10.3 to 10.5(cm) (ii) Billy with a reason, e.g. 'Billy because no correlation', 'Billy because leaves are different', 'Billy as no connection between length and width' (iii) Reasonable straight line of best fit (iv) Width in the range 6.6 to 7.5 cm	B1 B1 B1 B1 B1 5	With some points above and some points below following the trend Ignore a 'tail' at the lower part of the line OR correct reading from their line of best fit
10. (a) All three stages of the appropriate calculation $560 \times (4.55 \div 37.8) \times 1.48$ (£)99.76 (b)(i) $560 / 10.75$ or $560 / 10\ ¾$ 52(.093 mph) (ii) C selected or implied with a reason, e.g. 'C because 52mph average means travels fast'	M3 A2 M2 A1 E1 9	M2 for sight of $560 \times 4.55 \div 37.8$, OR M1 for sight of $560 \div 37.8$, $4.55 \div 37.8$, $37.8 \div 4.55$, or 4.55×1.48 *Note:* *$560 \div 37.8$ (= 14.814814… gallons)* *$\times 4.55$ (= 67.407… litres)* *Use of 14.8 gives 67.34, use of 15 gives 68.25* Depends on M3 A1 for (£)99.7629.. or 99.6632 or 101.01 or other amount from premature approximation M1 for 560/10.45 or 560/675 or 560/645 CAO Only FT provided their answer in $70 \geq$(b)(i)≥ 50
11. Design / n / r / Satisfies the criteria? Yes or No Rings 3 3 Yes Petals 4 4 Yes Legs 0 3 No	B2 B1 3	For correct first 2 columns OR B1 for any 4 correct entries in the first 2 columns For correct final column, FT appropriate decision for their lines and rotational responses written in the table
12.(a) Median / Range / Mode Internet 4 39 2 Town 16 20 14 (b) Statement, e.g 'not typical', 'the town centre shops are actually in need of more help rather than the internet businesses' 'mode for businesses is actually only twice'	B3 E1 4	B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries

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UNIT 2 (HIGHER TIER)

<table>
<tr><th>Applications Unit 2 Summer 2013 Higher Tier GCSE</th><th></th><th>Final</th></tr>
<tr><td>1(a)

(D3 =) C3 – B3

(F3=) D3 * E3 OR (F3=) D3 × E3 or equivalent

(b) (i) D2 219 F2 1095
D3 448.8(0) F3 3590.4(0)
F4 5000
(ii) (G5 =) F2 + F3 + F4 OR (G5 =) SUM(F2:F4)</td><td>

B2

B1

B1

B1

5</td><td>Penalise once only for consistent incorrect cell number
B1 for 3C – 3B or 1108.8(0) – 660
B0 for B3 – C3
Accept (C3 – B3) * E3 or (C3 – B3) × E3
Do not accept numerical solutions
Ignore inclusion of £ sign

Accept if formula continued for addition of further F cells</td></tr>
<tr><td>2.

<table><tr><th>Design</th><th>n</th><th>r</th><th>Satisfies the criteria?
Yes or No</th></tr><tr><td>Rings</td><td>3</td><td>3</td><td>Yes</td></tr><tr><td>Petals</td><td>4</td><td>4</td><td>Yes</td></tr><tr><td>Legs</td><td>0</td><td>3</td><td>No</td></tr></table></td><td>

B2

B1

3</td><td>

For correct first 2 columns
OR B1 for any 4 correct entries in the first 2 columns
For correct final column, FT appropriate decision for their lines and rotational responses written in the table</td></tr>
<tr><td>3. Howard (£)10
Betty 2/5 × 10 OR Charlie 2/5 × 6
(£) 4 (£)2.4(0)</td><td>B1
M1
A2

4</td><td>

A1 for each correct answer</td></tr>
<tr><td>4. (a) Reason e.g. ‘fair comparison’, ‘doing survey the same way’
(b) (i) Name: Shaun Length in range 10.3 to 10.5(cm)
(ii) Billy with a reason, e.g. ‘Billy because no correlation’, ‘Billy because leaves are different’, ‘Billy as no connection between length and width’
(iii) Reasonable straight line of best fit

(iv) Width in the range 6.6 to 7.5 cm</td><td>B1

B1
B1

B1

B1

5</td><td>

With some points above and some points below following the trend
Ignore a ‘tail’ at the lower part of the line
OR correct reading from their line of best fit</td></tr>
</table>

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5(a) All three stages of the appropriate calculation $560 \times (4.55 \div 37.8) \times 1.48$	M3	M2 for sight of $560 \times 4.55 \div 37.8$, OR M1 for sight of $560 \div 37.8$, $4.55 \div 37.8$, $37.8 \div 4.55$, or 4.55×1.48 *Note:* *560 ÷ 37.8 (= 14.814814… gallons)* *× 4.55 (= 67.407… litres)* *Use of 14.8 gives 67.34, use of 15 gives 68.25*
(£)99.76	A2	Depend s on M3 A1 for (£)99.7629.. or 99.6632 or 101.01 or other amount from premature approximation
Look for • spelling • clarity • the use of notation (watch for the use of '=', £, being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer • QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b)(i) 560 / 10.75 or 560 / 10 ¾ 52(.093 mph) (ii) C selected or implied with a reason, e.g. 'C because 52mph average means travels fast' 11	M2 A1 E1	M1 for 560/10.45 or 560/675 or 560/645 CAO Only FT provided their answer in 70≥(b)(i)≥50
6(a) $0.5 \times 6 \times 8 \times 130$ 3120 (cm^3) (b) Greater (by) 120 (cm^3) 4	M2 A1 B1	M1 for $0.5 \times 6 \times 8 \times 1.3(0)$ or for ½ × 6 × 8 × 'digits 13 with incorrect place value' Do not accept 0.5×6×8×10 as area cross section CAO FT difference between 'their 3120' and 3000 correctly evaluated with appropriate statement of greater or less
7(a) Internet: Median 4, Range 39, Mode 2 Town: Median 16, Range 20, Mode 14 (b) Statement, e.g 'not typical', 'the town centre shops are actually in need of more help rather than the internet businesses', 'mode for businesses is actually only twice' 4	B3 E1	B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries

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8(a) Method to calculate costs, e.g. 14 portions is 2(.)19 + 14 ×(0.)12 or equivalent calculation in pence	M1	OR for 1 portion, 2.19÷14 + 0.12 (£0.2764…) or equivalent calculation in pence. Units must be consistent
(Cost of making 14 portions) (£)3.87	A1	Allow B1 (instead of M1, A1) for costs (£)3.27 (considering 9×0.12+2.19)
(Sales from 9 bowls of soup =) 9 × 2.95 (= £26.55)	M1	Do not accept for '(2.95 ± ….)×9 unless used appropriately in further working
(Profit) (£)22.68	B1	CAO
(% profit =) $\frac{22.68}{\text{'their costs'}} \times 100$ 586(.046%)	M1 A1	FT provided M1 awarded and profit is (£)22.68 CAO
(b) (x – 1) × 1.6 + 13.4 = 35.8 OR x = $\frac{35.8 - 13.4}{1.6}$ +1	M2	M1 for 1.6×x + 13.4 = 35.8, or x = (35.8 – 13.4)/1.6, OR M1 for equation would be correct apart from missing brackets, OR M1 for correct equation expressed in words *Accept missing brackets if implied by a correct response*
15 (cartons)	A1	If no marks allow SC1 for 15 (cartons)
(c) 2c + 4.5s = 3(.)69 and 5c + 7.5s = 6(.)90	B2	Accept 'carrots' and 'swede' written in full within an equation B1 for either equation, or inconsistent place value for money
Method to solve, e.g. equal coefficients	M1	FT provided at least 1 equation is correct and equivalent level of difficulty Allow 1 slip in non equated variable
Correct first value Method to find the second variable Correct second value	A1 m1 A1	FT from their first value Carrots 45(p) per kg, Swede 62(p) per kg Accept 0.45 and 0.62. If units are given they need to be correct for A1
		Do not accept unsupported answers or use of trial & improvement methods. No marks
	15	
9. Any 2 correct separate reason based on risk: Reason: Females (pay less) longer life expectation Reason: 'Smokers life expectation shorter than non smokers (of same age)' Reason: 'Premiums increase with age as risk increases' Reason: 'Older people pay more as shorter time to make payments'	E2	E1 for one correct reason Do not accept a statement without giving reason, Do not accept e.g. 'premiums increase with age', or 'smokers pay more' within statement of why.
	2	
10(a) Idea to divide by 2 or a power of 2 $2.3 \times 10^{30} / 2^5$ or equivalent 7.2×10^{28} (b) $r = 0.75^t \times x$	M1 m1 A2 B3	Dividing their 2.3×10^{30} by 2^5 or equivalent A1 for $7.1875.. \times10^{28}$ B2 for correct expression $0.75^t \times x$ B1 for $0.75x$, x -1/4 x, $0.75^2 x$, … *SC2 for $r= 0.25^t \times x$ or SC1 for $0.25^t \times x$ or equivalent*
	7	

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11. Idea of ratio or length scale factor, e.g. sight of 0.8 or 1.25 Area scale factor used correctly $\div 0.8^2$ or $\times 1.25^2$ or equivalent 1 cartridge to make 38281(.25) smaller bubbles 15 000 000 ÷ 38281(.25) 391.8… or 392 cartridges needed Cost (£)9800	M1 M1 A1 M1 A1 A1 6	 Evidence of this implies also the first M1 FT their linear scale factor squared used correctly for all further marks FT 'their 38281.25'number of smaller bubbles provided both M1 awarded CAO. FT for the cost of a whole number of cartridges rounded up. (Note 9795.92 is A0) *Allow M1 and SC1 for linear calculation with answer (£)12 250*
12(a) 3.24×0.8 OR 3.24×0.60 2.59(%) AND 1.94(%) (b)(i) Oak AND a reason showing understand of AER (ii) Oak (Total amount after 2 years = £)25000×1.023^4 (Total amount £)27380.57(37…) OR (Interest £)2380.57(3696…) Sycamore (Total amount after 2 years = £)25000×1.046^2 (Total amount £)27352.9(0) OR (Interest £)2352.9(0) (Difference in interest is £) 27.67	M1 A3 E1 M2 A1 M1 A1 B1 11	Or other complete method A2 for 2.59(2) AND 1.94(4) A1 for either 2.59(2) OR 1.94(4) *If no marks SC1 for sight of digits 2592* ***and*** *1944 (incorrect place value), OR for 0.65* ***and*** *1.3(0)* Reason must say about comparing annually Accept 'Oak, because they give more interest (annually)' Or for alternative complete method compounding 4 times, or M1 for 2.3% × 25000 (= £575) Do not accept other rounding or truncation Or alternative complete method Do not accept other rounding or truncation FT provided M mark(s) for Oak or Sycamore awarded, with all this answer to nearest penny
13. Density = $\frac{21.4 \times 10.13}{19.3}$ = 11.2(322…troy ounces/cubic inch)	M1 A1 2	
14(a) R + P < 45 40R + 65P > 1560 (b) Line R + P = 45 shown Line 40R + 65P=1560 shown Region between the lines indicated (c) **Using their graph** to show Iwan's statement outside the region with 'No' in the table AND shown on the graph **Using their graph** to show Sid's statement inside the region with 'Yes' in the table AND shown on the graph	B1 B1 B1 B1 B1 B1 B1 7	*If no marks, SC1 for R+P…45 and 40R +65P…1560, with the gaps here both being inequalities* FT their inequalities if possible from a slip Accept FT from either line correct but for a similar region **MUST** be a FT from their graph in (c) provided at least 1 line is correct. Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly

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15. Sight of 3.45, 3.55, 4.75 and 4.85 tan x = 3.55/4.75 and tan x = 3.45/4.85 Greatest x = 36.77(3..°) or 36.8(°) or 37(°) Least x = 35.4(25...°) or 35.43(°) or 35(°) 4	B1 M1 A1 A1	 FT their least and greatest provided > < or > then values given in the question for M1 only From correct working From correct working
16. Volume hemisphere = ½ × 4/3 × π × 0.9^3 = 1.5(268… cm^3) Volume cylinder = 8.6 – volume hemisphere correctly evaluated (7.1 cm^3) 7.1 = π × 0.9^2 × h h = 7.1 / (π × 0.9^2) Answers in the range 2.77 to 2.8 (cm) Overall height = 3.7 (cm) Rod length = 3.7/sin68° Answers in the range 3.96 to 4 (cm) 10	M1 A1 B1 M1 M1 A1 B1 M2 A1	 Accept rounded or truncated 1.53 or 1.52 FT their volume hemisphere CAO CAO FT provided all M marks awarded FT their 3.7 provided >0.9 M1 for sin68° = 3.7/rod CAO

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

APPLICATIONS OF MATHEMATICS

UNIT 2: Financial, Business and Other Applications

FOUNDATION TIER

P.M. TUESDAY, 22 January 2013

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **8***(a)*.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**6**	
2	**6**	
3	**4**	
4	**4**	
5	**6**	
6	**6**	
7	**10**	
8	**8**	
9	**3**	
10	**4**	
11	**4**	
12	**3**	
13	**7**	
14	**3**	
15	**6**	
TOTAL MARK		

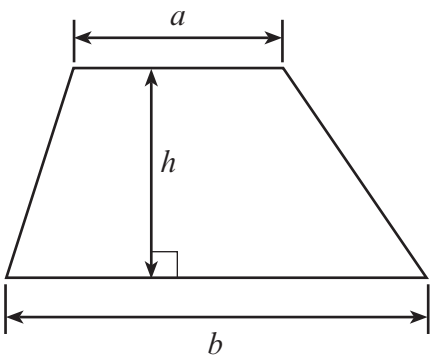
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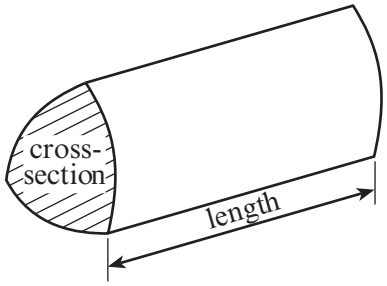
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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1. The table below shows the prices of different sandwiches.

Sandwich	Price
Tuna	£1.99
Egg Salad	£1.80
Chicken & Bacon	£2.20
Chicken & Mayo	£2.10
Cheese & Pickle	£1.85

(a) (i) Tommy buys two Tuna, one Chicken & Mayo and three Egg Salad sandwiches.
What is the total cost of these sandwiches?

.....

.....

.....

.....

[2]

(ii) For each sandwich bought, Tommy buys a drink costing £1.29.
How much do the drinks cost?

.....

.....

.....

[2]

(b) Tommy buys a box of chocolates to share out between six men.
There are 48 chocolates in the box.
The chocolates are shared out equally, how many will each man get?

.....

.....

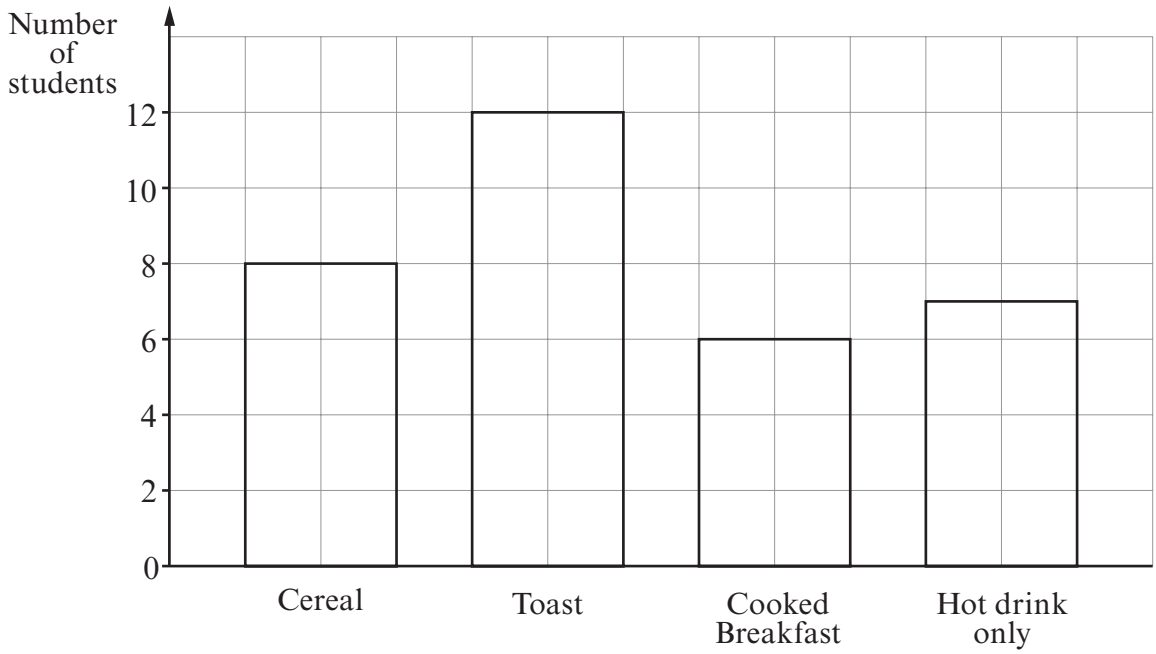
[2]

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2. The bar chart shows the breakfast choices of a group of students the morning after their last examination. Each student had only one of the choices for breakfast.



(a) How many students ate a cooked breakfast?

.....

[1]

(b) How many students were there altogether?

.....

.....

[2]

(c) The students want to display this information as a pictogram.
In the space below, draw a pictogram to represent the data given in the bar chart.

Use ⊕ to represent 4 students.

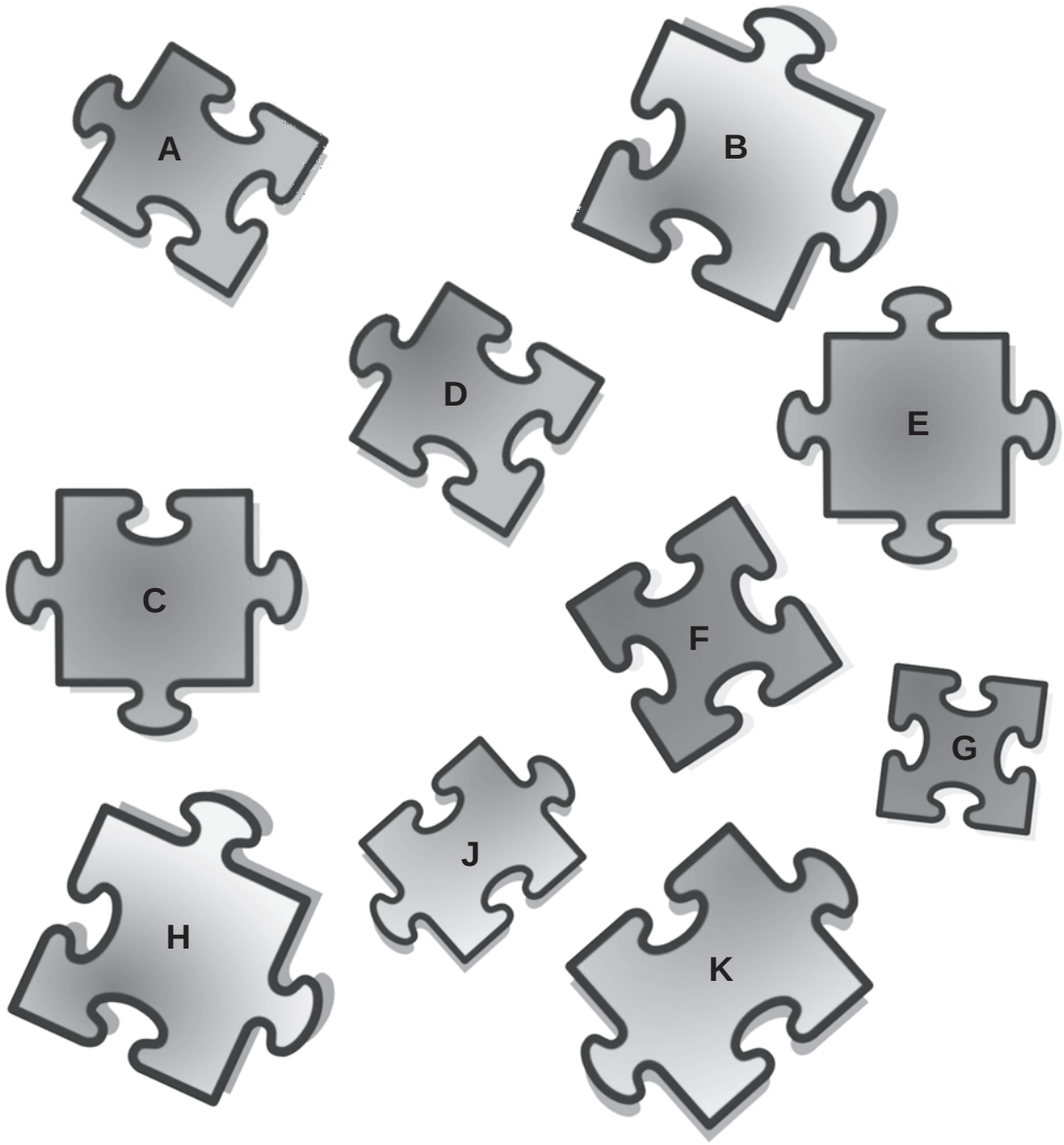
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3. The following shapes are pieces in a child's jigsaw puzzle.



(a) Which pieces of the jigsaw puzzle are congruent?

..... and ..... are congruent

..... and ..... are congruent

[2]

(b) Which pieces of the jigsaw puzzle are similar but not congruent?

..... and ..... are similar but not congruent

..... and ..... are similar but not congruent

[2]

