CCEA GCSE MATHEMATICS

MATHS



EXAM QUESTION PACK

UNIT T2 FOUNDATION TIER GMT21 PAPERS

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2016

Mathematics

Unit T2
(With calculator)
Foundation Tier



GMT21

[GMT21]

MONDAY 11 JANUARY, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all twenty-six** questions.
All working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

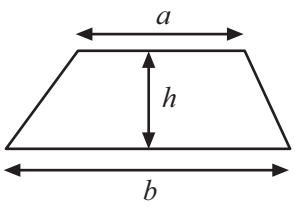
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in Questions **10** and **16(b)**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

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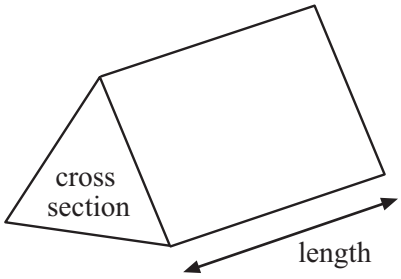
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Formula Sheet

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



Volume of prism = area of cross section × length



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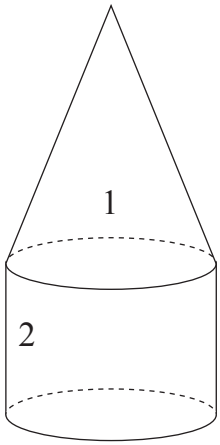
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(Questions start overleaf)

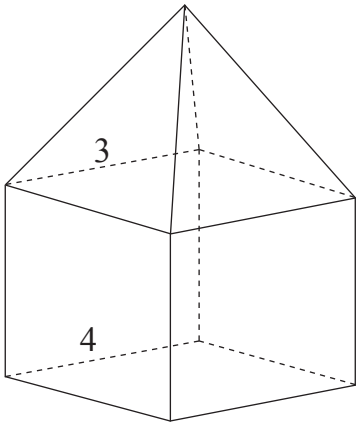
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1 Each of the shapes below is made by joining two different solids together.

(a) Fill in the names of the solids under each shape.



Shape A



Shape B

Solid 1 _____ Solid 3 _____

Solid 2 _____ Solid 4 _____

[4]

(b) Complete the following table for **Shape B**.

Number of Faces	Number of Edges	Number of Vertices

[3]

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2 The stem and leaf diagram illustrates the marks in a test for a group of students.

5	4 6 7 7 7 9
6	2 3 4
7	0 2 3 4 6
8	2 3 4 5 7

Key: 5 | 4 = 54%

(a) The mark for the top student has been left out of the diagram.

The range for the whole class of twenty students was 35.

Calculate the mark for the top student and insert it correctly in the stem and leaf diagram.

[2]

(b) What was the mean of the lowest four marks?

Answer _____ [2]

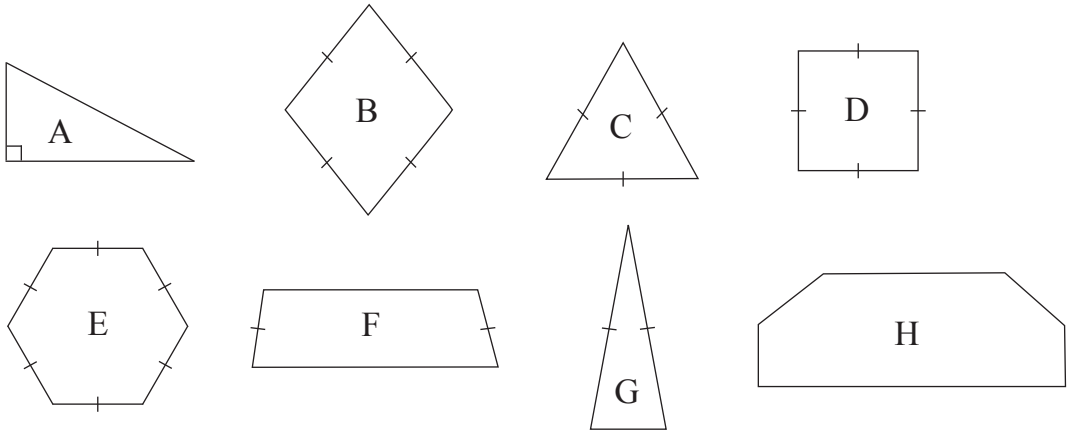
(c) The top 15% of all the students in the class were awarded an A* grade. What was the lowest mark needed to obtain the A* grade?

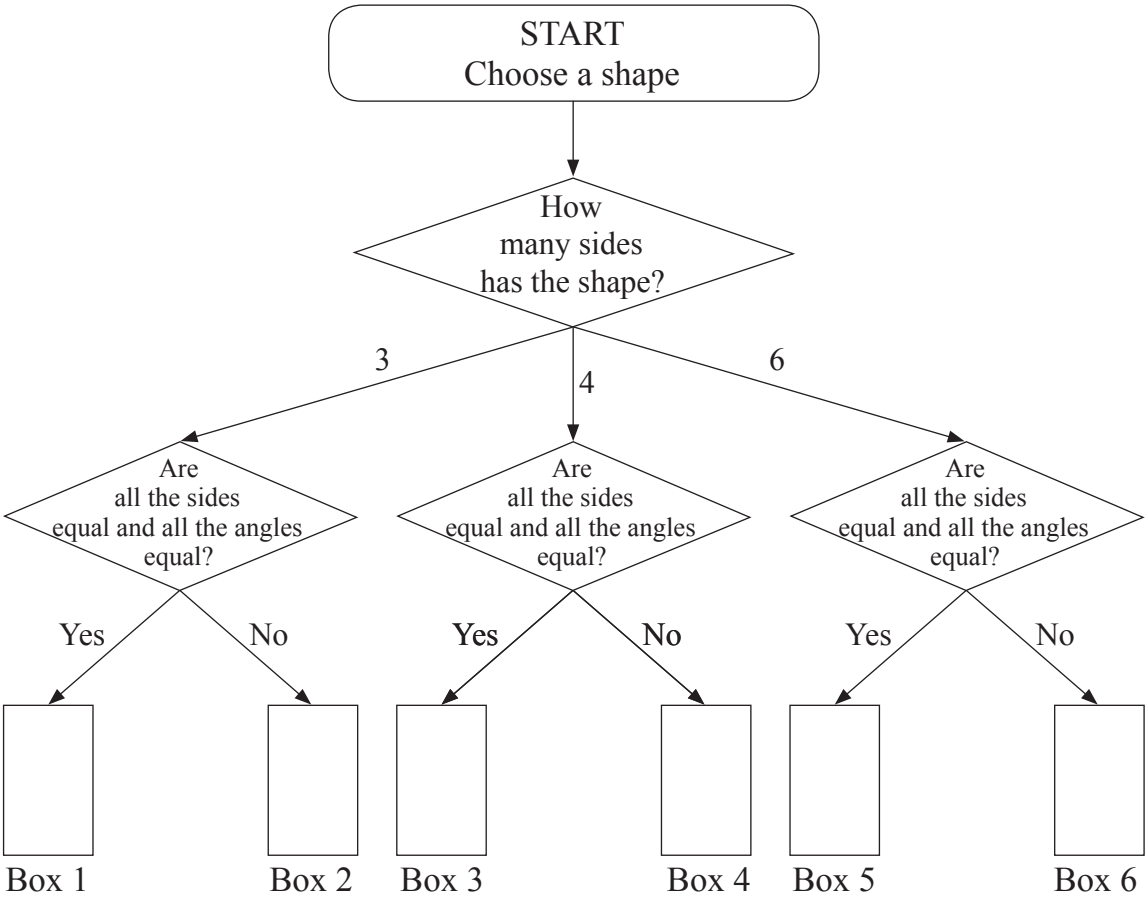
Answer _____ % [2]

[Turn over

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3 **(a)** Use the decision tree to sort the shapes A, B, C, D, E, F, G and H.





[2]

(b) Complete the sentence:

The shapes in Boxes 1, 3 and 5 are all _____ polygons. [1]

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4 **(a)** Simplify

$3p - 4r + 7p - 2r$

Answer _____ [2]

(b) Find the value of

$5e - 3f$

when $e = 3$ and $f = -7$

Answer _____ [2]

(c) Expand

$4(y - 6)$

Answer _____ [2]

(d) Solve

$6 - 2x = 12$

Answer $x =$ _____ [2]

[Turn over

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5 3.2 metres of electrical cable and 0.6 metres of copper wire cost a total of £4.07

The electrical cable costs 85p per metre.

How much does the copper wire cost per metre?

Show clearly all your working.

Answer £ _____ per metre [4]

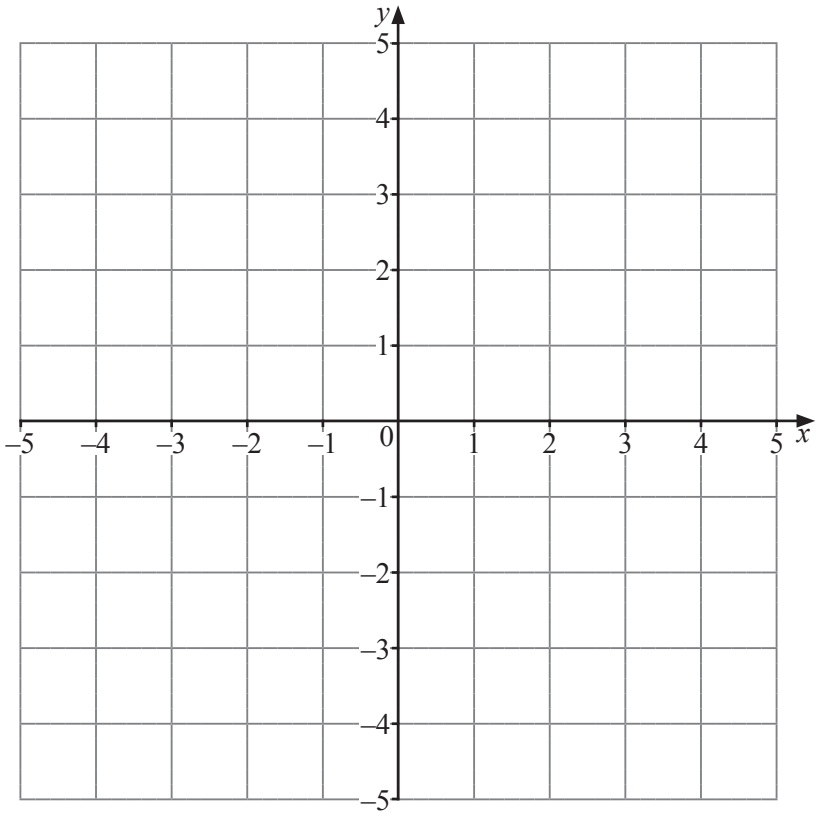
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6 **(a)** Complete the table below for $y = 2x + 1$

x	–2	–1	0	1	2
y	–3		1	3	

[1]

(b) Draw the line $y = 2x + 1$ on the grid provided.



[2]

[Turn over

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7 **(a)** Write 68% 0.64 and $\frac{13}{20}$ in ascending order of size.

Show all your working.

Answer _____ [3]

(b) Which of the numbers in **(a)** is closest in size to $\frac{2}{3}$?

Answer _____ [1]

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8 The scheduled arrival times (Sched.) and the actual landing times (Status) of flights into London Heathrow are given in the table.

London Heathrow	Arrivals			
Sched.	Flight No.	Arriving from	Status	Terminal
10.25	BA182	NEW YORK	LANDED 11.30	5
11.10	9W5050	CALGARY	LANDED 11.32	3
11.10	AC850	CALGARY	LANDED 11.32	3
11.10	BD4850	CALGARY	LANDED 11.32	3
11.15	AA6475	DUSSELDORF	LANDED 10.42	5
11.15	BA307	PARIS CDG	LANDED 11.00	5
11.15	BA7062	MADRID	LANDED 11.02	3

(a) How many of these flights arrived early?

Answer _____ [1]

(b) How many minutes late was the flight from New York?

Answer _____ minutes [2]

[Turn over

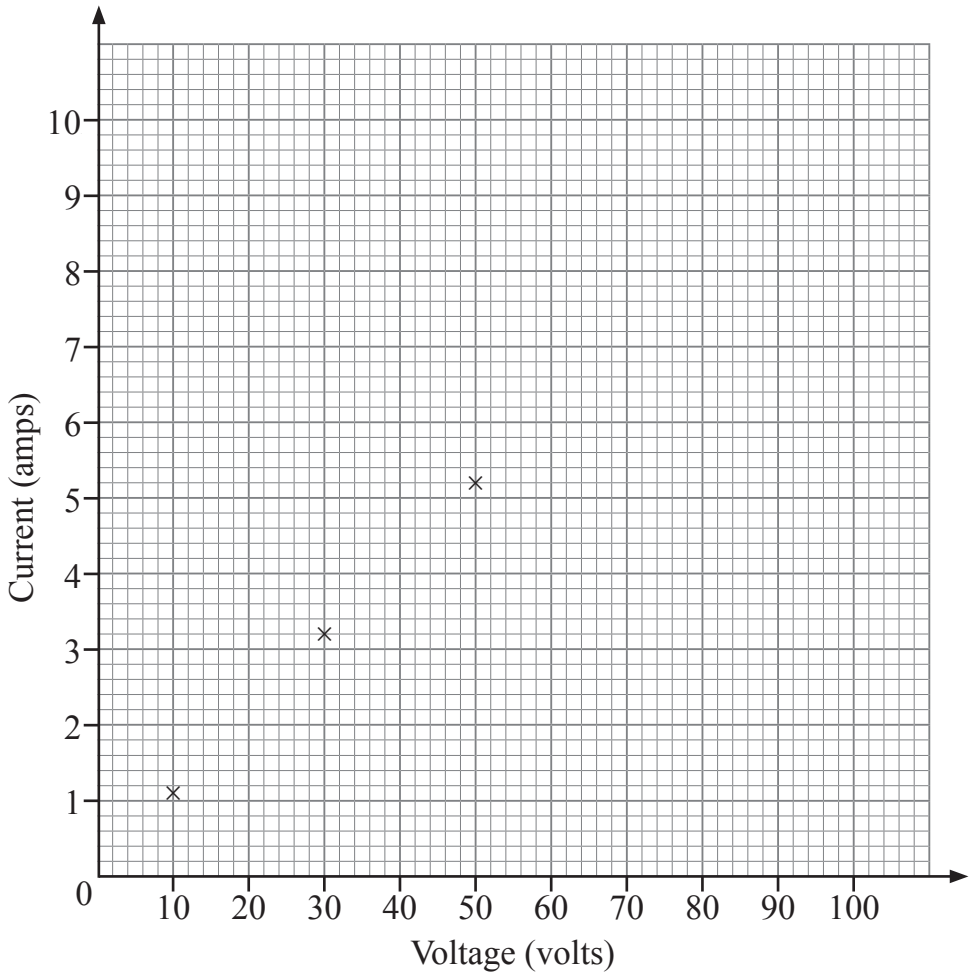
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9 Nine science students each measured the current (in amps) that flowed through a circuit at various voltages.

Their results are recorded below.

Student	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Voltage	10	50	30	20	80	40	60	70	90
Current	1.1	5.2	3.2	1.9	8.2	3.7	3.8	6.5	9.3

(a) Draw a scatter graph of the points. The first three points have already been plotted.



[2]

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(b) Which student appears to have taken an incorrect reading?

Answer student _____ [1]

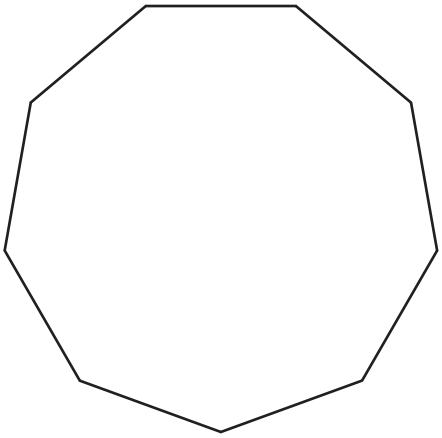
(c) Draw a line of best fit on your scatter graph. [1]

(d) Use the line of best fit to estimate the current for the incorrect reading taken by the student.

Answer current = _____ amps [1]

Quality of written communication will be assessed in this question.

10



This is a drawing of a regular nonagon (a shape with nine sides of equal length).

Explain why the size of an interior angle is 140°

[2]

[Turn over

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11 In the diagram lines AB and CD are parallel.

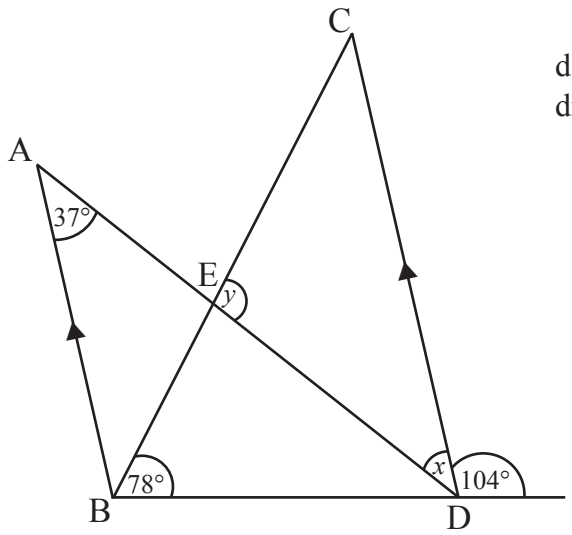


diagram not drawn accurately

(a) Find the size of the angle x.

Answer _____ ° [1]

(b) Calculate the size of the angle y.

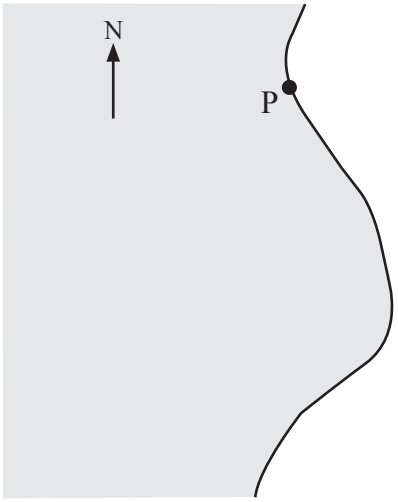
Answer _____ ° [2]

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12 A lifeboat leaves port P to answer an emergency call from a ship S.

The ship is 30 km from P on a bearing of 120°

Using a scale of 1 cm = 4 km, mark the position of the ship S.



[2]

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13 **(a)** What percentage is £35.25 of £47?

Answer _____ % [2]

(b) John bought a new phone for £44 plus 17.5% VAT.

Mark bought a similar phone in a different shop.

Mark paid £50.31 including VAT at 17.5%

Whose phone was more expensive and by how much?

Show all your working.

Answer _____ by £ _____ [3]

14 Factorise fully each of the following:

(a) $12a + 6$

Answer _____ [1]

(b) $y^2 - 6y$

Answer _____ [1]

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15 ABC is a triangle.

The length of the side AB is $(x + 2)$ cm.

(a) The length of the side AC is twice the length of the side AB.

Find an expression for the length of AC.

Answer _____ cm [1]

(b) The length of the remaining side CB is calculated by adding the lengths of the sides AB and AC together and subtracting 7 cm.

Find an expression for the length of CB.

Answer _____ cm [1]

(c) The perimeter of the triangle ABC is 20 cm.

Form an equation and solve it to find the length of the side AB.

Answer AB = _____ cm [3]

[Turn over

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Quality of written communication will be assessed in part (b) of this question.

16 Pupils are asked to investigate the number of electronic devices such as mobile phones, tablets, laptops etc. that people own.

(a) Joanne surveys her classmates and her results are recorded in the frequency table below.

Number of devices	Frequency
0	3
1	5
2	6
3	4
4	5
5	2
6	3

Calculate the mean number of devices for Joanne's classmates.

Answer _____ [3]

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(b) Paula surveys 100 people at random coming out of the Leisure Centre one Saturday morning. She calculates the mean for her results to be 3.4

Whose value should give a better estimate for the mean for the whole population?

Give 2 reasons for your answer.

[2]

17 **Without using a calculator** and showing every step in your working, calculate $\frac{2}{9} \div 4$ giving your answer in its simplest form.

Answer _____ [2]

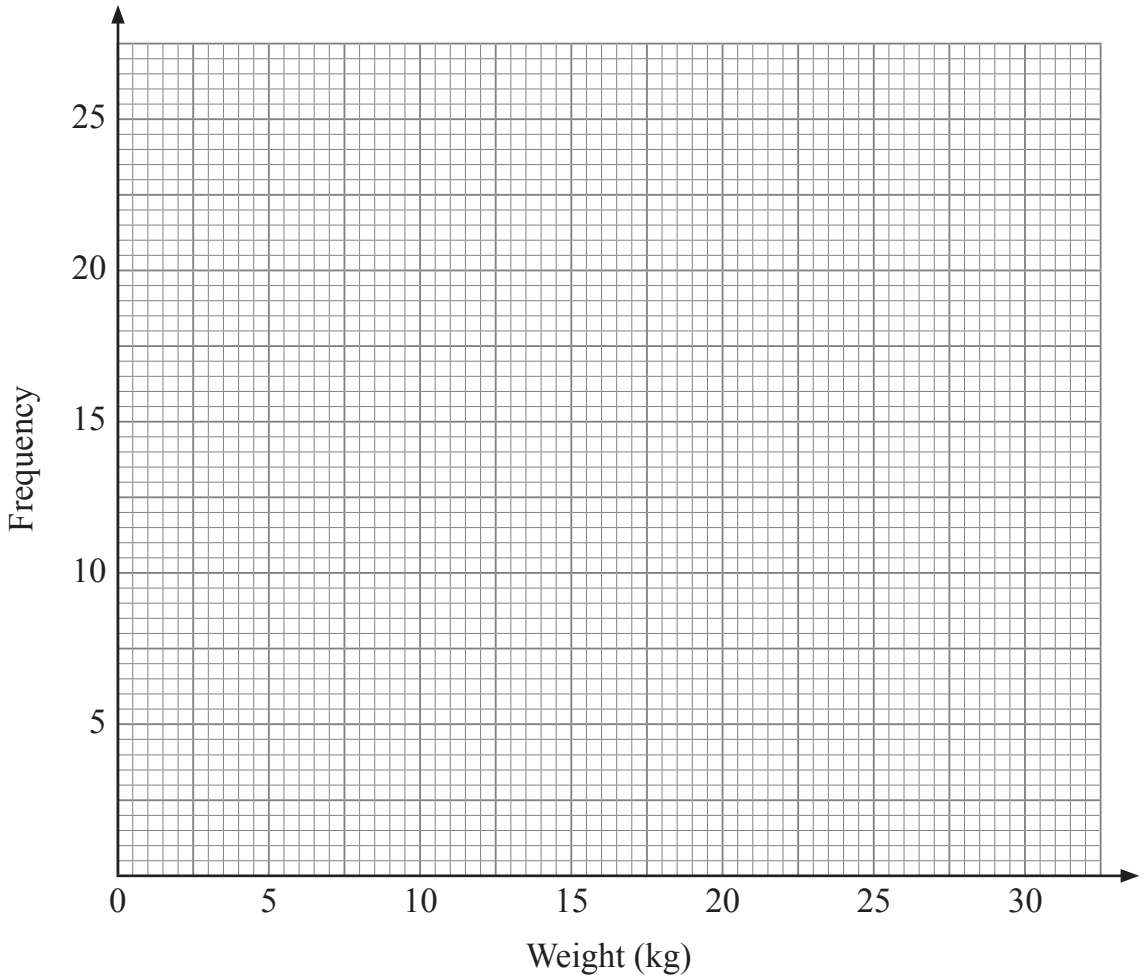
[Turn over

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18 The table below shows the weight of suitcases checked in for a flight.

Weight (kg)	Frequency
$0 < w \leqslant 5$	2
$5 < w \leqslant 10$	11
$10 < w \leqslant 15$	25
$15 < w \leqslant 20$	18
$20 < w \leqslant 25$	13
$25 < w \leqslant 30$	11

(a) Draw a frequency polygon for the data.



[2]

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(b) Which class interval contains the median weight?

Answer _____ [1]

(c) All luggage is charged at £20 per suitcase. A suitcase weighing over 20 kg has an additional charge of £7.50

How much money is charged for all the luggage on this flight?

Answer £ _____ [2]

[Turn over

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19 A circular glass shaving mirror has a diameter of 21 cm.



It has glass on both sides.

Calculate the **total** area of glass correct to the nearest whole number.

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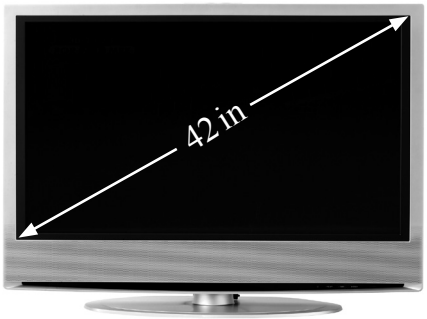
Answer _____ cm^2 [3]

20 The size of a television is given as the length of the diagonal of the screen.

This television has a size of 42 inches.

The height of the screen is 20.4 inches.

What is the width of the screen?



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Answer _____ inches [3]

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21 A Christmas Log cake has a uniform cross-sectional area of 120 cm^2 and a length of 22 cm.

Calculate the volume of the cake.

Answer _____ cm^3 [2]

22 **(a)** Write 200 as a product of its prime factors.

Give your answer in index notation.

Answer _____ [3]

(b) Hence find the smallest number you can multiply 200 by to make a cube number.

Answer _____ [1]

[Turn over

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23 Over a year a car decreased in value from £12 500 to £10 500

Calculate the percentage decrease.

Answer _____ % [3]

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24 Use the method of trial and improvement to solve the equation

$x^3 - 6x = 12$

Give your answer correct to 1 decimal place.

Show all your working.

x	$x^3 - 6x$	

Answer $x =$ _____ [4]

[Turn over



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25 **(a)** Simplify

$5(t - 2) - 3(4 - 2t)$

Answer _____ [2]

(b) Write down the nth term for

(i) 5, 10, 15, 20 ____

Answer _____ [1]

(ii) 5, 11, 17, 23 ____

Answer _____ [2]

26 **(a)** Complete the sentence with appropriate words:

As the age (in years) of a family car increases, its value in pounds (£)

_____ , hence there is _____ correlation. [1]

(b) Write down two variables (quantities) which would display no correlation.

_____ and _____ [1]

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For Examiner's use only	
Question Number	**Marks**
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22	
23	
24	
25	
26	
Total Marks	

Examiner Number

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Mathematics

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(With calculator)

Foundation Tier

[GMT21]

MONDAY 11 JANUARY

9.15 am–10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

C indicates marks for quality of written communication.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

				AVAILABLE MARKS
1	**(a)**	Shape A Cone and Cylinder	A1 A1	
		Shape B (Square based) Pyramid and Cube or Cuboid	A1 A1	
	(b)	9 16 9	A1 A1 A1	7
2	**(a)**	54 + 35 = 89 **or** 89 – 35 = 54	MA1	
		89 inserted in diagram	MA1	
	(b)	54 + 56 + 57 + 57 = 224 or (4 + 6 + 7 + 7)/4 = 6	MA1	
		224 ÷ 4 = 56	MA1	
	(c)	15% of 20 = 3 pupils	MA1	
		(Score of at least) 85%	A1	6
3	**(a)**	1 = C 2 = A and G 3 = D 4 = B and F 5 = E 6 = H A2 – all correct [A1 any four correct]		
	(b)	regular	A1	3
4	**(a)**	10p – 6r	A1 A1	
	(b)	5(3) – 3(–7) = 15 + 21	MA1	
		= 36	A1	
	(c)	$4y - 24$	A1 A1	
	(d)	$-2x = 6$	MA1	
		$x = -3$	MA1	8
5		3.2 × 0.85 = £2.72	MA1	
		£4.07 – 2.72 = £1.35	MA1	
		1.35 ÷ 0.6	MA1	
		= £2.25 per metre	A1	4
6	**(a)**	–1 and 5	A1	
	(b)	Correct line drawn (Award A1 for correct points or partial correct line)	A2	3

				AVAILABLE MARKS
7	**(a)**	68% = 0.68 **or** 0.64 = 64%	MA1	
		$\frac{13}{20}$ = 0.65 **or** 65%	MA1	
		0.64, $\frac{13}{20}$, 68%	A1	
	(b)	68%	A1	4
8	**(a)**	3	A1	
	(b)	11.30 – 10.25 = 65	M1 A1	3
9	**(a)**	6 points correct (any 4 correct)	A2 (A1)	
	(b)	Student 7	A1	
	(c)	appropriate lobf	A1	
	(d)	appropriate reading, e.g. 5.8	MA1	5
10	QWC			
	Exterior angle = 360 ÷ 9 = 40 **or** 9 × 40 = 360		C1	
	Interior angle = 180 – 40 = 140		C1	
	or			
	Interior = (180 × 7) ÷ 9 = 140		C2	2
11	**(a)**	37°	A1	
	(b)	ABE = 104 – 78 = 26°	MA1	
		AEB = 180 – (26 + 37) = 117° = y	MA1	3
		or		
		EDB = 180 – (104 + 37) = 39°		
		BED = 180 – (78 + 39) = 63°	MA1	
		y = 180 – 63 = 117°	MA1	
		or		
		BDC = 76°		
		BCD = 180 – (76 + 78) = 26°	MA1	
		y = 180 – (26 + 37) = 117°	MA1	

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			AVAILABLE MARKS
12	Correct length of 7.5 cm (± 2 mm)	MA1	
	Correct bearing of 120° (± 2°)	MA1	2
13	**(a)** $\frac{35.25}{47} \times 100$	MA1	
	$= 75\%$	A1	
	(b) John's phone $\frac{17.5}{100} \times 44$	MA1	
	$= £7.70$		
	John's phone cost £51.70	MA1	
	John's phone is dearer by £51.70 – £50.31 = £1.39	MA1	5
14	**(a)** $6(2a + 1)$	A1	
	(b) $y(y - 6)$	A1	2
15	**(a)** $AC = 2(x + 2)$ or $2x + 4$	MA1	
	(b) $CB = x + 2 + 2x + 4 - 7$ **or** $3x - 1$	MA1	
	(c) $x + 2 + 2x + 4 + 3x - 1 = 20$	MA1	
	$6x + 5 = 20$		
	$x = 2\frac{1}{2}$	MA1	
	$AB = 4\frac{1}{2}$	A1	5
16	**(a)** $3 \times 0 + 5 \times 1 + 6 \times 2 + 4 \times 3 + 5 \times 4 + 2 \times 5 + 3 \times 6$ **or** 77	M1	
	$\frac{77}{28}$	MA1	
	$= 2.75$	A1	
	(b) Paula		
	bigger sample	C1	
	age group/variety of sample	C1	5
17	$\frac{2}{9} \times \frac{1}{4}$	A1	
	$= \frac{2}{36}$		
	$= \frac{1}{18}$	A1	2

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			AVAILABLE MARKS
18	**(a)** Frequency polygon	M1	
	All frequencies correct at midpoint with straight lines	A1	
	(b) $15 < w \leqslant 20$	A1	
	(c) $80 \times 20 + 24 \times 7.50 = £1780$	M1 A1	
	alternatively		
	$(2 + 11 + 25 + 18) \times 20 + 24 \times 27.50 = £1780$	M1 A1	5
19	$\pi \times 10.5^2$	MA1	
	$= 692.7\,(211801\ldots)$ **or** 346.36×2 **or** $2 \times \pi \times 10.5^2$	A1	
	$= 693$	A1	3
20	$w^2 + 20.4^2 = 42^2$ **or** $w^2 = 42^2 - 20.4^2$	MA1	
	$w^2 = 1347.84$	A1	
	$w = 36.7\,(129405)$	A1	3
21	Volume $= 120 \times 22$	MA1	
	$= 2640$	A1	2
22	**(a)** Correct method used	M1	
	$2 \times 2 \times 2 \times 5 \times 5$	A1	
	$2^3 \times 5^2$	A1	
	(b) 5 (gives 1000)	A1	4
23	$12500 - 10500 = 2000$	MA1	
	$\frac{2000}{12500} \times 100$	MA1	
	16%	A1	3

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			AVAILABLE MARKS
24	$3^3 - 6 \times 3 = 9$		
	$4^3 - 6 \times 4 = 40$	MA1	
	$3.1^3 - 6 \times 3.1 = 11.191$		
	$3.2^3 - 6 \times 3.2 = 13.568$	MA1	
	$3.15^3 - 6 \times 3.15 = 12.355875$	MA1	
	Ans = 3.1	A1	4
25	**(a)** $5t - 10 - 12 + 6t$	MA1	
	$11t - 22$	A1	
	(b) **(i)** $5n$	A1	
	(ii) $6n - 1$	A2	5
26	**(a)** Decreases, negative	A1	
	(b) Any suitable **numerical** variables which display no correlation	A1	2
		Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Mathematics

Unit T2 **(With calculator)**
Foundation Tier



[GMT21]

GMT21

THURSDAY 21 MAY, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen**.
Answer **all twenty-eight** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **Questions 9** and **13**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

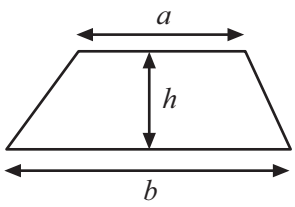
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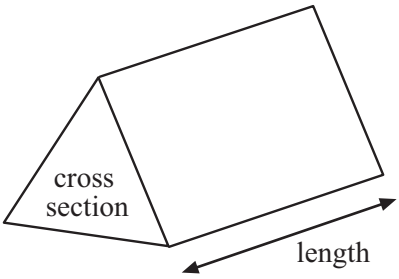
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Formula Sheet

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



Volume of prism = area of cross section × length



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1 Write down the next two terms in the following sequence

18, 17, 14, 9, _____ , _____ [2]

2 Simplify $4a + 3b - a - 5b$

Answer _____ [2]

3

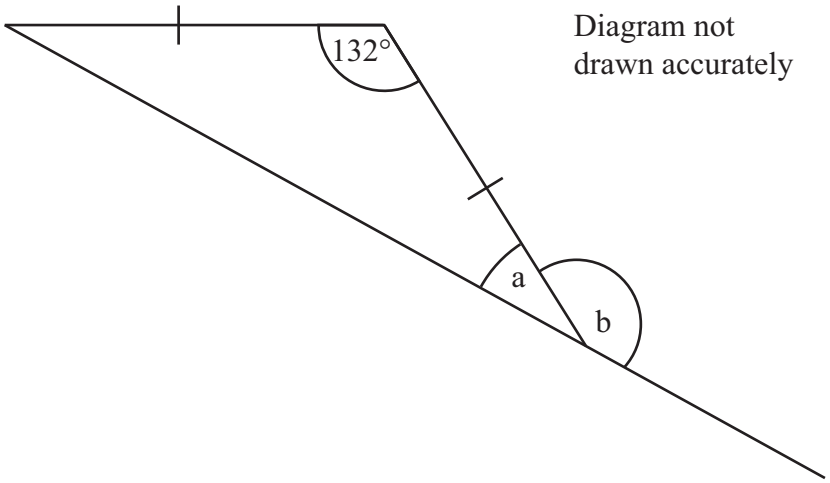


Diagram not drawn accurately

Find the size of

(a) angle a

Answer a = _____° [2]

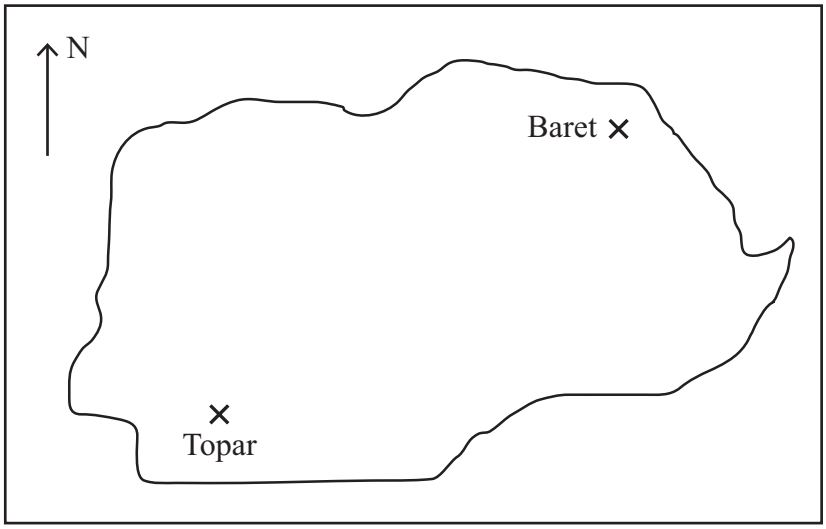
(b) angle b

Answer b = _____° [1]

[Turn over

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4



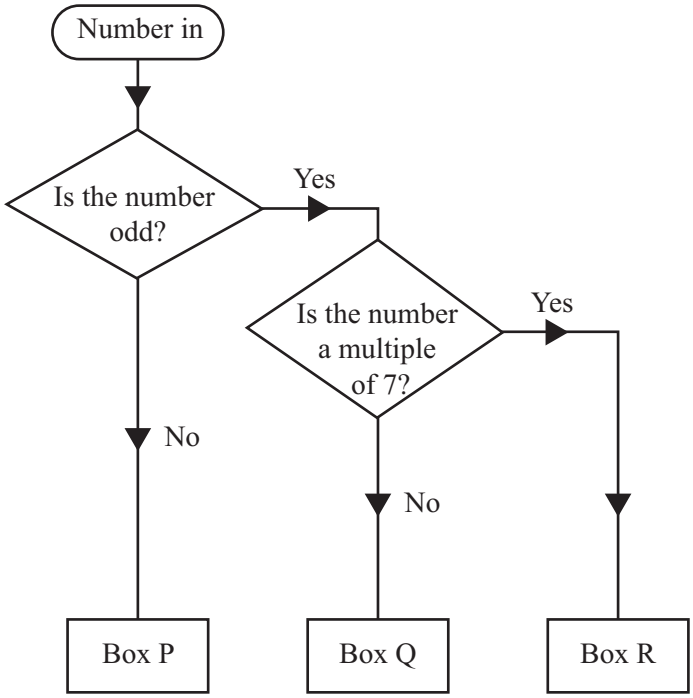
In the map above the scale is 1 cm = 60 km

Find the actual distance between Baret and Topar.

Answer _____ km [3]

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5



Using the decision tree diagram, name the box for

(a) 25 Answer Box _____

(b) 22 Answer Box _____

(c) 21 Answer Box _____ [2]

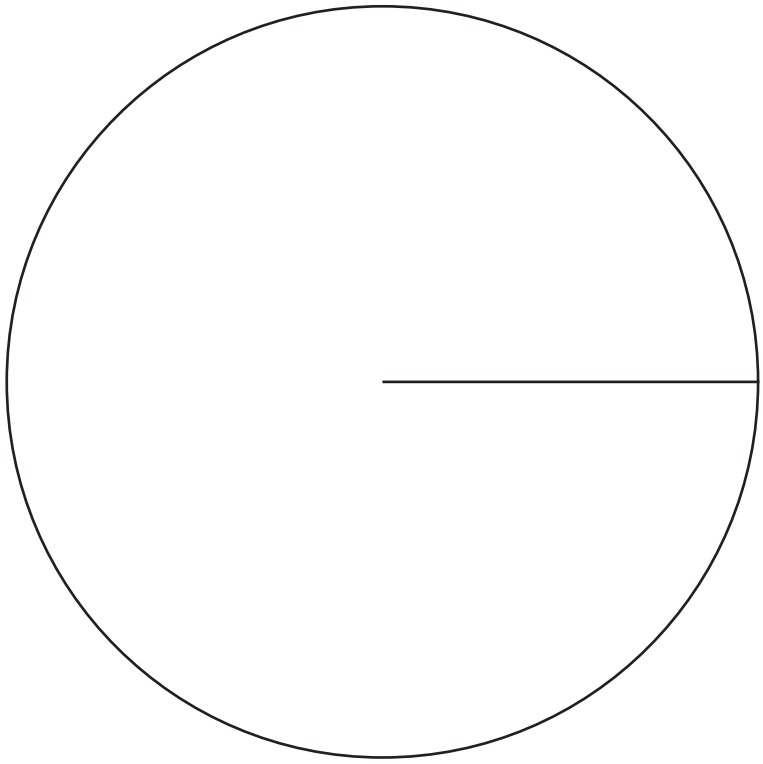
[Turn over

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6 The amount of fruit sold in a canteen was recorded as follows.

Fruit	Frequency	Angle
Oranges	30	
Apples	42	
Pears	23	
Bananas	25	

Draw a pie chart to illustrate this information.



[4]

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7 The stem and leaf diagram shows the weights of some babies.

2	4 6 8 8
3	0 5 5 5 7 8 9
4	1 2 2 3 6
5	1

Key 2 | 4 = 2.4 kg

(a) Find

(i) the range,

Answer _____ kg [1]

(ii) the mode,

Answer _____ kg [1]

(iii) the median.

Answer _____ kg [1]

(b) A mistake was made. The weight of 4.6 kg should have been 4.5 kg.
Which of the following will change?
Circle the correct answer.

range median mean mode

[1]

[Turn over

8 Write $\frac{3}{8}$, 0.4 and 35% in ascending order of size.
Show your working.

Answer _____ , _____ , _____ [3]

Quality of written communication will be assessed in this question.

9 Tom works 30 hours each week.
He earns £9.50 per hour.
He saves one-fifth of his earnings each week.
He wants to buy a guitar costing £840
How many weeks does it take Tom to save enough to buy the guitar?
You must show all your working.

Answer _____ weeks [5]

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10 The total cost of 4 kg of pears and 3 kg of bananas is £14.55
Pears cost £2.55 per kg.
Work out the cost of 1 kg of bananas.

Answer £ _____ [4]

[Turn over

11 A company makes 500 rag dolls.
It costs £3.14 to make each rag doll.
25% of the rag dolls are given to a local charity.
Of the rest, four-fifths are sold for the full price of £5
The remainder are then sold at half-price.
How much profit does the company make?

Answer £ _____ [6]

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(Questions continue overleaf)

[Turn over

12 A salesman recorded the average temperature (°C) and his cold drink sales (£) during 8 weeks of the summer.

	Week 1	**Week 2**	**Week 3**	Week 4	Week 5	Week 6	Week 7	Week 8
Average Temperature (°C)	**12**	**14**	**18**	13	16	15	14	18
Sales (£)	**204**	**268**	**392**	236	328	298	282	380

The first three points have already been plotted.

(a) Use the data to complete the scatter graph. [2]

(b) Draw the line of best fit. [1]

(c) In week 9 the average temperature was 17°C.

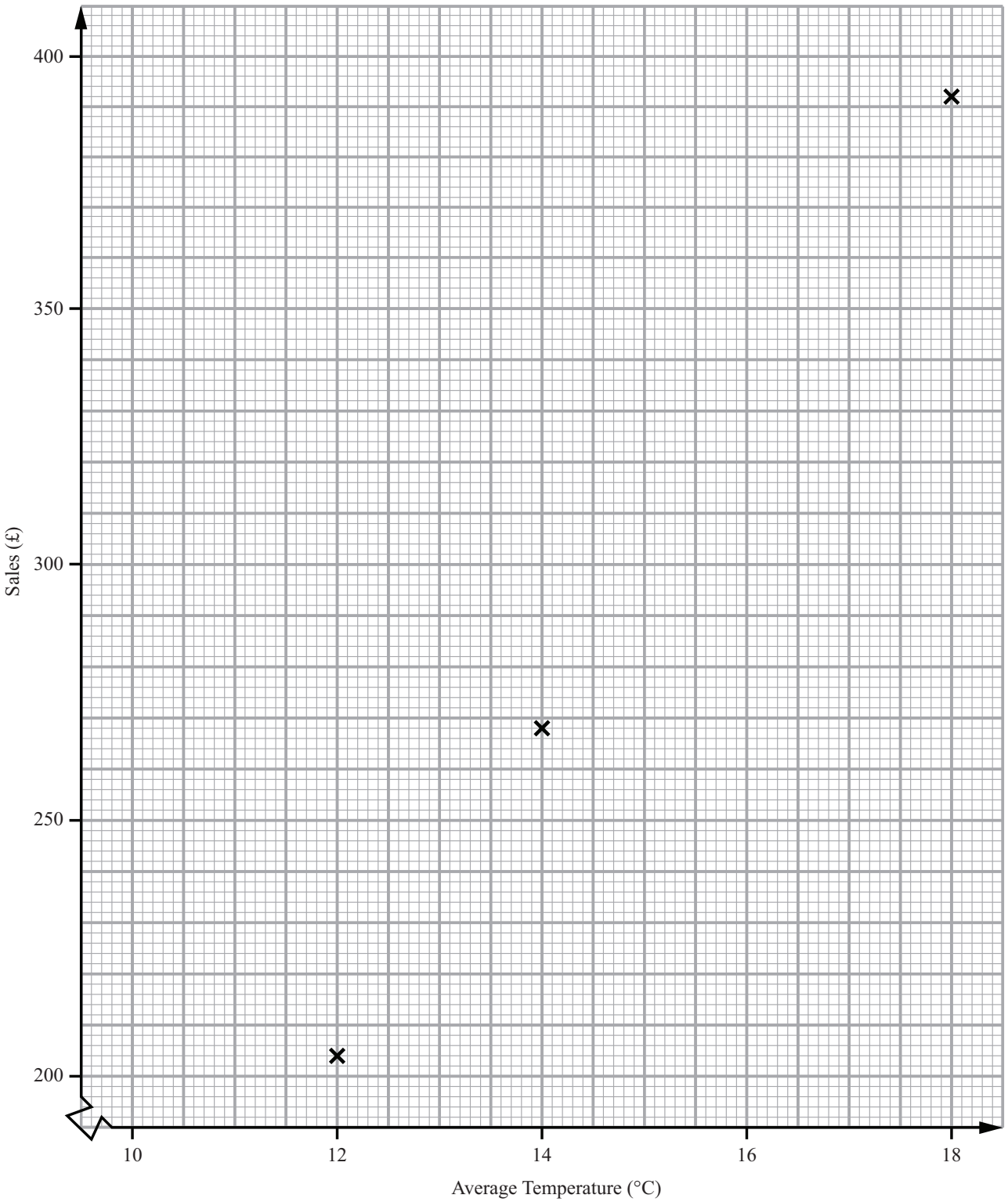
Estimate the sales for week 9

Answer £ _____ [1]

(d) What type of correlation does your graph show?

Answer _____ [1]

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[Turn over

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Quality of written communication will be assessed in this question.

13 Jean and Joyce are both pupils at Eastwood Girls High School and they want to know how many times a month, on average, the people in their town go to church.

(a) Jean asks 300 pupils in her school.

Give **two** reasons why Jean's sample may not be representative of the people in her town.

Reason 1 _____

_____ [1]

Reason 2 _____

_____ [1]

(b) Joyce stands outside her local church and asks 300 people on their way in to church.

Give **one** reason why Joyce's sample is biased.

Reason _____

_____ [1]

14 An airport had 123 planes departing one day.
46 of these planes departed late.
What percentage were late?
Give your answer correct to one decimal place.

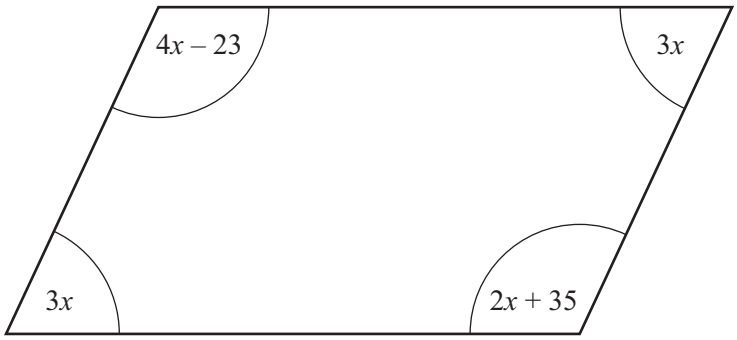
Answer _____ % [3]

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15 Grapefruit cost g pence each.
Mangoes cost m pence each.
Sarah buys 3 grapefruit and 4 mangoes.
The total cost is £5
Write down an equation containing g and m.

Answer _____ [3]

16



The diagram above is a parallelogram.
The sizes of the angles in degrees are $3x$, $4x - 23$, $3x$ and $2x + 35$
Work out the value of x.

Answer x = _____ [3]

[Turn over

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17 The price of a coat in a shop is £129
Pat has £100 but he has also a discount card which allows him 20% off the shop price.
Does he have enough money to buy the coat using his discount card?
You must show working to explain your answer.

[3]

18 a and b are different prime numbers less than 20

(a) Find a value for a and a value for b so that $a + b$ is a square number.

Answer $a =$ _____ , $b =$ _____ [2]

(b) Find a value for a and a value for b so that $a + b$ is a **different** square number.

Answer $a =$ _____ , $b =$ _____ [2]

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19 A regular polygon has an interior angle of 150°

(a) How many sides does it have?

Answer _____ [2]

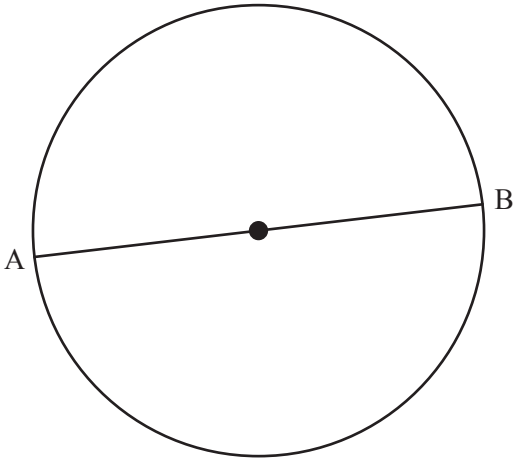
Two of these polygons are placed edge to edge.

(b) What regular shape would fit exactly in the space beside these touching edges?

Answer _____ [2]

[Turn over

20

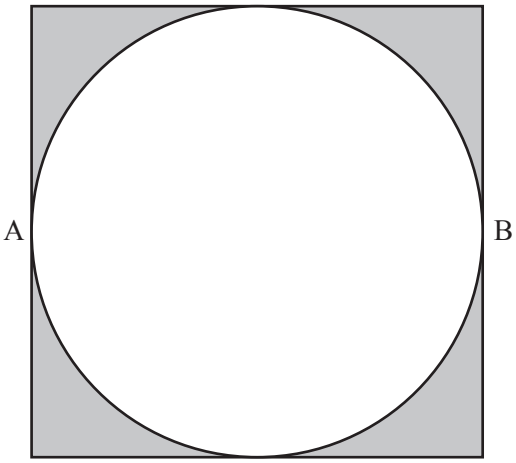


(a) AB is a diameter of the circle. AB is 13 cm.

Calculate the area of the circle.

Answer _____ [3]

(b) This circle is now set inside a square as shown. Find the shaded area.



Answer _____ [2]

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21 Solve the equation $\frac{4y}{5} - 3 = 9$

Answer $y =$ _____ [3]

22 Five years ago 123 million CDs were sold in the UK.
69.4 million were sold last year.
Work out the percentage fall in sales of CDs.

Answer _____ % [3]

[Turn over

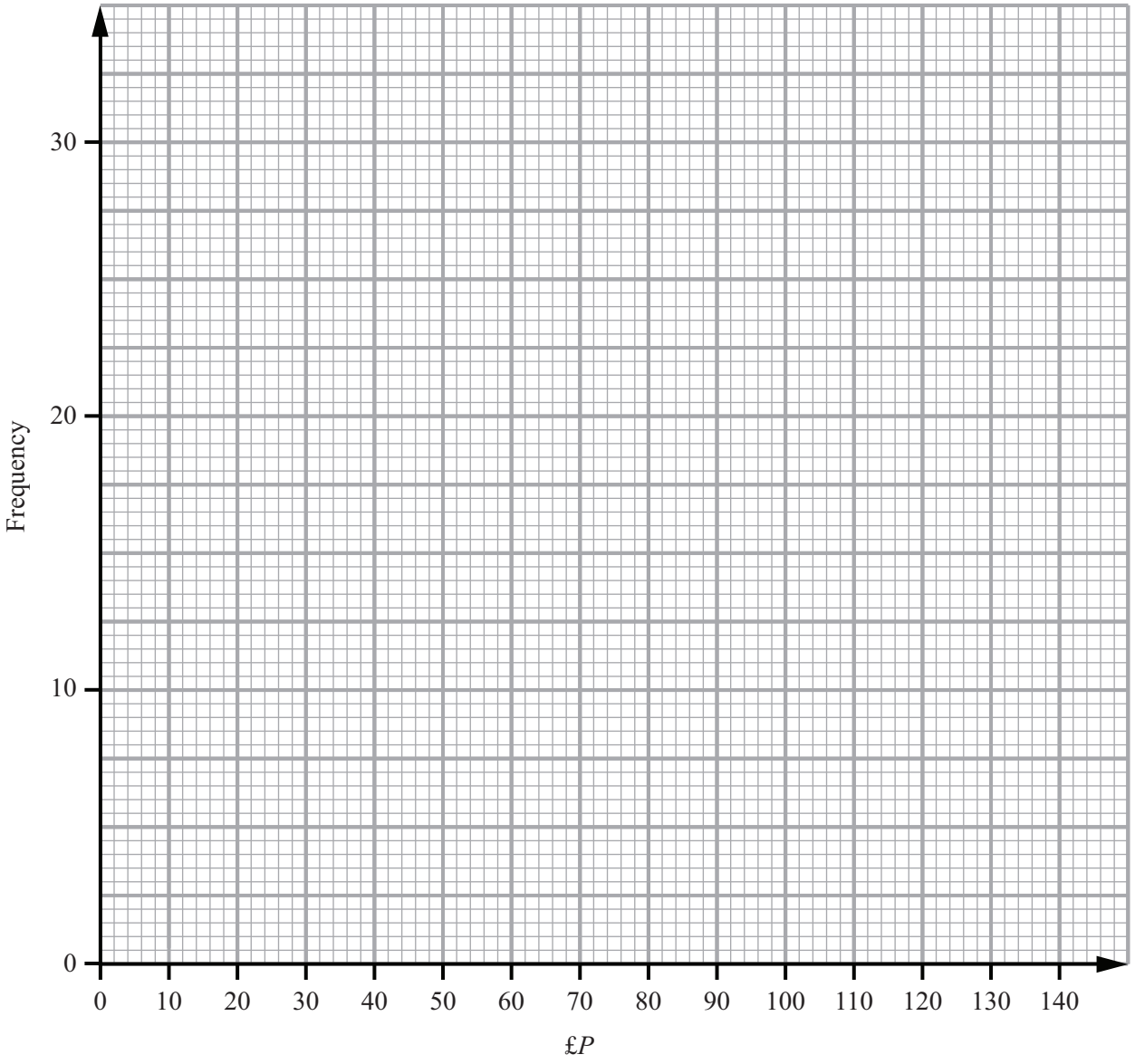
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23 100 shoppers were asked how much they spent on food in one week.

Amount spent (£P)	Frequency
$20 < P \leqslant 40$	8
$40 < P \leqslant 60$	30
$60 < P \leqslant 80$	28
$80 < P \leqslant 100$	27
$100 < P \leqslant 120$	5
$120 < P \leqslant 140$	2

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(a) Draw a frequency polygon to show this information. [2]



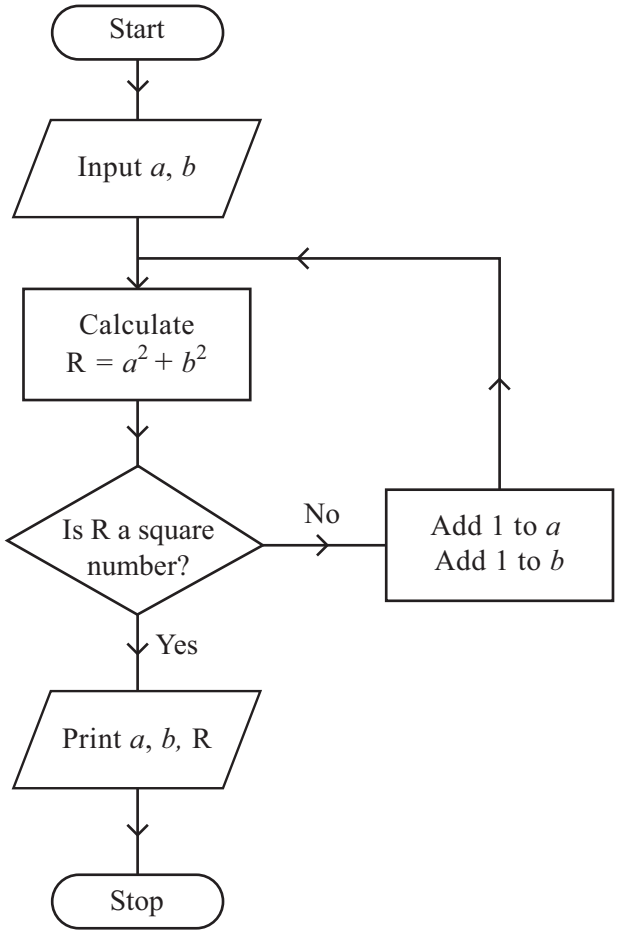
(b) Which class interval contains the median?

Answer _____ [1]

[Turn over

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24



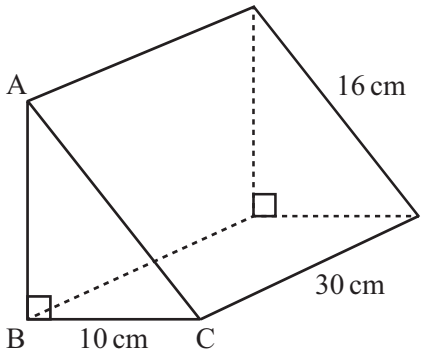
Starting with $a = 6$, $b = 13$ use the flow chart to find the values printed.

a	b	R
6	13	

Answer $a =$ _____ , $b =$ _____ , R = _____ [3]

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25 In the triangular prism ABC is a right-angled triangle.



(a) Calculate the length of AB.

Answer _____ cm [3]

(b) Calculate the volume of the prism.

Answer _____ cm^3 [3]

[Turn over

26 The equation $x^3 + 4x^2 = 100$ has a solution between 1 and 5
Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show all your working.

Answer $x =$ _____ [4]

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27 John thinks of a number.
He multiplies it by 9 and subtracts 4
The answer is three times the number he started with.
Work out the starting number.

Answer _____ [2]

[Turn over

28 (a) (i) Write 30 as a product of prime factors.

Answer 30 = _____ [1]

(ii) Write 22 as a product of prime factors.

Answer 22 = _____ [1]

(b) An airport bus leaves the city hall every 30 minutes.
A shuttle bus leaves the city hall every 22 minutes.
An airport bus and a shuttle bus both leave the city hall at 8.00 am.
At what time will an airport bus and a shuttle bus next leave the city hall at the same time?

Answer _____ [3]

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	Marks
1	
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27	
28	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2015

Mathematics

Unit T2
(With calculator)
Foundation Tier

[GMT21]

THURSDAY 21 MAY

9.15 am–10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.
A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e. where the method is not correct no marks can be given.
MA indicates marks for combined method and accurate working.
C indicates marks for quality of written communication
oe indicates "or equivalent" i.e. where a solution can be expressed in an alternative correct form, e.g. $\frac{1}{4} = 0.25$
ft indicates "follow through". See explanation below.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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			AVAILABLE MARKS
1	2 –7	A1, A1	2
2	$3a - 2b$	A1, A1	2
3	**(a)** 180 – 132 = 48 48 ÷ 2 24	M1 A1	
	(b) 180 – (a) = 156	MA1	3
4	Distance = 6.5 cm(±2 mm) 6.5 × 60 = 390	A1 M1 A1	3
5	**(a)** Q		
	(b) P		
	(c) R (Allow A1 for 2 correct)	A2	2
6	Oranges Apples Pears Bananas 90° 126° 69° 75° (award 1 mark for evidence of 3) sectors correct and labelled	MA2 MA2	4
7	**(a)** **(i)** 2.7	A1	
	(ii) 3.5	A1	
	(iii) 3.7	A1	
	(b) mean	A1	4
8	$\frac{3}{8} = 0.375$ 35% = 0.35 35%, $\frac{3}{8}$, 0.4	MA1 MA1 A1	3
9	£9.50 × 30 = 285 285 ÷ 5 = 57 840 ÷ 57 = 14.737 15	C1 C1 C1, C1 C1	5

			AVAILABLE MARKS
10	$2.55 \times 4 = £10.20$	MA1	
	$(14.55 - 10.20) = 4.35$	MA1	
	$4.35 \div 3 = £1.45$	M1, A1	4
11	$£3.14 \times 500 = £1570$	MA1	
	$500 \div 4 = 125$		
	$500 - 125 = 375$	MA1	
	$375 \div 5 \times 4 = 300$		
	$£5 \times 300 = £1500$	MA1	
	$£2.50 \times 75 = £187.50$	MA1	
	$1500 + 187.50 - 1570$ **or** $1687.50 - 1570$	MA1	
	£117.50	A1	6
12	**(a)** 5 correct (allow A1 for 3 correct)	A2	
	(b) correct line of best fit	A1	
	(c) follow candidate's line	A1	
	(d) positive	A1	5
13	**(a)** she only asks girls **or** she only asks one age group **or** she doesn't ask any adults **or** the pupils may not be from her town	C2	
	(b) she doesn't ask people who never go to church **or** these people are on their way into church, so they are likely to go more often **or** similar	C1	3
14	$\frac{46}{123} \times 100$	MA1	
	37.398…	A1	
	37.4	A1	3
15	$3g + 4m = 500$	A1, A1, A1	3
16	$4x - 23 = 2x + 35$ **or** $3x + 4x - 23 + 3x + 2x + 35 = 360$	M1	
	$2x = 58$ **or** $12x = 348$	MA1	
	$x = 29$ $x = 29$	MA1	
	or		
	$4x - 23 + 3x = 180$ **or** $2x + 35 + 3x = 180$	M1	
	$7x = 203$ **or** $5x = 145$	MA1	
	$x = 29$ $x = 29$	MA1	3

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			AVAILABLE MARKS
17	20% = £25.80	MA1	
	129 – 25.80 = 103.20 **or** 100 + 25.80 = 125.80	MA1	
	No, as discounted price is more than £100	A1	3
18	**(a)** (2, 7) **or** (3, 13) **or** (5, 11) **or** (17, 19)	A2	
	(b) values for a different square number	A2	4
19	**(a)** Exterior angle = 30	MA1	
	Number of sides = $\frac{360}{30} = 12$	MA1	
	(b) equilateral triangle Allow A1 for sight of 60° in calculation or diagram	A2	4
20	**(a)** Radius = 6.5 cm		
	Area = $\pi \times 6.5^2$	MA1	
	= 132.7(32…) cm^2	A1, A1 (units)	
	(b) Area of square = $13^2 = 169$	MA1	
	Area between square and circle = 169 – 132.7 = 36.3 Do not penalise for units in **(b)**	A1	5
21	$\frac{4y}{5} = 12$ **or** 4y – 15 = 45	MA1	
	$4y = 60$	MA1	
	$y = 15$	A1	3
22	53.6 million	MA1	
	$\frac{53.6}{123} \times 100$	M1	
	43.577…	A1	3
23	**(a)** correct points above midpoints	MA1	
	points joined	A1	
	(b) $60 < P \leqslant 80$	A1	3
24	6 13 205		
	7 14 245	MA1	
	8 15 289	MA1	
	Print 8 15 289	MA1	3

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			AVAILABLE MARKS
25	**(a)** $x^2 + 10^2 = 16^2$	MA1	
	$x^2 = 256 - 100 = 156$	A1	
	$x = \sqrt{156} = 12.5$ (12.489996)	A1	
	(b) Area of cross section $= \frac{1}{2}(10)(12.5) = 62.5$ (cm^2) (62.44997998)	MA2	
	Volume $= 62.5 \times 30 = 1875$ (1873.4994)	MA1	6
26			

x	$x^3 + 4x^2$	Comment
3.5	91.875	too low
3.6	98.496	too low
3.7	105.413	too high
3.65	101.917125	too high

between 3 and 4	MA1	
between 3.6 and 3.7	MA1	
Using 3.65	MA1	
3.6	A1	4
27 $9x - 4 = 3x$	M1	
$6x = 4$		
$x = \frac{2}{3}$	A1	2
28 **(a)** **(i)** $30 = 5 \times 3 \times 2$	A1	
(ii) $22 = 11 \times 2$	A1	
(b) using LCM of 30 and 22	M1	
$11 \times 5 \times 3 \times 2 = 330$ minutes $= 5.5$ hours	A1	
1.30pm	A1	5
	Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2015

Mathematics

Unit T2
(With calculator)
Foundation Tier



[GMT21]

GMT21

FRIDAY 9 JANUARY, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen**.
Answer **all twenty-eight** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **Questions 7 and 16**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

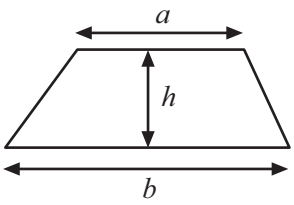
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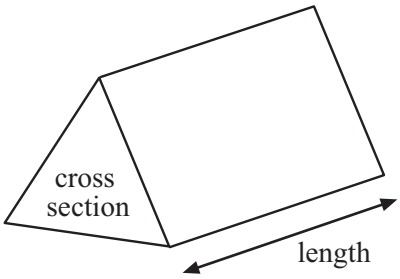
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Formula Sheet

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



Volume of prism = area of cross section × length



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(Questions start overleaf)

[Turn over

1 **(a)** Write down the next two prime numbers after 53

Answer _____ , _____ [2]

(b) Find the cube root of 27

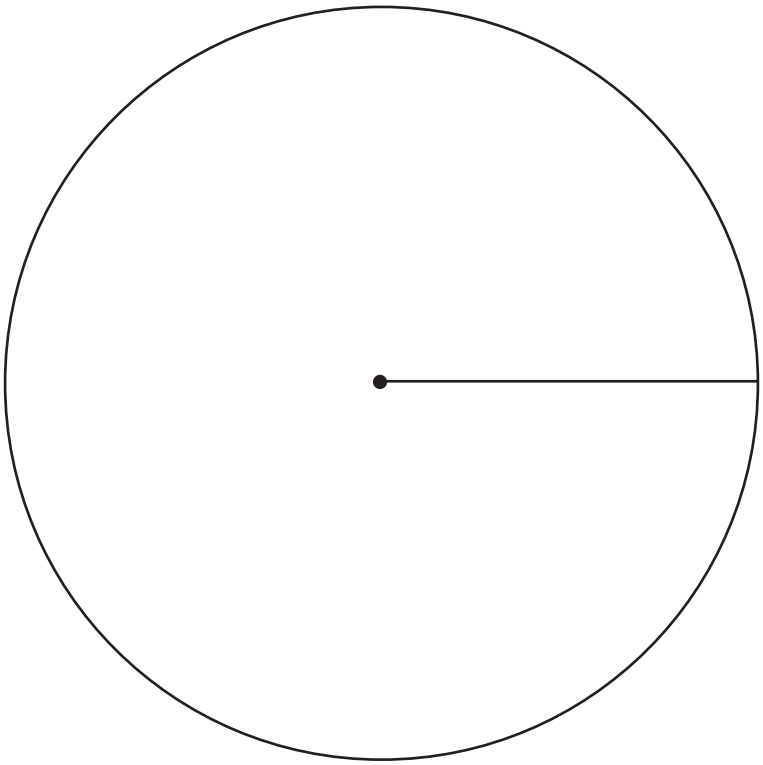
Answer _____ [1]

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2 The table below gives information on the sports played by boys after school.

Sport	Football	Rugby	Hockey	Tennis
Number of boys	26	8	12	14
Angle				

Draw a clearly labelled pie chart for this information.



[4]

[Turn over

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3 27 girls did a test.
The stem and leaf diagram shows their marks.

0	1	3	4			
1	4	4	5	6		
2	0	1	3	5	7	7
3	2	4	4	6	6	6
4	4	5	8	9		
5	0	0	3	5		

key 1 | 4 means 14 marks

(a) Find

(i) the mode of the marks,

Answer _____ [1]

(ii) the median of the marks,

Answer _____ [1]

(iii) the range of the marks.

Answer _____ [1]

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The marks for 27 boys in the same test are shown.

12	12	24	26	26	26	27
30	35	36	36	38	39	39
40	42	43	44	47	52	54
56	56	58	58	59	59	

(b) Complete a back to back stem and leaf diagram below for the boys.
The first two rows of the marks have already been entered.

Boys								Girls						
							0	1	3	4				
					2	2	1	4	4	5	6			
		7	6	6	6	4	2	0	1	3	5	7	7	
9	9	8	6	6	5	0	3	2	4	4	6	6	6	
							4	4	5	8	9			
							5	0	0	3	5			

key 2 | 1 means 12 marks key 1 | 4 means 14 marks

[2]

(c) By using the stem and leaf diagram decide whether the boys or girls did better in the test. Give a reason for your answer.

The _____ did better in the test because _____

_____ [2]

[Turn over

4 A fish tank is a cuboid.

The tank has a length of 9 metres, a width of 4 metres and a height of 3 metres.

The fish tank is filled with 99 m^3 of water.
What is the depth of water in the tank?

Answer _____ metres [2]

5 The Eurostar train leaves London at 11 24 (London time) and arrives in Paris at 14 47 (Paris time).

The time in Paris is 1 hour ahead of the time in London.
How long does the journey take?

Answer _____ [3]

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6 Work out the size of the angle w.

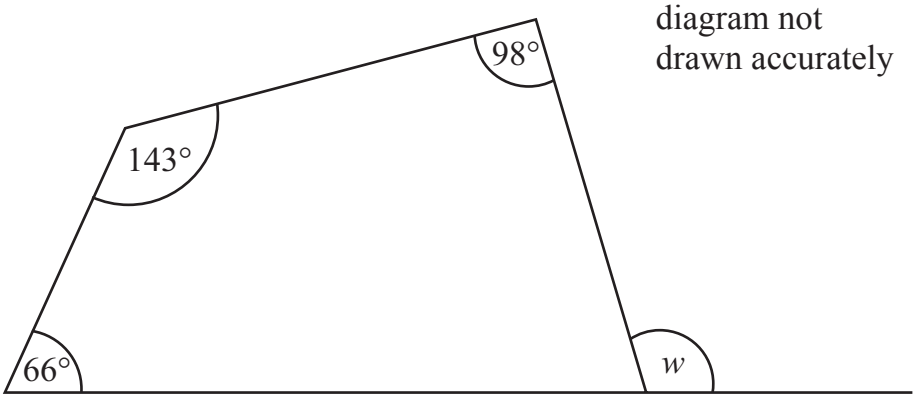


diagram not drawn accurately

Answer $w =$ _____ ° [3]

[Turn over

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Quality of written communication will be assessed in this question.

7 A smartphone costs £375

Jill pays a deposit of £95 for this smartphone.

She then pays £35 each month.

How many months will it take before she has paid for the smartphone?

Show your working clearly.

Answer _____ months [3]

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8 **(a)** Explain the meaning of 3^4

Answer _____ [1]

(b) Calculate $3^4 \times 5^3$

Answer _____ [1]

(c) Calculate $4.2^2 + \sqrt{3.61}$

Answer _____ [2]

9 **(a)** Find the value of $5x + 6y$ when $x = 9$ and $y = -2$

Answer _____ [2]

(b) Solve $7x - 9 = 47$

Answer x = _____ [2]

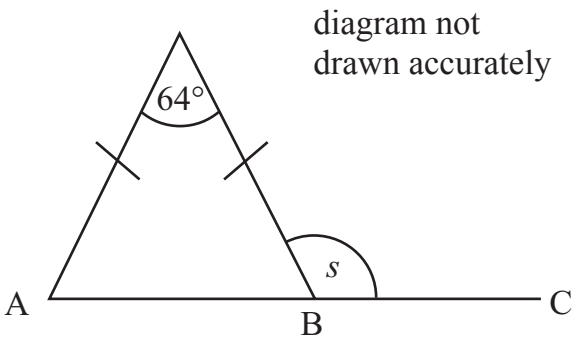
(c) In the spaces provided, write down the next two numbers in the sequence

23, 21, 17, 11, _____ , _____ [2]

[Turn over

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10 The triangle shown is isosceles. ABC is a straight line.



Work out the size of the angle s.

Answer s = _____ ° [3]

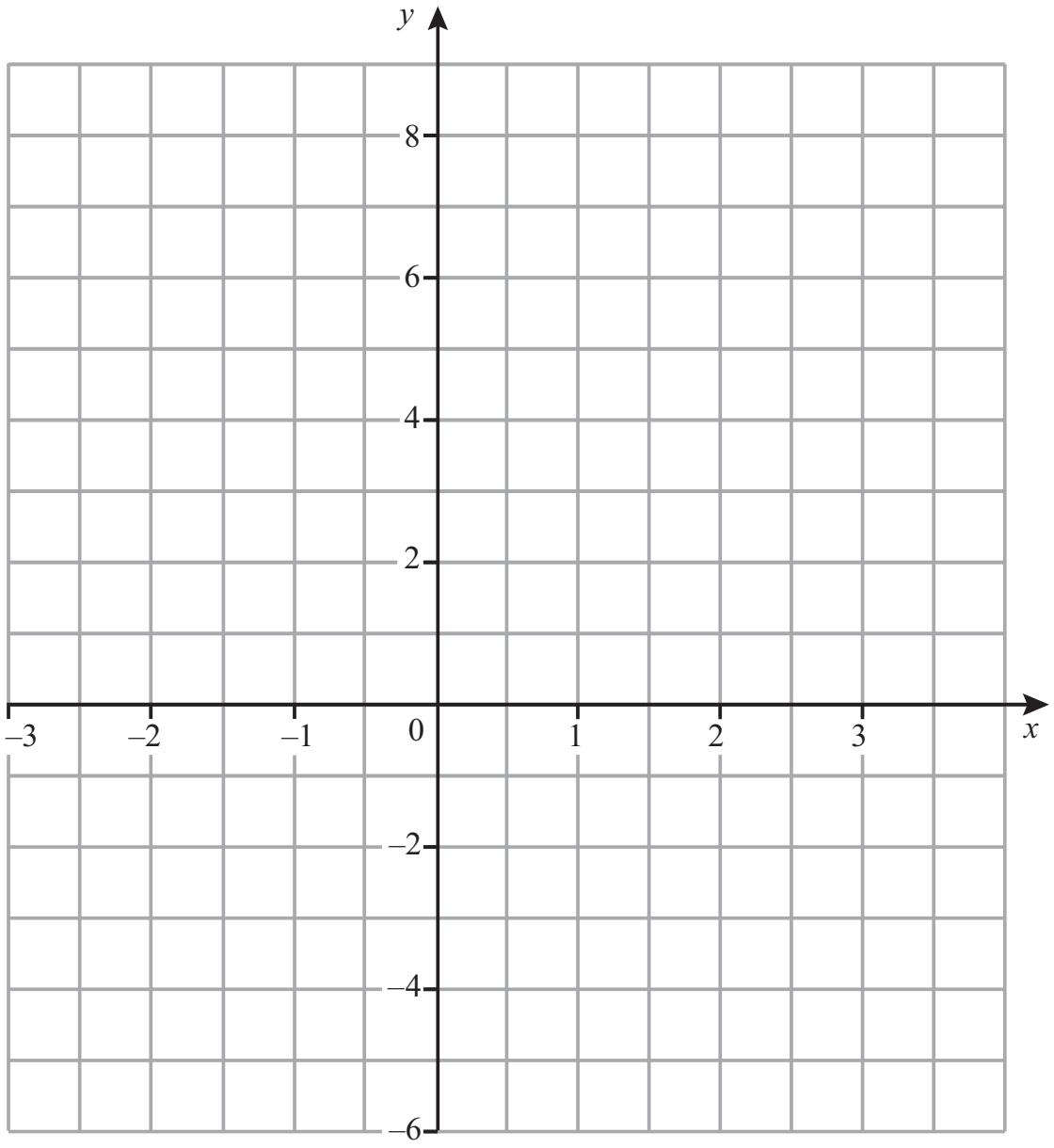
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11 **(a)** Complete the table for $y = 5 - 3x$

x	–1	0	1	2	3
$y = 5 - 3x$	8		2		–4

[2]

(b) Using values from the table, draw the graph of $y = 5 - 3x$



[1]

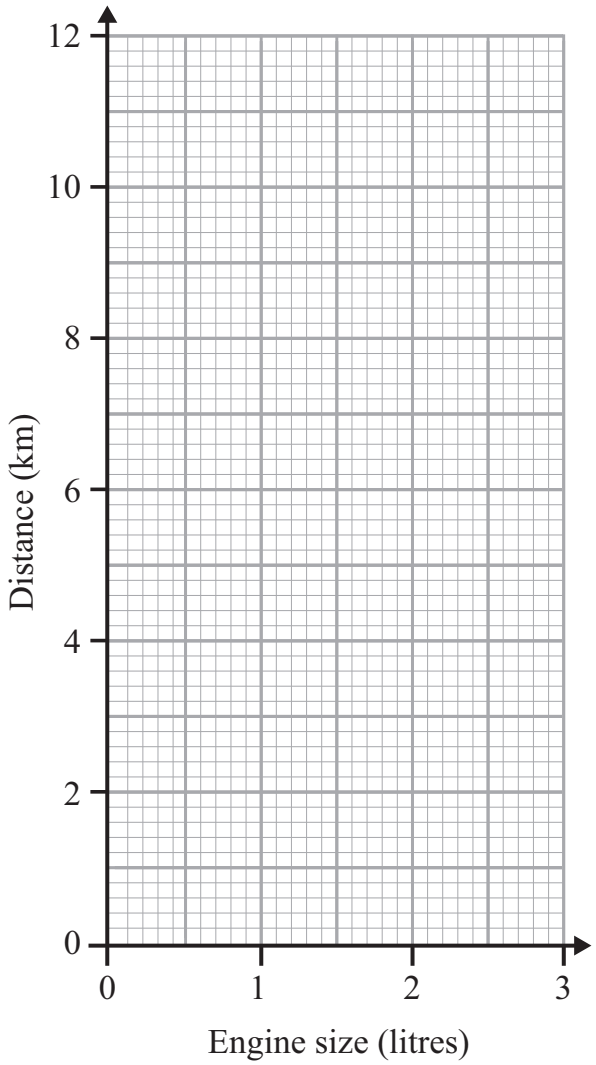
[Turn over

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12 The table shows the engine size (litres) of different cars and the distance (km) that the cars can travel on one litre of petrol.