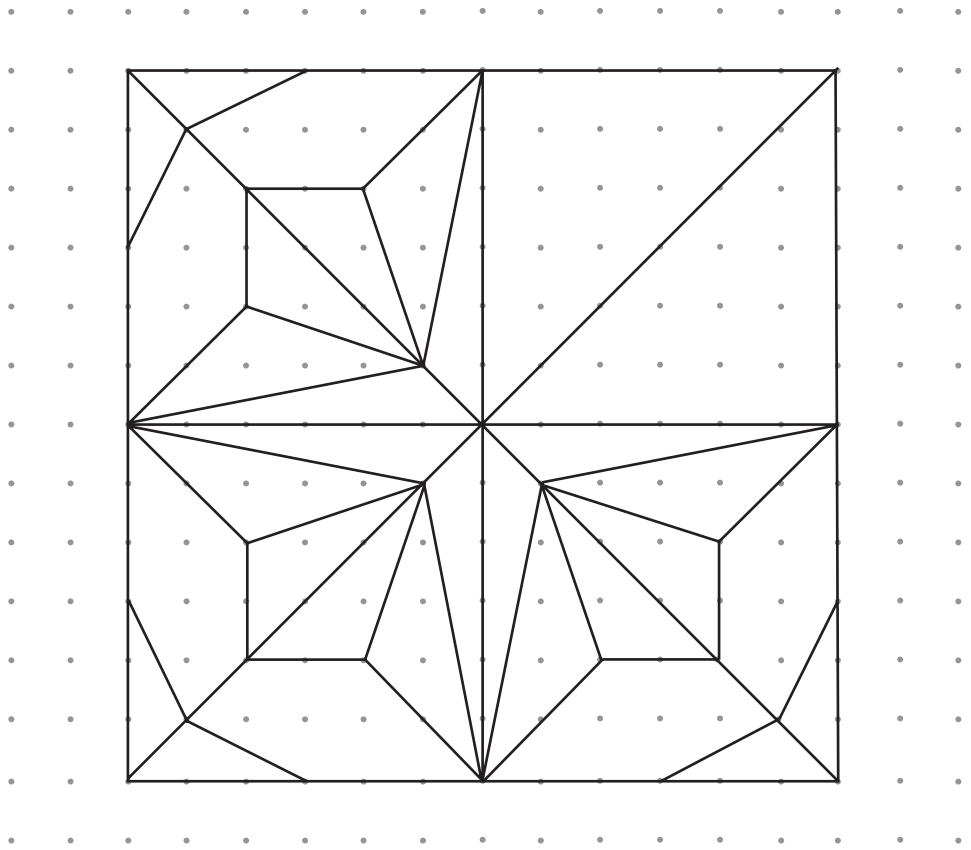
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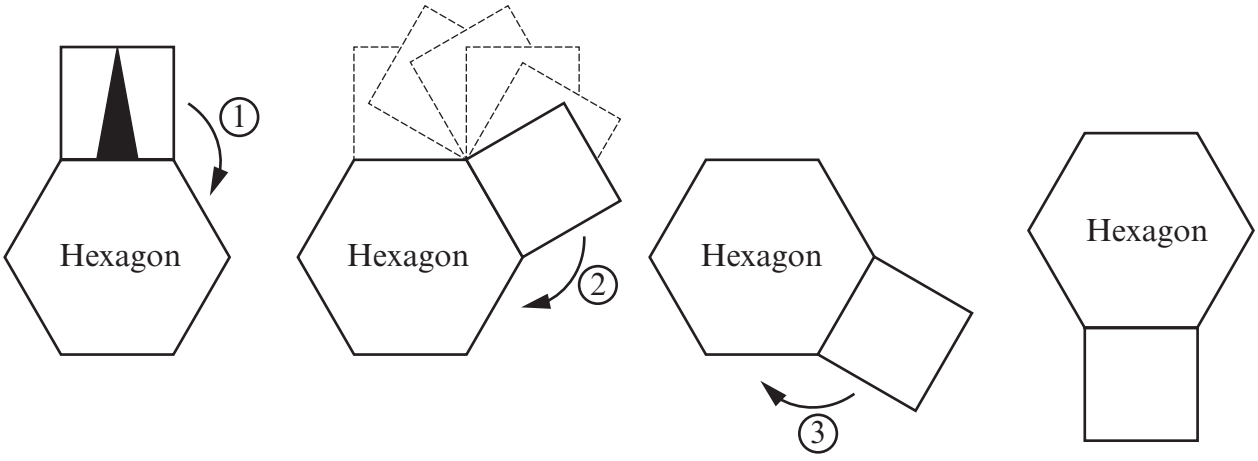
4. *(a)* Megan drew part of a Rangoli Pattern to celebrate the Diwali festival of light.
Rangoli Patterns are based on reflective symmetry.
Complete the pattern for Megan.

[2]



(b) Ben created a game to take to the festival's party.
His game is to roll a square, with a triangle inside it, around the outside of a regular hexagon.
Those taking part in the game must try and draw the position of the triangle in its new position.
Draw the correct position of the triangle inside the square after rolling the square 3 times around the outside of the regular hexagon.

[2]



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5. In a job interview for a position in a supermarket, Bryn and Stacy were asked about different measurements.

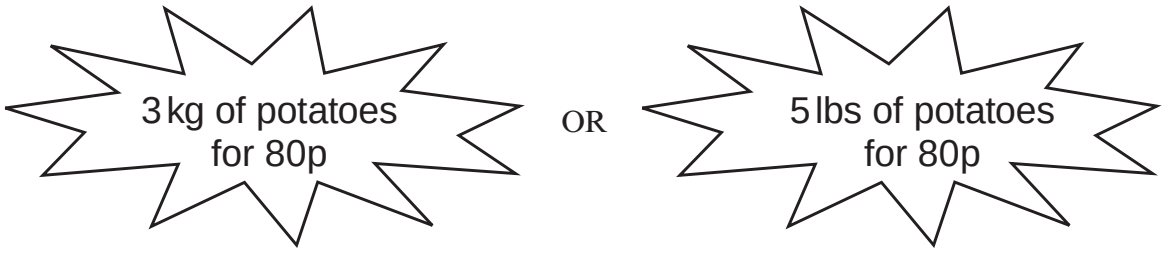
(a) Bryn was asked to link each statement with a possible measurement.

Statement	Measurement
Length of a pen	1 kg
Height of a door	14 cm
Weight of a tin of beans	330 ml
Capacity of a can of fizzy drink	420 g
Weight of a bag of sugar	5 ml
The amount of fluid in a teaspoon	2 m

By drawing arrows, link each statement with its possible measurement.
One arrow has already been drawn.

[4]

(b) Stacy was asked to explain which of the following is the better buy.



Which is the better buy? Give a reason for your answer.

.....

.....

.....

.....

[2]

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6.



Sale prices at P & A's Outlet Store are 40% below original prices.
On Saturdays an additional discount of 20% **off the sale price** is given.

(a) If Lorraine shops at P & A's Outlet Store on a Tuesday and buys a coat that was originally priced at £140, how much discount will she get?

.....

.....

.....

Discount = £ .....

[2]

(b) Lorraine is advised by her friend to wait until Saturday to purchase the coat.
How much will Lorraine pay for the coat on Saturday?

.....

.....

.....

.....

.....

.....

[4]

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7. A fireworks display for 240 people is to be held at a local sports club.
The 8 organisers decide to offer a hotdog to the 240 people who attend the display.
The organisers need to buy sausages and bread rolls.

1 kg of sausages will feed 15 people.
Sausages cost £5.20 per kg.
A pack of bread rolls costs £1 and will feed 12 people.

The sports club committee says they will pay 35% of the total cost of the food.
A local businessman decides to donate money to cover a quarter of the total cost of the food.

The 8 organisers share the remaining cost of the food equally between them.

Calculate how much each of the 8 organizers will have to pay to cover the cost of the food.

[10]

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Turn over.

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8. *(a)* *You will be assessed on the quality of your written communication in this part of the question.*

A local fitness centre wishes to build an outdoor 5-a-side football pitch of length 45 metres and width 25 metres.



Diagram not drawn to scale

The cost of building the outdoor 5-a-side football pitch is £85 per square metre.
Calculate the total cost of building the outdoor 5-a-side football pitch.
You must show your working.

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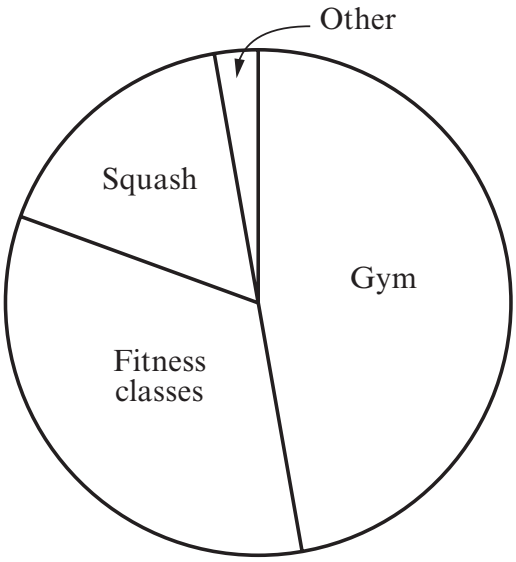
[6]

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(b) The manager of the fitness centre counted the number of people taking part in various activities at 10 a.m. last Tuesday.
He drew the following pie chart.



What fraction of the people were playing squash at 10 a.m. last Tuesday?

.....

.....

.....

[2]

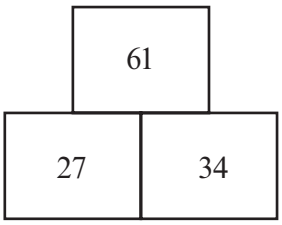
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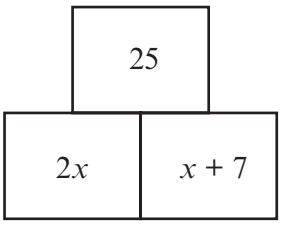
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9.





In the diagrams above, you find the value in the box on the top by finding the sum of the values in the two boxes below it.

For the second diagram, set up an equation and solve it to find the value of x.

.....

.....

.....

.....

.....

[3]

10. Jeff purchases a car costing £16 000 by obtaining a **simple interest** loan.
The interest rate on the loan is 6·5% per annum and the loan is to be paid back over 5 years.

Calculate the **simple interest and the total to be paid** back over the 5 years.

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[4]

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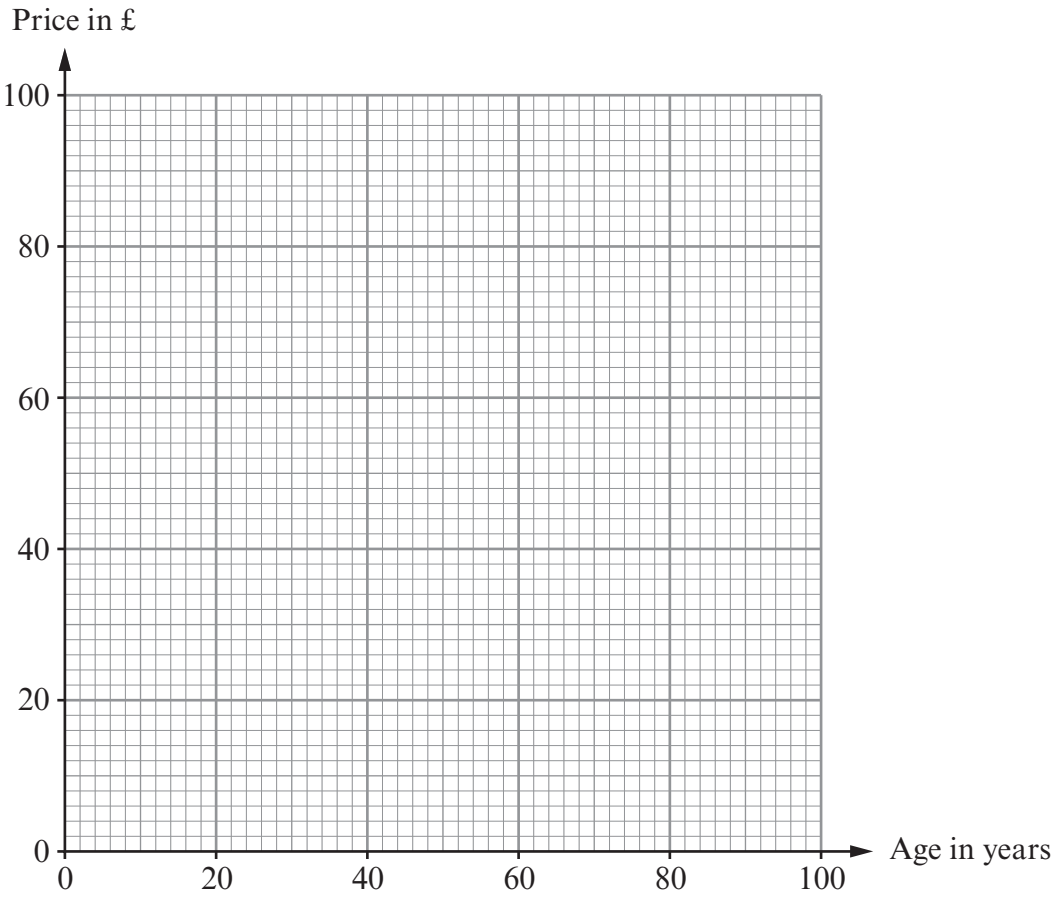
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11. The age and price of each of 8 clocks in an antique shop are recorded in the table.

Age in years	12	40	70	50	46	80	62	32
Price in £	90	60	80	50	20	40	20	28

(a) Draw a scatter diagram to display these ages and prices.

[2]



(b) Write down the price of the oldest clock.

Price £ .....

[1]

(c) Does the scatter diagram indicate that there is a correlation between the age and price of the clocks? You must give a reason for your answer.

.....

.....

.....

[1]

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12. Airlines publish flight records showing the percentage of flights that arrived on time at their destinations.



An extract from these flight records is shown below.