Engine size	1.0	1.8	2.4	1.2	2.1	1.5	2.7
Distance	12	8.6	5	9.4	5.9	10.2	3.8

(a) Draw a scatter graph. [2]



(b) Draw a line of best fit. [1]

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(c) Another car travels 7 km on one litre of petrol. Use your line of best fit to estimate the engine size of this car.

Answer _____ litres [1]

(d) Describe the correlation in this scatter graph.

Answer _____ [1]

13 The diagram shows a regular pentagon placed on top of a regular hexagon.

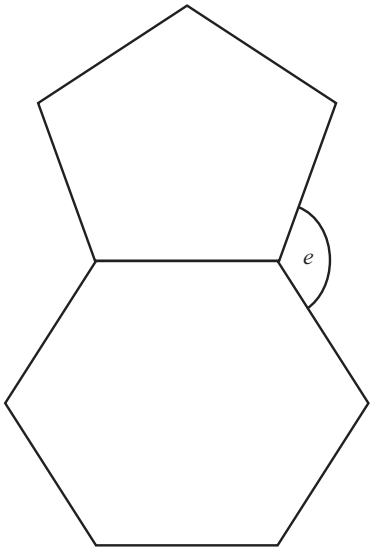


diagram not
drawn accurately

Calculate the size of the angle marked e.

Show all your working.

Answer e = _____ ° [4]

[Turn over

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14 ABCD is a parallelogram.

Angle DAB = 125°

Angle ADB = 37°

Angle CEB = 51°

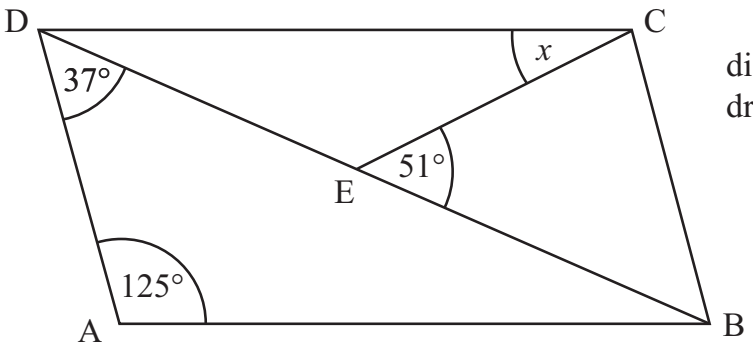


diagram not drawn accurately

Calculate the size of the angle x.

Answer x = _____ ° [4]

15 Factorise

(a) $8x + 12$

Answer _____ [1]

(b) $x^2 + 7x$

Answer _____ [1]

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Quality of written communication will be assessed in this question.

16 Joanne is having a party. She needs forty packets of crisps.
A single packet of crisps costs 30 pence in each of two local stores.
Each store has a special offer on packets of crisps.

Bargain Store	Discount Store
20% off every ten packets	buy 3 and get one more free

Which is better value?

Show your working clearly.

Answer _____ [4]

[Turn over

17 Complete the spaces **(a)**, **(b)**, **(c)** and **(d)** on the electricity bill.

Northern Electricity					
	Meter Reading				
Date	Current units	Previous units	Units used	Price per unit	Total (£)
30 June	43458	42763	**(a)**	15 pence	**(b)** £
				VAT @ 5%	**(c)** £
				Total Charge	**(d)** £

[5]

18 **(a)** Write the recurring decimal 0.375375375... using dot notation.

Answer _____ [1]

(b) Write $0.2\dot{8}$ correct to 4 decimal places.

Answer _____ [1]

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19 **(a)** A toy lorry has 6 wheels and a toy car has 4 wheels.

Write down an expression for the **total** number of wheels on x lorries and y cars.

Answer _____ [2]

(b) Write down the first 3 terms of the sequence whose n^{th} term is $n^2 + 3$

Answer _____ , _____ , _____ [2]

20 P is the point (2, 3) and Q is the point (–4, –1).

Work out the coordinates of the midpoint of the line PQ.

Answer (_____ , _____) [2]

[Turn over

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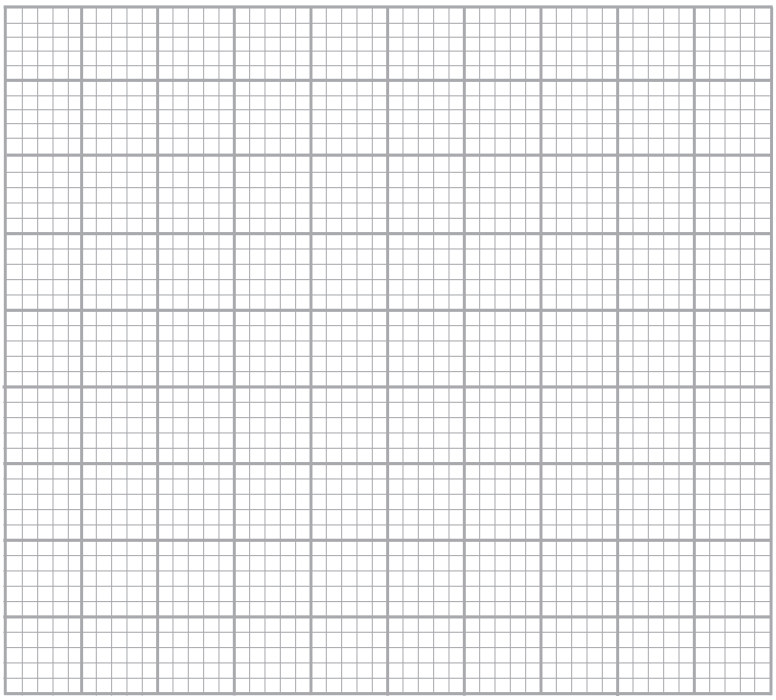
21 The masses of some stones found on a beach are shown in the table.

Mass (g)	Number of stones
$10 < m \leqslant 20$	33
$20 < m \leqslant 30$	88
$30 < m \leqslant 40$	57
$40 < m \leqslant 50$	52
$50 < m \leqslant 60$	43
$60 < m \leqslant 70$	17
$70 < m \leqslant 80$	10

(a) Which interval contains the median mass?

Answer _____ [1]

(b) Draw a frequency polygon to represent the data. [4]



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22 **(a)** Simplify $\frac{2^8}{2^2}$, leaving your answer in index form.

Answer _____ [1]

(b) Expand and simplify $4(x - 2) + 3(2x + 3)$

Answer _____ [2]

[Turn over

23 In a group of golfers there are 37 males and 23 females.
19 of the males are wearing glasses and 14 of the females are wearing glasses.
What percentage of the group are wearing glasses?

Answer _____ % [3]

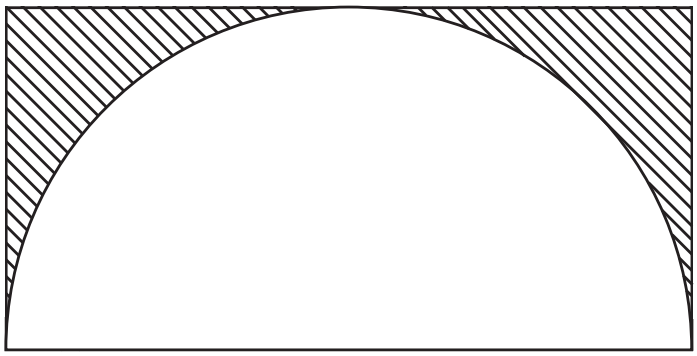
24 Write 600 as a product of prime factors.

Express your answer in index notation.

Answer _____ [3]

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25 The diagram shows a semicircle inside a rectangle.



Work out the area of the shaded region.

Answer _____ cm^2 [3]

[Turn over

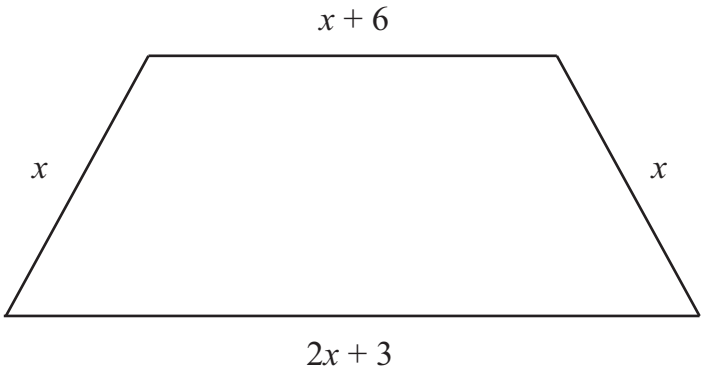
26 A sheet of paper measures 297 mm by 210 mm.
Work out the length between diagonally opposite corners.

Answer _____ mm [3]

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27 **(a)** Write an expression, in terms of x, for the perimeter of the trapezium shown.

Give your answer in its simplest form.



Answer _____ [2]

(b) The perimeter of this trapezium is 34 cm.

(i) Using the perimeter, write down an equation in terms of x.

Equation _____ [1]

(ii) Solve the equation to find x.

Answer x = _____ [1]

[Turn over

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28 A solution to the equation $x^3 - 4x = 26$ lies between 3 and 4
Use trial and improvement to solve this equation.
Give your answer correct to 1 decimal place.
Show each stage of your working.

x	$x^3 - 4x$	

Answer $x =$ _____ [3]

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THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
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	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
January 2015

Mathematics

Unit T2
(With calculator)
Foundation Tier
[GMT21]

FRIDAY 9 JANUARY
9.15 am–10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

C indicates marks for quality of written communication

oe indicates "or equivalent" i.e. where a solution can be expressed in an alternative correct form, e.g. $\frac{1}{4} = 0.25$

ft indicates "follow through". See explanation below.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

(xi) Incorrect money notation will generally lose one mark but will be penalised only once per paper.

(xii) In general, a tolerance of ±2° is allowed in drawing angles, and ±2 mm in measuring length.

(xiii) In algebra, if further inaccurate work is done to a correct answer, some marks may be lost.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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				AVAILABLE MARKS
1	**(a)**	59, 61	A1 A1	
	(b)	3	A1	3
2	Correct angles	156, 48, 72, 84	MA2	
	Labels, Sectors		A1 A1	4
3	**(a)**	**(i)** Mode = 36	A1	
		(ii) Median = 32	A1	
		(iii) Range = 54	A1	
	(b)	7 4 3 2 0 9 9 8 8 6 6 4 2	A2	
	(c)	Boys, more higher scores or median is higher	A2	7
4	$36 \times d = 99$ or $99 \div 36$		MA1	
	2.75		A1	2
5	Valid attempt to find the difference in the times or 3:23 seen		M1	
	Taking the time difference into account		A1	
	2 hours 23 minutes or 143 minutes		MA1	3
6	$360 - (66 + 143 + 98)$ or $360 - 307$		MA1	
	53		A1	
	127		MA1	3
7	375 – 95 = 280 still to pay		C1	
	£280 at £35 per month			
	280 ÷ 35 = 8 months		C1 A1	3
8	**(a)**	$3 \times 3 \times 3 \times 3$	MA1	
	(b)	10125	A1	
	(c)	19.54 (allow A1 for either 17.64 or 1.9 seen)	A2	4
9	**(a)**	45 – 12	MA1	
		33	A1	

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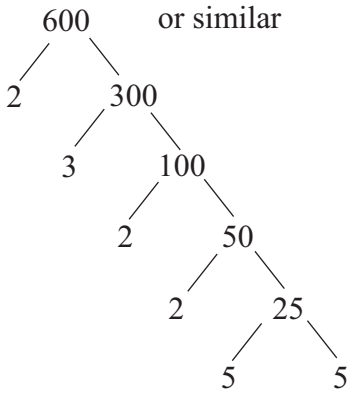
			AVAILABLE MARKS
	(b) $7x = 56$ $x = 8$	MA1 MA1	
	(c) 3, –7	A1 A1	6
10	(180 – 64) ÷ 2 58 122	M1 A1 MA1	3
11	**(a)** 5, –1	A1 A1	
	(b) Correct line	MA1	3
12	**(a)** 7 points correct (allow A1 for 4 correct)	A2	
	(b) Correct line	A1	
	(c) Correct reading	A1	
	(d) Negative	A1	5
13	360 ÷ 5 = 72 **or** 360 ÷ 5 = 72 **or** 540 ÷ 5 = 108 360 ÷ 6 = 60 360 ÷ 6 = 60 720 ÷ 6 = 120 72 + 60 108 + 120 108 + 120 = 228 132 360 – (108 + 120) = 132 360 – 228 = 132	MA1 MA1 MA1 MA1	4
14	∠DBC = 37° (even in diagram) ∠ECB = 92° (even in diagram) 125 – 92 or 180 – (92 + 37 + 18) $x = 33$ **Or** < DBA = 18 < EDC = 18 < DEC = 129 $x = 33$	MA1 MA1 M1 A1 MA1 MA1 MA1 MA1	4
15	**(a)** $4(2x + 3)$	MA1	
	(b) $x(x + 7)$	MA1	2
16	Bargain £12.00 – £2.40 = £9.60 or Discount £9.00 Discount £9.00 or Bargain £9.60 Discount is better	C2 C1 C1	4

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				AVAILABLE MARKS
17	**(a)**	695	MA1	
	(b)	695 × 15 or 10425 104.25	M1 A1	
	(c)	5.21	MA1	
	(d)	109.46	MA1	5
18	**(a)**	$0.\dot{3}7\dot{5}$	A1	
	(b)	0.2828	A1	2
19	**(a)**	$6x + 4y$	A2	
	(b)	4, 7, 12	A2	4
20		(–1, 1)	A1 A1	2
21	**(a)**	$30 < m \leqslant 40$	A1	
	(b)	Frequency polygon (scales, points, labels, lines)	M1 A3	5
22	**(a)**	2^6	A1	
	(b)	$4x - 8 + 6x + 9$ $10x + 1$	MA1 MA1	3
23		$\frac{33}{60}$	MA1	
		$\frac{33}{60} \times 100 = 55\%$	M1 A1	3

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				AVAILABLE MARKS
24	$2 \mid 600$ $2 \mid 300$ $2 \mid 150$ $3 \mid 75$ $5 \mid 25$ 5	or	$5 \mid 600$ $5 \mid 120$ $3 \mid 24$ $2 \mid 8$ $2 \mid 4$ 2	



or similar

		M1 A1	
	$2^3 \times 3 \times 5^2$	MA1	3
25	$\pi \times 5.5^2 = 95.033$ or 60.5	MA1	
	$\frac{1}{2} \times \pi \times 5.5^2 = 47.5166$	MA1	
	$60.5 - 47.5166 = 12.98$	MA1	3
26	$d^2 = 297^2 + 210^2$	MA1	
	132309	A1	
	364 or 363.743	A1	3
27	**(a)** $2x + 3 + x + 6 + x + x$	MA1	
	$5x + 9$	A1	
	(b) **(i)** $5x + 9 = 34$	MA1	
	(ii) $5x = 25$ $x = 5$	MA1	4
28	$x = 3.5 \rightarrow 28.875$ and $x = 3.4 \rightarrow 25.704$	MA1	
	$x = 3.45 \rightarrow 27.263625$	MA1	
	$x = 3.4$	MA1	3
		Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2014

Mathematics

Unit T2
(With calculator)
Foundation Tier



[GMT21]

GMT21

FRIDAY 10 JANUARY, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen**.
Answer **all twenty-nine** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

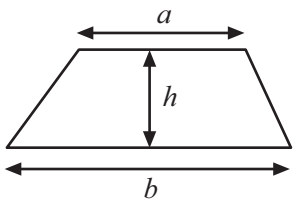
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 1 and 16(b)**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

8691

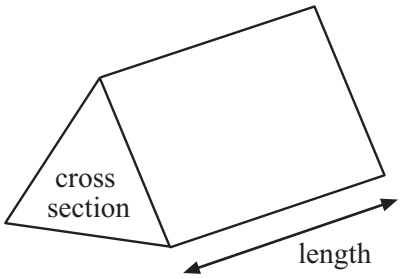
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Formula Sheet

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



Volume of prism = area of cross section × length



8691

Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

1 **(a)** Work out the value of $2^2 \times 3^3$ showing each step of your working.

Answer _____ [2]

(b) Which of the following fractions is nearest in value to $\frac{1}{4}$?

$\frac{2}{10}$ $\frac{3}{20}$ $\frac{7}{30}$ $\frac{11}{40}$

Show clearly how you reach your answer.

Answer _____ [2]

Total Question 1

[Turn over

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Examiner Only	
Marks	Remark

2 **(a)** From the numbers in the list below

24 56 81 40 25 66 59 90 27

(i) write down a square number,

Answer _____ [1]

(ii) write down a cube number.

Answer _____ [1]

(b) Martha's grandmother's age on her next birthday will be both a square number and a cube number at the same time.

What age is Martha's grandmother now?

Answer _____ [2]

Total Question 2

3 Anne bought pink and blue ribbon for her Nursery School.

She bought 3.2 metres of pink ribbon and 2.6 metres of blue ribbon and paid the shopkeeper £8.89

The pink ribbon cost £1.60 per metre.

How much did the blue ribbon cost per metre?

Show clearly how you worked out your answer.

Answer £ _____ [4]

Total Question 3

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4

Year	2008	2009	2010	2011	2012
Rainfall (cm)	60.5	62.5	62.0	61.0	

The mean rainfall over these 5 years was 62 cm. What was the rainfall in 2012?

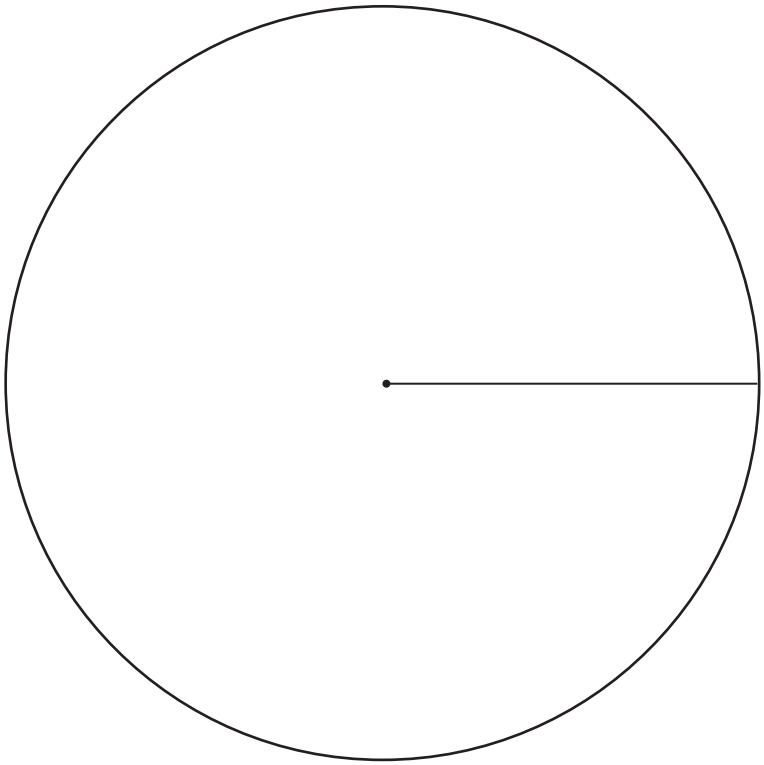
Answer _____ cm [3]

Examiner Only	
Marks	Remark
Total Question 4	

5 The table below shows the number of pairs of shoes of different colours sold in a shop one day.

Colour	Black	Brown	Blue	Other
Number	35	20	18	17
Angle				

Draw a clearly labelled pie chart to show the number of pairs of shoes of each colour.

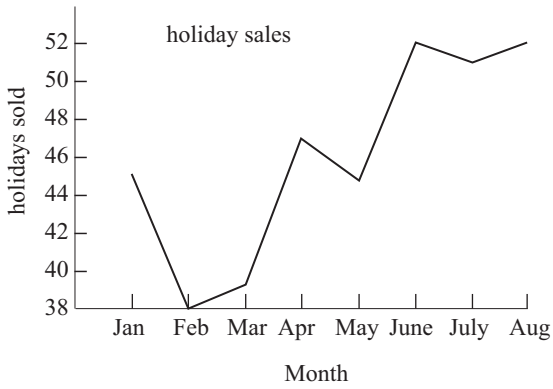


[4]

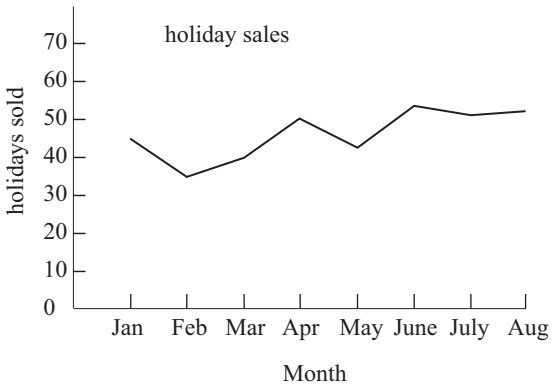
Total Question 5

6 The two graphs below show similar information but look different.

Graph A



Graph B



(a) Which graph appears to show the biggest increase in sales?

Answer Graph _____ [1]

(b) What causes this graph to be misleading?

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 6	

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7 Calculate the size of angle x in the diagram below.

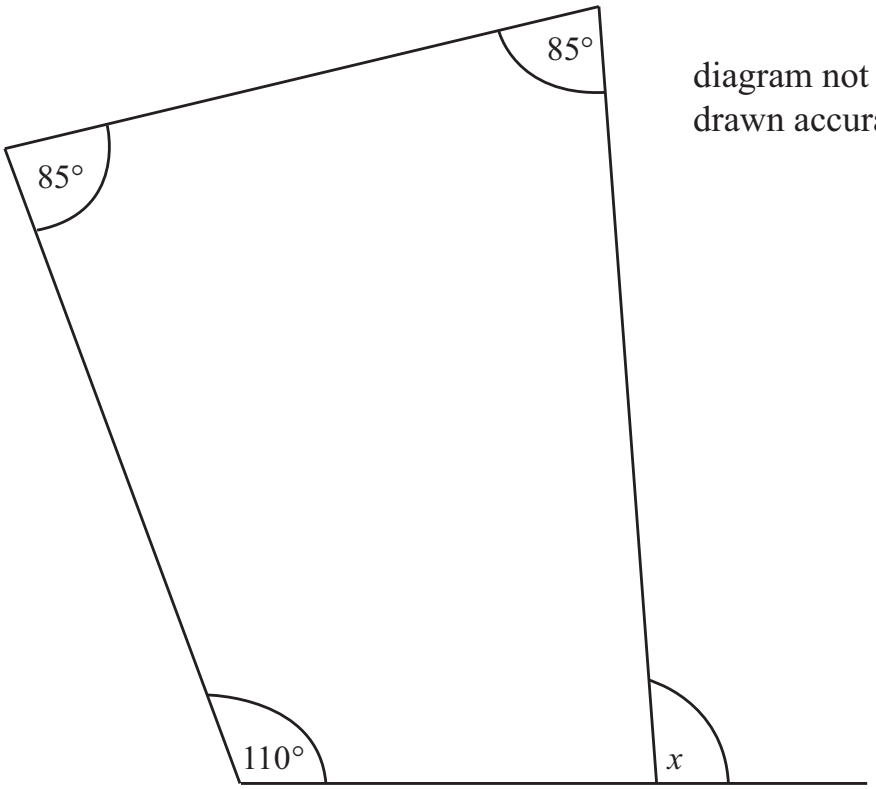


diagram not drawn accurately

Answer $x =$ _____° [3]

Examiner Only	
Marks	Remark
Total Question 7	

[Turn over

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8

Dublin Connolly				*1000*				*1300*				*1600*			
Newry (L)				*1112*				*1412*				*1712*			
Poyntzpass				|				|				|		
Scarva				|				|				|		
Portadown	0845	0945	1045	*1134*	1145	1245	1345	*1434*	1445	1545	1645	*1734*	1745	1845	
Lurgan	0851	0951	1051	*1144*	1151	1251	1351	|	1451	1551	1651	|	1751	1851	
Moira	0857	0957	1057	|	1157	1257	1357	|	1457	1557	1657	|	1757	1857	
Lisburn	0910	1010	1110	*1203*	1210	1310	1410	|	1510	1610	1710	|	1810	1910	
Hilden	0912	1012	1112	|	1212	1312	1412	|	1512	1612	1712	|	1812	1912	
Lambeg	0914	1014	1114	|	1214	1314	1414	|	1514	1614	1714	|	1814	1914	
Derriaghy	0916	1016	1116	|	1216	1316	1416	|	1516	1616	1716	|	1816	1916	
Dunmurry	0919	1019	1119	|	1219	1319	1419	|	1519	1619	1719	|	1819	1919	
Finaghy	0922	1022	1122	|	1222	1322	1422	|	1522	1622	1722	|	1822	1922	
Balmoral	0924	1024	1124	|	1224	1324	1424	|	1524	1624	1724	|	1824	1924	
Adelaide	0926	1026	1126	|	1226	1326	1426	|	1526	1626	1726	|	1826	1926	
Great Victoria Street	0930	1030	1130	|	1230	1330	1430	|	1530	1630	1730	|	1830	1930	
Great Victoria Street	0834	0934	1034	1134	|	1234	1334	1434	|	1534	1634	1734	|	1834	1934
City Hospital	0837	0937	1037	1137	|	1237	1337	1437	|	1537	1637	1737	|	1837	1937
Botanic	0839	0939	1039	1139	|	1239	1339	1439	|	1539	1639	1739	|	1839	1939
Belfast Central (M)	0842	0942	1042	1142	*1216*	1242	1342	1442	*1507*	1542	1642	1742	*1807*	1842	1942
Belfast Central	0845	0945	1045	1145		1245	1345	1445		1545	1645	1745		1845	1945
Titanic Qtr (Bridge End)	0848	0948	1048	1148		1248	1348	1448		1548	1648	1748		1848	1948
Sydenham	0851	0951	1051	1151		1251	1351	1451		1551	1651	1751		1851	1948
Holywood	0855	0955	1055	1155		1255	1355	1455		1555	1655	1755		1855	1955
Marino	0857	0957	1057	1157		1257	1357	1457		1557	1657	1757		1857	1957
Cultra	0859	0959	1059	1159		1259	1359	1459		1559	1659	1759		1859	1959
Seahill	0902	1002	1102	1202		1302	1402	1502		1602	1702	1802		1902	2002
Helen's Bay	0905	1005	1105	1205		1305	1405	1505		1605	1705	1805		1905	2005
Carnalea	0909	1009	1109	1209		1309	1409	1509		1609	1709	1809		1909	2009
Bangor West	0911	1011	1111	1211		1311	1411	1511		1611	1711	1811		1911	2011
Bangor	0916	1016	1116	1216		1316	1416	1516		1616	1716	1816		1916	2016

© Adapted from Translink Timetable (www.translink.co.uk). With kind permission

(a) Sarah takes the 1134 train from Portadown to Belfast Central.
How long should the journey take?

Answer _____ minutes [1]

Examiner Only	
Marks	Remark

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(b) James is in Portadown. He has to be in Holywood by 5 pm. What is the latest train he could take from Portadown?

Answer _____ [1]

(c) Using this train service, but not starting in Portadown, Joshua made a journey which lasted exactly 2 hours 7 minutes. What is the earliest time his journey could have started?

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 8	

9 A rectangle measures 7.6 cm by 4.8 cm.

Calculate

(a) the area of this rectangle,

Answer _____ [3]

(b) the perimeter of this rectangle.

Answer _____ cm [1]

Examiner Only	
Marks	Remark
Total Question 9	

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10 **(a)** Simplify

$5x + 2y - 3x - 5y$

Answer _____ [2]

(b) Solve

$7x - 3 = 18$

Answer $x =$ _____ [2]

(c) Solve

$\frac{x}{20} = 2$

Answer $x =$ _____ [1]

Examiner Only	
Marks	Remark
Total Question 10	

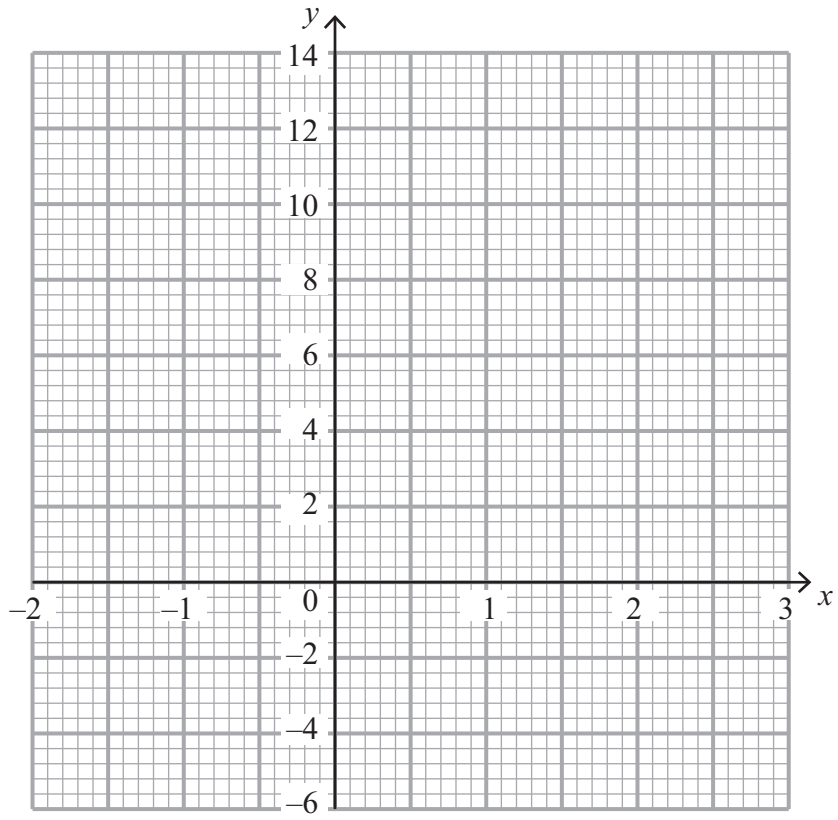
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11 **(a)** Complete the table of values for the equation $y = 3x + 5$

x	–2	–1	0	1	2	3
y	–1		5	8		14

[1]

(b) On the grid below, draw the graph of $y = 3x + 5$ between $x = –2$ and $x = 3$



[2]

(c) Draw the line $x = 2$ on the same grid. [1]

Examiner Only	
Marks	Remark
Total Question 11	

12 Hugh is a travelling salesman. He claims 24.6p for each km he travels and £27.60 for meals on each day he is travelling.

If he travels more than 700 km in any week he adds 12.5% to his total claim.

Last week Hugh travelled 915 km in 5 days.

How much did Hugh claim for last week?

Show clearly how you arrived at your answer.

Answer £ _____ [5]

Examiner Only	
Marks	Remark
Total Question 12	

13 **(a)** Write down two numbers which are square roots of 49

Answer _____ and _____ [1]

(b) Explain the meaning of $0.\dot{1}0\dot{3}$

Answer _____ [1]

Total Question 13	

[Turn over

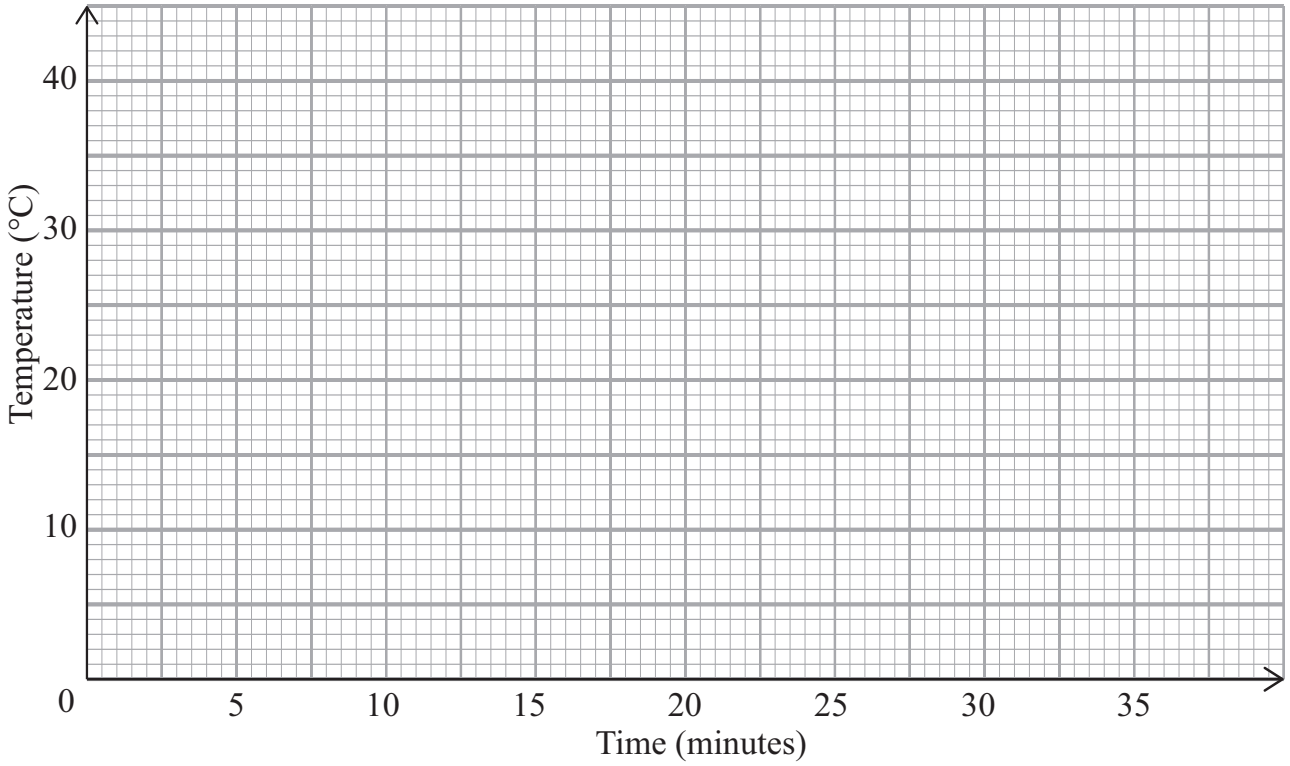
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14 The table shows the temperature of some liquids as they cool in a freezer.

Examiner Only	
Marks	Remark

Time (minutes)	5	10	15	18	25	30	30
Temperature (°C)	35	31	24	22	12	7	6

(a) Draw a scatter graph for this data. [2]



Examiner Only	
Marks	Remark

(b) Draw a line of best fit. [1]

(c) Estimate the time taken for a liquid to reach freezing point (0 °C).

Answer _____ minutes [1]

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(d) Describe the correlation.

Answer _____ [1]

Examiner Only	
Marks	Remark

Total Question 14

15 Twenty two pupils were asked to record the time (in minutes) they spent on their homework last Monday night.
Their responses are listed below.

40	55	80	60	50	55	65	40	120	100	90
55	60	110	100	120	75	50	80	85	60	45

Construct a stem and leaf diagram to illustrate this data.

[3]

Total Question 15



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Quality of written communication will be assessed in part (b) of this question.

Examiner Only	
Marks	Remark

16 (a) Calculate the size of the interior angle of a regular pentagon.

Answer _____ ° [2]

(b) Three regular pentagons are placed together as shown below.

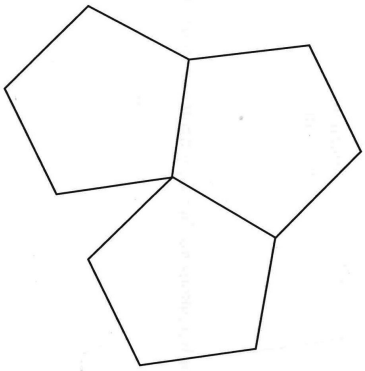


diagram not drawn accurately

Explain why you cannot cover a floor with regular pentagonal tiles.