Flights from Cardael to Belslow Autumn 2012			
Airline	**Flight number**	**Percentage of flights arriving on time**	**Average ticket price including taxes, in £**
Far Flung	FF4356	74%	£100
Celtic Flights	CF3967	99%	£65
Roly Air	RA2099	96%	£65

Holly intends to fly from Cardael to Belslow to go to an appointment in Belslow city centre.
If her flight arrives on time, she can catch the free bus to the city centre.
If her flight arrives late, then she must take a taxi to the city centre costing £25.

Which airline should Holly choose to fly with?

You must
- consider each of the airlines,
- give a reason for your choice of airline **and** also reasons for not choosing each of the other two airlines.

Write your answers in the table opposite.

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Airline	Choice, Yes or No?	Reasons
Far Flung	.....	.....
Celtic Flights	.....	.....
Roly Air	.....	.....

[3]

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13. The spreadsheet below gives details of the hours worked and the rate of pay for three of the employees who work in a supermarket.

	A	B	C	D	E
1	Employee	Hourly rate in £	Weekday hours worked	Weekend hours worked	Total week's pay in £
2	Erica	9.50	22	3	266
3	Georgie	12.80	20	5	384
4	Ranj	9.80	17		245

All employees earn double the hourly rate for any weekend hours worked.

(a) Use the entries in the spreadsheet to calculate the hidden value of cell **D4**.

.....

.....

.....

.....

[3]

(b) Write down the formula, using cell references, used to calculate the entry for cell **E3**.

.....

.....

.....

.....

.....

[4]

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14.

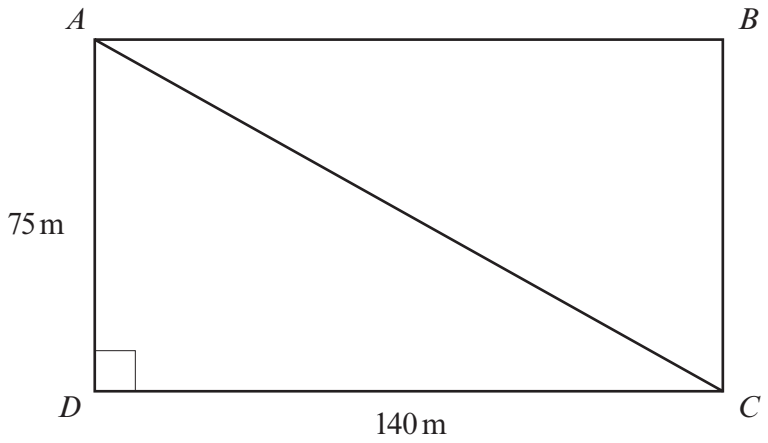


Diagram not drawn to scale

The above diagram represents a rectangular field $ABCD$.
The length of the field $DC = 140$ m.
The width of the field $AD = 75$ m.
Calculate the length of the diagonal AC.

.....

.....

.....

.....

.....

[3]

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15. Tanya used a stem-and-leaf diagram to record the prices of two makes of mobile phone on display in a supermarket.
Tanya's stem-and-leaf diagram is shown below.

NewKey		eLime
1	5	0 2
	4	2 3
8 7	3	1 1 6 8
3 3	2	3
8 6 2 1	1	5

Key: NewKey 1 | 5 means £51
eLime 1 | 5 means £15

(a) Tanya has forgotten to record a £45 NewKey phone and a £25 eLime phone.
Complete the stem-and-leaf diagram above by entering this extra data for Tanya.

[2]

(b) Including the extra data you have entered for Tanya, complete the following table.

	Median in £	Range in £	Mode in £
NewKey			
eLime			

.....

.....

.....

.....

.....

[4]

END OF PAPER

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2013

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INTRODUCTION

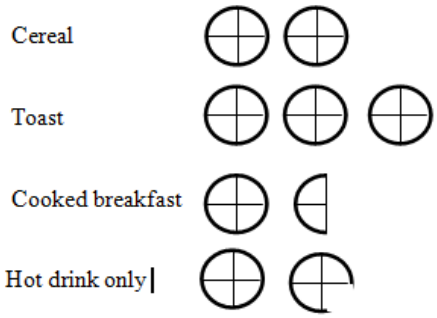
The marking schemes which follow were those used by WJEC for the January 2013 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT 2 - FOUNDATION TIER

Applications Unit 2 Foundation Tier January 2013		Final
1. (a)(i) 2 × (£)1.99 + (£)2.10 + 3 × (£)1.80 (£)11.48 (ii) 6 × (£)1.29 (£)7.74 (b) 48 ÷ 6 8	M1 A1 M1 A1 M1 A1 6	Allow one omission/extra CAO FT 'their number of sandwiches' used in part (a) FT 'their number of men'
2. (a) 6 (b) 8 + 12 + 6 + 7 33 (c) For correct pictogram drawn with labels  	B1 M1 A1 B3 6	 For adding frequencies Award B2 for 3 correct, B1 for 2 correct Penalise -1 for no labels
3. (a) A and D B and H (b) F and G K and J	B1 B1 B1 B1 4	*Accept pairs of answers in any order in both parts*
4. (a) Correct completion of Rangoli Pattern (10 lines) (b) Triangle in correct position in 4th diagram	B2 B2 4	Award B1 for 5 or more lines correctly drawn Award B1 for the triangle drawn in correct position in 2nd or 3rd diagram OR award B1 for incorrect triangle drawn in 2nd diagram but then a correct FT drawn in (3rd and) 4th diagram(s).
5. (a) Length of pen – 14cm Height of door – 2m Weight of a tin of beans – 420g Capacity of a can of fizzy drink – 330ml Weight of a bag of sugar – 1kg (b) Better buy is 3kg of potatoes for 80 pence with a reason that 3kg is approx 6(.6)lbs, so are getting a greater weight of potatoes (for the same money).	B4 E2 6	Award B3 for 3 or 4 correct, B2 for 2 correct, B1 for 1 correct. Award E1 for a partial reason or award E1 for sight of 6(.6)lbs with no reason Eg if say 3kg is heavier than 5lbs award E1 Or 3 kg gives ore potatoes for the same money
6. (a) 40/100 × 140 (£)56 (b) coat on Tuesday costs (140 – 56 =) (£)84 20/100 × 84 (£)16.8(0) Coat costs (84 – 16.80=) (£)67.2(0)	M1 A1 B1 M1 A1 B1 6	Answer of (£)84 in this part gets M1 A0 FT 'their 56.' *Award this B1 if shown in part (a)* *Alternative method 80/100 × 84 M2* *=(£)67.2(0) A1* FT 'their 84 and 16.80' if at least M1 awarded in (a) or (b) *If no marks awarded in (b)* *Award SC2 for an answer of 112* *Or Award SC1 for sight of 28 or for 1 slip in workings towards answer of 112*

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Applications Unit 2 Foundation Tier January 2013		Final
7. (Cost of Sausages) 240 ÷ 15 × 5.20 (£)83.2(0) (Cost of Rolls) 240 ÷ 12 × 1 (£)20 (Total) (£) 103.2(0) 35/100 × 103.2(0) (£)36.12 (¼ × 103.2(0)=) (£)25.8(0) (103.2(0) – 36.12 – 25.8(0)=) (£)41.28 (41.28 ÷ 8 =) (£)5.16	M1 A1 M1 A1 B1 M1 A1 B1 B1 B1 10	If M0 A0 Award SC1 for 16 (kgs) If answer given as **20 packs** Award SC1 FT 'their (£)83.20' + 'their (£)20' provided at least M1 awarded FT 'their (£)103.2(0)' FT 'their (£)103.2(0)' but not 'their (£)36.12' FT 'their (£)103.2(0) – 'their (£)36.12' – ' their (£)25.80' *Watch for 103.2(0) – 60% of 103.2(0) or 40% of 103.2(0)* FT 'their remaining cost' ÷ 8
8. (a) (area =) 45 × 25 1125(m^2) (Cost =) 1125 × (£)85 (£) 95625 Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, m^2 being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer (b) 60(±2) /360 ISW	M1 A1 M1 A1 Q W C 2 B2 8	 FT 'their area' *If no marks awarded* *Award SC2 for sight of (£)11900* *OR Award SC1 for ×85 correctly* QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. Award B1 for sight of 60 (±2°) or for a numerator <90 with a denominator of 360
9. $2x + x + 7 = 25$ $3x = 18$ $x = 6$	B1 B1 B1 3	FT until 2nd error This line implies 1st B1 Answer only of (x =) 6 award B0 B0 B1
10. 16000 × 6.5 ÷ 100 OR 16000 × 6.5 × 5 × 5 OR ÷ 100 Simple interest = (£)5200 Total paid (16000 + 5200 =) (£)21200	M1 m1 A1 B1 4	Or sight of 1040 FT their 5200 provided M1 awarded
11.(a) All 8 points correctly plotted (b) (£)40 (c) Implies "no" with a reason (e.g. points scattered, or not in line, etc.)	B2 B1 E1 4	B1 for at least 6 points correctly plotted, OR all correctly plotted but joined dot-to-dot OR FT from their graph for their oldest clock Accept statements saying it is 'not positive **and** not negative correlation'

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Applications Unit 2 Foundation Tier January 2013		Final
12. No, Yes, No Far Flung: No and most expensive or most often late Statement that implies Celtic Flights is more reliable than Roly Air	 B1 E1 E1 3	Accept percentages used within comparison Do not accept percentages quoted without interpretation. Accept statements such as '<u>only</u> 74%' as a comparison No with statement of 1 of the 2 reasons Unambiguous and not contradicted. In either reason box for Celtic Flights or Roly Air
13.(a) (245/9.8(0) - 17) or (245−9.8(0)×17)÷9.8(0) (=25 – 17 = 8) ÷2 Conclusion D4 entry is 4 (i.e. half their 8) (b) (=) C3 × B3 + 2 × D3 × B3 OR (=) C3 × B3 + D3 × B3 + D3 × B3 OR (=) (2 × D3 + C3) × B3 OR equivalent	M1 m1 A1 B4 7	Or equivalent method that could lead to 8 Depends on M1. May be embedded CAO A correct answer in the table gets M1, m1, A1 Ignore 'E3 ='. Accept '*' as '×' Award *B3* for sight of C3 × B3 + D3 × B3, or 2 × D3 × B3, or D3 × B3 + D3 × B3, or (2 × D3 + C3) Award *B2* for sight of 'B3×C3' or 'B3×D3' Award *B1* if shown numerically, with an attempt then to use a cell reference *Penalise consistent incorrect row -1 only*
14. $AC^2 = 75^2 + 140^2$ $AC^2 = 25225$ OR $AC = \sqrt{25225}$ AC = 158.8(238017) or 159 (m)	M1 A1 A1 3	
15.(a) 5 | 4 and 2 | 5 (b) Median in £ / Range in £ / Mode in £ NewKey: 23 / 40 / 23 eLime: 36 / 37 / 31	B2 B4 6	B1 for either entered correctly *FT their entries, or no extra entries, to mark (b)* Median, mode and range correct, OR B3 for 4 or 5 correct entries B2 for 3 correct entries B1 for 1 or 2 correct entries