Answer _____

_____ [2]

Total Question 16

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17 The radius of the base of a cylindrical oil tank is 60 cm.

(a) Calculate the area of the base of the oil tank.

Answer _____ cm^2 [2]

The height of the oil tank is 70 cm.

(b) Calculate the volume of the oil tank. Give your answer in **litres**.

Answer _____ litres [3]

Examiner Only	
Marks	Remark
Total Question 17	

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18 Angela buys 5 DVDs and 4 CDs.
Each DVD costs d pounds. Each CD costs c pounds.
Write down an expression for the total cost.

Answer _____ [2]

Examiner Only

Marks	Remark

Total Question 18

19 The n^{th} term of a sequence is given by $n^2 - 1$

(a) Write down the first 3 terms of this sequence.

Answer _____, _____, _____ [2]

(b) Explain why 101 cannot be a term in this sequence.

Answer _____ [1]

Total Question 19

20 Solve $7e + 3 = 4e + 5$

Answer e = _____ [3]

Total Question 20

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21 **(a)** Express 84 as a product of its prime factors **in index form**.

Answer _____ [3]

(b) Find the Lowest Common Multiple (LCM) of 63 and 84

Answer _____ [2]

Examiner Only	
Marks	Remark

Total Question 21

22 The weight of a cow increases from 147 kg to 165 kg.

What is the percentage increase in the weight of the cow?

Answer _____ % [3]

Total Question 22

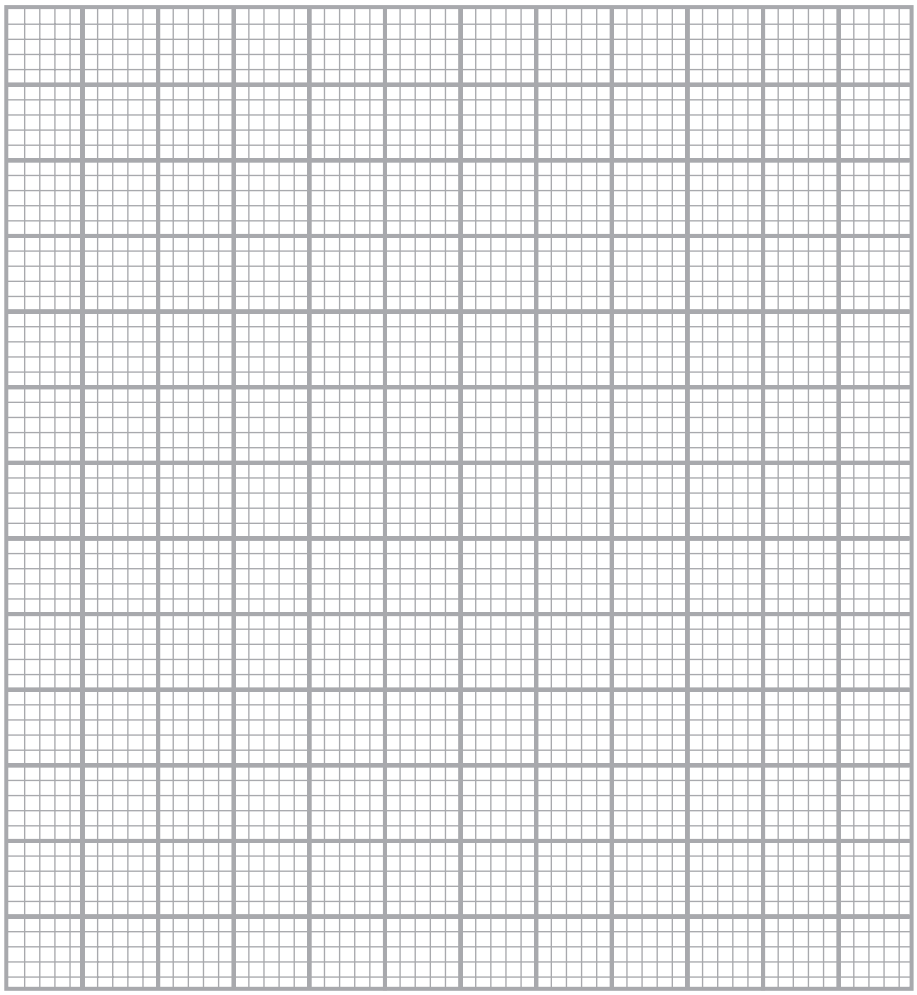
[Turn over

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23 The table below shows the weights of fish caught in a competition.

Weight (g)	Frequency
$0 < w \leqslant 150$	10
$150 < w \leqslant 300$	25
$300 < w \leqslant 450$	18
$450 < w \leqslant 600$	12
$600 < w \leqslant 750$	10
$750 < w \leqslant 900$	5

Draw a frequency polygon for this data.



[3]

Examiner Only	
Marks	Remark
Total Question 23	

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24 A student wishes to carry out a survey relating to television viewing by the general public.
Her first question is

"What age are you?" **Answer** ☐

(a) Give one criticism of this question.

_____ [1]

(b) Design a more suitable question with appropriate response boxes for her to record the age of those being surveyed.

[2]

Examiner Only	
Marks	Remark
Total Question 24	

25 The first five terms of a sequence are 9, 13, 17, 21, 25
Find an expression, in terms of n, for the n^{th} term of this sequence.

Answer _____ [2]

Total Question 25

26 A glass window is in the shape of a semi-circle with diameter 40 cm.

Calculate the perimeter of the semi-circle.

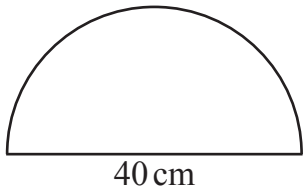


diagram not drawn accurately

Answer _____ cm [3]

Examiner Only	
Marks	Remark
Total Question 26	

27 The sketch shows a field which is in the shape of a right-angled triangle.
The side PQ = 10 m and the side QR = 26 m.

Calculate the length of the side PR.

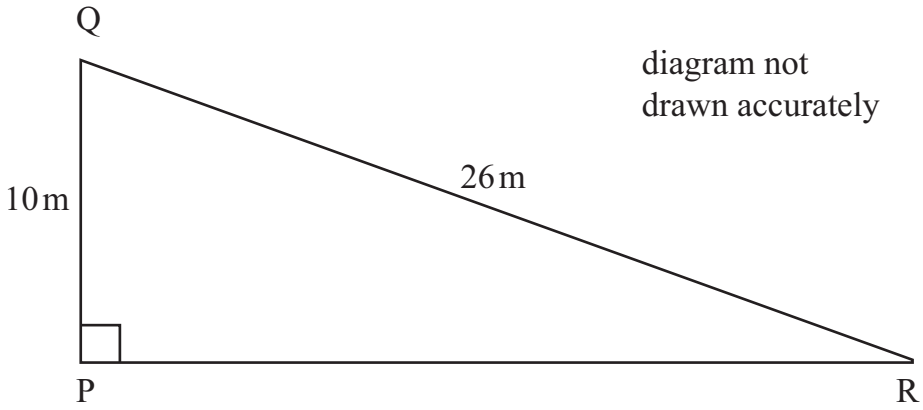


diagram not drawn accurately

Answer _____ m [3]

Total Question 27	

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28 Expand and simplify $3(2w - 1) - 2(w - 4)$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 28	

29 Use the method of trial and improvement to find the solution to the equation $x^3 + 3x = 47$
Give your answer correct to 1 decimal place.
Show all your working.

Answer x = _____ [4]

Total Question 29

THIS IS THE END OF THE QUESTION PAPER

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DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
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25	
26	
27	
28	
29	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
January 2014

Mathematics

Unit T2
Foundation Tier

[GMT21]

FRIDAY 10 JANUARY
9.15 am–10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

C indicates marks for quality of written communication

oe indicates "or equivalent" i.e. where a solution can be expressed in an alternative correct form, e.g. $\frac{1}{4} = 0.25$

ft indicates "follow through". See explanation below.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

(xi) Incorrect money notation will generally lose one mark but will be penalised only once per paper.

(xii) In general, a tolerance of ±2° is allowed in drawing angles, and ±2 mm in measuring length.

(xiii) In algebra, if further inaccurate work is done to a correct answer, some marks may be lost.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

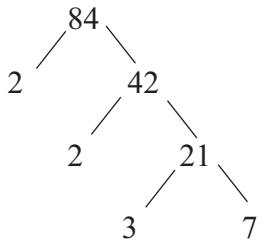
This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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				AVAILABLE MARKS
1	**(a)** $2 \times 2 \times 3 \times 3 \times 3$ or 4×27 $= 108$	C1 A1		
	(b) $\frac{2}{10} = 0.2$ $\frac{3}{20} = 0.15$ $\frac{7}{30} = 0.233$ $\frac{11}{40} = 0.275$	or	$\frac{24}{120}$ 20% $\frac{18}{120}$ 15% $\frac{28}{120}$ 23% $\frac{33}{120}$ 27 or 28%	or CA1
	closest to $\frac{1}{4}$ is $\frac{7}{30}$	C1		4 QWC
2	**(a)** **(i)** 25 or 81	A1		
	(ii) 27	A1		
	(b) 64 (seen) Answer = 63	A1 A1		4
3	Pink ribbon = $3.2 \times £1.60 = £5.12$ Remaining cost = £8.89 – £5.12 = £3.77 Cost of blue = £3.77 ÷ 2.6 = £1.45	M1, A1 MA1 MA1		4
4	$60.5 + 62.5 + 62.0 + 61.0 = 246$ $62 \times 5 = 310$ $310 - 246 = 64$	MA1 MA1 MA1		3
5	140° 80° 72° 68° sectors with correct labels	MA2 A2		4
6	**(a)** Graph A	A1		
	(b) Uses top part of graph only or Truncated scale or similar	A1		2
7	$360 - (110 + 85 + 85)$ or $360 - 280$ 80 $180 - 80 = 100$	M1 A1 MA1		3

				AVAILABLE MARKS
8	**(a)**	42 minutes	A1	
	(b)	1545	A1	
	(c)	1300	A1	3
9	**(a)**	7.6×4.8 $36.48\,cm^2$	M1 A1, A1 (units)	
	(b)	24.8	MA1	4
10	**(a)**	$2x - 3y$	A1, A1	
	(b)	$7x = 21$ $x = 3$	MA1 A1	
	(c)	40	A1	5
11	**(a)**	2, 11	A1	
	(b)	Points plotted correctly Correct line	A1 A1	
	(c)	$x = 2$ drawn correctly	A1	4
12		$915 \times 24.6 = £225.09$ Meals $= 5 \times £27.60 = £138$ Total claim $= £363.09$ $£363.09 \times 12.5\%$ $= £45.39$ $= £408.48$	MA1 MA1 A1 MA1 A1	5
13	**(a)**	7 and –7	A1	
	(b)	0.103103103 …	A1	2
14	**(a)**	7 points correct (4 points correct)	A2 (A1)	
	(b)	accurate line of best fit	A1	
	(c)	reading from graph (approx. 36/37)	MA1	
	(d)	negative	A1	5

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								AVAILABLE MARKS
15	4 | 0 0 5							
	5 | 0 0 5 5 5							
	6 | 0 0 0 5							
	7 | 5							
	8 | 0 0 5							
	9 | 0							
	10 | 0 0							
	11 | 0						M1, A1	
	12 | 0 0			**Key**: 11 | 0 = 110			A1	3
16	**(a)**	Exterior = 72° or total interior = 540°					MA1	
		108°					MA1	2
	(b)	Each interior angle = 108° and 3 × 108° = 324°					C1	
		360° – 324° = 36° which leaves a gap					C1	
		(Alternatively 360° ÷ 108° = 3.33 … which is **not** a whole number)						2 QWC
17	**(a)**	$\pi \times 60^2$					MA1	
		11309.73355 (any correct rounding)					A1	
	(b)	11309.73355 × 70					MA1	
		791681.3487					A1	
		791.68 litres (any correct rounding)					MA1	5
18	$5d + 4c$						A1, A1	2
19	**(a)**	0, 3, 8					A2	
		(A1 for 2 correct)						
	(b)	102 is not a square number					A1	3
20	$7e - 4e = 5 - 3$						MA1	
	$3e = 2$						MA1	
	$e = \frac{2}{3}$						MA1	3
21	**(a)**	2 | 84 2 | 42 3 | 21 7 | 7 1	or		or similar		M1, A1	
		$= 2^2 \times 3 \times 7$					A1	
	(b)	$63 = 3 \times 3 \times 7$					MA1	
		LCM = 2 × 2 × 3 × 3 × 7 = 252					A1	5

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			AVAILABLE MARKS
22	Increase = 18 kg	A1	
	$\% = \frac{18}{147} \times 100$	MA1	
	= 12.244 (897 …)	A1	3
23	Polygon with correct scales	A1	
	Correct mid points	A1	
	Points joined	A1	3
24	**(a)** Suitable criticism – too big a variety of ages to be recorded, people may find it too personal, does not state required accuracy etc.	A1	
	(b) "What age range are you in?" Tick one box.		
	Response boxes given.	A1	
	Response boxes must be exhaustive and non-overlapping.	A1	3
25	$4n + 5$	A1, A1	2
26	$\pi \times 40 = 125.663$	MA1	
	$125.663 \div 2 = 62.83$	MA1	
	$62.83 + 40 = 102.83$	MA1	3
27	$26^2 = 10^2 + PR^2$	MA1	
	$PR^2 = 676 - 100 = 576$	A1	
	$PR = 24$	A1	3
28	$6w - 3 - 2w + 8$	MA1	
	$4w + 5$	MA1	2
29	value between 3 and 4	MA1	
	$\underline{x}$ $\quad$ $x^3 + 3x$		
	3.4 $\quad$ 49.504		
	3.3 $\quad$ 45.837	A1	
	3.35 $\quad$ 47.645375	A1	
	$x = 3.3$	A1	4
		Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2013

Mathematics

Unit T2
(With calculator)
Foundation Tier



[GMT21]

GMT21

TUESDAY 11 JUNE, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen**.
Answer **all twenty-seven** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

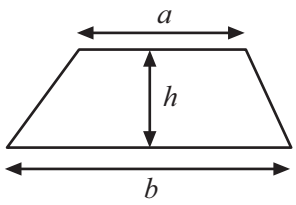
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 9 and 26.**
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

8166

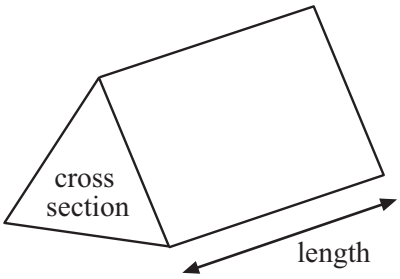
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Formula Sheet

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



Volume of prism = area of cross section × length

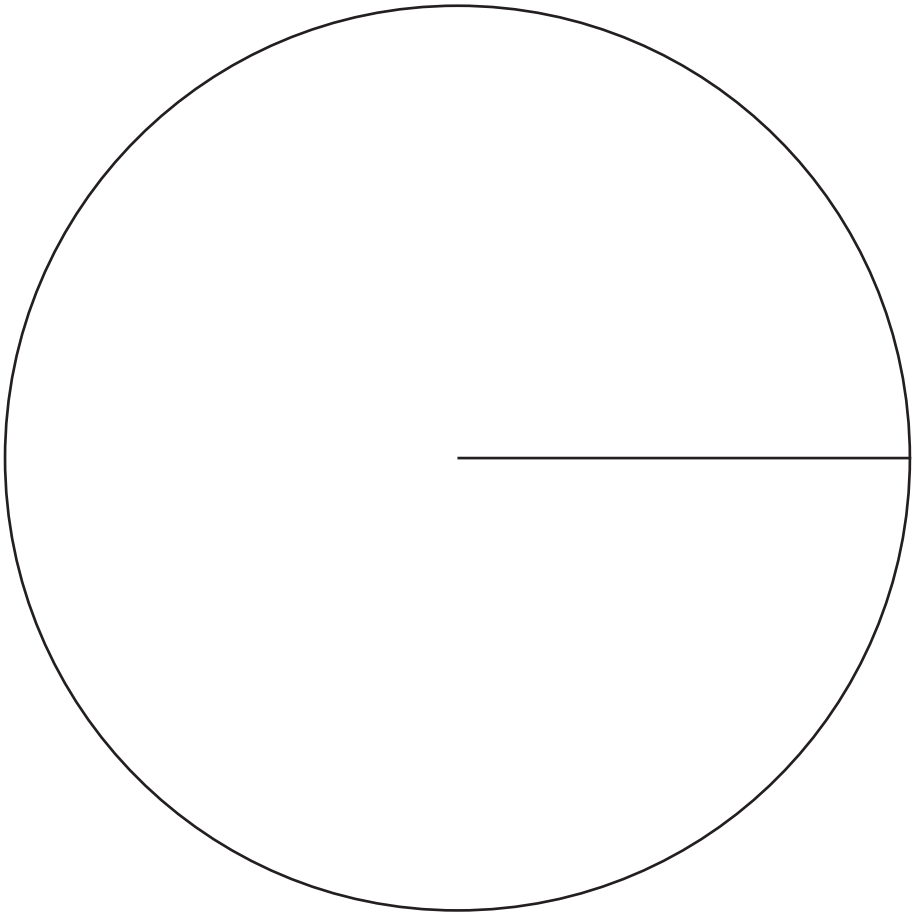


8166

1 The number of crisps sold in a tuck shop was recorded as follows.

Flavour	Frequency	Angle
Salt and Vinegar	10	
Ready Salted	8	
Smokey Bacon	17	
Cheese and Onion	25	

Draw a pie chart to illustrate this information.



[4]

Examiner Only	
Marks	Remark
Total Question 1	

2 Calculate $\frac{2}{0.5^2}$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 2	

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3 **(a)** Name each of the 3D shapes from the given descriptions.

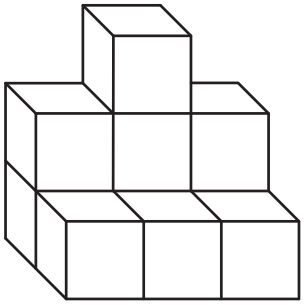
(i) I have 12 edges. I have 8 vertices.
My faces are not all the same. My faces are all rectangles.

Answer _____ [1]

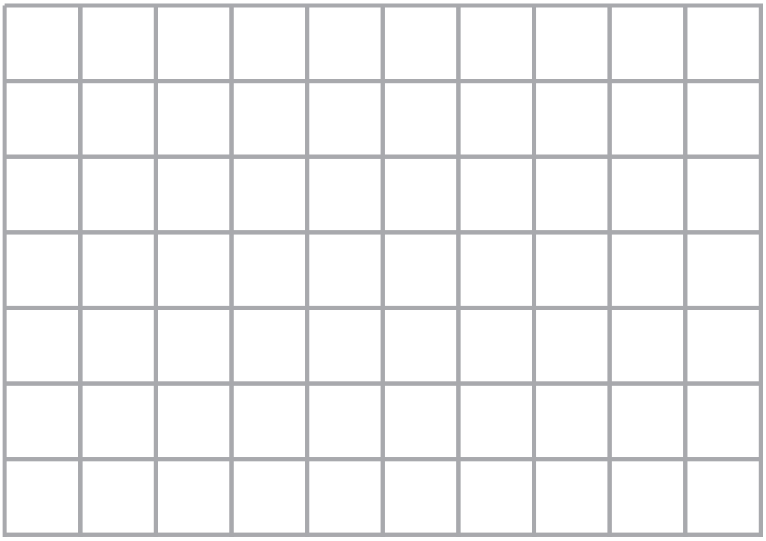
(ii) I have 9 edges. I have 6 vertices.
I have two triangular faces and three rectangular faces.

Answer _____ [1]

(b) This solid is made up of centimetre cubes.



On the grid below draw the front elevation of the solid.



[2]

Examiner Only	
Marks	Remark
Total Question 3	

[Turn over

4 **(a)** Simplify $7a - 3b - 2a + 6b$

Answer _____ [2]

(b) Find the value of $5x + 2y$ when $x = 2$ and $y = -6$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 4	

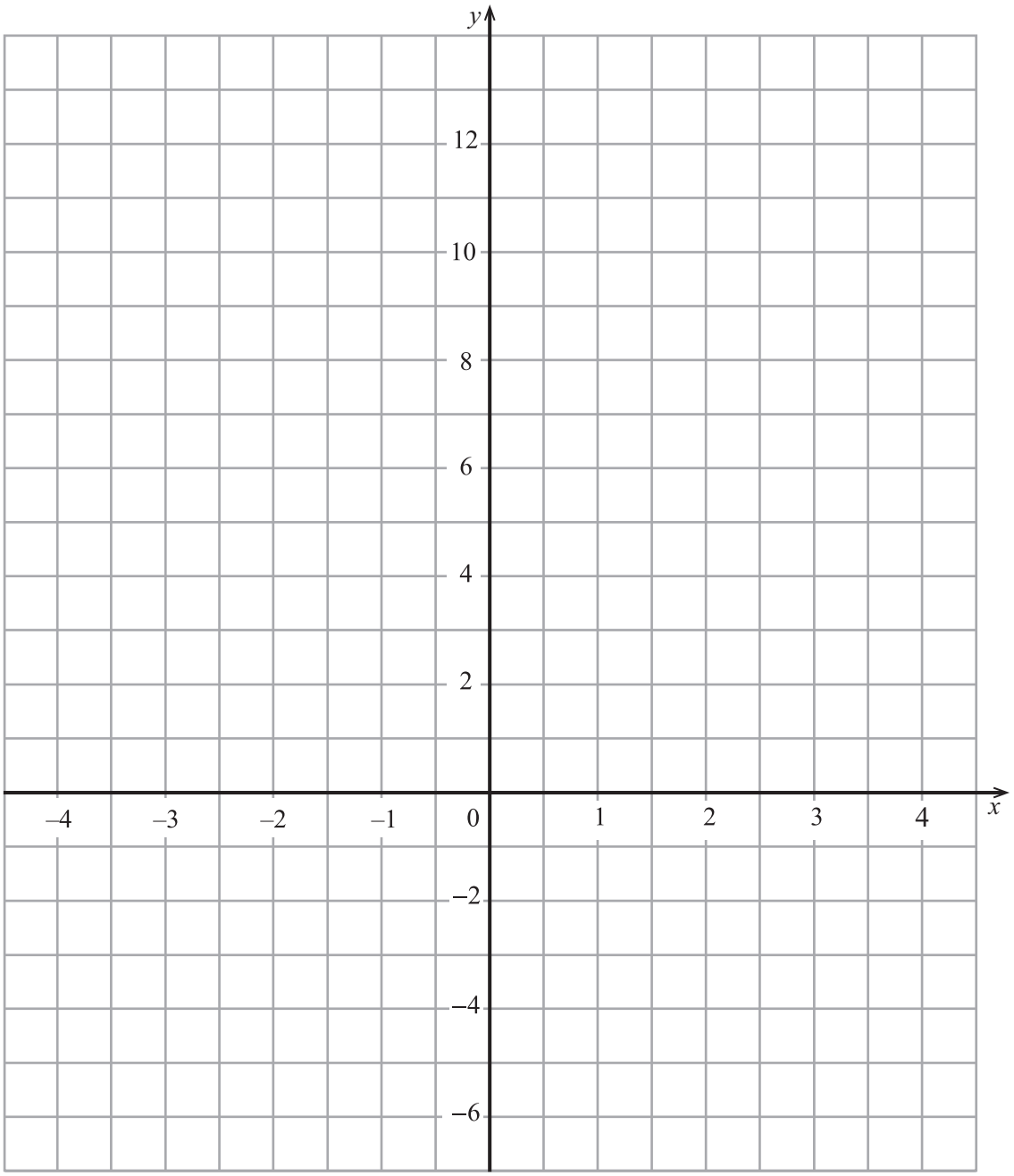
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5 **(a)** Complete the table for $y = 6 - 2x$

x	-1	0	1	2	3
$y = 6 - 2x$	8		4		0

[2]

(b) Using values from the table, draw the graph of $y = 6 - 2x$



[2]

Examiner Only

Marks	Remark

Total Question 5

[Turn over

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Examiner Only	
Marks	Remark

6 **(a)** Which of the following fractions is nearest in size to $\frac{1}{4}$?

$\frac{6}{25}$ $\frac{13}{50}$ $\frac{49}{200}$ $\frac{97}{400}$

Show your work.

Answer _____ [2]

(b) Work out the answer to the following, without using a calculator.
Show your work.

$$\frac{7}{12} - \frac{1}{6}$$

[2]

Total Question 6

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7 Construct a triangle ABC where AB is 8 cm, AC is 5 cm and angle A is 55°



[2]

Examiner Only	
Marks	Remark
Total Question 7	

[Turn over

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8

Timetable: Enniskillen Bus Centre – Omagh Bus Centre
Service 94 (Monday–Friday)

Calling points:								
Enniskillen, Bus Centre	...	0655	0735	0740	0905	1130	1330	1545
Mullaghmeen, Village	...	...	...	...	...	...	...	...
Ballinamallard, Church	...	0710	...	0755	0920	...	1345	1605
Trillick, Warnock's Shop	...	0720	0802	0805	0930	...	1355	1615
Irvinestown, Bypass	...	...	...	...	...	1200	...	...
Dromore (Tyrone), Bypass	0727	0730	...	0815	0940	1220	1405	1625
Prices Shop, near Dromore	...	0738	...	0823	0948	1225	1413	1633
Omagh, Bus Centre	0752	0752	...	0850	1005	1240	1430	1655

(a) The 0740 bus from Enniskillen is running 8 minutes late.
At what time will it arrive in Ballinamallard?

Answer _____ [1]

(b) A girl needs to be in Omagh for an appointment at 1.15 pm. She leaves Enniskillen on the latest possible bus to be in time for her appointment.
How long will she have to spend in Omagh before the appointment?

Answer _____ minutes [2]

Examiner Only	
Marks	Remark
Total Question 8	

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Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

9 The boys in Class 12A scored the following goals in a penalty competition:

6, 10, 9, 8, 7, 6, 7, 10, 9, 8

The 8 boys in Class 12B scored a total of 72 goals.

Which class did better in the competition?
Explain your answer.

Answer _____

because _____

_____ [4]

Total Question 9

10 In a greengrocer's, cooking apples cost £2.65 per kg.
Mary buys 0.6 kg of cooking apples.
She also buys 0.4 kg of tomatoes.
At the checkout her bill for both items comes to £2.83
Work out the price **per kg** for the tomatoes.

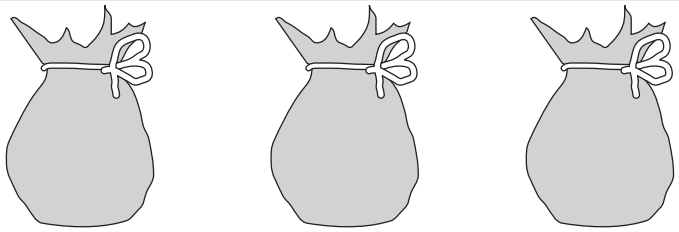
Answer £ _____ [4]

Total Question 10

[Turn over

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11



1 **2** **3**

Bag 1 contains m marbles.

Bag 2 contains 5 less marbles than Bag 1

(a) Write down an expression in terms of m for the number of marbles in Bag 2

Answer _____ [1]

Bag 3 contains twice as many as in Bag 1 **plus** the number of marbles that are in Bag 2

(b) Write down an expression in terms of m for the number of marbles in Bag 3
Give your answer in its simplest form.

Answer _____ [2]

The total number of marbles in Bag 3 is 22

(c) Set up and solve an equation to help find how many marbles are **in Bag 2**

Answer In Bag 2 there are _____ marbles [3]

Examiner Only	
Marks	Remark
Total Question 11	

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12 **(a)** Fill in the boxes to show the next 2 terms in the sequence

16, 11, 6, ☐, ☐ [2]

(b) The n^{th} term in a sequence is given as

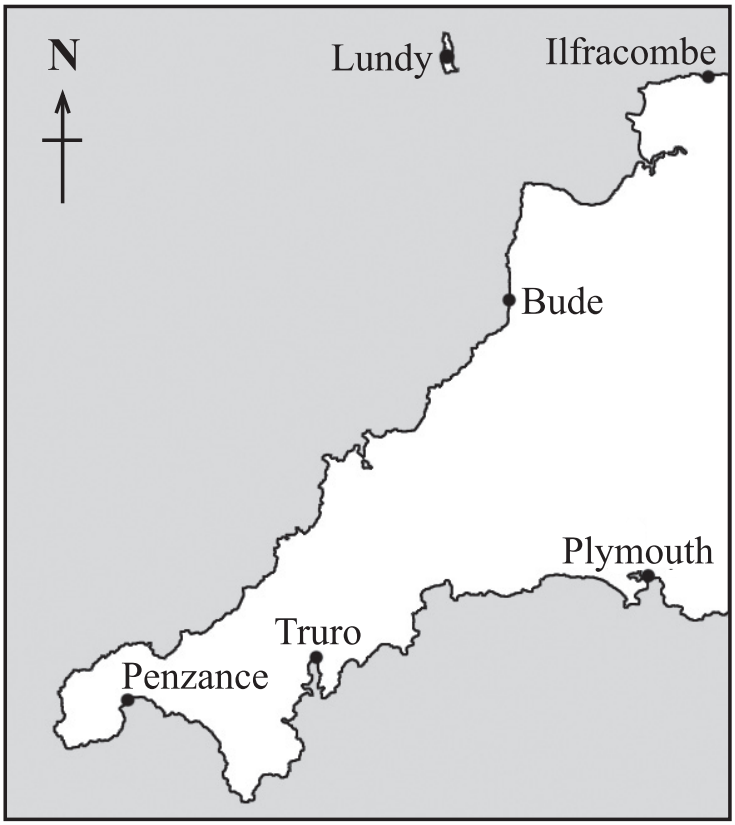
$2n$ + ☐

The 3rd term is 10. What value is missing from the box?

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 12	

13



© Graded examples in Mathematics: Geometry & Trigonometry, by M R Heylings, page 24, published by Schofield & Sims, 1984. ISBN 0721722314

Boscastle is on a bearing of 028° from Truro.
Boscastle is on a bearing of 310° from Plymouth.
Locate the position of Boscastle on the map above. Indicate Boscastle with a point marked B. [3]

Total Question 13	

[Turn over

14 **(a)** Show how to work out the answer to the following without using a calculator.

$$\frac{3}{8} \div \frac{3}{4}$$

[2]

(b) What percentage is £24 of £320?

Answer _____ % [2]

Total Question 14

15 The correlation in a scatter graph may be described as one of the following:

no correlation positive correlation negative correlation

Write down the type of correlation you would expect to find in scatter graphs which show the following information:

(a) average daily temperature and cold drinks sales,

Answer _____ [1]

(b) marks in a test and distance travelled to school,

Answer _____ [1]

(c) number in family and average weekly amount spent on food,

Answer _____ [1]

(d) average speed for journey to school and average time for journey to school.

Answer _____ [1]

Total Question 15

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16 The heights (in centimetres) of fifteen girls in a Dance Class are:

151	173	157	165	166	168	170	169
169	169	168	171	154	176	177	

Construct a stem and leaf diagram to illustrate these heights.

[3]

Examiner Only	
Marks	Remark
Total Question 16	

[Turn over

17

Primus Energy Gas Tariff

Standing charge is 7.93p per day

Gas used is 4.433p per unit

Marie's gas meter was read on 1st March.

The reading was

0	1	9	5	7

The meter was read again on 1st June.

The reading was

0	4	1	0	8

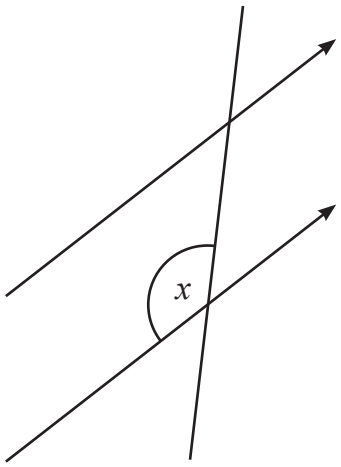
Calculate the total gas bill that Marie will have to pay for the 92 days from 1st March, if VAT is charged at 5% on the total.

Answer £ _____ [5]

Examiner Only	
Marks	Remark
Total Question 17	

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18 **(a)** Mark the angle corresponding to angle x on the diagram.



[1]

(b) Calculate the sum of the interior angles of a regular octagon.

Answer _____° [2]

(c) Is it possible to have a regular polygon with an interior angle of 130°?
Explain your answer.

_____

_____

_____ [2]

Total Question 18

19 Convert 62 000 cm^2 into m^2.

Answer _____ m^2 [2]

Total Question 19

Examiner Only

Marks	Remark

[Turn over

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20 Solve $\frac{2x}{5} - 3 = 7$

Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark
Total Question 20	

21 Derek is trying to find a number x such that $x^2 + \sqrt{x} = 90$

He knows the answer is between 9 and 10
Use trial and improvement to find Derek's number to **2 decimal places**.
Show your work.

Answer Derek's number is _____ [4]

Total Question 21	

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22 **(a)** **(i)** Write 210 as a product of prime factors.

Answer _____ [2]

(ii) Find the LCM of 210 and 84

Answer _____ [2]

(iii) Find the HCF of 210 and 84

Answer _____ [1]

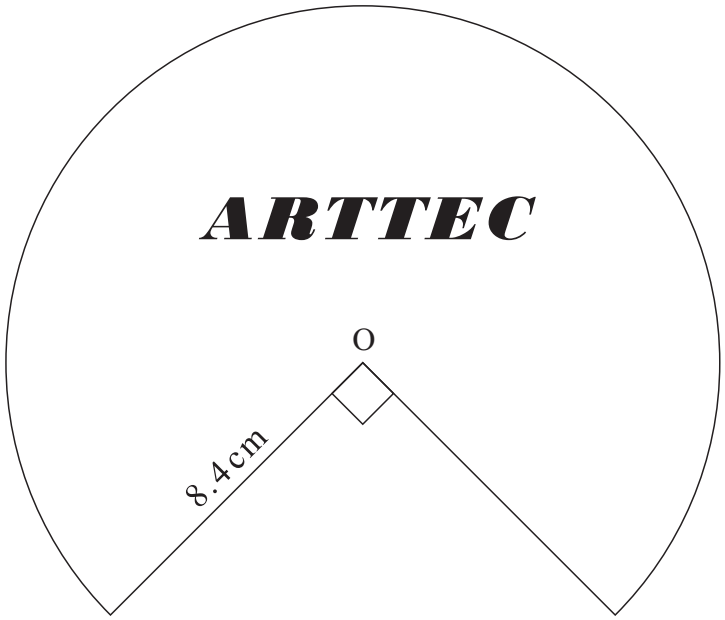
(b) Andrea opened an account using £720 with the Eastern Bank.
After one year, the bank paid interest into her account.
She then had £747.27 in her account.
Work out, as a percentage, Eastern Bank's interest rate on the account.

Answer _____ % [3]

Examiner Only	
Marks	Remark
Total Question 22	

[Turn over

23 A company logo is shown below. It is $\frac{3}{4}$ of a circle, centre O.



Calculate the perimeter of the logo.

Answer _____ cm [3]

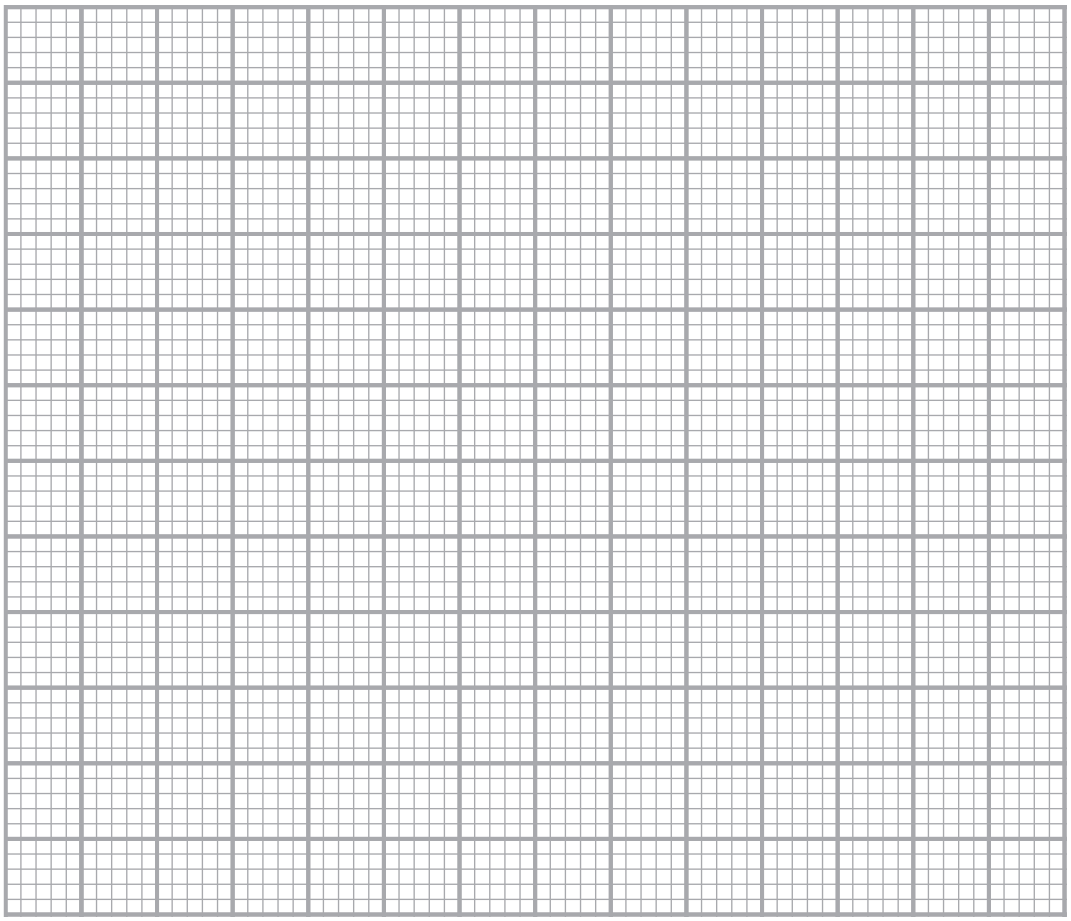
Examiner Only	
Marks	Remark
Total Question 23	

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24 The number of items that 80 students had in their sports bags was recorded. The numbers were grouped as shown in the table.