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UNIT 2 - HIGHER TIER

Applications Unit 2 January 2013 Higher Tier GCSE		Final
1.(a) 4.5(00 m) (b) 3200 × 750 with an attempt to change units 2.4 (m^2) (c) 600 × 750 × .... = 405 000 000 900 (mm)	B1 M1 A1 M1 A1 5	 Attempt to change units needs evidence of $\div 10^n$ where $n \geq 3$ Or equivalent method
2.(a) All 8 points correctly plotted (b) (£)40 (c) Implies "no" with a reason (e.g. points scattered, or not in line, etc.)	B2 B1 E1 4	B1 for at least 6 points correctly plotted, OR all correctly plotted but joined dot-to-dot OR FT from their graph for their oldest clock Accept statements saying it is 'not positive **and** not negative correlation'
3. (a) (i)250 × 4.37 = 1092.5(0) (Buys)1050 (zloty) (ii) 1050 ÷ 4.37 = (£)240.27(46) (b) (1050 – 340.40 =) 709.6(0) 709 ÷ 4.43 (£) 160.04	M1 A1 A1 M1 A1 B1 M1 A1 8	 FT provided M1 awarded FT 'their 1050 zloty' provided rounded to the nearest 50,must be in zloty not £s FT 'their (a)' provided >340.40 FT rounding down their 709.60 to whole number Accept (£)160.05 An answer of (£)160.18 should be awarded B1 then SC1 in (b) An answer of (£)160.27 should be awarded SC1, with B1 only if 709.6(0) seen
4. No, Yes, No Far Flung: No and most expensive or most often late Statement that implies Celtic Flights is more reliable than Roly Air	 B1 E1 E1 3	Accept percentages used within comparison Do not accept percentages quoted without interpretation. Accept statements such as '<u>only</u> 74%' as a comparison No with statement of 1 of the 2 reasons Unambiguous and not contradicted. In either reason box for Celtic Flights or Roly Air
5.(a) (245/9.8(0) - 17) or (245−9.8(0)×17)÷9.8(0) (=25 – 17 = 8) (78.4(0) ÷9.8(0) =8) ÷2 Conclusion D4 entry is 4 (i.e. half their 8) (b) (=) C3 × B3 + 2 × D3 × B3 OR (=) C3 × B3 + D3 × B3 + D3 × B3 OR (=) (2 × D3 + C3) × B3 OR equivalent	M1 m1 A1 B4 7	Or equivalent method that could lead to 8 Depends on M1. May be embedded CAO A correct answer in the table gets M1, m1, A1 Ignore 'E3 ='. Accept '*' as '×' Award *B3* for sight of C3 × B3 + D3 × B3, or 2 × D3 × B3, or D3 × B3 + D3 × B3, or (2 × D3 + C3) Award *B2* for sight of 'B3×C3' or 'B3×D3' Award *B1* if shown numerically, with an attempt then to use a cell reference *Penalise consistent incorrect row -1 only*
6.(a) 5 | 4 and 2 | 5 only (with no other entries) (b) (c) Shows understanding that the pie charts don't show how many phones were sold	B2 B4 B1 7	B1 for either entered correctly *<u>FT their **2** entries, or 'nil entries', or if **1** extra entry to mark (b)</u>. However if responses in (b) are correct then award marks as appropriate* Median, mode and range correct, OR B3 for 4 or 5 correct entries B2 for 3 correct entries B1 for 1 or 2 correct entries

	Median in £	Range in £	Mode in £
NewKey	23	40	23
eLime	36	37	31

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Applications Unit 2 January 2013 Higher Tier GCSE		Final
7.(a) (Driftwood) $\frac{68\times36 - 2000}{2000}$ (×100) 22.4(%)	M1 A1	(2448 – 2000)/2000 or 0.224 Accept 22(%) from correct working *If no marks SC1 for an answer of 122(.4%)*
(Grain Bank) 0.1×2000 + 15×146 (= 2390) $\frac{\text{'their 2390'} - 2000}{2000}$ ×100 19.5(%)	M1 m1 A1	(200+2190-2000)/2000 or 0.195 An answer of 19(%) or 20(%) is A0 *If M1 only, then also award SC1 for an answer of 119.5(%), 119(%) or 120(%)*
Other considerations, e.g. reference to time period Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	E1 Q W C 2	Accept reasonable ideas, i.e. 'consider other bank terms/rates', 'length of time business will last', 'able to repay the loan each month' QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b)(i) 26.60/3.5 (£)7.6(0) (ii) 26.60/1.3 (£)20.46	M1 A1 M1 A1 12	For an answer of 8.06, implying division by 3.3, award SC1 Accept (£)20.47 Award M1 only for 20.4615...
8. $2f + 3g = 5$ and $3f + 4g = 4$ Method, e.g. equal coefficients Correct first variable Method to find 2nd variable, e.g. substitution Correct second variable	B1 M1 A1 m1 A1 5	FT provided at least 1 correct equation and solving is of equivalent difficulty Allow 1 slip in non-equalised variable $f = -8$ or $g = 7$
9.(a) 34990 / 1.175 × 1.24 36930 (euros) (b) Sight of 1769.5 (mm) Sight of 2007.5 (mm) 2007.5 – 1769.5 (÷2) (One wing mirror) 119(mm) (c) 11.5 × 7.5 × 5.5 474.4(cm^3)	M1 M1 A2 B1 B1 M1 A1 M1 A2 11	(29778.72(34)) Independent of 1st M1 CAO Not FT from M0, M1. A1 for 36925(.617 euros) or if incorrectly rounded to 36920 If M0, M1 also allow SC1 for an answer of 35790 (euros) Or half of this Or half of this Must FT from correct working A1 for 474.375 rounded or truncated, but not to 1dp as required An answer of 472.4699… comes from 11.49, 7.49 and 5.49 which is M0, A0, A0
10.(a) 2.0×10^4 (b) 1.1×10^5	B2 B2 4	B1 for 2×10^4 or $1.9(984) \times 10^4$. B1 for $1.(05191) \times 10^5$
11. Opposite = Tan56°× 19 = 28.168658….(m) Height of the tree = 29.968658…(m)	M2 A1 A1 4	M1 for tan56° = opposite/19 Accept rounded or truncated from working Accept rounded or truncated from working, and FT from their rounded or truncated 28.168…

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Applications Unit 2 January 2013 Higher Tier GCSE		Final
12.(a) $t + f \leq 30$ and $3t + 4f \geq 80$	B3	B2 for $t+f \leq 30$ and $3t+4f \ldots 80$, or $t+f \ldots 30$ and $3t+4f \geq 80$, or $t+f < 30$ and $3t+4f > 80$ B1 for either inequality correct, or $t+f \ldots 30$ and $3t+4f \ldots 80$ FT their inequalities if possible provided similar level of difficulty
(b) Line $t+f=30$ drawn correctly	B1	
Line $3t+4f=80$ drawn correctly	B1	
The region indicated	B1	FT from 2 lines with at least one line drawn correctly
(c) Any correct point from the correct region, using whole numbers only	B1 7	OR FT their graph for whole number solutions only
13.(a) Calculation that would lead to a correct answer for TOTAL 2009, 2010, 2011 and 2012	M1	Calculations are: 2009: 2300 2010: 2300×3 2011: 2300×3×3 2012: 2300×3×3×3
92000 (T-shirts)	A2	A1 for correct answer for 2009, 2010, 2011 & 2012 as 2300, 6900, 20700, 62100 T-shirts SC1 for an answer of 6900, 20700 or 62100 T-shirts only *Treat starting with 2009 as 2300×3 and continuing with appropriate pattern of trebling as MR-1 and mark accordingly*
(b) Idea that 3.60 is 112% of previous year price	B1	
$3.60 \div 1.12^3$	M2	M1 for equivalent of $3.60 \div 1.12$
(£)2.56	A1	
(c) Strategy to use quadratic similarity	S1	This may be linear or cubic *The following answers imply S1:* *for linear, 6.468 or 6.46 or 6.47* *for cubic, 12.677 or 12.67 or 12.68*
Sight of 50^2 with 70^2, or 5^2 with 7^2, or 1.4^2, or $(5/7)^2$	M1	
$(4.62/50^2)\times70^2$ or equivalent	A1	
(£)9.06	A1 11	Accept (£)9.05(52)
14.(a) Area of 5 faces of the cuboid 2304 (cm^2)	B1	(144+ 540+ 540+ 540 + 540 = 2304)
Slant height$^2 = 18^2 + 6^2$ (=360)	M1	Or alternative complete method
Slant height = 18.97…. or 19(cm)	A1	
Area 1 triangular face = ½ ×12×'slant height' (=113.84..)	M1	FT for their 18.97, provided not 18
OR 4 triangular areas (= 455.36798…)	A1	Rounded or truncated
Total area 2759.36798…(cm^2)	B1	FT provided includes 'their area of 4 triangles' and 'their total area of rectangles' only if at least 4 rectangles have been considered *Allow rounding or truncation errors if method clear, however if consistent rounding or truncation errors then penalise PR-1*
(£0.045 × Total area =) (£) 124.17		
(b) Appropriate sketch (may be implied) with realisation that 1st step is to find the height/length of the cylinder, then subtraction from 22 will give the height of the cone	S1 M1 A1	
$\Pi \times 6^2 \times$ height of cylinder = 1018	M1	FT '22 – their height of cylinder'
Height of the cylinder 9(.00..cm)	A1	
Volume cone = $1/3 \times \Pi \times 6^2 \times$ (22- height of cylinder)	A1	CAO from correct working
Volume cone, answers in range 489.8 to 490.3 (cm^3)	12	
Overall volume1.5 (litres)		

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4362/01

APPLICATIONS OF MATHEMATICS

UNIT 2: FINANCIAL, BUSINESS AND OTHER APPLICATIONS

FOUNDATION TIER

A.M. THURSDAY, 21 June 2012

$1\frac{1}{2}$ hours

4362
010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question ***3(c)***.

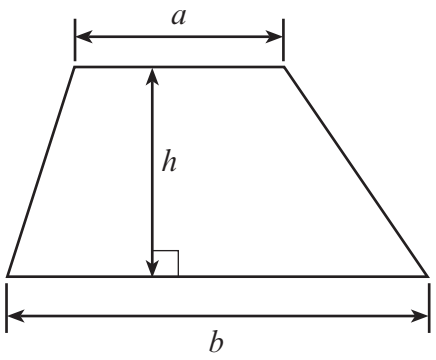
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**12**	
2	**6**	
3	**12**	
4	**3**	
5	**10**	
6	**3**	
7	**6**	
8	**6**	
9	**7**	
10	**15**	
TOTAL MARK		

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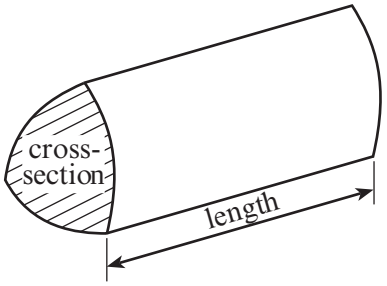
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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Examiner only

1. Jane needs to buy plants and shrubs for her garden.
She goes to her local gardening shop 'Buds in Bloom'.

(a) Jane sees the following on display.

Rose Bushes
£4.99 each



Busy Lizzie Plants
£1.39 each



Compost
£3.50 per bag



Plant food
£7.89 per box



(i) Jane buys a box of plant food, 3 bags of compost, 4 rose bushes and 25 Busy Lizzie plants.
Complete the following table to show her bill for these items.

Item	Cost
1 box of plant food	£7.89
	£
	£
	£
Total	£

[4]

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(ii) Jane belongs to the gardening club, so the store offers her a discount of 10% of the total cost of these items.
How much discount does she receive?

.....

.....

[2]

(iii) After receiving her discount, Jane pays for the items with four twenty pound notes.
How much change should she be given?

.....

.....

.....

[3]

(b) Jane's neighbour has given her £20 to buy as many Busy Lizzie plants as she can.
How much change should Jane give back to her neighbour?

.....

.....

.....

.....

.....

[3]

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2. *(a)* In a school quiz, pupils were asked to state the units used to measure certain items. Below are the questions that were asked. State the answers for each question.

(i) What is the best metric unit that could be used to measure

- the volume of liquid in a large tank, ...
- the distance between London and Wrexham? .....

(ii) What unit could be used to measure

- the weight of a person? .....

[3]

(b) One of the questions was a puzzle to find the values of the letters a, b and c.
The letters represent different values and the sum for each row is given in the last column.
Using the information given in the table, find the value of each of the letters.

	a	a	18
	a	b	20
a	b	c	17

.....

.....

.....

.....

a = ... b = ... c = ...

[3]

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Examiner only

3. Ashley earns £6.50 per hour in her job at a local shop.

(a) How much will she earn for working 8 hours on a Saturday?

.....

.....

[2]

(b) One week she works on a Bank Holiday Monday and earns double her usual rate. If she works for 5 hours, how much will she earn?

.....

.....

.....

.....

[3]

(c) *You will be assessed on the quality of your written communication in this part of the question.*

Ashley usually works 32 hours a week at £6.50 per hour.

She pays one tenth of her weekly earnings in tax and national insurance.
She gives £50 of her weekly earnings to her family for her room and food.
She spends £60 a week on socialising, clothing and other things.
She saves the rest of her weekly earnings.

Ashley wants to book a week's holiday to Portugal costing £439.
How many weeks will it take her to pay for her holiday?

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[7]

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Turn over.

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4. The diagram below, which is drawn to scale, shows a man standing next to an Olympic-sized rowing boat.



Using your knowledge of the height of a man, estimate the **actual length** of the boat.

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[3]

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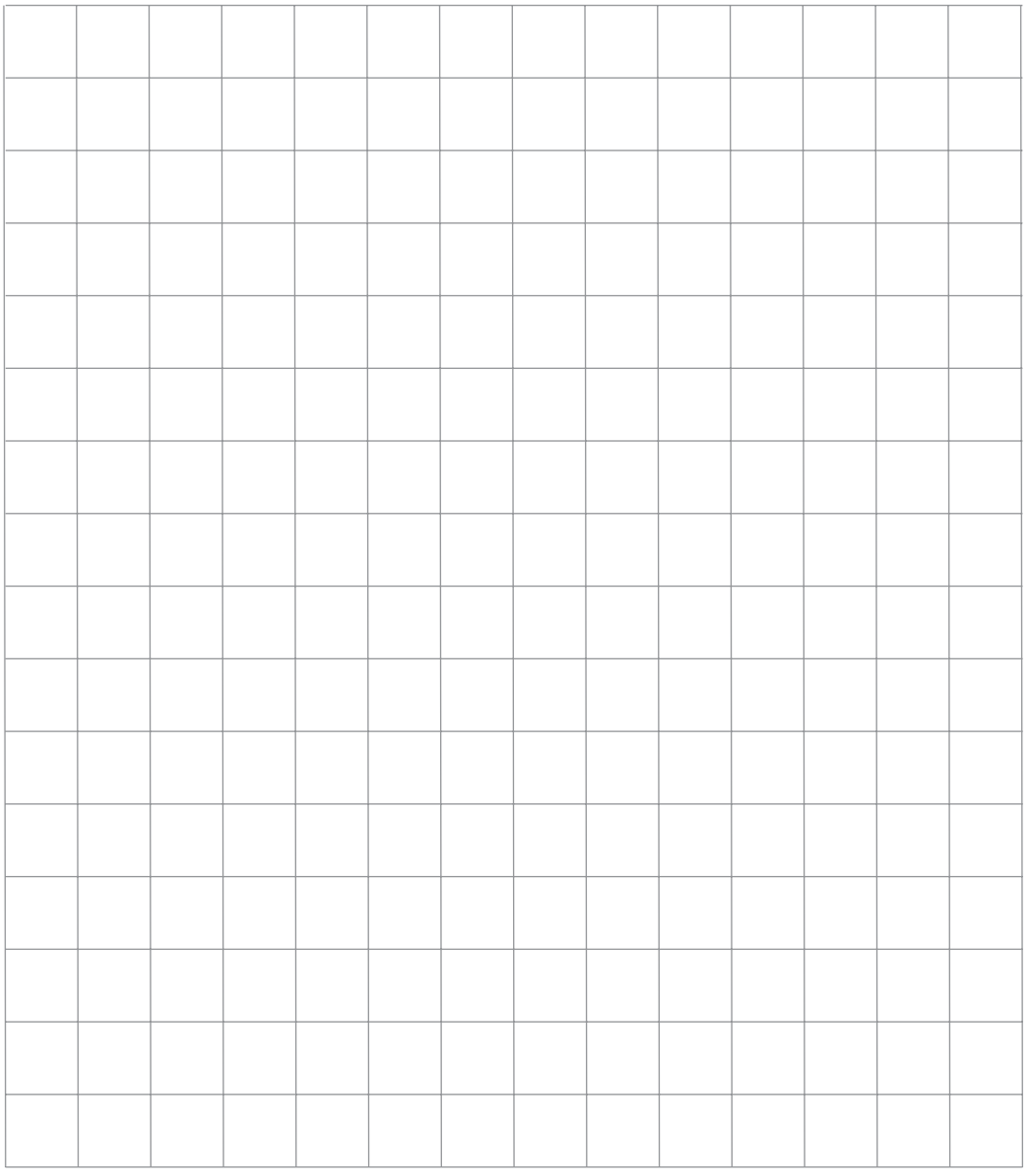
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Examiner only

5. *(a)* Ben carries out a survey of his class, to find each pupil's favourite type of music. His results are shown in the following table.

Type of music	Number of children	Frequency
Rock	𝍸 ||	7
R & B	𝍸 𝍸 𝍸 |	16
Dance	𝍸 𝍸 |	11

Use this data to draw a suitable bar chart on the squared paper below. [3]



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(b) Ben also records the number of music CDs his friends have.

56	37	15	28	68
23	28	39	42	24
18	49	18	31	52

Construct a stem and leaf diagram to show this data.

[3]

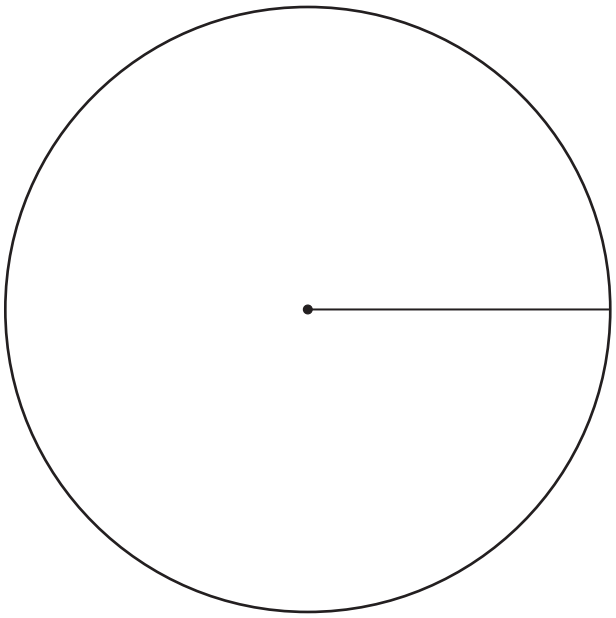
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(c) A music store notes the number of hits it receives on the Internet for some pieces of equipment it sells.
The results are summarised in the table below.

Equipment	Number of hits on the Internet
Drum kit	28
Microphone	31
Electric guitar	37
Keyboard	24

Draw a pie chart to illustrate these results. You should show how you calculate the angles of your pie chart. [4]



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Examiner only

6. Jenny wants to record six episodes of her favourite programme onto a DVD.
Each programme lasts exactly 45 minutes.
Will she be able to record all the programmes onto a DVD that can hold 4 hours of programmes?
Explain your answer carefully.

.....

.....

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.....

.....

[3]

7. On Monday, Gary went to the gym and worked out on four machines.
The fraction of the time he spent on each machine is represented in the diagram below.



(a) What fraction of the total time was Gary on the bike?

.....

.....

[2]

(b) Gary spent 24 minutes on the treadmill.
How long did Gary spend in the gym on Monday?

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[4]

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8. The local council decided to lay a $1\frac{1}{2}$ metre wide concrete path around their bowling green, as shown in the diagram.

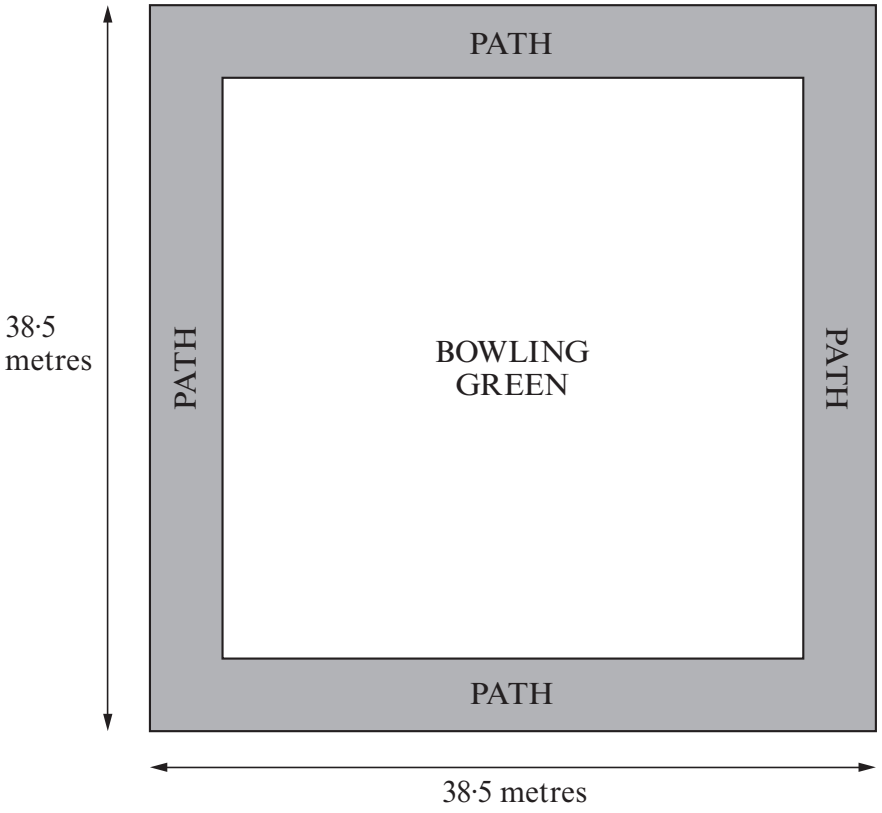


Diagram not drawn to scale

Calculate the area, in square metres, of the concrete path.

[6]

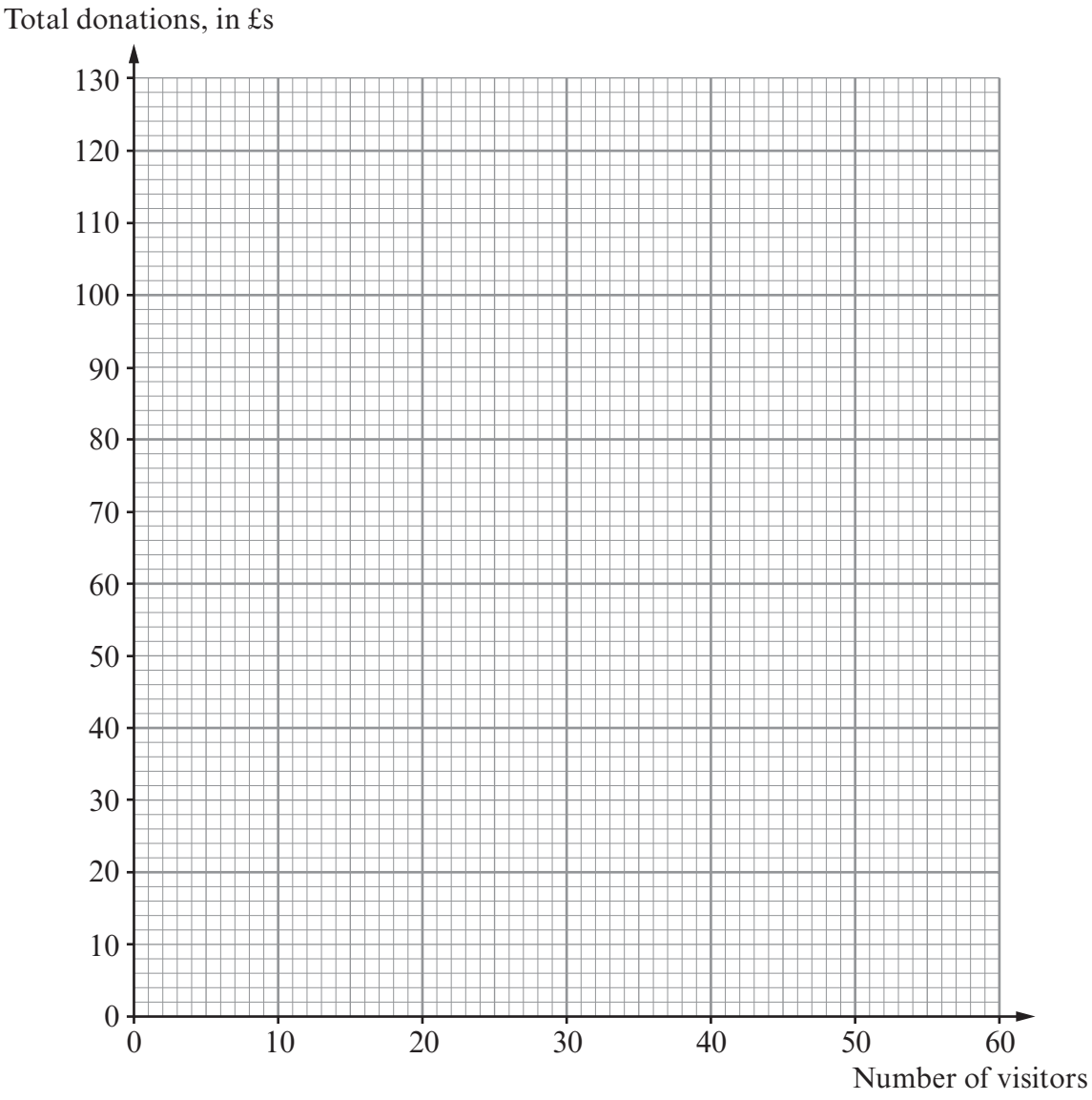
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9. The number of visitors to an animal rescue centre and the total donations received were recorded every day for 7 days.
The table below shows the results.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of visitors	40	10	16	30	25	55	12
Total donations, in £s	90	28	46	70	62	120	100

(a) On the graph paper provided, draw a scatter diagram of these results. [2]



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(b) Draw, by eye, a line of best fit on your scatter diagram. [1]

(c) Describe the correlation between the number of visitors and the total donations.