Number (n)	Frequency
$2 < n \leqslant 4$	8
$4 < n \leqslant 6$	24
$6 < n \leqslant 8$	18
$8 < n \leqslant 10$	17
$10 < n \leqslant 12$	9
$12 < n \leqslant 14$	4

(a) Show this information on a frequency polygon.



[3]

(b) Which class interval contains the median number?

Answer _____ [1]

Total Question 24

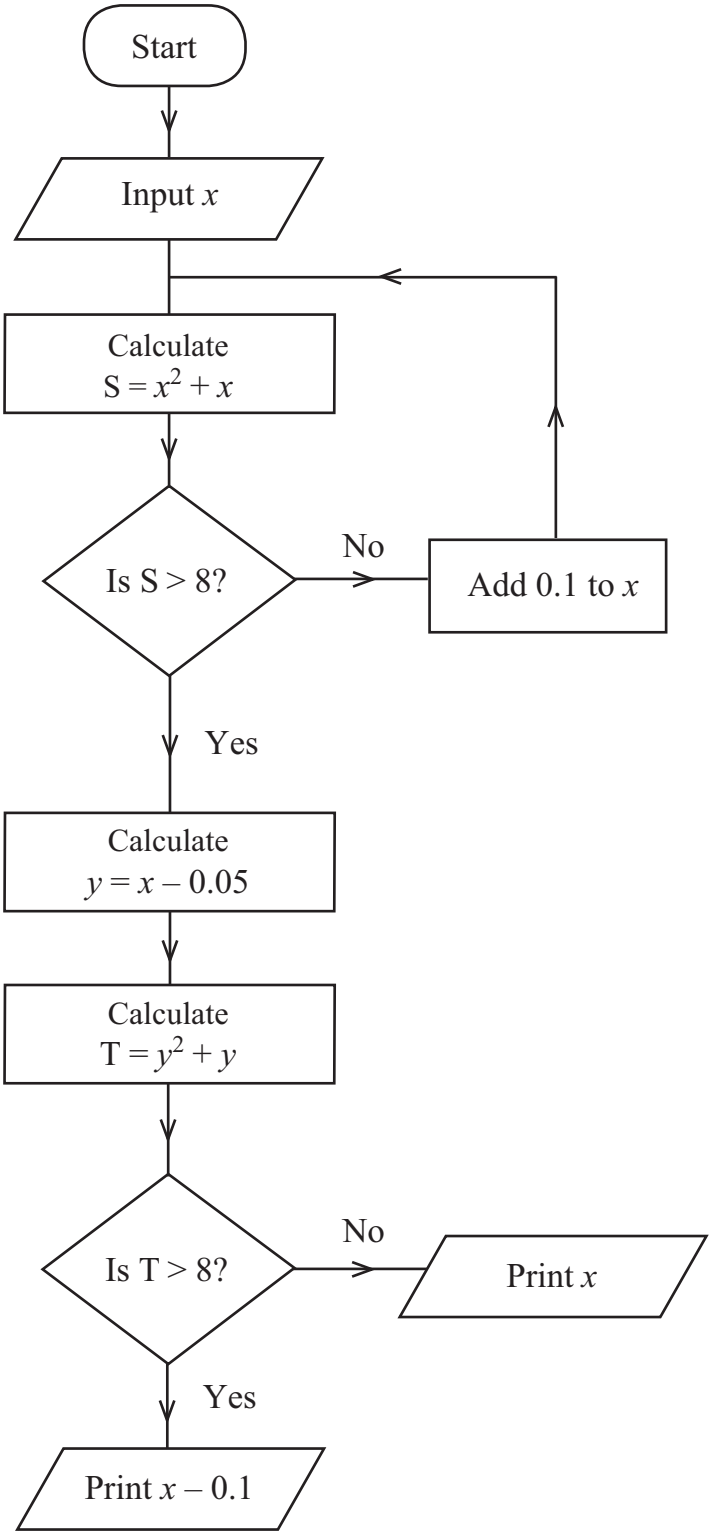
Examiner Only

Marks | Remark

8166

[Turn over

25



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Starting with $x = 2.0$ use the flow chart to find the value printed.

x	S	y	T

Answer Print _____ [4]

Examiner Only

Marks	Remark

Total Question 25

Quality of written communication will be assessed in this question.

26 The dimensions of three triangles are given:

Triangle A: 5 cm 6 cm 8 cm
Triangle B: 5 cm 12 cm 13 cm
Triangle C: 5 cm 10 cm 12 cm

Only one of these triangles is right-angled. Which one?
Explain your answer clearly.

Triangle: _____ because _____

_____

_____ [3]

Total Question 26

[Turn over

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27 Find the value of x when $5x^3 = 135$

Examiner Only	
Marks	Remark

Answer $x =$ _____ [1]

THIS IS THE END OF THE QUESTION PAPER

Total Question 27	

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For Examiner's use only	
Question Number	**Marks**
1	
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Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2013

Mathematics

Unit T2
Foundation Tier

[GMT21]

TUESDAY 11 JUNE

9.15 am – 10.45 am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right-hand column andthey are prefixed by the letters **M, A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.
A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded i.e. where the method is not correct no marks can be given.
MA indicates marks for combined method and accurate working.
C indicates marks for quality of written communication.
oe indicates "or equivalent" i.e. where a solution can be expressed in an alternative correct form, e.g. $\frac{1}{4} = 0.25$
ft indicates "follow through". See explanation below.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

(xi) Incorrect money notation will generally lose one mark but will be penalised only once per paper.

(xii) In general, a tolerance of ±2° is allowed in drawing angles, and ±2 mm in measuring length.

(xiii) In algebra, if further inaccurate work is done to a correct answer, some marks may be lost.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

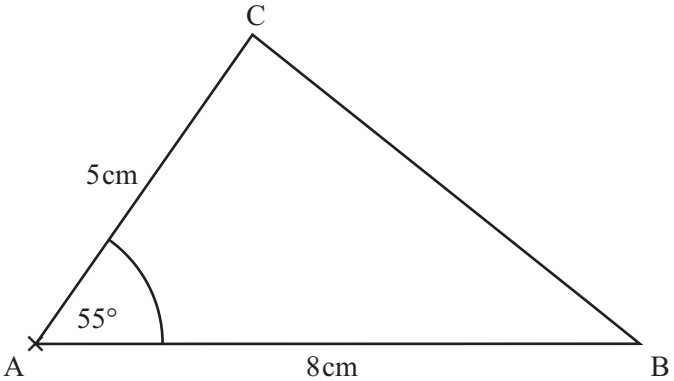
(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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			AVAILABLE MARKS
1	see overlay 60°, 48°, 102°, 150° (award [1] for evidence of 6) all sectors correct and labelled (allow A1 for 2 correct and labelled) **Alternatively**, with no work shown, 4 sectors correct and labelled A4 3 sectors correct and labelled A3 2 sectors correct and labelled A2 1 sector correct and labelled A1 Deduct only 1 from total if no labels	A2 A2	4
2	8 ($2 \div \frac{1}{4}$ **or** $2 \div 0.25$ seen in work gets A1)	A2	2
3	**(a)** **(i)** cuboid	A1	
	(ii) triangular prism	A1	
	(b) Front elevation (correct diagram using 2 cm × 2 cm squares gets A1)	A2	4
4	**(a)** $5a + 3b$	A1, A1	
	(b) $10 + (-12)$ **or** $10 - 12$ **or** $10 + -12$ -2	MA1 A1	4
5	**(a)** 6 and 2	A1, A1	
	(b) Points plotted correctly Correct line	A1 A1	4
6	**(a)** 0.24, 0.26, 0.245, 0.2425 (or % or fractions) $\frac{49}{200}$	MA1 A1	
	(b) $\frac{7}{12} - \frac{2}{12}$ or $\frac{42}{72} - \frac{12}{72}$ **oe** $\frac{5}{12}$ or $\frac{30}{72}$ or $\frac{15}{36}$ **oe**	MA1 A1	4
7	 Correct triangle (overlay) (55° and one correct length gets A1)	MA2	2

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			AVAILABLE MARKS
8	**(a)** 0803	A1	
	(b) indicates 1130 bus	MA1	
	1.15 pm – 12.40 pm = 35 minutes	MA1	3
9	12 A's mean = 80 ÷ 10 = 8	C1	
	12 B's mean = 72 ÷ 8 = 9	C1	
	12 B because its mean/average is greater	C1, C1	4
10	2.65 × 0.6 (=1.59)	MA1	
	2.83 – 1.59 =1.24	MA1	
	1.24 ÷ 0.4	MA1	
	£3.10	A1	4
11	**(a)** $m - 5$	A1	
	(b) $2m + m - 5$	M1	
	$3m - 5$	A1	
	(c) $3m - 5 = 22$	A1	
	$3m = 27$		
	$m = 9$	A1	
	Bag 2 (9 – 5) = 4 marbles	A1	6
12	**(a)** 1 and –4	A1, A1	
	(b) 6 + □ = 10	A1	
	missing number is 4	A1	4
13	028 from Truro	MA1	
	310 from Plymouth	MA1	
	Boscastle marked B	A1	3
14	**(a)** $\frac{3}{8} \times \frac{4}{3}$ or $\frac{3}{8} \div \frac{6}{8}$ **oe**	MA1	
	$\frac{1}{2}$ or $\frac{3}{6}$ or $\frac{12}{24}$ **oe**	A1	
	(b) $\frac{24}{320} \times 100$	MA1	
	7.5	A1	4

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			AVAILABLE MARKS
15	**(a)** pos. cor.	A1	
	(b) no. cor.	A1	
	(c) pos. cor.	A1	
	(d) neg. cor.	A1	4
16	15 | 1 4 7 16 | 5 6 8 8 9 9 9 17 | 0 1 3 6 7 Key 15|1 means 151 cm	M1, A1 MA1	3
17	4108 – 1957 = 2151	A1	
	2151 × 4.433p = £95.35383	MA1	
	92 × 7.93p = £7.2956	MA1	
	102.64943 × 0.05 = 5.13247	MA1	
	£107.78	A1	5
18	**(a)** Correct angle marked	A1	
	(b) (8 – 2) × 180	M1	
	1080	A1	
	Alternative ext = $\frac{360}{8}$ = 45 so int. = 135	MA1	
	135 × 8 = 1080	A1	
	(c) int = 130 so ext = 50	MA1	
	360 ÷ 50 = 7.2 which is not a whole number of sides; therefore not possible	A1	5
19	$62000 \div (100)^2$ **oe**	M1	
	6.2	A1	2
20	$\frac{2x}{5} = 10$ **or** $2x - 15 = 35$	MA1	
	$2x = 50$		
	$x = 25$	A1	2

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				AVAILABLE MARKS
21	$x^2 + \sqrt{x} = 90$			
	9.3	89.5396	(Too small)	
	9.4	91.426	(Too big)	MA1
	9.32	89.9153	(Too small)	
	9.33	90.1034	(Too big)	MA1
	9.325	90.0093	(Too large)	MA1
	Answer 9.32			A1 4
	NB: Correct answer with no working gets no marks.			
22	**(a)** **(i)** attempt to split into prime factors (at least 2 primes)			MA1
	$2 \times 3 \times 5 \times 7$			A1
	(ii) $84 = 2 \times 2 \times 3 \times 7$			MA1
	LCM $= 2 \times 2 \times 3 \times 5 \times 7 = 420$			MA1
	(iii) HCF $= 2 \times 3 \times 7 = 42$			MA1
	(b) 27.27			A1
	$\frac{27.27}{720} \times 100$			MA1
	3.7875% (accept 3.8%)			A1 8
23	$2 \times \pi \times 8.4$			MA1
	$(\frac{3}{4} \times 52.77... =)$ 39.584			MA1
	(39.584 + 2 × 8.4 =) 56.384			MA1 3
	NB: Using an incorrect formula for the circumference will gain no marks.			
24	**(a)** correct diagram with scales			MA1
	correct points above mid points			A1
	points joined			A1
	(b) $6 < n \leq 8$			A1 4

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						AVAILABLE MARKS
25	x	S	y	T		
	2.0	6.0				
	2.1	6.51			MA1	
	2.2	7.04				
	2.3	7.59			MA1	
	2.4	8.16	2.35	7.8725	MA1	
	Print 2.4				MA1	4
26	Recognition of Pythagoras as test				C1	
	Triangle B selected with supporting evidence $5^2 + 12^2 = 13^2$				C1, C1	3
27	$x = 3$				A1	1
					Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2013

Mathematics

Unit T2
(With calculator)



Foundation Tier

[GMT21]

GMT21

FRIDAY 11 JANUARY 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write in pencil or with a gel pen**.
Answer **all twenty-seven** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 4, 7 and 10**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is overleaf.

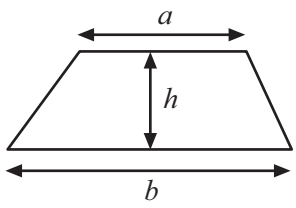
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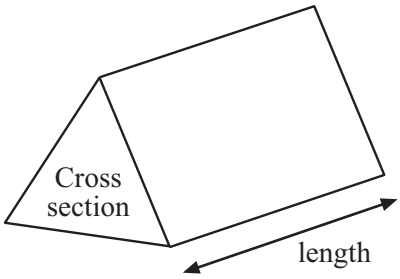
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Formula Sheet

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



Volume of prism = area of cross section × length



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Examiner Only	
Marks	Remark

1 **(a)** Write down the next two prime numbers after 43

Answer _____, _____ [2]

(b) Find the cube root of 125

Answer _____ [1]

Total Question 1

2 In the diagram of the triangle ABC below, AB = AC.

Angle ABC = 49°.

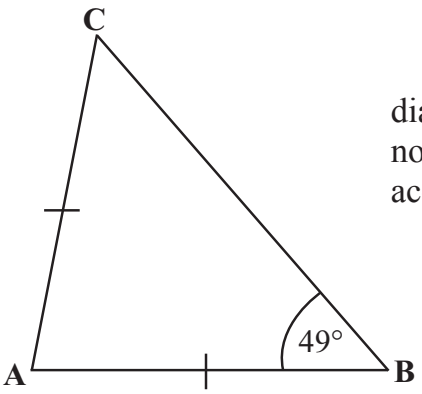


diagram not drawn accurately

(a) Write down the size of the angle BCA.

Answer _____° [1]

(b) Calculate the size of the angle BAC.

Answer _____° [2]

Total Question 2

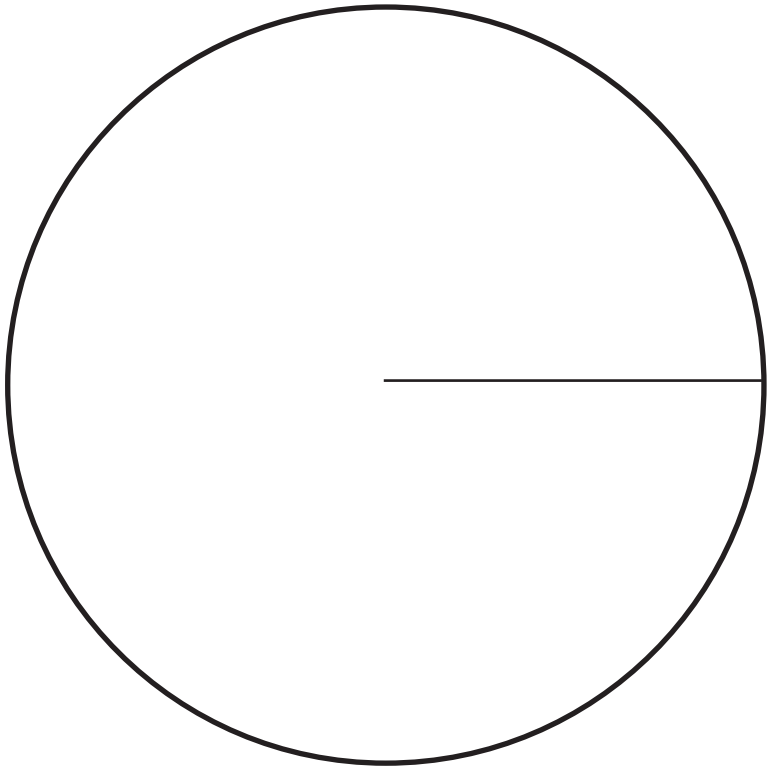
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3 The table below shows the number of different types of birds on a lake.

BIRD	TERNS	WADERS	GEESE	DUCKS	SWANS
NUMBER	50	20	30	10	10
ANGLE					

Draw a clearly labelled pie chart to show the number of different types of birds.



[4]

Examiner Only	
Marks	Remark
Total Question 3	

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4 Quality of written communication will be assessed in this question.
Show your working.



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A TV costs £265
Sam pays a deposit of £85 for this TV.
He then pays £15 each month.
How many complete months will it take before he has paid for the TV?
Explain your working clearly, using words and numbers.

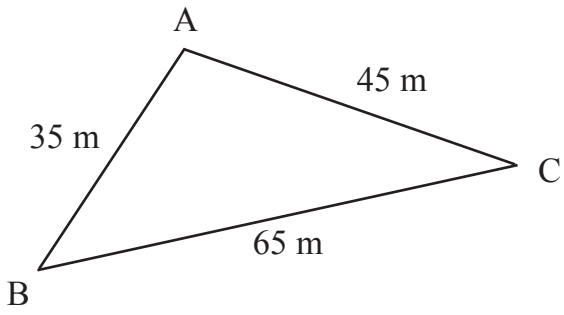
Answer _____ months [3]

Examiner Only	
Marks	Remark
Total Question 4	

[Turn over

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5 The diagram below shows a rough sketch of a triangular plot of land.



Using ruler and compasses only, make an accurate scale drawing below of the plot of land.
Use a scale of 1 cm to represent 5 metres.

[3]

Examiner Only	
Marks	Remark
Total Question 5	

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6 **(a)** Calculate $3^2 \times 8^3$

Answer _____ [1]

(b) Calculate $3.6^2 + \sqrt{2.89}$

Answer _____ [2]

(c) Write down a cube number between 20 and 40

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 6	

[Turn over

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Examiner Only	
Marks	Remark

7 **Quality of written communication will be assessed in this question. Show your working.**

The times, in minutes, taken by 15 women to complete a crossword are shown in this stem and leaf diagram.

	WOMEN
1	2 3 3 5 7 7 8 9
2	4 6 8 8
3	5 6 8

Key 2 | 4 means 24 minutes

(a) Find the range of the women's times.

Answer _____ [1]

(b) Find the median of the women's times.

Answer _____ [1]

The women's times were then compared with the times of 15 men in this new stem and leaf diagram.

	WOMEN
1	2 3 3 5 7 7 8 9
2	4 6 8 8
3	5 6 8
4	

	MEN
1	2 4 4 6
2	1 3 3 3 9
3	7 8
4	3 4 5 6

Key 2 | 4 means 24 minutes

(c) The men say that they were quicker at completing the crossword. Do you agree? Give a reason for your answer.

_____ because _____

_____ [2]

Total Question 7	

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8 **(a)** Simplify $3x - 2y - x + 6y$

Answer _____ [2]

(b) Expand $4(3t - 1)$

Answer _____ [2]

(c) Solve $\frac{y}{4} = 8$

Answer $y =$ _____ [1]

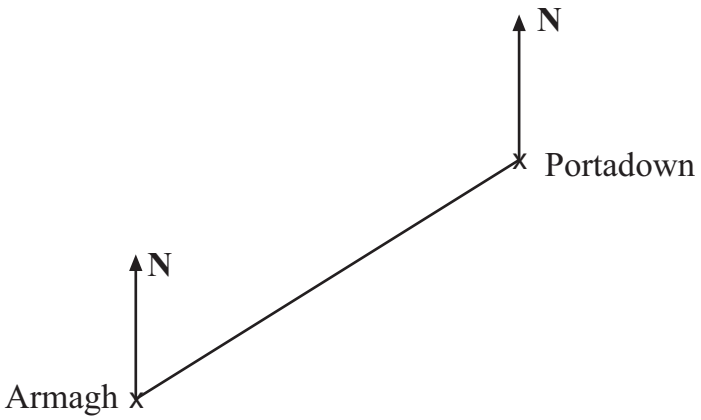
(d) Solve $3p - 2 = 16$

Answer $p =$ _____ [2]

Examiner Only	
Marks	Remark
Total Question 8	

[Turn over

9 The diagram below represents the positions of Armagh and Portadown.



Scale 1 cm to 3 km

(a) What is the bearing of Portadown from Armagh?

Answer _____ ° [1]

(b) Calculate the actual distance from Armagh to Portadown.

Answer _____ km [2]

(c) The city of Newry is 27 km from Armagh on a bearing of 130°.
Mark clearly the position of Newry on the diagram above. [2]

Examiner Only	
Marks	Remark
Total Question 9	

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10 **Quality of written communication will be assessed in this question.**
Show your working.

The signs below showed the price of the same table in two different stores.

Super Price £640 15% off marked price

Right Price £460 plus 20% VAT

Which store had the cheaper price for the table?

Explain your answer.

Answer _____ [6]

Examiner Only	
Marks	Remark
Total Question 10	

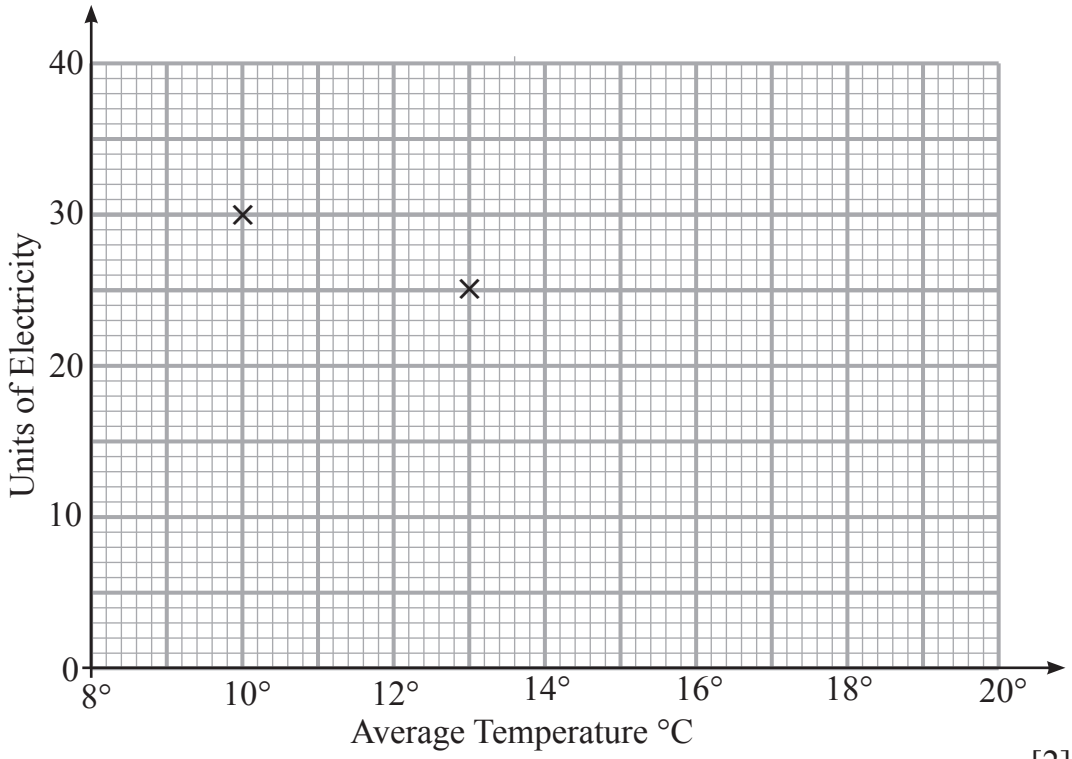
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11 The table shows the number of units of electricity used in heating a greenhouse on eight different days and the average temperature for each day.

Average Temperature (°C)	10	13	15	12	14	20	17	19
Units of Electricity	30	25	22	26	20	14	17	15

(a) Complete the scatter diagram shown (the first two points have been plotted for you).



[2]

(b) Describe the correlation between Average Temperature and Units of Electricity.

Answer _____ [1]

(c) Draw a line of best fit on the scatter diagram.

[1]

(d) Use your line of best fit to estimate how many units of electricity were used when the temperature was 16 °C.

Answer _____ units [1]

Examiner Only	
Marks	Remark
Total Question 11	

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12 **(a)** Write down the next two numbers in the sequence

18, 16, 12, 6, ...

Answer _____, _____ [2]

(b) Write down the *n*th term for the sequence

2, 8, 14, 20, ...

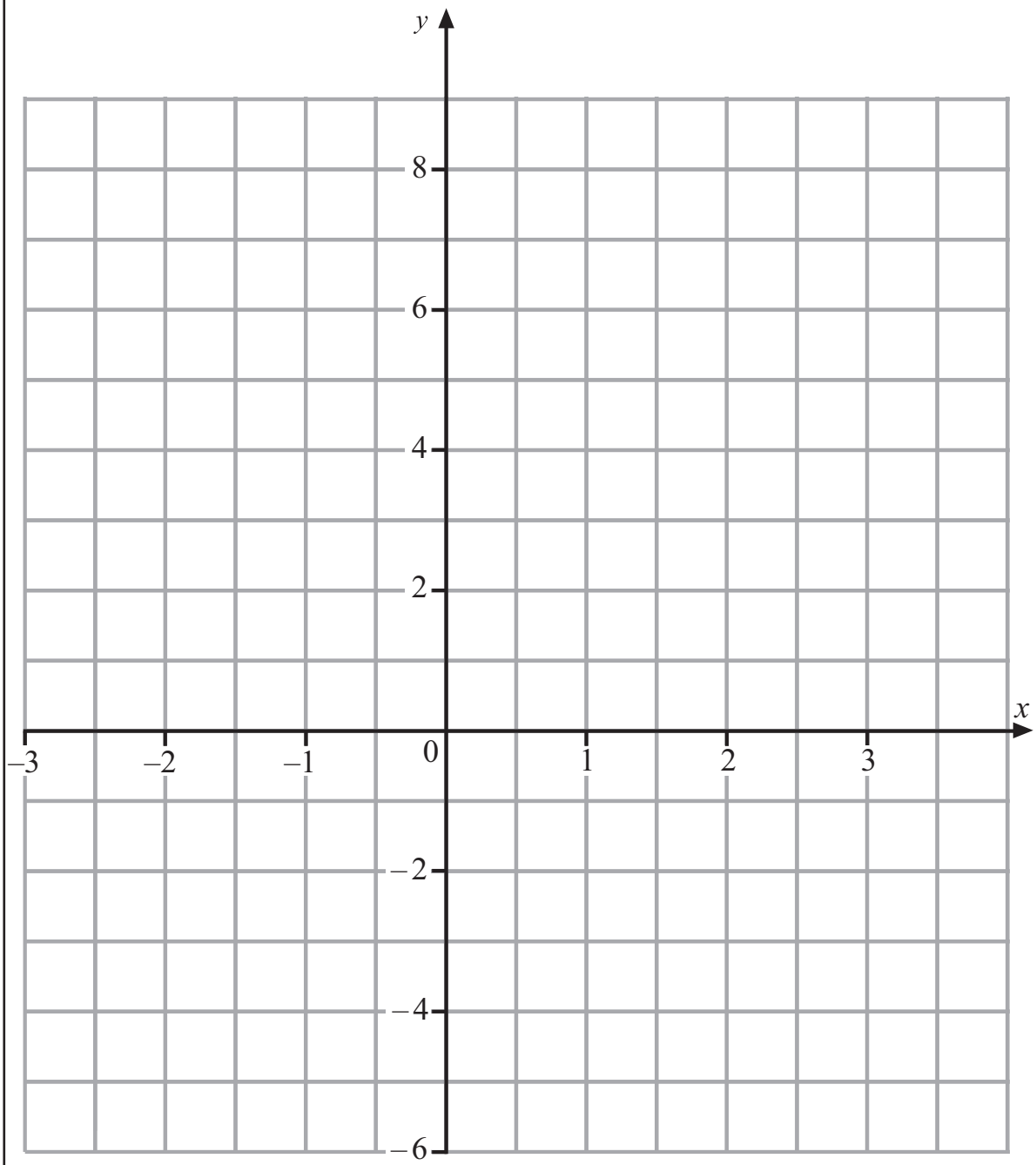
Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 12	

[Turn over

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13 Draw the graph of $y = 3 - 2x$ on the grid below.



[3]

Examiner Only	
Marks	Remark
Total Question 13	

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14 A circle has a radius of 11.7 cm.

Work out the circumference of the circle.

Answer _____ [3]

Examiner Only	
Marks	Remark
Total Question 14	

15 **(a)** Which of the following fractions is nearest in value to $\frac{1}{4}$?

$\frac{3}{10}$ $\frac{7}{20}$ $\frac{4}{15}$ $\frac{17}{60}$

Show your working.

Answer _____ [2]

(b) Write down the meaning of $0.\dot{5}\dot{7}$

Answer _____ [1]

Total Question 15	

[Turn over

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16 AB is a straight line. Three angles are shown.

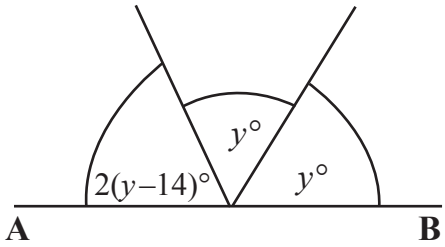


diagram not drawn accurately

(a) Write an **equation** in terms of y.

Answer _____ [1]

(b) Solve your equation to find y.

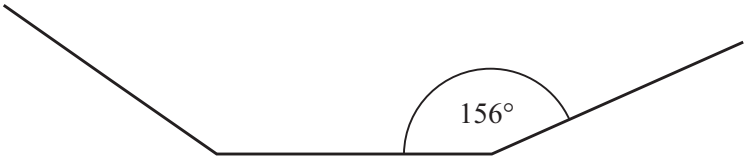
Answer y = _____ [3]

Examiner Only	
Marks	Remark
Total Question 16	

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17 The diagram below shows part of a regular polygon.

Each interior angle is 156°.



(a) Calculate the size of the exterior angle of the polygon.

Answer _____° [2]

(b) Calculate the number of sides of the polygon.

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 17	

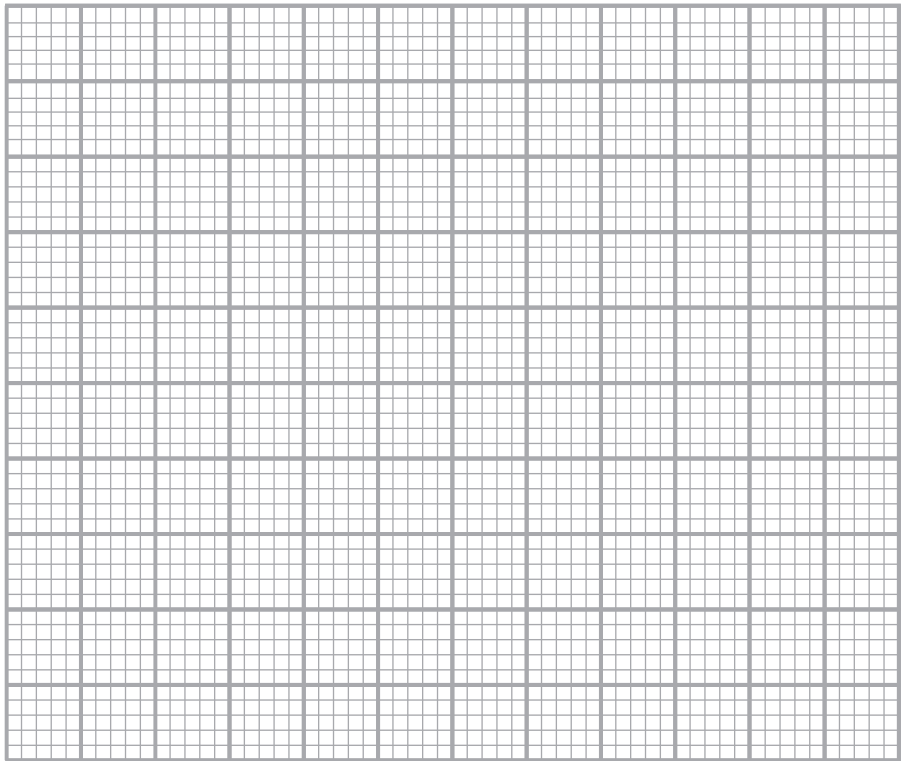
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18 The table shows the marks achieved by a class of girls in a test.

Marks	Number of girls
1–10	3
11–20	8
21–30	7
31–40	7
41–50	4
51–60	2

(a) Draw a grouped frequency diagram.



[3]

(b) Write down the modal class.

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 18	

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19 **(a)** Factorise fully

(i) 12p + 8 Answer _____ [1]

(ii) $x^3 + x$ Answer _____ [1]

(b) Expand and simplify

$6(y + 3) - 2(2y + 3)$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 19	

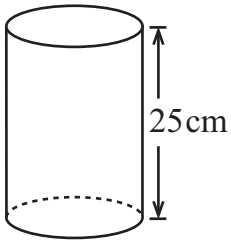
[Turn over

20 Naomi used $3\frac{3}{4}$ cans of paint for the living room and $1\frac{2}{3}$ cans for the kitchen. Show how to work out the total amount of paint used without using a calculator.

Answer _____ cans [3]

Examiner Only	
Marks	Remark
Total Question 20	

21



The cylinder above has a capacity of 3 litres. It is 25 cm high.

Find the radius of the cylinder.

Answer _____ cm [4]

Examiner Only	
Marks	Remark
Total Question 21	

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22 The two points A(6, –1) and B(–4, 6) are joined by a straight line.

Work out the co-ordinates of the midpoint of the line AB.

Answer (_____, _____) [2]

Examiner Only	
Marks	Remark
Total Question 22	

23 In a class there are 16 girls and 14 boys.
Thirteen of the girls are right-handed and eleven of the boys are right-handed.
What percentage of the class are right-handed?

Answer _____ % [3]

Total Question 23	

[Turn over

24 A student is designing a questionnaire for her friends to complete. She wants to find the different activities that her friends attend after school.

Design a suitable question with appropriate response boxes which would allow **every** student to make a response.

[2]

Examiner Only	
Marks	Remark
Total Question 24	

25 Write 90 as a product of prime factors. Express your answer in index notation.

Answer _____ [3]

Total Question 25	

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26 One solution of $x^3 - 2x = 30$ lies between 3 and 4

Use the method of **trial and improvement** to find this solution correct to one decimal place.

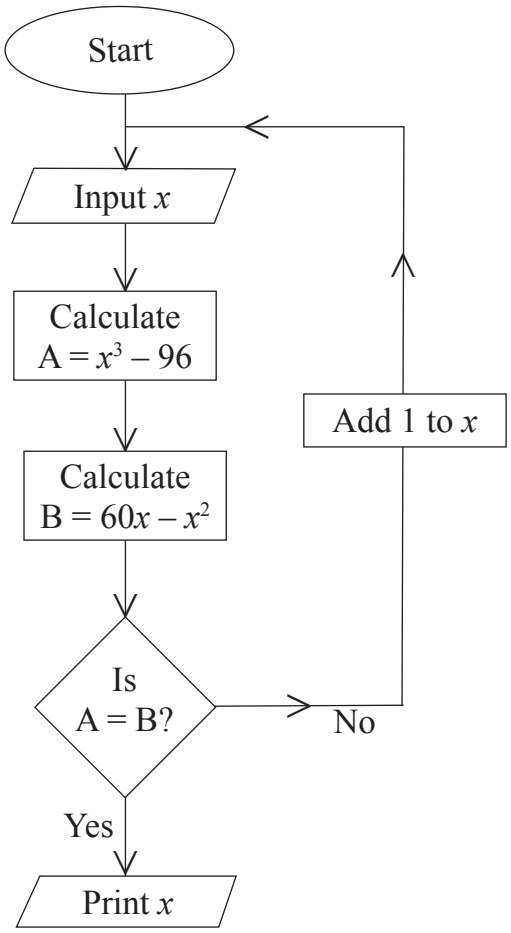
Show all your working.

Answer $x =$ _____ [3]

Examiner Only	
Marks	Remark
Total Question 26	

[Turn over

27



The flow chart above is used to solve an equation.

(a) Starting with $x = 5$ complete the table:

x	A	B
5		

[3]

(b) What is the equation that the flow chart is solving?

Answer _____ [1]

Examiner Only

Marks	Remark
Total Question 27	

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THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
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18	
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21	
22	
23	
24	
25	
26	
27	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
January 2013

Mathematics

Unit T2
Foundation Tier

[GMT21]

FRIDAY 11 JANUARY

9.15 a.m.–10.45 a.m.