.....

[1]

(d) Which particular day does not fit the correlation?

.....

[1]

(e) The animal rescue centre is given a target to raise £100 a day on each of the next 5 days. The manager says this should be possible just by making sure that they advertise and get 50 visitors a day.

The number of visitors on each of the next 5 days was as follows:

62, 55, 51, 52, and 58.

Can the manager be sure of achieving her target of £100 per day in total donations? You must give a reason for your answer.

.....

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.....

[2]

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Turn over.

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Examiner only

10.

Maple Beech Furniture Store
Fantastic discounts available!
Ask our sales personnel for details

A large furniture store decides to offer various discounts.

Sales personnel are given the following instructions:

- When a customer's total spend is less than £400, then offer a 6% discount.
- When a customer's total spend is £400 or more, then offer a 12% discount.
- After calculating the discount, if a customer is buying more than one item, then offer a **further** 2% discount on the **already discounted price**.

(a) Construct a flowchart to show the most efficient process of giving discounts.

[6]

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(b) Calculate how much these customers would pay when buying the following items from Maple Beech Furniture Store.

(i) Ms Johnson buys a bed for £350.

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[3]

(ii) Mr Grange buys 4 chairs for £160 **each**, and a table for £450.

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[6]

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GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2012

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 examination in GCSE APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT 2 (FOUNDATION TIER)

Applications Unit 2 Foundation June 2012		FINAL
1. (a) (i) 10.5(0) 19.96 34.75 73.1(0) (ii) $\frac{10}{100}$ × 'their 73.1(0)' (£)7.31 ISW (iii) Actual cost of goods (£)65.79 80 – 'their 65.79' (£)14.21 (b) 20 ÷ 1.39 (14.388..) Buys 14 plants Change = 54(pence) or (£)0.54	B1 B1 B1 B1 M1 A1 B1 M1 A1 M1 A1 A1 12	FT for 1 error. B0 for 73.01 FT their total from(i) (£)65.79 may be seen in (ii). FT their 65.79 Use of 0.388… to calculate change A0 for £54 or 0.54p. Accept £0.54p *For use of 10% discount:* *M1 20 ÷ their cost of a plant* *A1 number of plants bought* *A1 Change given.* *For final A1 a correct 10% value must be used.*
2.(a) (i)Litres Km (ii) Kg or Stones or pounds (b) a = 9 b = 11 c = -3	B1 B1 B1 B1 B1 B1 6	Accept m^3 Accept pounds, lbs or stones and pounds FT their a FT their a and b

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Applications Unit 2 Foundation June 2012		FINAL
3.(a) 8 × 6.50 (£)52	M1 A1	
(b) (6.50 × 2 × 5 (£)65	M2 A1	Award M1 for either 6.5(0) × 2 or 6.5(0) × 5 OR Award M1 5 × 2 = 10 hours M1 10 × 6.5(0) A1 (£)65
(c) earnings (32 × 6.50=) (£)208 Tax &NI (1/10 of 208=) (£)20.8(0) Total outgoings (20.8(0) + 50 + 60=) (£)130.8(0) Has left (208 – 130.8(0)=) (£)77.2(0) Number of weeks (439 ÷ 77.2(0)= 5.68...) 6 weeks needed	B1 B1 B1 B1 B1	CAO FT their 208 FT their 20.8(0) FT their 130.8(0) FT their 77.2(0) <u>Alternative method</u> Earnings = 208 **B1** Tax = 20.80 **B1** (208 – 20.80 =)187.20 **B1** Has left 77.20 **B1** FT 187.20 – 50 - 60 Number of weeks = 6 weeks **B1** FT their 77.2(0)
For QWC Look for • spelling • clarity of text explanations • the use of notation (watch for the use of '=', '£' being appropriate) Notes: QWC2 requires words throughout the response not just connected to the final answer. QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	Q W C 2	*If no tax & NI Award* *B1 for 208, B0, B0, B1 for (208 – 110 =) 98, B1 for (439 ÷ 98=) 5 weeks* QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
	12	
4.Use of height of man 2m or 6 feet Scale factor 8 16m or 48ft	B1 B1 B1	Accept range of 1.5m – 2m or 5ft – 6 ½ft Award B1 if boat subdivided into 8 parts. FT their scale factor if in range 6 – 9 × their height. *For final B1 units of metres or feet must be included.* *Award B3 For unsupported answers in the range 12m – 16m or 40ft – 52ft. Units must be given.*
	3	

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Applications Unit 2 Foundation June 2012		FINAL
5.(a) Labels on both axes Uniform scale on vertical axis All bars correct	B1 M1 A1	 Bars must have correct heights and equal widths
(b) 1 | 5 8 8 2 | 3 4 8 8 3 | 1 7 9 4 | 2 9 5 | 2 6 6 | 8 Key eg. 5/6 represents 56	B2 B1	-1 for each error Award SC1 for a correct stem and leaf diagram but not ordered
(c) 3 or 4 angles correct and correctly labelled. OR 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram.</u> 360/120 Angles are 84, 93, 111, 72.	B4 OR (B3) (B3) (B2) (B1) (M1) (A1) 10	Use the correct overlay and allow ±2°. Correct labels (Words NOT the frequency OR angle) 3 correct labels are enough. If only B1 is scored for the diagram and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 3° gets the M1 OR SC1 for all the correct percentages 23.3%, 25.8%, 30.8%, 20%
6. $6 \times 45 = 270$ (mins) 4 hours = $4 \times 60 = 240$ (mins) or 270 (mins) = 4 ½ (hours) No because she needs 30 mins more	B1 B1 E1 3	*Alternative method* *2 programmes = 1 ½ hours* *4 programmes = 3 hours* *6 programmes = 4 ½ hours* Accept "no because there isn't enough time" or "can watch 5 episodes (and 15 mins of 6th)" *Penalise -1 for incorrect use of hours and minutes for final E1*
7. (a) $^4/_{10}$ (ISW) or $^2/_5$ (b) knowing that 3 parts represent 24 mins $24 \div 3 = 8$ 10×8 = 80 (mins) or equivalent	B2 B1 M1 M1 A1 6	B1 for denominator of 10 (5) or B1 for numerator of 4 (2) in a fraction less than 1.

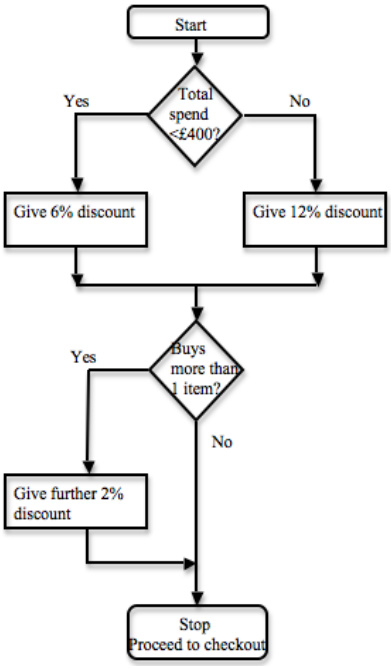
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Applications Unit 2 Foundation June 2012		FINAL
8. Area of whole = 38.5^2 = 1482.25 One Dimension of green = 35.5 Area of green = (35.5^2) 1260.25 Area of path 1482.25 – 1260.25 = 222 square metres <u>Alternative method 1</u> M1 38.5 × 1.5 M1 35.5 × 1.5 A1 for either 57.75 or 53.25 B1 for both 115.5 and 106.5. M1 115.5 + 106.5 A1 222 square metres <u>Alternative method 2</u> M1 38.5 × 1.5 (= 57.75) A1 (57.75 × 4 =) 231 M1 1.5 × 1.5 (= 2.25) A1 (2.25 × 4 =) 9 M1 231 – 9 A1 222 square metres	M1 A1 B1 B1 M1 A1 6	 FT their 1482.25 – their 1260.25 FT their 2 × 57.75 and 2 × 53.25 FT provided M1, A1 and B1 awarded FT provided both M marks awarded and one A mark
9.(a) All 7 points plotted correctly, not joined (b) Reasonable straight line of best fit by eye, some points above and below (c) Positive (d) Indicates Sunday (12, 100) (e) No with a reason based on risk, not really a secure relationship between what people give and how many	B2 B1 B1 B1 E2 7	B1 for at least 3 correct plots not joined, or all points plotted correctly but joined Accept appropriate descriptions E1 for No with statement such as ‘people only gave £1 each’

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Applications Unit 2 Foundation June 2012		FINAL
10.(a) Correct flowchart with appropriate symbols Accept equivalent ways of describing the discounts (or equivalent using $\geq$ **400** with reverse initial decisions) For example,  	B6	Ignore if start/stop rounded rectangle and input parallelogram missing. Accept shapes not drawn using a ruler. Mark as follows: B1 Shape of boxes –All decision boxes shown as rhombus, all non-decision boxes as (intention) rectangle B1 for correct use of **<400** or in words "less than 400" within a flowchart, or equivalent *Accept if $\leq$ or < written or implied as appropriate* B1 Yes/No with actions for initial discounts correct B1 Bringing back together ready for next consideration as single flow *FT if now two separate flows* B1 Question(s) relating to more than 1 item AND Yes/No with action for discount B1 Finish indicated, e.g. "proceed to checkout", accept as two separate flows
(b)(i) Selects 6% discount only & no further discounts 350 - 0.06 × 350 or 0.94 × 350 or equivalent (£)329	S1 M1 A1	Indication of 6% may be with incorrect notation
(ii) 4 × 160 + 450 (£)1090 1090 × 0.88 or equivalent (£)959.2(0) 959.2(0) × 0.98 (£)940(.016)	M1 A1 M1 A1 M1 A1	FT their 1090 FT their 959.2(0) May be embedded answers leading towards a final response Accept 940, 940.01, 940.02, 940.016 *If 1 chair and a table then:* *(M0 160 + 450)* *(A0 = (£)610)* *M1 610 × 0.88 (FT their 610)* *A1 = (£)536.8(0)* *M1 536.8(0) × 0.98 (FT their 536.8(0)* *A1 = (£)526(.064)* *Treat starting with 4 chairs or 1 table as above with FT, however if only 1 table no 2% discount should be awarded marks, hence maximum, M0, A0, M1, A1, M0, A0* *No marks for working with 1 chair only* *Candidates working with discount of 14%, possible M1, A1 for (£)1090, then SC1 for (£)937.4(0), allow FT from their (£)1090*
	15	

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UNIT 2 (HIGHER TIER)

Applications Unit 2 Summer 2012 Higher Tier		FINAL
1.(a) 122 ÷ 14 8 (stone) 10 (pounds) (b) 10 × 14 + 4 144 (pounds) 144 ÷ 2.2 65 (kg) or 65.5 (kg)	M1 A2 M1 A1 m1 A1 7	Or for repeated addition or subtraction of 14, at least 6 correct calculations A1 for 8.7(142…) with an attempt to work with the decimal, or sight of 112. M1, A0 for 8.7(142…) or 8 stone 7lb The "+4" may be embedded in further calculation May be implied in later calculation FT provided M1 awarded Accept 65.4(545…) *Conversion of 4lb to a decimal (0.2857…)leads to a difference in final answer, penalise PR-1* *SC1 for an answer of 66.18.. or 66.2 or 66 (from 10.4×14÷2.2), OR for an answer of 63.6(33…) (from 10×14÷2.2)*
2.(a) All 7 points plotted correctly, not joined (b) Reasonable straight line of best fit by eye, some points above and below (c) Positive (d) Indicates Sunday (12, 100) (e) No with a reason based on risk, not really a secure relationship between what people give and how many visitors	B2 B1 B1 B1 E2 7	B1 for at least 3 correct plots not joined, or all points plotted correctly but joined Accept appropriate descriptions E1 for No with statement such as 'people only gave £1 each'

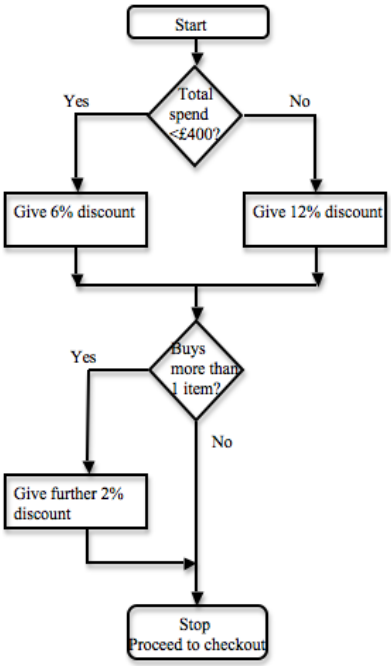
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Applications Unit 2 Summer 2012 Higher Tier		FINAL
3.(a) 300 × 154.18 46254 (krona) Need to buy 46240 (krona) 46240 ÷ 154.18 299.91 (euros) Look for • spelling • clarity of text explanations, • the use of notation and units (watch for the use of '=', euro, krona being appropriate) QWC2 can only be awarded if 'krona' is stated appropriately in working, and 'euro' in a final answer QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 A1 M1 A1 QWC 2	FT 'their 46240' but not 300 or 46254 An answer of 299.9(0) is M1, A1, A1, M1, A0 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b) 0.082 Canadian Dollars = 0.058 euros, linked with either appropriate calculation required 0.7073… euros, rounded or truncated 1.41379… Canadian Dollars, rounded or truncated	M1 A1 A1	May be implied by 1 correct answer *Do not award M1 if answers are reversed* 1÷0.082 (= 12.195122…) × 0.058 = 0.707… 1÷0.058 (=17.241379…) × 0.082 = 1.41379… *Penalise premature truncation or rounding errors -1 only, and only if their answer would be different to 0.70, 0.71 and 1.41 if truncated or rounded* *If a place value error is repeated in (b), due to use of, for example 0.58 or 0.82, then penalise once only* *M1 may be implied by answer from premature approximation*
	10	

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Applications Unit 2 Summer 2012 Higher Tier		FINAL
4.(a) Correct flowchart with appropriate symbols Accept equivalent ways of describing the discounts (or equivalent using $\geq$ **400** with reverse initial decisions) For example,  	B6	Ignore if start/stop 'rounded rectangle' and/or input/output parallelogram missing. Accept shapes not drawn using a ruler. Mark as follows: B1 Shape of boxes –All decision boxes shown as rhombus, all non-decision boxes as (intention) rectangle B1 for correct use of **<400** or in words "less than 400" within a flowchart, or equivalent *Accept if ≤ or < written or implied as appropriate* B1 Yes/No with actions for initial discounts correct B1 Bringing back together ready for next consideration as single flow *FT if now two separate flows* B1 Question(s) relating to more than 1 item AND Yes/No with action for discount B1 Finish indicated, e.g. "proceed to checkout", accept as two separate flows
(b)(i) Selects 6% discount only & no further discounts 350 - 0.06 × 350 or 0.94 × 350 or equivalent (£)329	S1 M1 A1	Indication of 6% may be with incorrect notation
(ii) 4 × 160 + 450 (£)1090 1090 × 0.88 or equivalent (£)959.2(0) 959.2(0) × 0.98 (£)940(.016)	M1 A1 M1 A1 M1 A1	FT their 1090 FT their 959.2(0) May be embedded answers leading towards a final response Accept 940, 940.01, 940.02, 940.016 *If 1 chair and a table then:* *(M0 160 + 450)* *(A0 = (£)610)* *M1 610 × 0.88 (FT their 610)* *A1 = (£)536.8(0)* *M1 536.8(0) × 0.98 (FT their 536.8(0)* *A1 = (£)526(.064)* *Treat starting with 4 chairs or 1 table as above with FT, however if only 1 table no 2% discount should be awarded marks, hence maximum, M0, A0, M1, A1, M0, A0* *No marks for working with 1 chair only* *Candidates working with discount of 14%, possible M1, A1 for (£)1090, then SC1 for (£)937.4(0), allow FT from their (£)1090*
	15	

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Applications Unit 2 Summer 2012 Higher Tier		FINAL
5.(a)(i) (ii) Statement, e.g. 'greater spread for the men (than the women)', or 'very similar' (b) Reason that includes reference to the fact that cannot tell how much time was spent	B3 E1 E1 5	B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries Accept 'more higher weights for men', 'the difference in the range is (only) one' Do not accept 'there are more men than women', without further clarification related to not knowing the time spent
6.(a) 3.5×10^{10} 8.2×10^{-4} 4.1×10^{-14} (b) Evidence of 9.5, 10.5, 7.5, 8.5 Perimeter Lower **34** (cm) Upper **38** (cm) Area Lower **71.25** (cm^2) Upper **89.25** (cm^2)	B2 B2 B1 B1 B4 10	B1 for $3.4(78) \times 10^{10}$ B1 for $8.24(9) \times 10^{-4}$ CAO *Penalise once, on the first occasion, only for consistent incorrect notation* May be implied by 3 correct answers in the table In upper bounds accept $0.49^{\cdot}$ or 0.49 recurring B1 for each correct entry Accept 71.3 and 89.3, for 71.25 and 89.25 respectively from evidence of correct bounds *Also possible SC1for appropriate use of values in the range 10.4 to 10.49.. **and** 8.4 to 8.49.., e.g. for sight of 37.6 for upper perimeter and 87.36 or 87.4 for upper area from use of 10.4 and 8.4*
7.(a) Speed = $\frac{1.2}{9/60}$ or equivalent 8 (mph) (b) $h = \sin 11.2(°) \times 2.6$ $= 0.5(05\ldots)$	M1 A1 M2 A1 5	or 1.2/0.15 CAO M1 for $\sin 11.2(°) = h/2.6$ Mark final answer
8. Strategy: attempt to set up simultaneous equations with clear indication of the variables, e.g. on diagrams $2x+2y=10$ with $6x+4y=27$, or equivalent Equating coefficient (1 slip allowed), One of the variables found Method to find the second variable, using their first variable Second variable	S1 M1 M1 A1 M1 A1 6	May be informal, shown by diagrams. Variables used may be implied later Could be semi-perimeter with correct interpretation later N.B. Any FT from here is for M marks only, accuracy marks for correct answers only FT for $x+y=10$ with $3x+2y=27$, or one of these 2 equations with an appropriate one of $2x+2y=10$ or $6x+4y=27$. FT for one correct equation with another in a similar form. Do not award M1 for a trial & improvement method Do not award M1 for a trial & improvement method Answer of 7 and 3 as a final answer is A0 ***(Length cost) x=(£)3.5(0) and (Width cost) y=(£)1.5(0)*** *Award SC2 for unsupported correct answers, or for correct answers from correct visual interpretation* *$x + y = 10$ and $2x + 3y = 27$ leading to answer of 7 and 3 from a correct method is awarded 3 marks: S1, M0, M1, A0, M1, A0*
9.Strategy: Pythagoras' Theorem and $\Pi r^2 h/3$ $8.4^2 - 5.2^2 = h^2$ $h = 6.596969\ldots$ or appropriately rounded $\frac{\Pi \times 5.2^2 \times h}{3}$ Accept answers 186 (cm^3) to 187(cm^3) inclusive	S1 M2 A1 m1 A1 6	 M1 for $8.4^2 = 5.2^2 + h^2$ Depends on previous M1 or M2. FT 'their height' not 8.4, however if inappropriately truncated then FT for M1 only Must be from correct working, or unsupported

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Applications Unit 2 Summer 2012 Higher Tier		FINAL
10. Overall idea, working in the quadrant shown to find a region and technique for solution of the problem	S1	
Any 2 of the lines 5y=7x-14, x+2y=14 and 3x+2y=18 drawn correctly	B2	B1 for 1 line
Correct region identified from all correct lines	B1	CAO. May be implied by further work in maximising
Use of x+y= … OR solution of x+2y = 14 & 3x+2y = 18	M1	FT for their identified region
Maximised when $x = 2$ and $y = 6$	A1 6	FT for their identified region
11.(a)(i) All 9 plots accurate (taking into account accuracy difficulty of plotting after 6.25) AND joined with a curve	B3	B2 for plots generally accurate from 100 to 6.25 with an attempt at the others, but not joined by a curve, OR B1 for points 100 to 12.5 accurately plotted For information: *100, 50, 25, 12.5, 6.25, 3.125, 1.5625, 0.78125, 0.390625*
(ii) From their graph, provided their answer is between 4 and 5 (seconds) **exclusive**	B1	
(b) $f = m/2^t$ or $f = m \times 0.5^t$	B3 7	B2 for expression $m/2^t$, or $m \times 0.5^t$, OR B1 for evidence of m **repeatedly** being divided by 2 or multiplied by 0.5, i.e. more than once, or sight of 2^t or 0.5^t
12.(a)(i) Use of $i = 0.086$	B1	
Use of $n = 4$	B1	
$(1 + 0.086/4)^4 - 1$	M1	Correct substitution in the formula given
AER 8.88(%)	A2	A1 for 0.088(813467……) or incorrect rounding or truncation of the AER percentage
(ii) Explanation, based on need for fair comparison of interest rates	E1	Accept 'percentage of interest paid annually', must mention 'year' or 'annual'
(b) $5.54/100 \times 350$ or 0.0554×350	B1	
$(1 + 0.0554)^3 \times 350$	M1	May be embedded in further calculation Method of adding on different amounts , 3 year period, following attempts to calculate 5.54% (350+19.39=369.39 369.39+20.46(42..)=389.85(42..) 389.85+21.597.. =)
(£) 411.45(21…)	A1	Accept 411.44(7..)) *B1 and SC1 for depreciation 294.99, but no FT*
Conclusion, e.g. Yes as more than £410	E1 10	*Accept 5.4% monthly used instead to give an answer of 411.40(15..)* FT from their compounded amount provided M1, and FT from simple interest for an answer of 408.17 (408.12 from monthly) being < than 410
13.(a) $31.3 = (80/360) \times \Pi \times r^2$	M1	
$r^2 = 31.3/\{(80/360) \times \Pi\}$	m1	
Answers between 6.69 and 6.70 (m)	A1	
(b) $(280/360) \times 2 \times \Pi \times r$	M1	FT 'their r'
Answers between 32.6 and 32.75(m)	A1	
Adding on 13.4 correctly (between 46.0 and 46.15 (m))	A1 6	FT +13.4 provided M1 awarded

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