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

C indicates marks for quality of written communication.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to regard candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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			AVAILABLE MARKS
1	**(a)** 47, 53	A1, A1	
	(b) 5	A1	3
2	**(a)** 49	A1	
	(b) $180 - 49 \times 2$	MA1	
	82	A1	3
3			

	Terns	Waders	Geese	Ducks	Swans
Angles	150°	60°	90°	30°	30°

		MA2	
	Sectors correct and labelled	MA2	4
4	$265 - 85 = 180$	C1	
	$180 \div 15$	C1	
	12	A1	3
5	Triangle drawn with sides of 7 cm, 9 cm and 13 cm (Allow tolerance of 2 mm) (If no triangle is drawn, evidence of 7, 9 and 13 gets A1)	A3	3
6	**(a)** $(9 \times 512 =) 4608$	MA1	
	(b) 14.66 (allow M1 for either 12.96 or 1.7 seen)	M1, A1	
	(c) 27	A1	4
7	**(a)** $(38 - 12 =) 26$	A1	
	(b) 19	A1	
	(c) No + men's median, 23, is greater than women's median	A1, C1	4
	Quality of Written Communication		
8	**(a)** $2x + 4y$	A1, A1	
	(b) $12t - 4$	A1, A1	
	(c) $y = 32$	MA1	
	(d) $3p = 18$	MA1	
	$p = 6$	A1	7

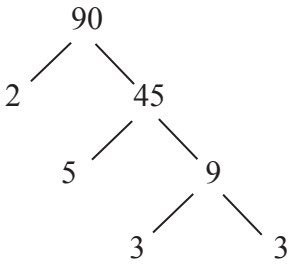
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				AVAILABLE MARKS
9	**(a)**	058° (± 2°)	A1	
	(b)	6 cm (±0.2)	A1	
		18 (±0.6)	A1	
	(c)	See template		
		correct distance of 9 cm (±0.2)	A1	
		correct bearing (±2°)	A1	5
10	$\frac{15}{100} \times 640 = 96$ **or**	$\frac{20}{100} \times 460 = 92$	C2	
	$(640 - 96) = 544$	$(460 + 92) = 552$	C1	
	$0.2 \times 460 = 92$	$0.15 \times 640 = 96$	C1	
	$(460 + 92) = 552$	$(640 - 96) = 544$	C1	
	Super Price		C1	6
11	**(a)**	Points plotted	6 correct A2 (4 correct A1)	
	(b)	Negative	A1	
	(c)	Accurate line drawn	A1	
	(d)	Their reading correct	A1	5
12	**(a)**	–2, –12	A1, A1	
	(b)	$6n - 4$	A1, A1	4
13	1st correct point		A1	
	2nd correct point		A1	
	Straight line		MA1	3
14	$2 \times \pi \times 11.7$		MA1	
	73.5(1326 ...) cm		A1, A1 (units)	3
15	**(a)** $\frac{18}{60}$ $\frac{21}{60}$ $\frac{16}{60}$ **or** 0.3 0.35 0.26(66...) 0.28(33...)		MA1	
	or 30% 35% 26(27)% 28%			
	$\frac{4}{15}$		A1	
	(Work must be shown for any mark)			
	(b)	0.575757...	A1	3

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				AVAILABLE MARKS
16	**(a)**	$2(y - 14) + y + y = 180$ (or equivalent)	MA1	
	(b)	$4y - 28 = 180$	MA1	
		$4y = 208$	MA1	
		$y = 52$	A1	4
17	**(a)**	$180 - 156$	MA1	
		24	A1	
	(b)	$360 \div 24$	MA1	
		15	A1	4
18	**(a)**	Suitable diagram with scales	M1	
		6 bars correct (4 or 5 correct A1)	A2	
	(b)	Modal class = 11–20	A1	4
19	**(a)**	**(i)** $4(3p + 2)$	A1	
		(ii) $x(x^2 + 1)$	A1	
	(b)	$6y + 18 - 4y - 6$	MA1	
		$2y + 12$	A1	4
20	$3\frac{3}{4} + 1\frac{2}{3}$	or $\frac{15}{4} + \frac{5}{3}$		
	$3\frac{9}{12} + 1\frac{8}{12}$	$\frac{45}{12} + \frac{20}{12}$	MA1	
	$4\frac{17}{12}$	$\frac{65}{12}$	MA1	
	$5\frac{5}{12}$	$5\frac{5}{12}$	MA1	3
21	3 litres = 3000 cm^3		A1	
	$\pi \times r^2 \times 25 = 3000$		MA1	
	$r^2 = 38.197$		MA1	
	$r = 6.18$		A1	4
22	(1, 2.5)		A1, A1	2
23	$\frac{24}{30}$		MA1	
	$\frac{24}{30} \times 100 = 80\%$		M1, A1	3

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			AVAILABLE MARKS
24	Must contain question/title/statement relating to activities		
	Must contain OTHER		
	Must contain DON'T HAVE ACTIVITY	A2	2
25	2)90 / 3)45 / 3)15 / 5) 5 / 1 or 2)90 / 5)45 / 3) 9 / 3 or 	M1, A1	
	$2 \times 3^2 \times 5$	MA1	3
26	$x = 3.4$ 32.504		
	$x = 3.3$ 29.337	MA1 for these two values identified	
	$x = 3.35$ tested 30.895375	MA1	
	$x = 3.3$	A1	3
27	**(a)** 5 29 275 6 120 324 7 247 371 8 416 416 (any 2 correct MA1, any 5 correct MA2)	MA3	
	(b) $x^3 - 96 = 60x - x^2$	A1	4
		Total	**100**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T2
(With calculator)
Foundation Tier



[GMT21]

GMT21

WEDNESDAY 6 JUNE 9.15 am–10.45 am

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**
Answer **all twenty-two** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 1, 4 and 10**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is overleaf.

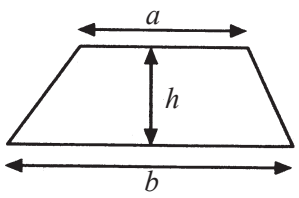
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32GMT2101

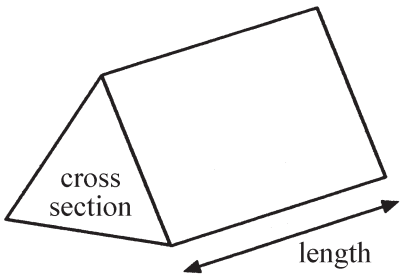
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Formula Sheet

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



Volume of prism = area of cross section × length



7417

Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

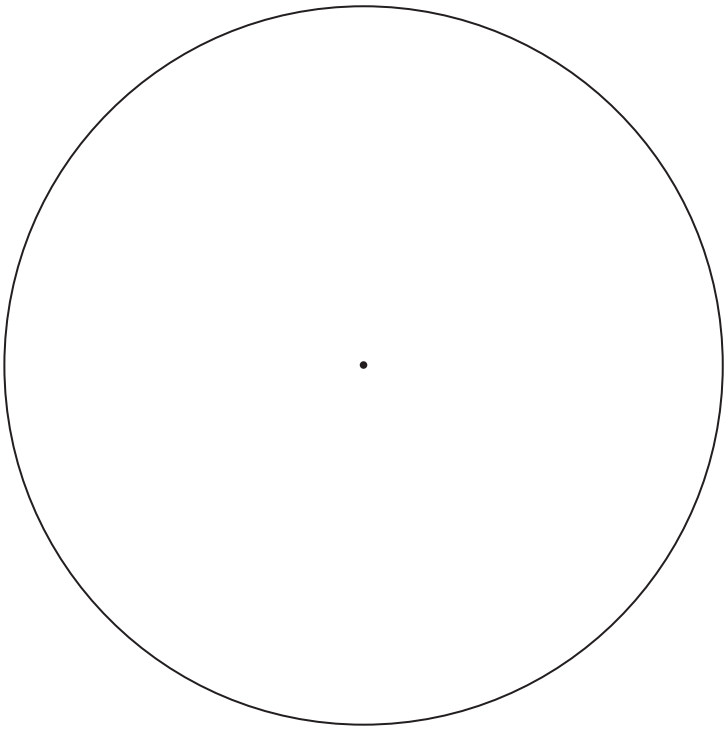
1 **(a)** Show how to work out $\frac{7}{12} - \frac{1}{2}$ if you do not have a calculator.

[2]

(b) The following table gives the numbers of the pets owned by a group of primary school children.

Pet	Dog	Cat	Rabbit	Guinea Pig
Number of children	55	35	20	10
Angle				

Draw a pie chart to illustrate this data.



[4]

Total Question 1

2 **(a)** Draw accurately and label a triangle ABC with AB = 7 cm, angle A = 60° and angle B = 70°. Start with the line AB below.

Examiner Only	
Marks	Remark

A _____ B [2]

(b) Calculate the size of angle x in the kite below.

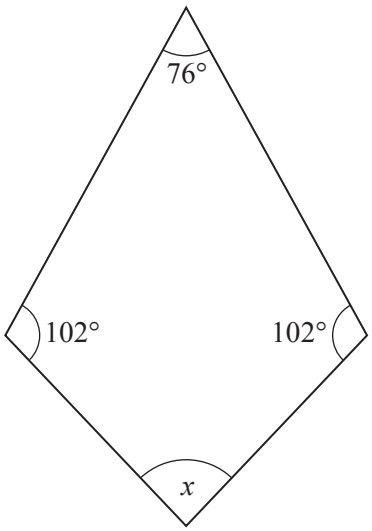


Diagram not drawn accurately

Total Question 2

Answer x = _____ ° [2]

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3 Write in the missing numbers

(a) $\sqrt{2.25}$ + $\square$ = 4 [1]

(b) $\square$ − 3^3 = 11 [1]

(c) $\dfrac{3}{0.5^2}$ = $\square$ [1]

Examiner Only	
Marks	Remark
Total Question 3	

[Turn over

32GMT2105
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Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

4 Bill bought 36 memory sticks at £4.20 each.

He sold 28 of them for £4.50 each and the other 8 for £3 each.

Did he make a profit or loss, and by how much?

Show your working.

Answer _____ by £ _____ [4]

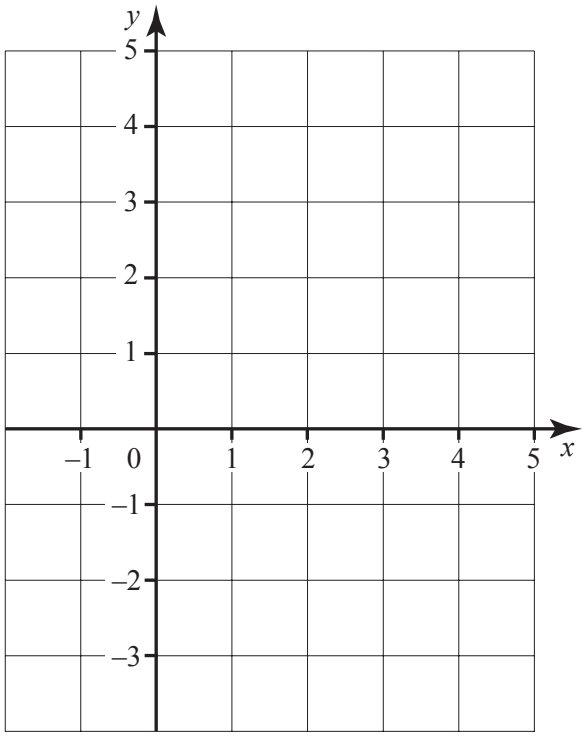
Total Question 4

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5 Complete the table below and hence draw the graph of $y = 2x - 3$

x	0	1	2	3	4
y	-3		1		5

[1]



[2]

Examiner Only	
Marks	Remark
Total Question 5	

32GMT2107
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6 Ages of 24 people taking a car driving test

Examiner Only	
Marks	Remark

1	5 7 7 8 8 8 9
2	0 0 0 0 1 2 3 5 7 7
3	2 2 4 6 6
4	1 2

Key: 3 | 2 = 32 years

(a) One age has been recorded inaccurately. Put an **X** through the inaccurate age and give a reason for your answer.

Reason _____ [1]

(b) The test centre manager says, "The range of ages of those who sat the test was 28". Use this information to make the stem and leaf diagram correct. [1]

(c) The data from the stem and leaf diagram is to be represented on a pie chart. Calculate the angle on the pie chart which would represent the modal age.

Answer _____ ° [2]

Total Question 6

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7 **(a)** Solve the equations:

(i) $3x + 11 = 17$

Answer $x =$ _____ [2]

(ii) $3(2x - 5) = 4$

Answer $x =$ _____ [3]

(b) Write down the next two numbers in the sequence

12, 11, 9, 6, _____ , _____ [2]

(c) Simplify $3b - 2g + 4b + 7g$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 7	

[Turn over

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8 An exchange bureau charges £3.50 for every transaction.

The number of euro you get from changing a certain number of pounds can be calculated using the formula:

number of euro = exchange rate × (number of pounds − 3.5)

(a) Calculate the number of euro you get for £150 when the exchange rate is 1.2

Answer _____ euro [3]

(b) Explain how the formula would change if the bureau increased the charge to £3.80 for every transaction.

[1]

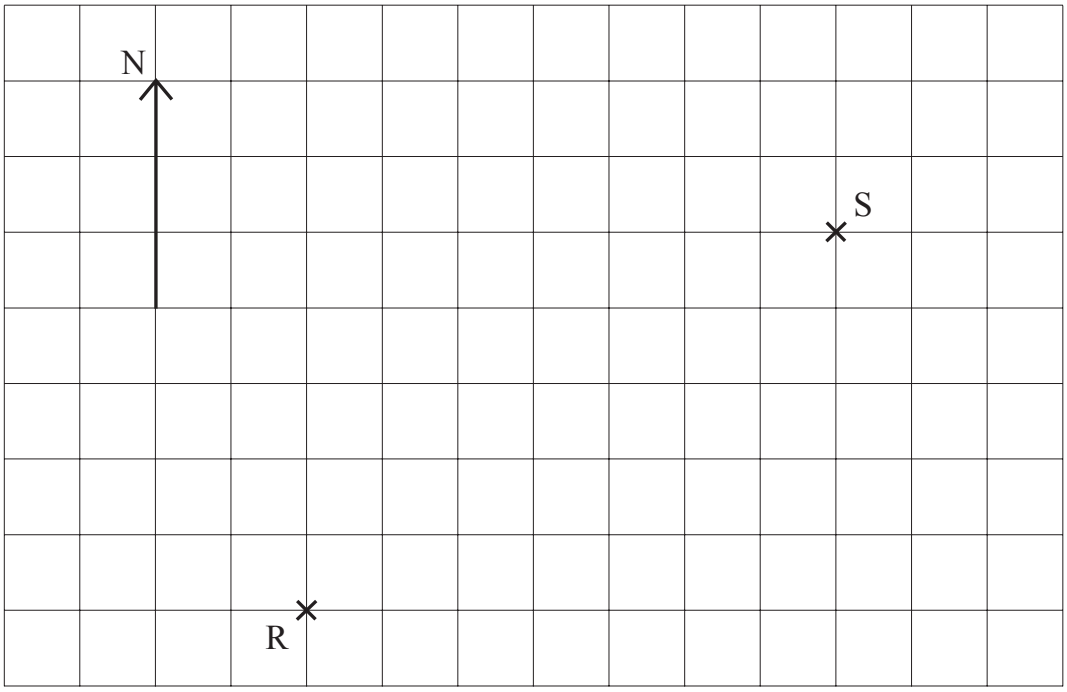
(c) One week the bureau discovered that 15% of the £20 notes they changed were fake. If they changed £5,600 worth of £20 notes, how many of these £20 notes were fake?

Answer _____ [3]

Examiner Only	
Marks	Remark
Total Question 8	

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9 Two lighthouses are at the points R and S on the diagram.



(a) What is the bearing of S from R?

Answer _____° [1]

(b) What is the bearing of R from S?

Answer _____° [1]

(c) The scale of the drawing is 1 cm to 4 km.

What is the actual distance between the two lighthouses?

Answer _____ km [3]

Examiner Only	
Marks	Remark
Total Question 9	

[Turn over

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Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

10 Jacob wants to investigate the hypothesis

"Children watch more television than adults."

He surveys 8 boys in his class and 8 teachers in his school.

Give **two** reasons why his sample is unsuitable.

Reason 1 _____

_____ [1]

Reason 2 _____

_____ [1]

Total Question 10	

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11 Liz buys x markers at 90p each and 3 books at £1.20 each. The total cost is £13.50

Write down an equation and solve it to find x.

Equation _____

Answer x = _____ [4]

Examiner Only	
Marks	Remark
Total Question 11	

[Turn over

12 **(a)** Write the ratio 12 : 27 in its simplest form.

Answer _____ [1]

(b) The heights of three flower pots are 45 cm, 30 cm and 10 cm.

Write the ratio of their heights in simplest form.

Answer _____ [1]

(c) Complete the following:

(i) $0.\dot{6}$ can be written as the fraction _____ [1]

(ii) The recurring decimal 0.280280280… can be written using dot notation as _____ [1]

(d) Fill in the box to make the statement correct.

$$\frac{1}{\square}+\frac{1}{4}=\frac{9}{20}$$ [2]

Examiner Only	
Marks	Remark
Total Question 12	

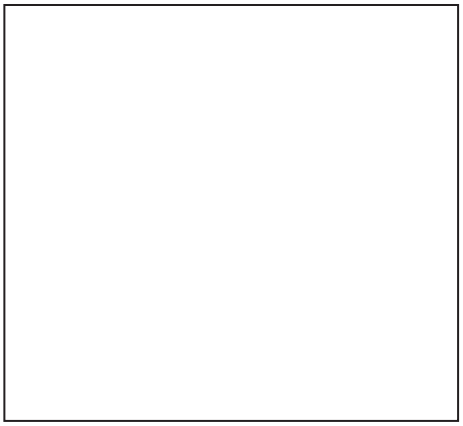
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13 **(a)** Calculate the circumference of a circular garden with radius 5.4 m.

Examiner Only	
Marks	Remark

Answer _____ m [2]

(b) The area of the rectangle below is 33 cm^2.



Change 33 cm^2 into mm^2.

Answer _____ mm^2 [2]

[Turn over

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(c) Find the area of a triangle with base 9 cm and perpendicular height 6 cm.

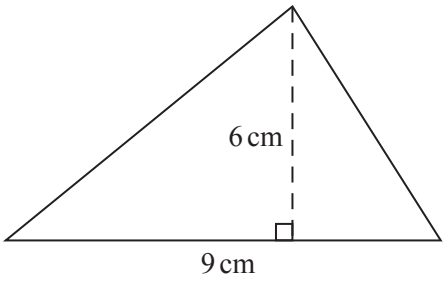


Diagram not drawn accurately

Answer _____ [3]

Examiner Only	
Marks	Remark
Total Question 13	

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14 **(a)** Complete the following to write 252 as a product of prime factors.

$252 = 2 \times 2 \times 3 \times _____ \times _____$ [1]

(b) Write 297 as a product of prime factors.

Answer _____ [1]

(c) A floor measuring 252 cm by 297 cm is to be covered **completely** by identical square tiles.
What is the **length** of side of the largest square tile that can be used?

Answer _____ cm [2]

Examiner Only	
Marks	Remark
Total Question 14	

[Turn over

15 **(a)** Paul's car insurance is due and the company quote him a price of £228. Another company make him an offer which is 35% cheaper and he decides to take up their offer. How much does he pay?

Answer £ _____ [2]

(b) Last year Paul's house insurance cost £250.
This year the cost is £268. What is the percentage increase?

Answer _____ % [3]

Examiner Only	
Marks	Remark
Total Question 15	

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16 Write down the nth term of the following sequences:

(a) 6, 12, 18, 24, ...

Answer _____ [1]

(b) 3, 8, 13, 18, ...

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 16	

[Turn over

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17 Two sides of a triangle are 6 cm and 8 cm.

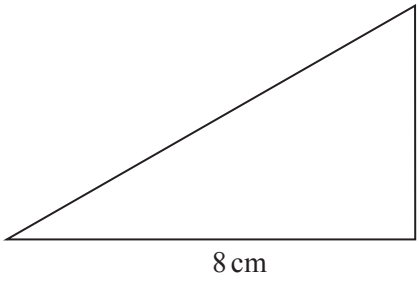


Diagram not drawn accurately

(a) **If** the third side is 10 cm, show why the triangle **must** be right-angled.

[1]

(b) If the triangle is **not** right-angled write down a possible length that the third side could have.

Answer _____ cm [1]

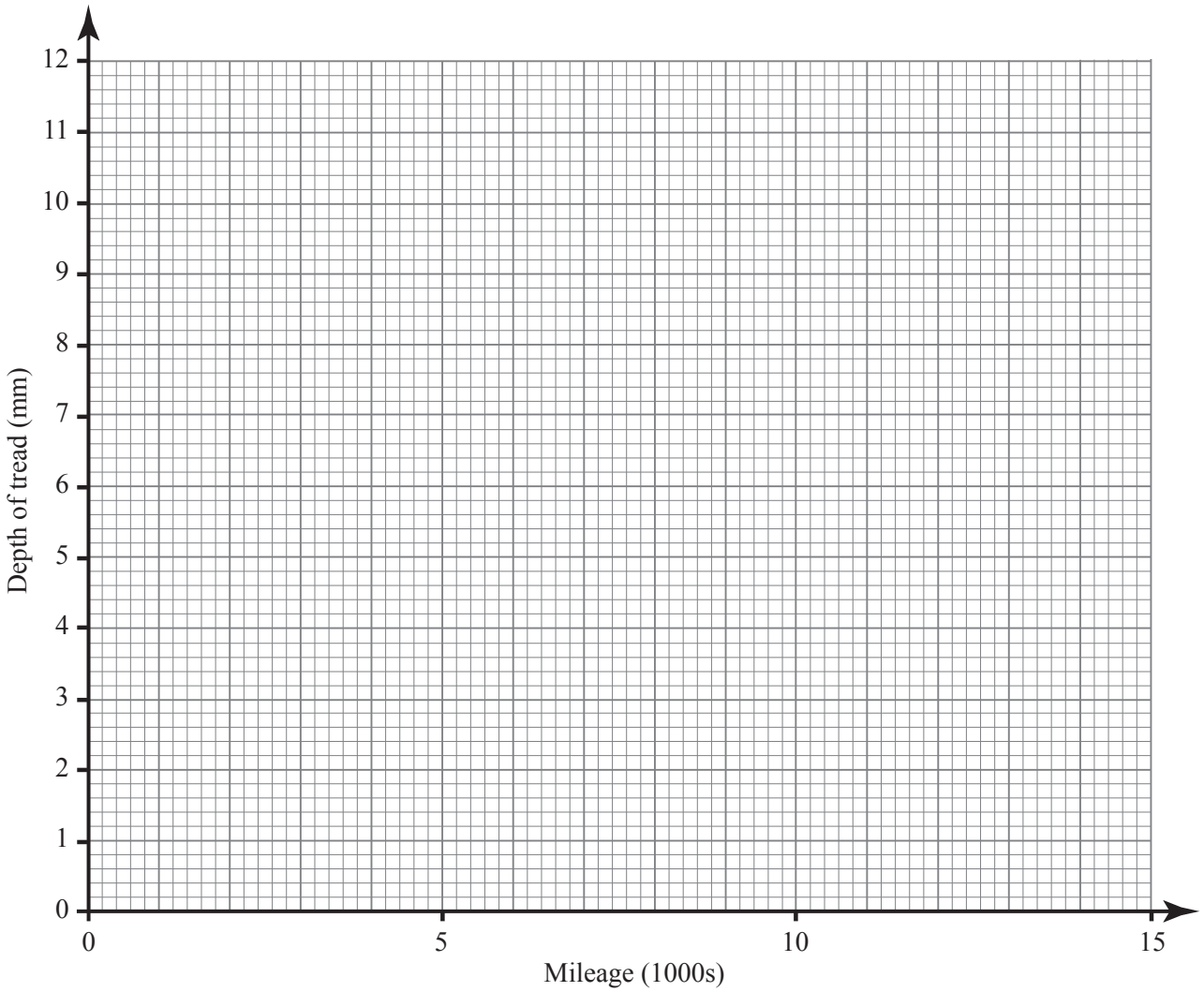
Examiner Only	
Marks	Remark
Total Question 17	

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18 The mileage on seven cars (in 1000s of miles) and the depth of tread on the tyres (in mm) were recorded. The table shows the results.

Mileage (1000s)	3	8	12.5	9	6	15	4.5
Depth of tread (mm)	9.4	7.7	10.6	7.4	8.4	4.9	8.7

(a) Draw a scatter graph for this data.



[2]

Examiner Only	
Marks	Remark

[Turn over

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(b) One of the points seems unusual. Circle this point and suggest a possible reason for it.

Answer _____

_____ [1]

(c) Describe the type of correlation of the other points and explain what this means.

Answer _____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 18	

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19 **(a)** P is the point (1, 4). Q is the point (7, −2). Find the co-ordinates of the midpoint of PQ.

Answer (_____ , _____) [2]

(b) Calculate the size of the interior angle of a regular nonagon (nine-sided polygon).

Answer _____ ° [2]

(c) Calculate the area of a semi-circle with diameter 6 cm.

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark
Total Question 19	

[Turn over

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20 The table shows the ages of people visiting the town library one Saturday morning.

Age	Frequency
$0 < A \leqslant 10$	7
$10 < A \leqslant 20$	4
$20 < A \leqslant 30$	5
$30 < A \leqslant 40$	4
$40 < A \leqslant 50$	18
$50 < A \leqslant 60$	20
$60 < A \leqslant 70$	22

(a) Write down the class interval which contains the median age.

Answer _____ [1]

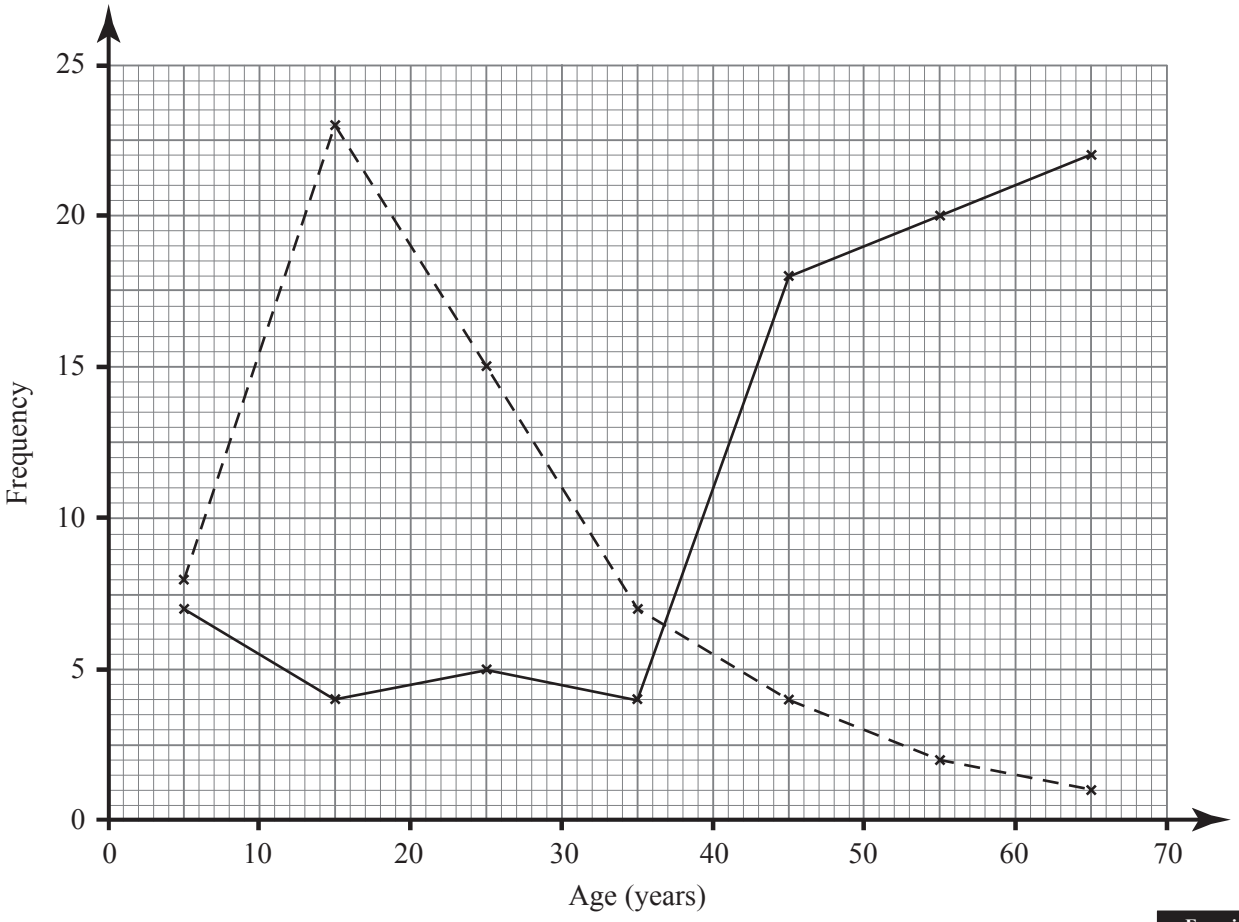
Examiner Only	
Marks	Remark

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(b) The frequency polygon below (solid line) illustrates the data recorded at the library.

A second frequency polygon (broken line) illustrates the ages of people visiting a different place in the same town on the Saturday morning.

By considering the polygons suggest what the second place might be.
Give a reason for your answer.

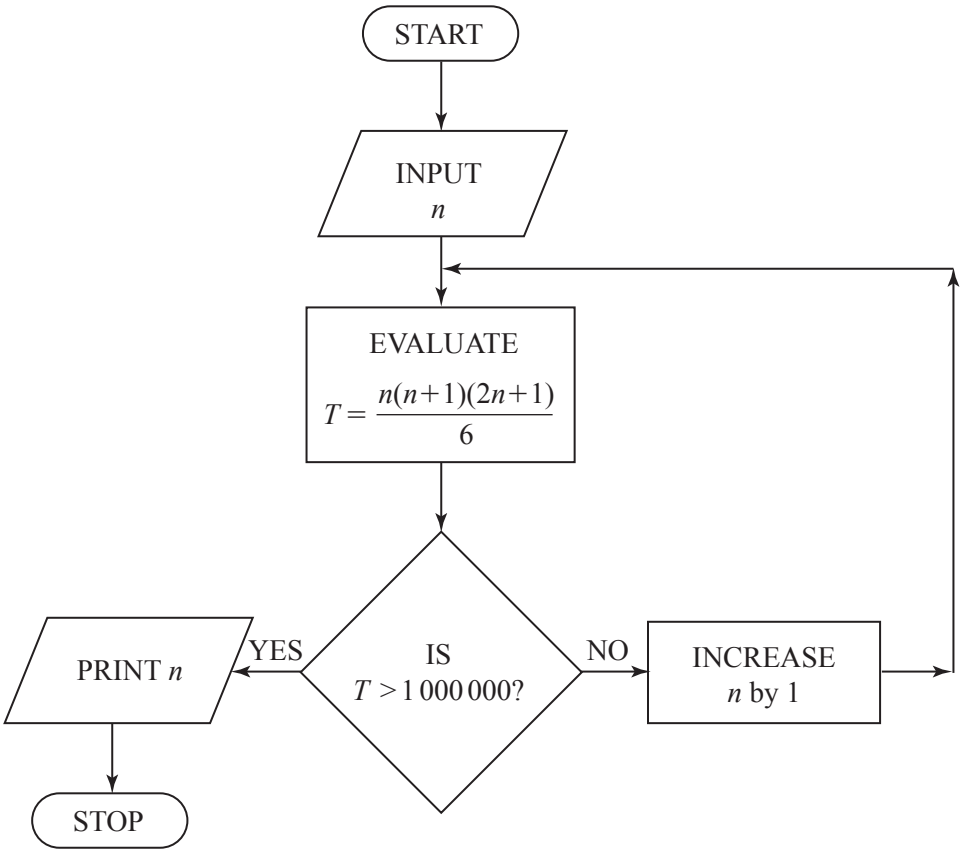


Answer _____ because _____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 20	

21 The sum, T, of the first n squares, i.e. $1^2 + 2^2 + 3^2 + \ldots + n^2$, is known to be $\frac{n(n+1)(2n+1)}{6}$. The flow diagram can be used to find the least value of n for which T is greater than 1 000 000.



Examiner Only	
Marks	Remark

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Listing each successive value of n and each corresponding value of T, use the flow diagram to find this value of n. Start the search with $n = 141$.

n	T
141	

Value printed _____ [4]

Examiner Only	
Marks	Remark
Total Question 21	

[Turn over



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22 Use the method of trial and improvement to solve the equation

$$x^3 + 2x = 60$$

giving the answer correct to one decimal place.

Show all your working.

Answer $x =$ _____ [4]

Examiner Only	
Marks	Remark
Total Question 22	

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
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18	
19	
20	
21	
22	
QWC	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2012

Mathematics

Unit T2
Foundation Tier
[GMT21]

WEDNESDAY 6 JUNE
9.15 am–10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right-hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.
A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.
MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

				AVAILABLE MARKS
1	**(a)**	$\frac{1}{2} = \frac{6}{12}$	MA1	
		$\frac{7}{12} - \frac{6}{12} = \frac{1}{12}$	A1	
		Quality of written communication		
	(b)	Angles 165, 105, 60, 30	MA2	
		Pie chart (sectors and labels)	A2	6
2	**(a)**	Angle A = 60 ± 2°	A1	
		Angle B = 70 ± 2° and triangle completed	A1	
	(b)	360 – (102 + 102 + 76)	M1	
		80	A1	4
3	**(a)**	2.5	A1	
	(b)	38	A1	
	(c)	12	A1	3
4		36 × £4.20 = £151.20	MA1	
		28 × £4.50 = £126		
		8 × £3 = £24	MA1	
		Total = £150	MA1	
		Loss by £1.20	MA1	
		Alternative Method		
		28 × £0.30 = £8.40 profit	MA1	
		8 × £1.20 = £9.60 loss	MA1	
		9.60 – 8.40	MA1	
		Loss by £1.20	MA1	4
5		x 1 3	MA1	
		y –1 3		
		Points plotted correctly	A1	
		Correct line	A1	3
6	**(a)**	15 years old – too young to take a driving test	A1	
	(b)	45 correctly placed in stem and leaf diagram	A1	
	(c)	modal age identified as 20	A1	
		$\frac{4}{24} = \frac{1}{6} \Rightarrow 60$	MA1	4

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				AVAILABLE MARKS
7	**(a)**	**(i)** $3x = 6$	MA1	
		$x = 2$	A1	
		(ii) $6x - 15 = 4$	MA1	
		$6x = 19$	MA1	
		$x = \frac{19}{6}$ **or** $3\frac{1}{6}$ **or** $3.1\dot{6}$	A1	
	(b)	$2, -3$	A1, A1	
	(c)	$7b + 5g$	A1, A1	9
8	**(a)**	$1.2 \times (150 - 3.5)$	M1	
		$1.2 \times 146.5 = 175.8$	MA1	
		$= 175.80$	A1	
	(b)	(Number of pounds – 3.8)	A1	
	(c)	$5600 \div 20 = 280$	MA1	
		$\frac{280}{100} \times 15 = 42$	M1, A1	
		Alternative Method		
		$\frac{15}{100} \times 5600$	M1	
		$= 840$	A1	
		$840 \div 20 = 42$	MA1	7
9	**(a)**	054 ± 2	A1	
	(b)	234 ± 2	A1	
	(c)	8.6 ± 0.2	A1	
		$8.6 \times 4 = 34.4 \pm 0.8$	M1, A1	5
10	Boys are not representative of all children. Teachers are not representative of all adults. Sample too small (Other suitable explanations)		A1, A1	2
	Quality of written communication			
11	$90x + 360 = 1350$	**or** $0.9x + 3 \times 1.20 = 13.50$	M1, A1	
	$90x = 990$	**or** $0.9x = 9.90$	MA1	
	$x = 11$		A1	4

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				AVAILABLE MARKS
12	**(a)**	4 : 9	A1	
	(b)	9 : 6 : 2 (accept any order)	A1	
	(c)	**(i)** $\frac{2}{3}$ or equivalent	A1	
		(ii) $0.\dot{2}8\dot{0}$	A1	
	(d)	5	M1, A1	6
13	**(a)**	$2\pi \times 5.4$	MA1	
		33.92920066	A1	
	(b)	33×100	MA1	
		3300	A1	
	(c)	$\frac{9 \times 6}{2}$	MA1	
		$27\,\text{cm}^2$	A1, A1 (units)	7
14	**(a)**	3×7	A1	
	(b)	$3 \times 3 \times 3 \times 11$	A1	
	(c)	9	M1, A1	4
15	**(a)**	$\frac{228}{100} \times 35 = 79.8$ **or** 228×0.65	MA1	
		$228 - 79.8 = 148.20$	MA1	
	(b)	$\frac{18}{250}$	M1, A1	
		7.2%	A1	5
16	**(a)**	$6n$	A1	
	(b)	$5n - 2$	A1, A1	3
17	**(a)**	$6^2 + 8^2 = 10^2$	MA1	
	(b)	2 < any length < 14 (length $\neq$ 10)	A1	2

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				AVAILABLE MARKS
18	**(a)**	7 points correct (4 correct – A1)	A2	
	(b)	(12.5, 10.6) circled – (perhaps the car has been recently fitted with new tyres – accept **any** reasonable suggestion)	A1	
	(c)	negative correlation	A1	
		meaning that as the number of miles travelled increases the depth of tread decreases.	A1	5
19	**(a)**	(4, 1)	A1, A1	
	(b)	Exterior = 40 **or** total interior = 1260	MA1	
		140	MA1	
	(c)	$\pi \times 3^2$ **or** 28.274	MA1	
		14.137....	MA1	6
20	**(a)**	$50 < A \leqslant 60$	A1	
	(b)	Cinema/leisure centre/bowling alley because there are many more younger people and fewer older people attending. Or similar.	A2	3
21		944371	MA1	
	142	964535	MA1	
	143	984984	MA1	
	144	1005720		
		144	MA1	4
22	$x = 3$	$27 + 6 = 33$	MA1	
	$x = 4$	$64 + 8 = 72$		
	$x = 3.7$	58.053	MA1	
	$x = 3.8$	62.472		
	$x = 3.75$	60.234 375	MA1	
	$x = 3.7$		A1	4
			Total	**100**

New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics

Unit T2
(With calculator)
Foundation Tier

[GMT21]

WEDNESDAY 11 JANUARY

9.15 am–10.45 am

GMT21

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
Total Marks	

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twenty-two** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

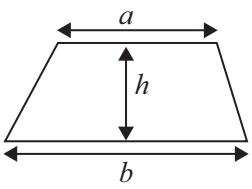
INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **question 10**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is overleaf.

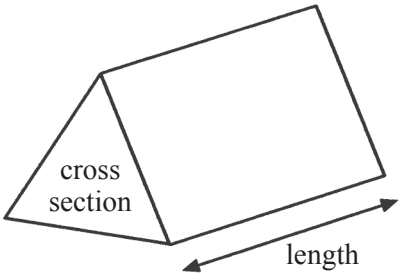
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Formula Sheet

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



Volume of prism = area of cross section × length

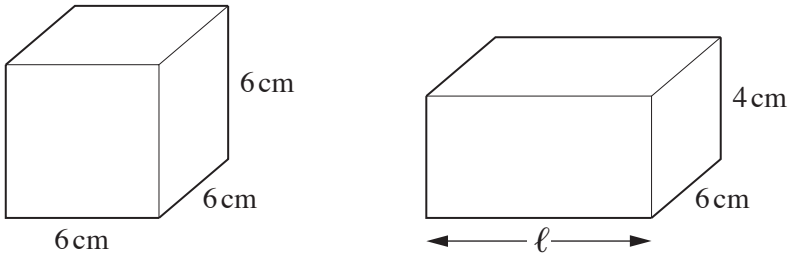


Answer **all** questions.

Examiner Only	
Marks	Remark

1 The volumes of this cube and this cuboid are the same.

What is the missing length marked ℓ on the cuboid?



Answer _____ [3]

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Examiner Only	
Marks	Remark

2 **(a)** Each student in Year 10 studies one language (French, Spanish or German).

There are 135 students in Year 10.

Two-fifths study French, one-third study Spanish and the rest study German.

How many students study German?

Answer _____ [4]

(b) Below is a portion of Miss Johnston's bank statement for September.

Account Summary
Opening Balance £1224.08
Monthly Overdraft Limit £500.00

Miss Johnston
1st September–30th September

Account details

DATE	PAYMENT DETAILS	OUT	IN	BALANCE
02 Sept	Balance forward			1224.08
04 Sept	Southford BS	1013.27		_____
11 Sept	Travelwide Ins.	134.28		76.53
23 Sept	Carcomp. Finance	253.68		_____
27 Sept	Cheque Lodge.		52.00	_____

(i) Complete **all** the blank spaces on the statement. [3]

(ii) How much more could Miss Johnston have spent in September, without exceeding her overdraft limit?

Answer £ _____ [1]

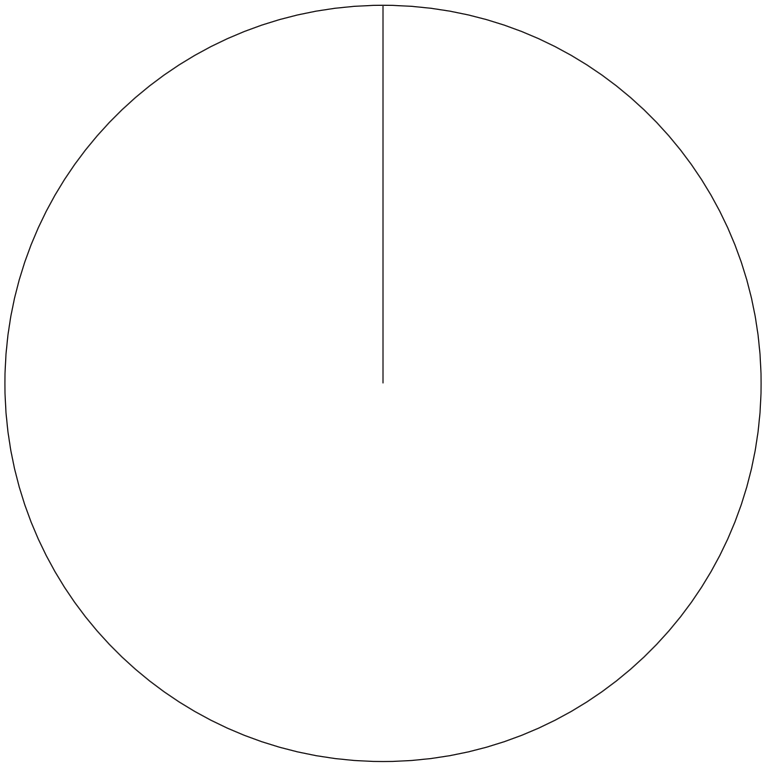
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3 A travel agency recorded the types of holiday which were booked on a particular week.

The table below shows the results.

Type of Holiday	Frequency	Degrees
Bed & Breakfast	20	
Hotel half-board	22	
Self-catering	6	
Camping	12	

Complete an accurate pie chart below to show this information.



[4]

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Marks	Remark

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Examiner Only	
Marks	Remark

4 120 Year 13 students each study one science.

The table below shows some information about these students.

	Biology	**Chemistry**	**Physics**	**Total**
Female	27			68
Male			29	
Total		31	48	120

Complete the table. [2]

5 **(a)** Solve the equations

(i) $9x - 5 = 58$

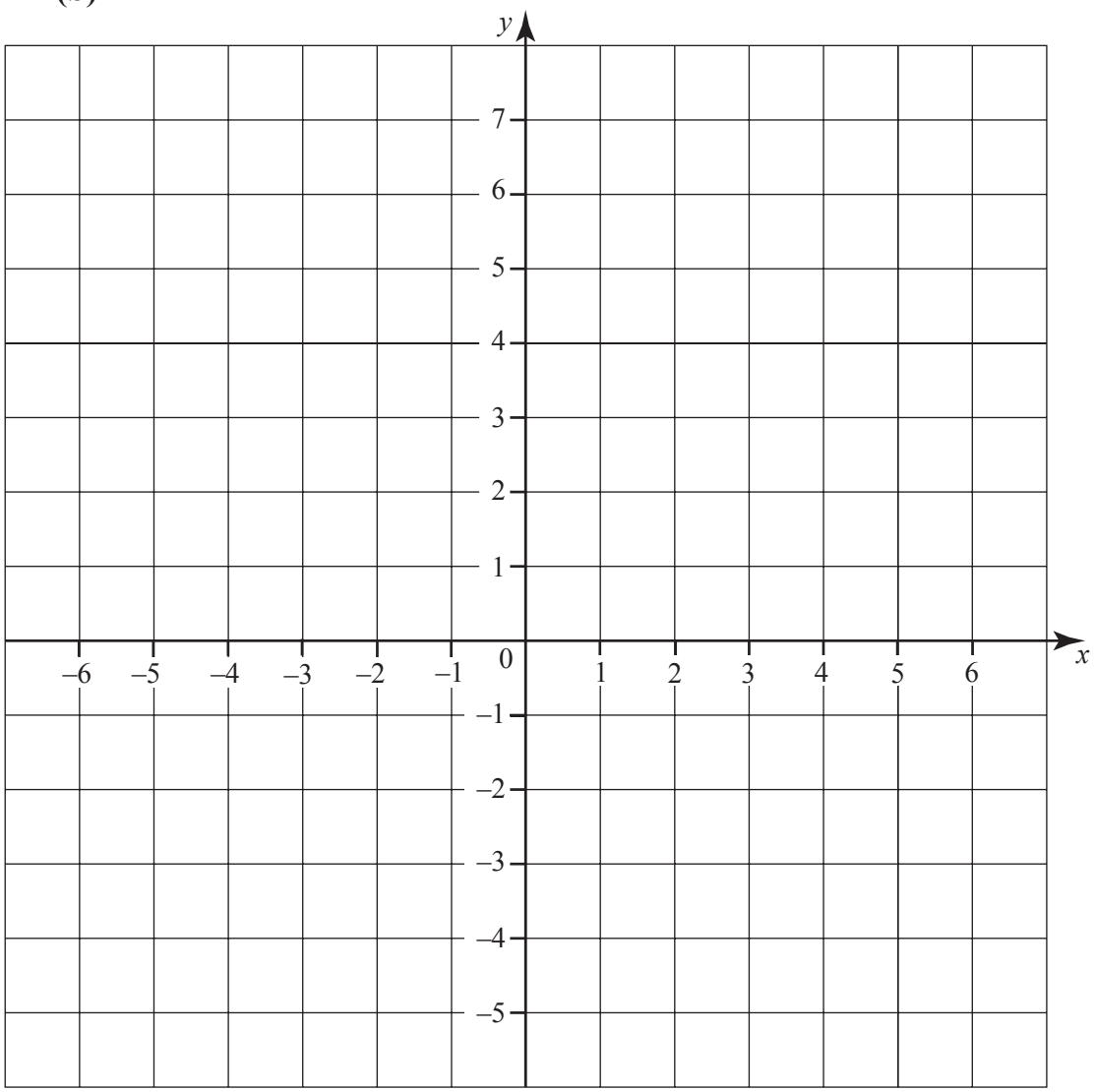
Answer $x =$ _____ [2]

(ii) $\frac{x}{8} = 3$

Answer $x =$ _____ [1]

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(b)



Draw the line $x = 5$ on the grid above. [1]

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Marks	Remark

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Examiner Only	
Marks	Remark

6 A group of students take class tests in both English and Mathematics.

Each test is marked out of 50.

The stem and leaf diagrams below show the distribution of marks for both tests.

	English
0	
1	2 5 6 9
2	3 6 7 7 8
3	0 2 4 5 5
4	1 2 2 3 6
5	0

	Mathematics
0	9
1	0 1 2 6 7
2	1 3 4 5 7 8 8
3	2 5 7 9
4	1 4 8
5	

Key: 2 | 5 means 25

(a) Which subject has the bigger range of marks and by how much?

Answer _____ has the bigger range by _____ [2]

(b) Which subject has the bigger median mark and by how much?

Answer _____ has the bigger median mark by_____ [2]

---

7 **(a)** In the spaces provided, write down the next two numbers in the sequence

18, 17, 14, 9, _____, _____ [2]

(b) Simplify $6x + 3y - 2x + 2y$

Answer _____ [2]

(c) Factorise $20d + 35$

Answer _____ [1]

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Examiner Only	
Marks	Remark

8 **(a)** Which of the following fractions is nearest in size to $\frac{3}{5}$?

Show your working.

$\frac{7}{10}$ $\frac{11}{20}$ $\frac{17}{30}$ $\frac{1}{2}$

Answer _____ [2]

(b) Calculate

(i) $\frac{1}{2.5^2}$

Give your answer as a **decimal**.

Answer _____ [2]

(ii) $\frac{6.5 \times 5.8}{5.3 + 2.1}$

Give your answer correct to 2 decimal places.

Answer _____ [2]

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Examiner Only	
Marks	Remark

9 **(a)** Calculate the size of angle a.

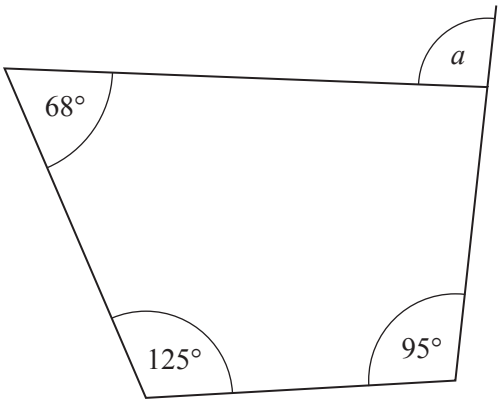


Diagram not drawn accurately

Answer $a =$ _____ ° [3]

(b) A square just touches an equilateral triangle as shown.

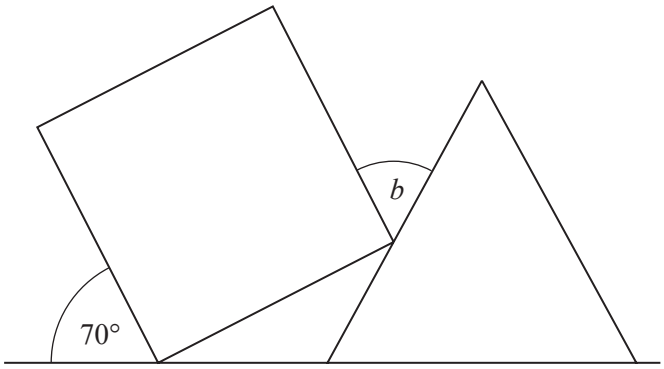


Diagram not drawn accurately

Calculate the size of angle b.

Answer $b =$ _____ ° [3]

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(c) AB is parallel to CD. EF is a straight line. BC = BD. Angle ABC = 42°

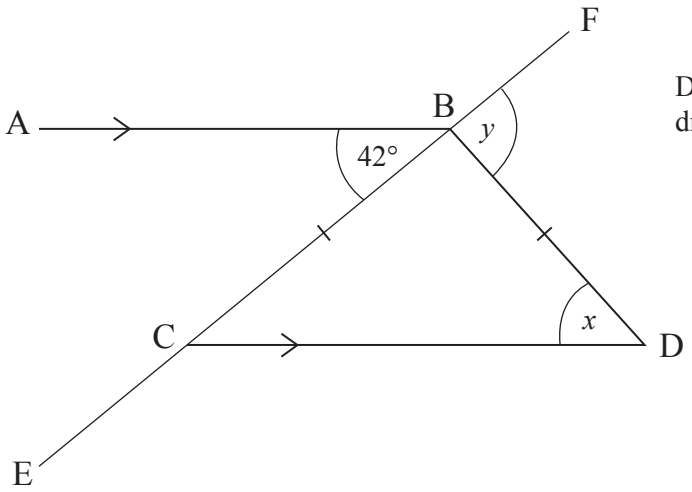


Diagram not drawn accurately

(i) Calculate the size of angle x.

Answer x = _____ ° [1]

(ii) Calculate the size of angle y.

Answer y = _____ ° [2]

Examiner Only

Marks	Remark

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Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

10 Aaron wants to find out how often people go to the cinema.
He designs the following questionnaire to use to gather data for his survey.

> How often do you go to the cinema?
>
> Tick one box below.
>
> Not very often ☐ Sometimes ☐ A lot ☐

(a) Write down two things that are wrong with this questionnaire.

1. _____

_____

2. _____

_____ [2]

(b) Design a better questionnaire for him to use to find out how often people go to the cinema.
You should include some response boxes.

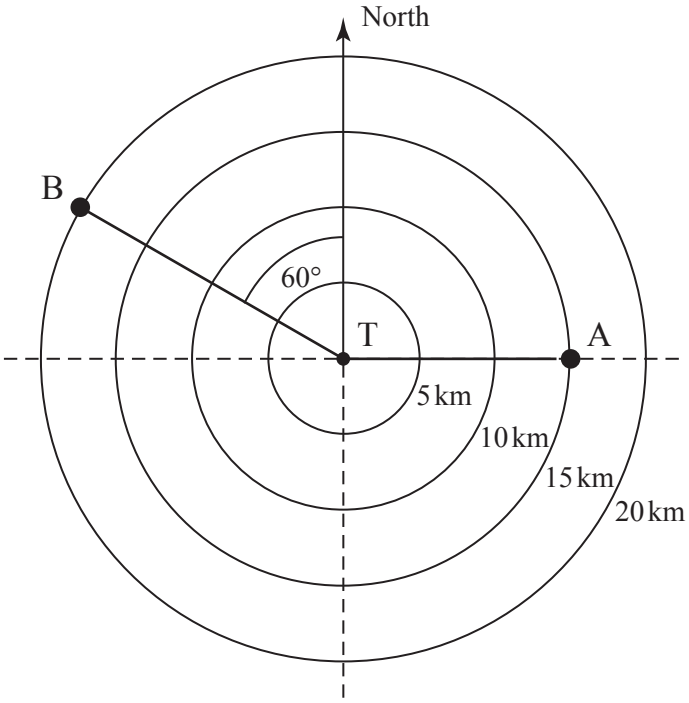
[2]

(c) Aaron intends to give out his questionnaire to all the men leaving the cinema.
Give two reasons why the data he will collect from his survey will be biased.

1. _____

2. _____ [2]

11 A radar screen shows the position of mountain rescue teams at the centre T and two climbers who need help at positions A and B.



Complete the following sentences:

(a) To help climber A a rescue team must travel

_____ km on a bearing of _____°. [1]

(b) To help climber B a second rescue team must travel

_____ km on a bearing of _____°. [1]

(c) Another climber C needs help at a distance of 12.5 km from T on a bearing of 210°. Mark the position of climber C on the diagram. [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

12 **(a)** In April last year, it rained on 24 days.

What percentage of days in April were dry?

Answer _____% [2]

(b) A wealthy American has $300 000 to spend on a holiday villa in Spain.

The exchange rates are shown below:

£1 = 1.1752 euro	£1 = $1.5669

She sees a villa priced at 240 000 euro.

Has she enough money to buy the villa?

Show working to explain your answer.

Answer _____

_____ [3]

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13 (a) Work out the value of x in the quadrilateral below.

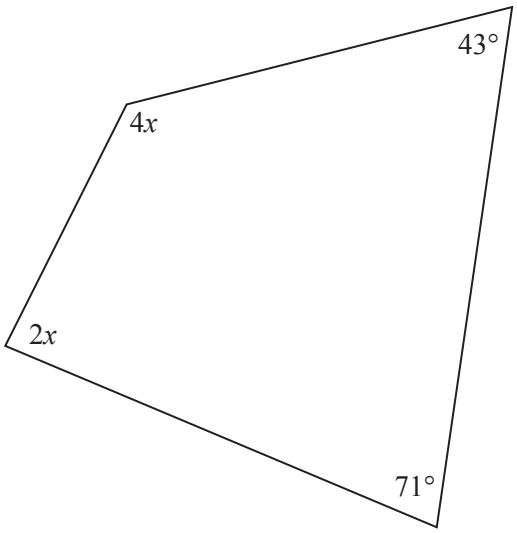


Diagram not drawn accurately

Answer $x =$ _____° [4]

(b) A minibus can carry 10 passengers and a car can carry 4 passengers.

Write down an expression for the **total** number of passengers that can be carried in x minibuses and y cars.

Answer _____ [2]

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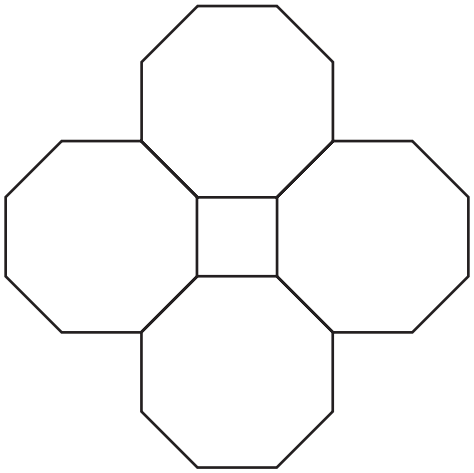
Marks	Remark

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14 **(a)** Calculate the size of the interior angle of a regular octagon.

Answer _____° [2]

(b) Four floor tiles, each in the shape of a regular octagon are placed together as shown. Explain why the shape between them must be a square.



Answer _____

_____ [2]

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Marks	Remark

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BLANK PAGE

(Questions continue overleaf)

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15 The table shows information about the number of pages (P) that 100 children printed from a computer last week.

Number of pages	Frequency
$0 < P \leq 3$	10
$3 < P \leq 6$	19
$6 < P \leq 9$	23
$9 < P \leq 12$	32
$12 < P \leq 15$	10
$15 < P \leq 18$	6

(a) What is the modal class?

Answer _____ [1]

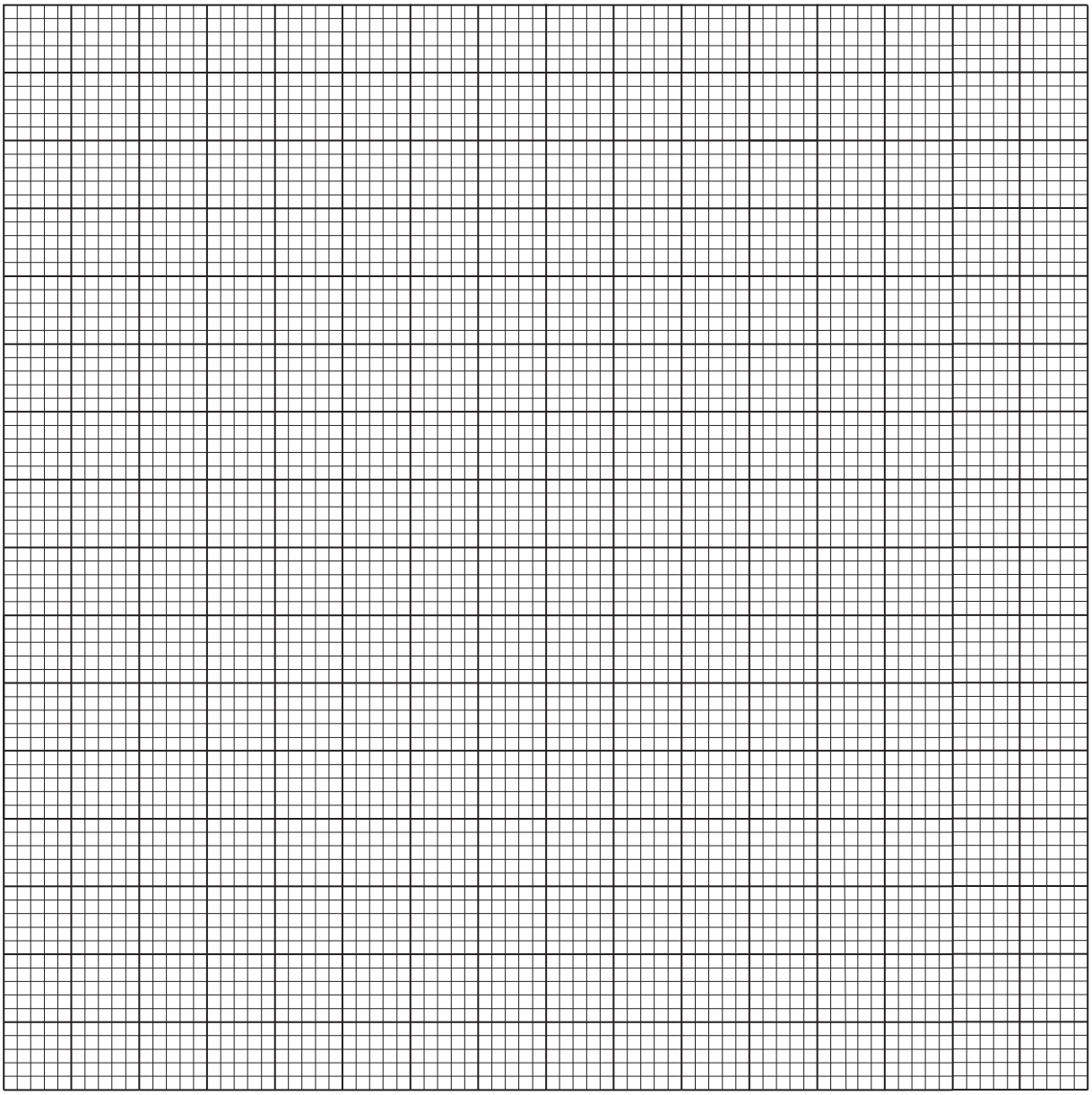
(b) What class interval contains the median?

Answer _____ [1]

Examiner Only	
Marks	Remark

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(c) On the grid below draw a frequency polygon to illustrate the data opposite.



[2]

Examiner Only	
Marks	Remark

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16 **(a)** Write 24 as a product of prime factors.

Answer _____ [2]

(b) Hence or otherwise find the lowest common multiple (LCM) of 24 and 30.

Answer _____ [2]

(c) What is the smallest whole number 24 could be multiplied by to make a square number?

Answer _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

17 **(a)** Find the midpoint of the line joining the points $(-5, 1)$ and $(3, -5)$

Answer _____ [2]

(b) Calculate the length of the line joining the points $(-2, -2)$ and $(3, 10)$

Answer _____ [3]

18 Expand and simplify $7(2a + 3) + 3(4a - 2)$.

Answer _____ [2]

19 Kyle bought 6 pears at x pence each and 3 tins of meat at $4x$ pence each.
He got £4.24 change from £10

Write down an equation in terms of x and solve it to find the value of x.

Answer $x =$ _____ [4]

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Examiner Only	
Marks	Remark

20 From a large bottle containing $2\frac{1}{2}$ litres of lemonade, a girl pours four full glasses each holding $\frac{2}{5}$ litre.

How many **more** full glasses can she pour before running short of lemonade?

Answer _____ [3]

---

21 A solution to the equation $x^3 - 5x = 27$ lies between 3 and 4.

Use trial and improvement to find this solution.

Give your answer correct to 1 decimal place.

Show each stage of your working.

Answer $x =$ _____ [3]

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22 The mean test score for a class of 20 pupils was 15.

Some scores are shown below.

Score	Frequency	
18	4	
16	11	
12	3	
	2	

Calculate the missing score.

Answer _____ [3]

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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112506

New Specification

Rewarding Learning

General Certificate of Secondary Education
January 2012

Mathematics

Unit T2
Foundation Tier

[GMT21]

WEDNESDAY 11 JANUARY

9.15 am – 10.45 am

MARK SCHEME

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Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of following through their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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			AVAILABLE MARKS
1	$6 \times 6 \times 6 = 216$	MA1	
	$4 \times 6 \times \ell = 24\ell$		
	$24\ell = 216$ $\quad \ell = 9$ cm	MA1, A1 units	3
2	**(a)** 2/5 of 135 = 54	MA1	
	1/3 of 135 = 45	MA1	
	54 + 45 = 99	MA1	
	135 – 99 = 36	MA1	
	(b) **(i)** 210.81; –177.15; –125.15	A3	
	(ii) £374.85	A1	8
3	Angles are 120°, 132°, 36° and 72°	M1, A1	
	Each sector correctly drawn and labelled (4 × A1) (±2°)	MA2	4
	(for no work shown, A1 each correct, labelled sector)		
4	22 19		
	14 9 52		
	41	A2	2
5	**(a)** **(i)** $9x = 63$	MA1	
	$x = 7$	A1	
	(ii) 24	MA1	
	(b) Correct line	A1	4
6	**(a)** Mathematics; (39 – 38) = 1	A2	
	(b) English; (31 – 26) = 5	A2	4
7	**(a)** 2, –7	A1, A1	
	(b) $4x + 5y$	A1, A1	
	(c) $5(4d + 7)$	A1	5

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				AVAILABLE MARKS
8	**(a)**	$\frac{42}{60}, \frac{33}{60}, \frac{34}{60}, \frac{30}{60}$ **or** 0.7, 0.55, 0.566 . . ., 0.5	M1	
		$\frac{17}{30}$	A1	
	(b)	**(i)** $\frac{1}{6.25}$ **or** $\frac{4}{25}$	A1	
		0.16	A1	
		(ii) 5.09459 ...	MA1	
		= 5.09	A1	6
9	**(a)**	360 – (68 + 125 + 95)	M1	
		= 72	A1	
		a = 180 – 72 = 108	MA1	
	(b)	180 – (70 + 90) = 20	MA1	
		180 – (20 + 120) = 40	MA1	
		b = 180 – (40 + 90) = 50	MA1	
	(c)	**(i)** x = 42	A1	
		(ii) 180 – (42 + 42) = 96	MA1	
		y = 180 – 96		
		= 84	MA1	9
10	**(a)**	1. No time period 2. Labels on boxes too vague 3. No box for "never" — any two of these	A2	
	(b)	Use of time period	A1	
		Good response boxes (at least three which are exhaustive and non-overlapping)	A1	
	(c)	1. Only males questioned	A1	
		2. Questionnaire to cinema-goers only	A1	6
11	**(a)**	15 km on 090	A1	
	(b)	20 km on 300	A1	
	(c)	C at correct distance on correct bearing	A1, A1	4

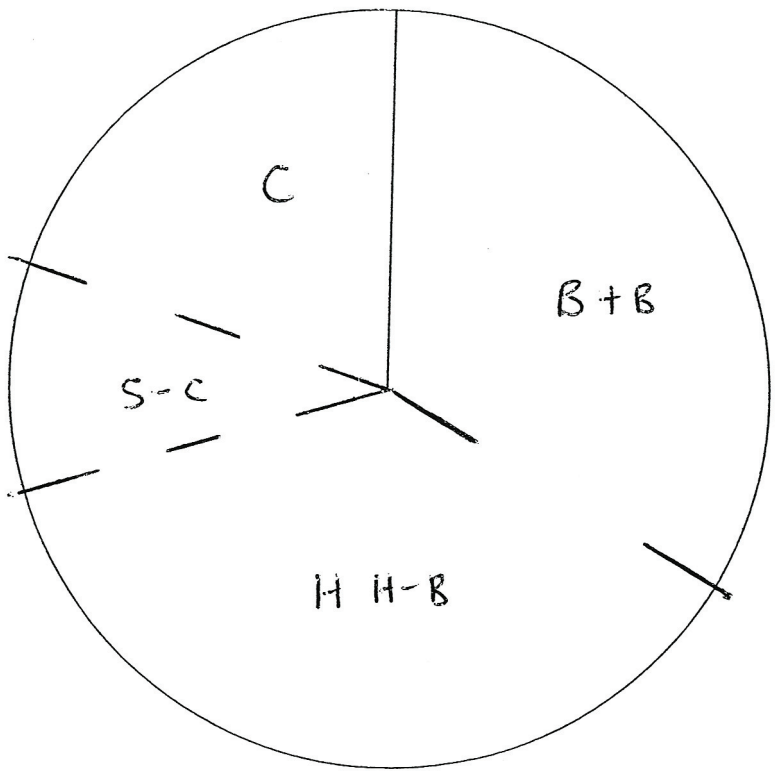
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				AVAILABLE MARKS
12	**(a)**	$\frac{6}{30}$ or 80%	MA1	
		20%	A1	
	(b)	\$300 000 = £191 460.85	MA1	
		= 225 005 euro	MA1	
		No; she has not enough to cover 240 000 euro	A1	
		Alternatively		
		240 000 euro = £204 220	MA1	
		240 000 euro = \$319 993	MA1	
		No; she has not enough to cover 240 000 euro	A1	5
13	**(a)**	$4x + 2x + 71 + 43 = 360$ or equivalent	MA1	
		$6x + 114 = 360$	MA1	
		$6x = 246$	MA1	
		$x = 41$	A1	
	(b)	$10x + 4y$	A1, A1	6
14	**(a)**	360/8 = 45 **or** $6 \times 180 = 1080$	MA1	
		$180 - 45 = 135$ **or** $1080 \div 8 = 135$	MA1	
	(b)	Angles are $360 - 270 = 90$	MA1	
		Sides are all equal sides because of regular octagon (explanation needed)	MA1	4
15	**(a)**	$9 < P \leqslant 12$	A1	
	(b)	$6 < P \leqslant 9$	A1	
	(c)	Accurate frequency polygon drawn	MA2	4
16	**(a)**	$2 \times 2 \times 2 \times 3$ **or** $2^3 \times 3$	M1, A1	
	(b)	$30 = 2 \times 3 \times 5$	MA1	
		LCM = 120	A1	
	(c)	$2 \times 3 = 6$	M1, A1	6
17	**(a)**	(–1, –2)	A1, A1	
	(b)	$\sqrt{(5^2 + 12^2)} = 13$	M1, A1, A1	5

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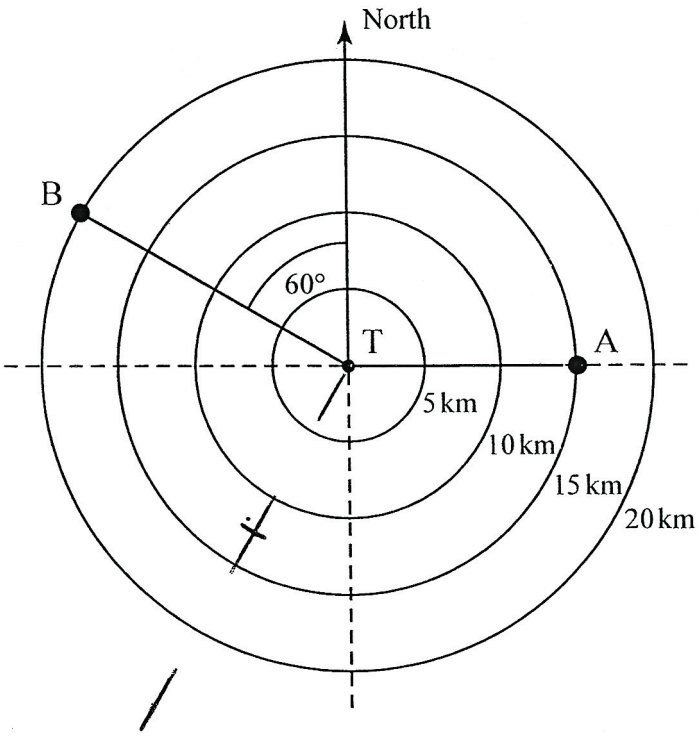
			AVAILABLE MARKS
18	$14a + 21 + 12a - 6$	MA1	
	$26a + 15$	MA1	2
19	$6x + 12x + 424 = 1000$ (or equivalent)	M1, A1	
	$18x = 576$	MA1	
	$x = 32$	A1	4
20	$2.5 - 4 \times 0.4 = (0.9)$	M1	
	$0.9 \div 0.4 = 2.25$	MA1	
	2	MA1	3
21	$x = 3.5 \rightarrow 25.375$ and $x = 3.6 \rightarrow 28.656$	MA1	
	$x = 3.55 \rightarrow 26.988875$	MA1	
	$x = 3.6$	MA1	3
22	72, 176, 36 **or** 284	MA1	
	$300 - 284 = 16$	MA1	
	$16 \div 2 = 8$	MA1	3
		Total	**100**

GCSE NEW SPEC MATHEMATICS JANUARY 2012
UNIT T2
OVERLAYS QUESTION 3



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GCSE NEW SPEC MATHEMATICS JANUARY 2012
UNIT T2
OVERLAYS QUESTION 11



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New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics



Unit T2
(With calculator)
Foundation Tier

[GMT21]

TUESDAY 31 MAY
9.15 am–10.45 am

GMT21

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
Total Marks	

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twenty-four** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

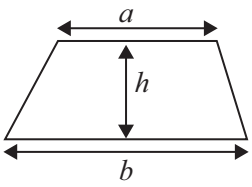
INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **question 13**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is overleaf.

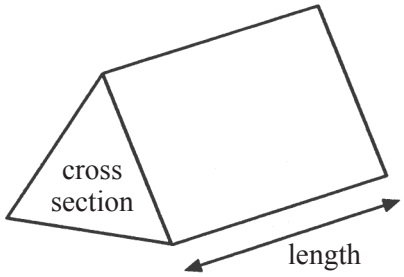
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Formula Sheet

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



Volume of prism = area of cross section $\times$ length



Answer **all** questions.

Examiner Only	
Marks	Remark

1 **(a)** The stem and leaf diagram shows the weights of bags of onions.

3	5 7 8 9
4	2 5 6 8 9 9
5	1 3 4

Key 3|5 = 3.5 kg

Write down

(i) the range,

Answer _____ kg [1]

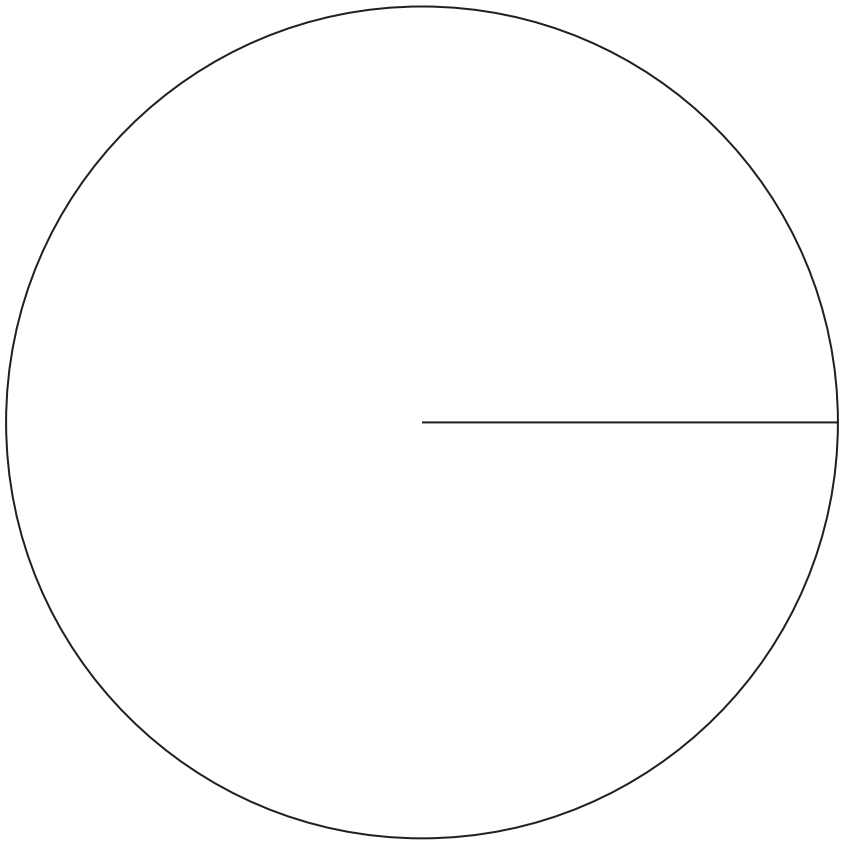
(ii) the median.

Answer _____ kg [1]

(b) The number of buns sold in a bakery was recorded as follows.

Cream	16
Fruit	10
Jam	9
Chocolate	25

Draw a pie chart to illustrate this information.

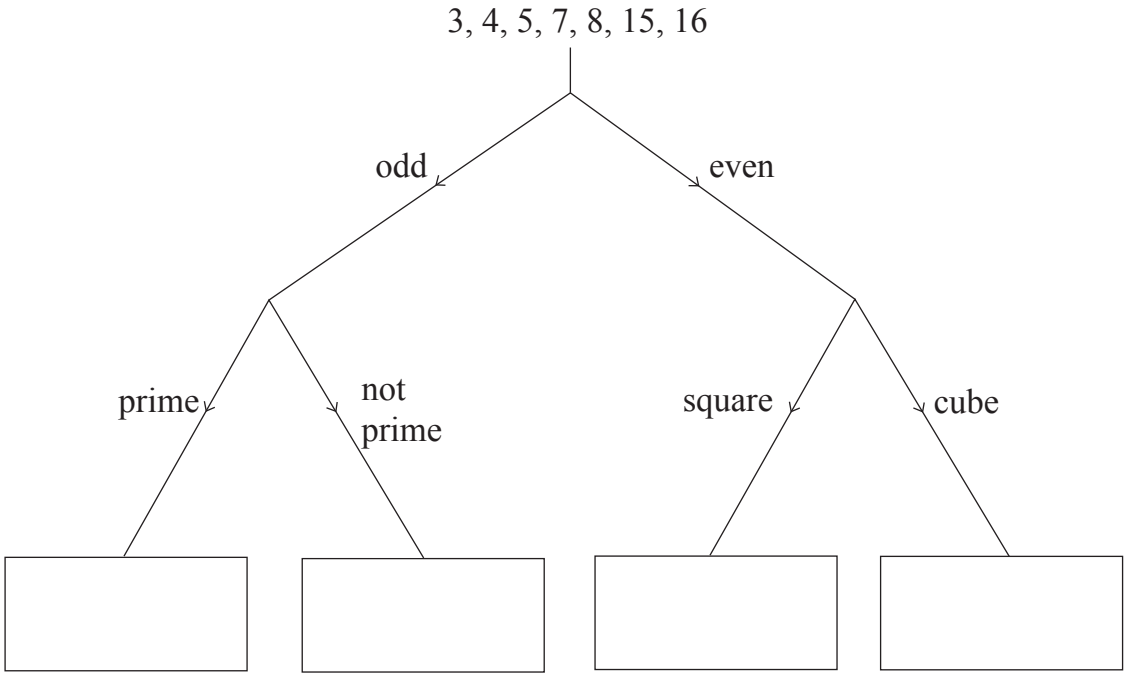


[4]

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Examiner Only	
Marks	Remark

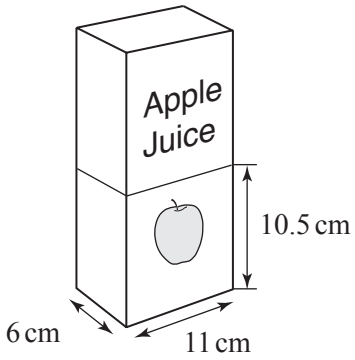
2 Using the decision tree diagram, sort these numbers into the correct boxes.



[2]

3 **(a)** A rectangular carton holds apple juice. The base of the carton has dimensions of 6 cm and 11 cm. The height of the juice in the carton is 10.5 cm above the base. ($1\,cm^3 = 1\,ml$)

What is the volume of juice left in the carton in millilitres?



Answer _____ ml [2]

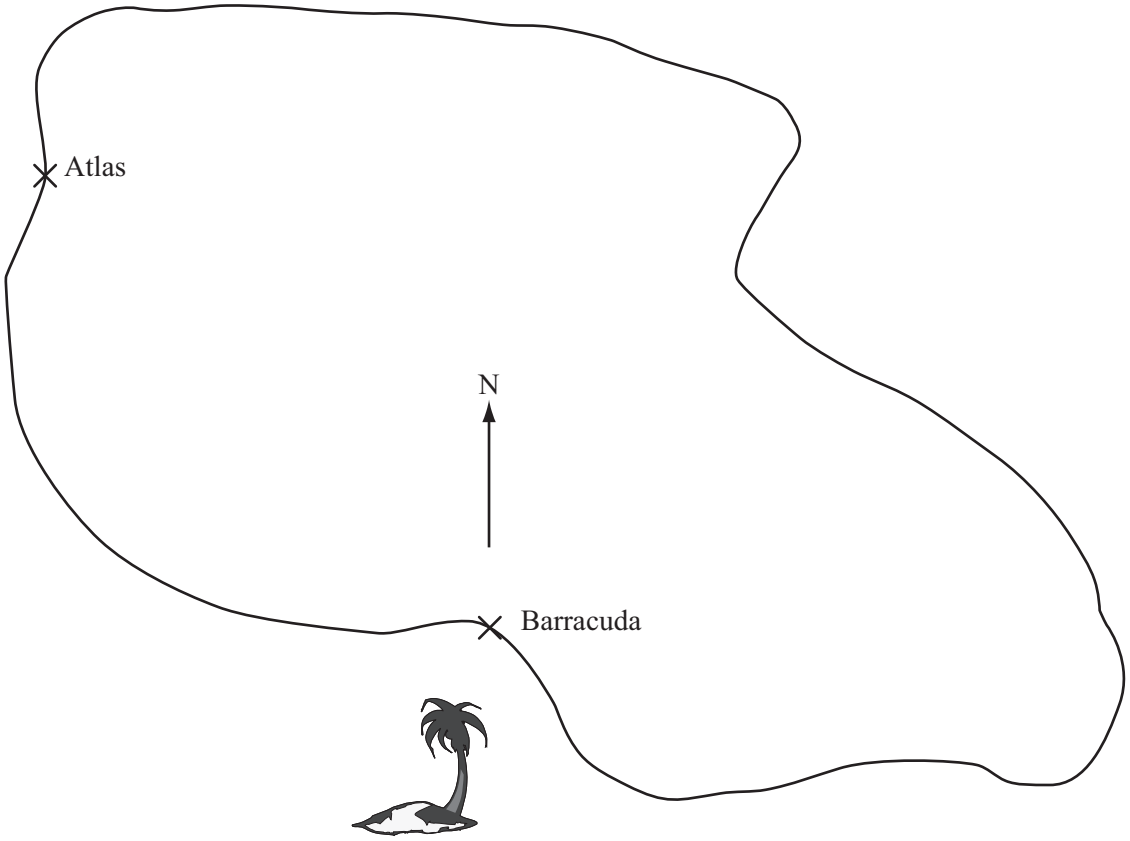
(b) John pours himself a glass of juice. The volume in the carton is now 412.5 ml. What is the height of the juice above the base now?

Answer _____ cm [2]

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4 An outline map of Tanua Island is shown.

The Atlas and the Barracuda are two hotels on this island.



Scale: 1 cm to 5 km

(a) Use the diagram to calculate the actual distance of the Atlas from the Barracuda.

Answer _____ km [2]

(b) A new hotel, the Capri, is being built 25 km North East of the hotel Barracuda. Mark the correct position of this new hotel. [2]

(c) What is the bearing of the Atlas from the Barracuda?

Answer _____° [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** Calculate

(i) the cube root of 64

Answer _____ [1]

(ii) $3.3^2 + 6^3$

Answer _____ [1]

(iii) 2^7

Answer _____ [1]

(b) Write 23.35 correct to three significant figures.

Answer _____ [1]

(c) Write down a prime number between 48 and 58.

Answer _____ [1]

---

6 Andrew earns £900 a month. He spends $\frac{1}{4}$ of this money on rent and $\frac{1}{5}$ on computer games. What fraction of the £900 has he left?

Answer _____ [4]

Examiner Only	
Marks	Remark

7 Aine buys 500 g of beef mince at £8.30 per kg and 300 g of pork mince at £9.50 per kg.

Barney buys 400 g of lamb mince at £10.20 per kg and 400 g of sausage meat at £7.00 per kg.

Who pays more and by how much?

Answer _____ pays _____ more [6]

---

8 **(a)** Solve

(i) $\frac{p}{6} = 3$

Answer $p =$ _____ [1]

(ii) $2t - 5 + t - 2 = 5$

Answer $t =$ _____ [3]

(b) Write down the next two numbers in the sequence

22, 20, 16, 10, ..., ...

Answer _____, _____ [2]

(c) Write down the first 3 terms of the sequence whose nth term is $n^2 + 9$

Answer _____, _____, _____ [2]

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Examiner Only	
Marks	Remark

9 An adult ticket for a show costs £a.

A child ticket costs £4 less than an adult ticket.

(a) Write down an expression, in terms of a, for the cost of a child ticket.

Answer £ _____ [1]

(b) Daisy buys two adult tickets and three child tickets. The total cost is £23

(i) Use this information to write down an **equation**, in terms of a.

Answer _____ [2]

(ii) Solve your equation to find the cost of an adult ticket.

Answer £ _____ [2]

---

10 The Ross family eat $\frac{3}{5}$ of a loaf of bread each day.

What is the least number of loaves they will need to buy for 9 days?

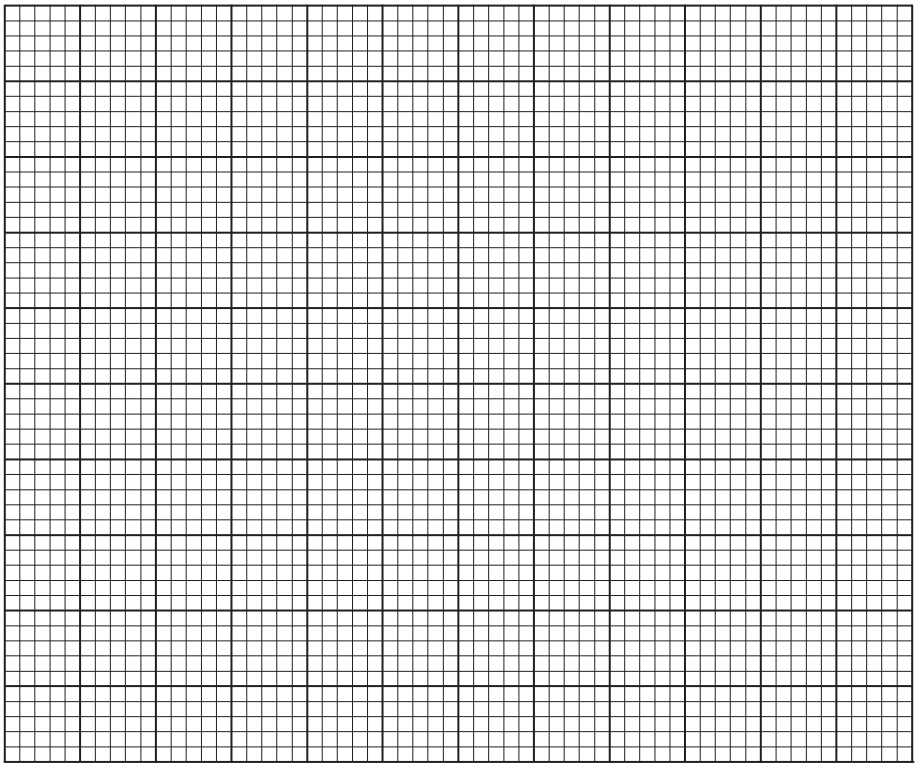
Answer _____ [3]

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11 The increase in test scores of 100 children over a period of time was recorded.

Increase in test scores (w)	$0 < w \leq 5$	$5 < w \leq 10$	$10 < w \leq 15$	$15 < w \leq 20$	$20 < w \leq 25$
Frequency	16	36	22	14	12

(a) Show this information on a grouped frequency diagram. [3]



(b) Write down the modal class interval.

Answer _____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

12 Lines AB, CD and EF are parallel

Angles of 96° and 60° are marked in the diagram as shown.

Calculate the size of the angles marked x, y and z.

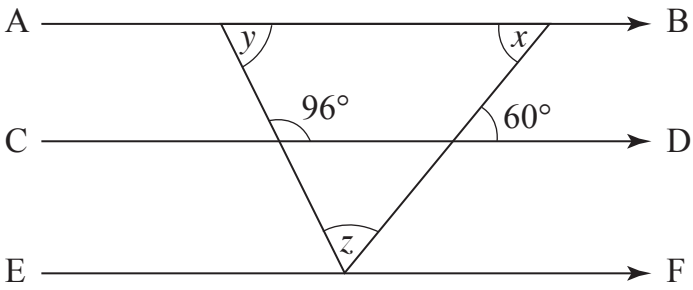


Diagram not drawn accurately

Answer Angle x = _____° [1]

Angle y = _____° [1]

Angle z = _____° [1]

Quality of written communication will be assessed in this question.

13 (a) 

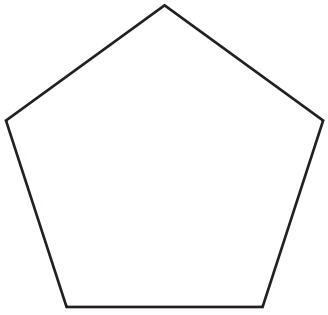
© *The Royal Mint*

A ten pence piece has a radius of 1.4 cm.

Calculate the circumference of this coin.

Show your work clearly.

Answer _____ cm [2]

(b) 

Explain why the sum of the interior angles in a regular pentagon is 540°.

_____

_____

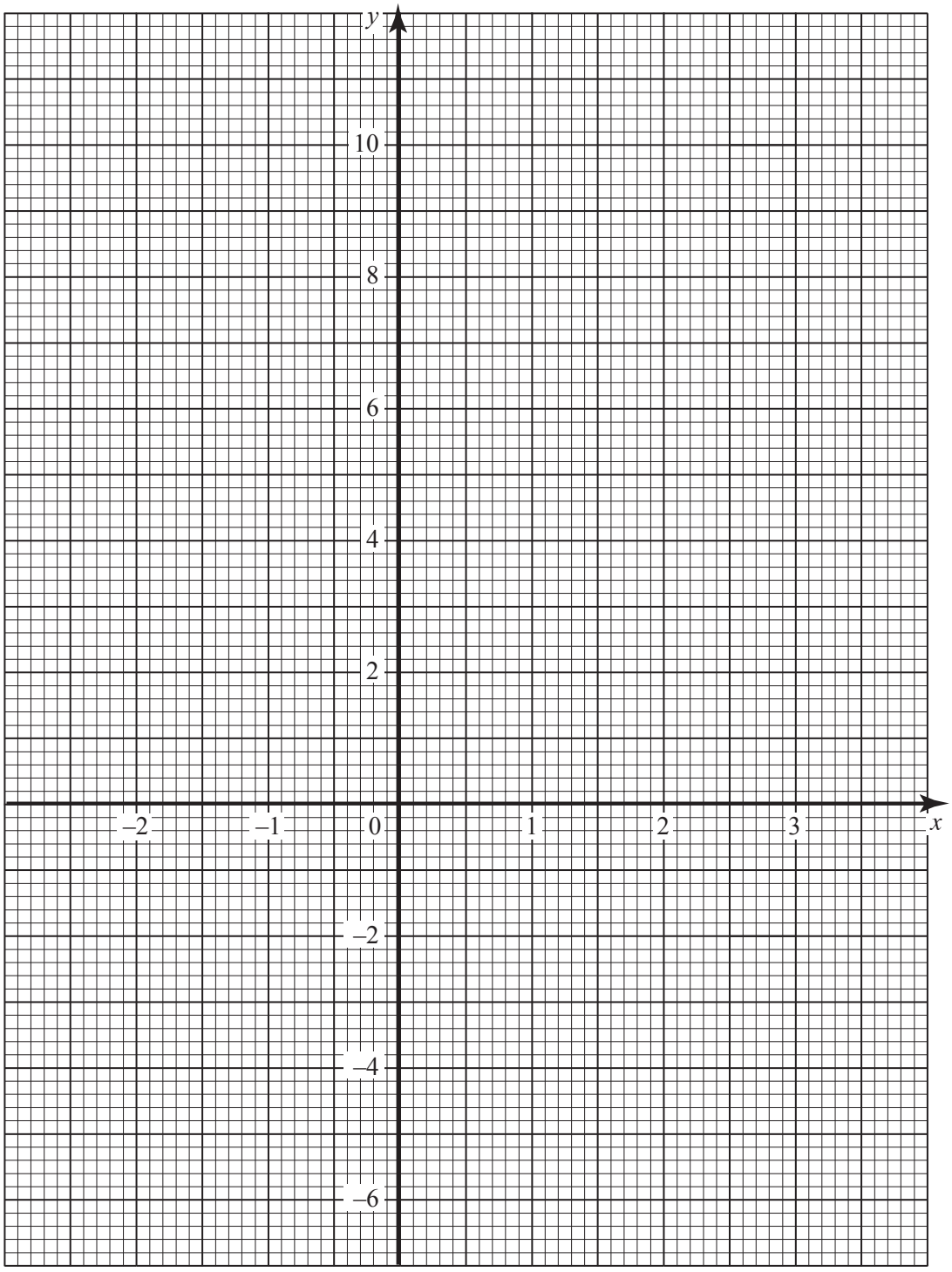
_____

_____

[2]

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14 Draw the graph of $y = 4 - 3x$ on the graph paper below.



[3]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

15 A new bicycle is priced at £240

In a sale it is reduced by 35%.

Calculate the sale price.

Answer £ _____ [3]

---

16 **(a)** Write down the *n*th term for the sequence

6, 12, 18, 24, ...

Answer _____ [1]

(b) Write down the *n*th term for the sequence

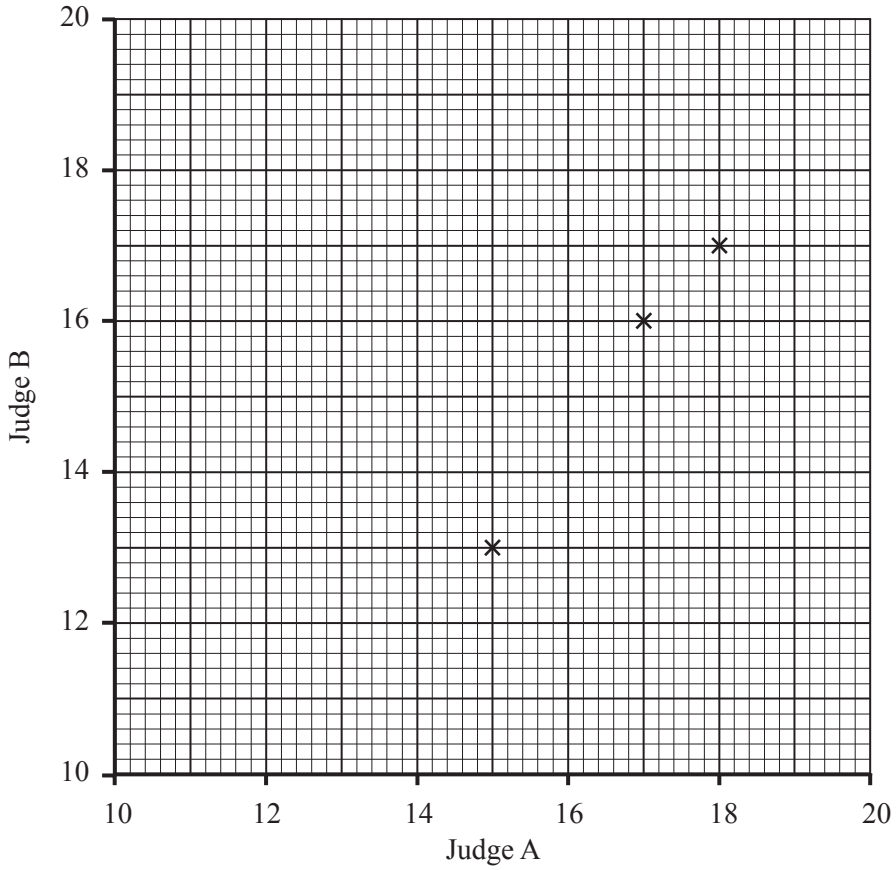
4, 9, 14, 19, ...

Answer _____ [2]

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17 The table shows the marks awarded by two judges to the first eight competitors in a gymnastics competition.

Judge A	**18**	**15**	**17**	13	19	15	12	18
Judge B	**17**	**13**	**16**	13	18	16	14	16



(a) The first three points have already been plotted.

Use the data to complete the scatter graph. [2]

(b) Draw the line of best fit. [1]

(c) Another competitor was awarded 14 marks by Judge A.

Estimate the marks awarded to this competitor by Judge B.

Answer _____ [1]

(d) What type of correlation does your graph show?

Answer _____ [1]

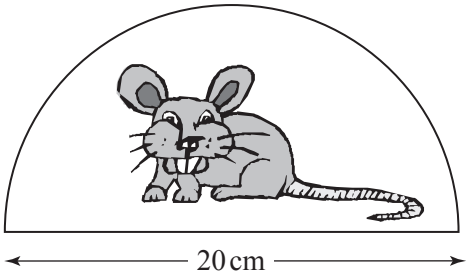
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

18 **(a)** A computer mouse mat is semicircular in shape. It has a diameter of 20 cm. Calculate the area of the mat.



Answer _____ cm^2 [2]

(b) Find the midpoint of the line joining the points A (−1, 6) and B (3, −2).

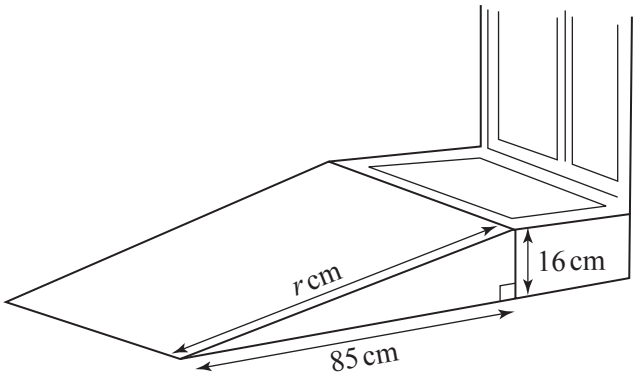
Answer (_____, _____)[2]

---

19 A ramp is placed next to a step to allow wheelchair access.

The ramp is 16 cm high and reaches 85 cm from the step.

Calculate the sloping length, r cm, of the surface of the ramp to the edge of the step.



Answer _____ cm [3]

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Examiner Only	
Marks	Remark

20 **(a)** At birth a baby boy weighed 4 kg. Six weeks later he weighed 7 kg.

What was the percentage increase in his weight?

Answer _____% [2]

(b) Colin leaves £4,800 in the bank for two years.

It earns simple interest of 3% per year.

Calculate the total amount Colin has in the bank at the end of the two years.

Answer £ _____ [2]

---

21 **(a)** Write 84 as a product of prime factors. Express your answer in index notation.

Answer _____ [3]

(b) Hence find the Highest Common Factor of 84 and 8

Answer _____ [1]

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22 **(a)** One solution of $x^2 + 4x = 50$ lies between 5 and 6

Use the method of **trial and improvement** to find this solution correct to one decimal place.

Show all your working.

Answer $x =$ _____ [3]

(b) Expand and simplify

$$4(x + 3) + 3(2x - 5)$$

Answer _____ [2]

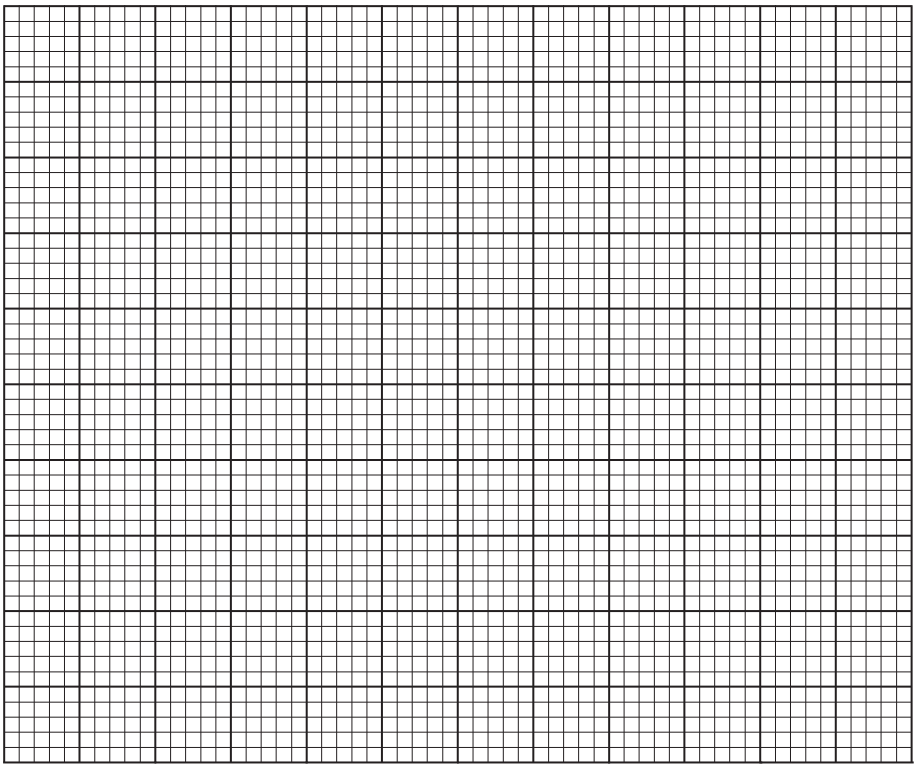
Examiner Only	
Marks	Remark

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23 The numbers of TV programmes that 100 students watched during one weekend were recorded. The numbers were grouped as shown in the table.

Number (n)	Frequency
$0 < n \leq 2$	4
$2 < n \leq 4$	18
$4 < n \leq 6$	32
$6 < n \leq 8$	20
$8 < n \leq 10$	16
$10 < n \leq 12$	10

(a) Show this information on a frequency polygon. [3]



(b) Which class interval contains the median number?

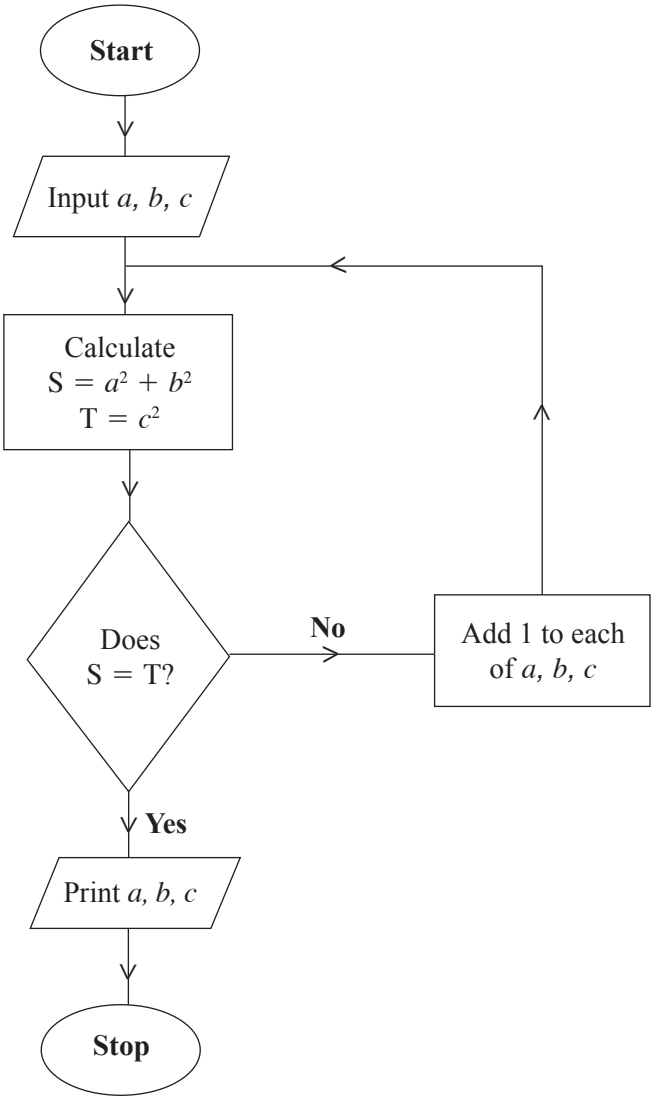
Answer _____ [1]

Examiner Only

Marks	Remark

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24



Starting with $a = 2$, $b = 9$, $c = 10$ use the flow chart to find the values printed.

a	b	c	S	T
2	9	10		

Answer $a =$ _____, $b =$ _____, $c =$ _____ [3]

Examiner Only

Marks	Remark

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THIS IS THE END OF THE QUESTION PAPER

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New Specification

Rewarding Learning

General Certificate of Secondary Education
2011

Mathematics

Unit T2
Foundation Tier

[GMT21]

TUESDAY 31 MAY
9.15 am – 10.45 am

MARK SCHEME

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GCSE MATHEMATICS

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The solution to a question gains marks for correct method and marks for accurate working based on this method. The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.
A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded i.e. where the method is not correct no marks can be given.
MA indicates marks for combined method and accurate working.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice:

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

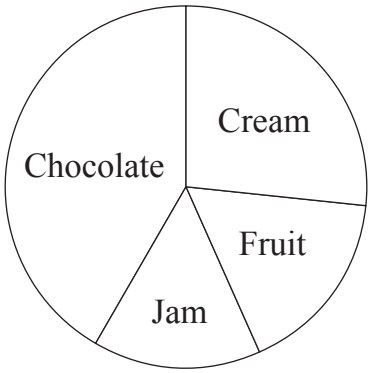
(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e. mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

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				AVAILABLE MARKS
1	**(a)** **(i)** 1.9		A1	
	(ii) 4.6		A1	
	(b)			
	see overlay 96°, 60°, 54°, 150° (award one mark for evidence of 6) all sectors correct and labelled (allow A1 for 2 correct + labelled) alternatively, with no work shown, 4 sectors correct and labelled A4 3 sectors correct and labelled A3 2 sectors correct and labelled A2 1 sector correct and labelled A1 deduct only 1 from total if no labels tolerance ±2°		A2 A2	6
2	3, 5, 7 15 4, 16 8 (A1 for 4 correct)		A2	2
3	**(a)** $6 \times 11 \times 10.5 = 693$		M1, A1	
	(b) $6 \times 11 \times h = 412.5$			
	$h = \dfrac{412.5}{66}$		MA1	
	$h = 6.25$		A1	4
4	**(a)** 8.4 ±0.2		MA1	
	42 ±1		MA1	
	(b) correct bearing at 045° ±2°		A1	
	correct distance at 5 ±0.2 cm		A1	
	(c) 315° ±2°		A1	5

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			AVAILABLE MARKS
5	**(a)** **(i)** 4	A1	
	(ii) 226.89	A1	
	(iii) 128	A1	
	(b) 23.4	A1	
	(c) 53	A1	5
6	£225 or $\frac{1}{4} + \frac{1}{5}$	MA1	
	£180 or $\frac{9}{20}$	MA1	
	£495 or $1 - \frac{9}{20}$	MA1	
	$\frac{495}{900}$ or $\frac{11}{20}$	MA1	4
7	$0.5 \times £8.30 + 0.3 \times £9.50 = £4.15 + £2.85 = £7.00$	M1, A1	
	$0.4 \times £10.20 + 0.4 \times £7.00 = £4.08 + £2.80 = £6.88$	M1, A1	
	Answer Aine ... 12p	M1, A1	6
8	**(a)** **(i)** 18	A1	
	(ii) $3t - 7 = 5$	MA1	
	$3t = 12$	MA1	
	$t = 4$	A1	
	(b) 2, −8	A1, A1	
	(c) 10, 13, 18	M1, A1	8
9	**(a)** $a - 4$	A1	
	(b) **(i)** $2a + 3(a - 4) = 23$ A1 for correct expression set up/A1 for equation		
	(ii) $2a + 3a - 12 = 23$		
	$5a - 12 = 23$	MA1	
	$5a = 35$		
	$a = 7$	MA1	5

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			AVAILABLE MARKS
10	$9\times\frac{3}{5}$ or $\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}$	M1	
	$\frac{27}{5}$ or $5\frac{2}{5}$ or 5.4	A1	
	6	MA1	3
11	**(a)** correct scales	A1	
	correct heights (award A1 for 3 correct)	A2	
	(b) $5 < w \leq 10$	A1	4
12	60	A1	
	84	A1	
	36	A1	3
13	**(a)** C = π × 2.8	MA1 QWC	
	= 8.796	A1 QWC	
	(b) EITHER 3 Triangles = 3 × 180 = 540°, triangles drawn		
	OR explain Interior = 108° Total = 108 × 5 = 540°	A2 QWC	4
14	2 points correctly identified	MA1	
	2 points accurately plotted	A1	
	Straight line	A1	3
15	0.35 × 240 = 84 or 0.65 × 240	M1, A1	
	(240 − 84 =) £156	MA1	3
16	**(a)** $6n$	A1	
	(b) $5n - 1$	A1, A1	3
17	**(a)** correct points (allow A1 for 3 correct)	A2	
	(b) oblique line with roughly half the points on either side	A1	
	(c) follow pupil's line	A1	
	(d) positive	A1	5

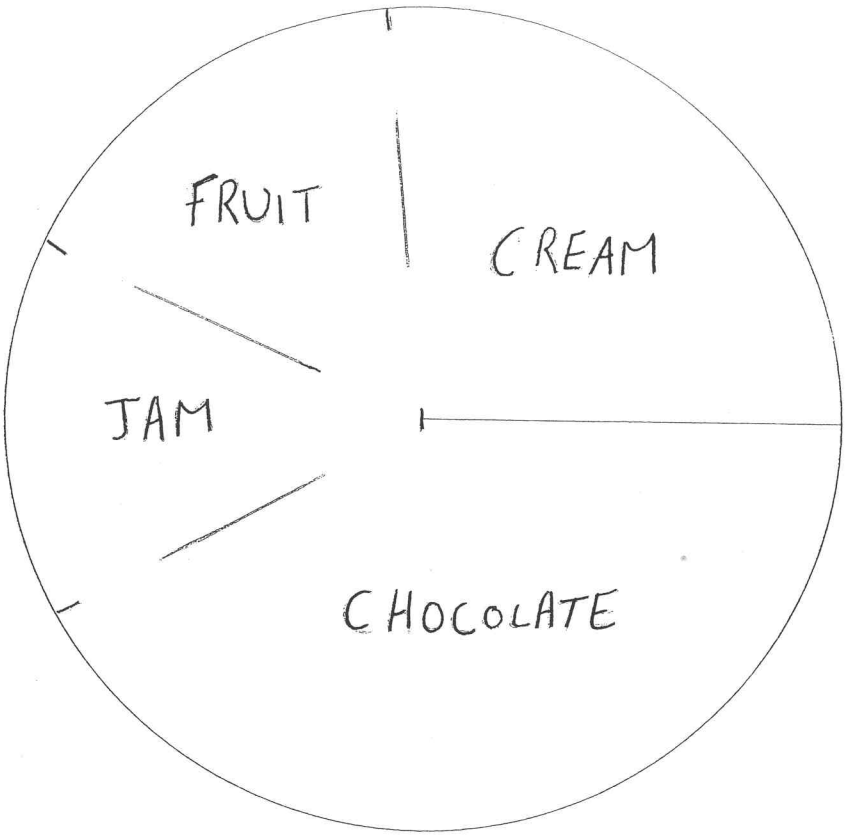
			AVAILABLE MARKS
18	**(a)** $\frac{1}{2}\times\pi\times10^2$	M1	
	157.1	A1	
	(b) (1, 2)	A1, A1	4
19	$r^2 = 85^2 + 16^2$	MA1	
	$r^2 = 7481$	A1	
	$r = 86.5$	A1	3
20	**(a)** $\frac{3}{4} \times 100$	MA1	
	75	A1	
	(b) $4800 \times 2 \times 3 \div 100$	MA1	
	5088	MA1	4
21	**(a)** $2\overline{)84}$, $2\overline{)42}$, $3\overline{)21}$, 7	M1, A1	
	$2^2 \times 3 \times 7$	A1	
	(b) 4	A1	4
22	**(a)** $5.3 \rightarrow 49.29$		
	$5.4 \rightarrow 50.76$	MA1	
	5.35 tested $\rightarrow 50.0225$	MA1	
	5.3	A1	
	5.35 must be tested for full marks		
	(b) $4x + 12 + 6x - 15$	MA1	
	$10x - 3$	A1	5
23	**(a)** scales	A1	
	points	A1	
	polygon	A1	
	(b) $4 < n \leq 6$	A1	4

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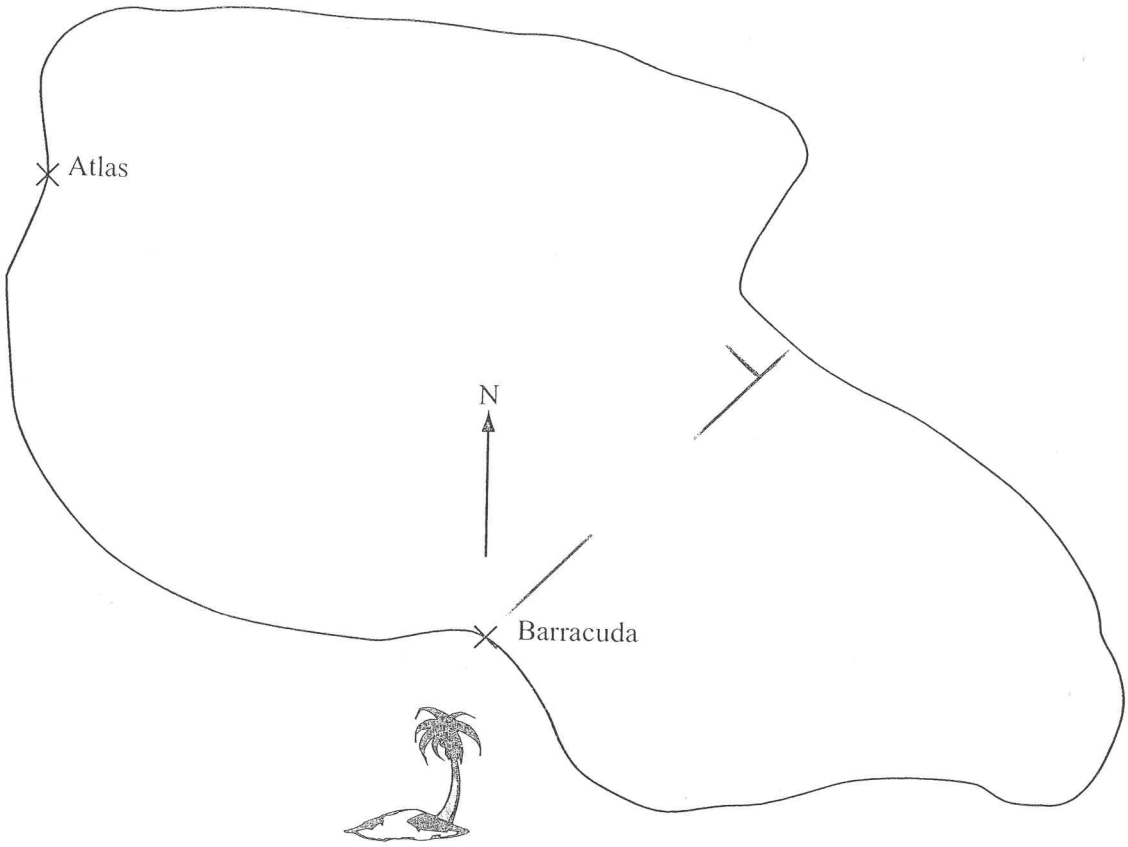
			AVAILABLE MARKS
24	$S_1 = 85, T_1 = 100$ $S_2 = 109, T_2 = 121$ $S_3 = 137, T_3 = 144$ $S_4 = 169, T_4 = 169$ 5, 12, 13	MA1 MA1 MA1	3
		Total	**100**

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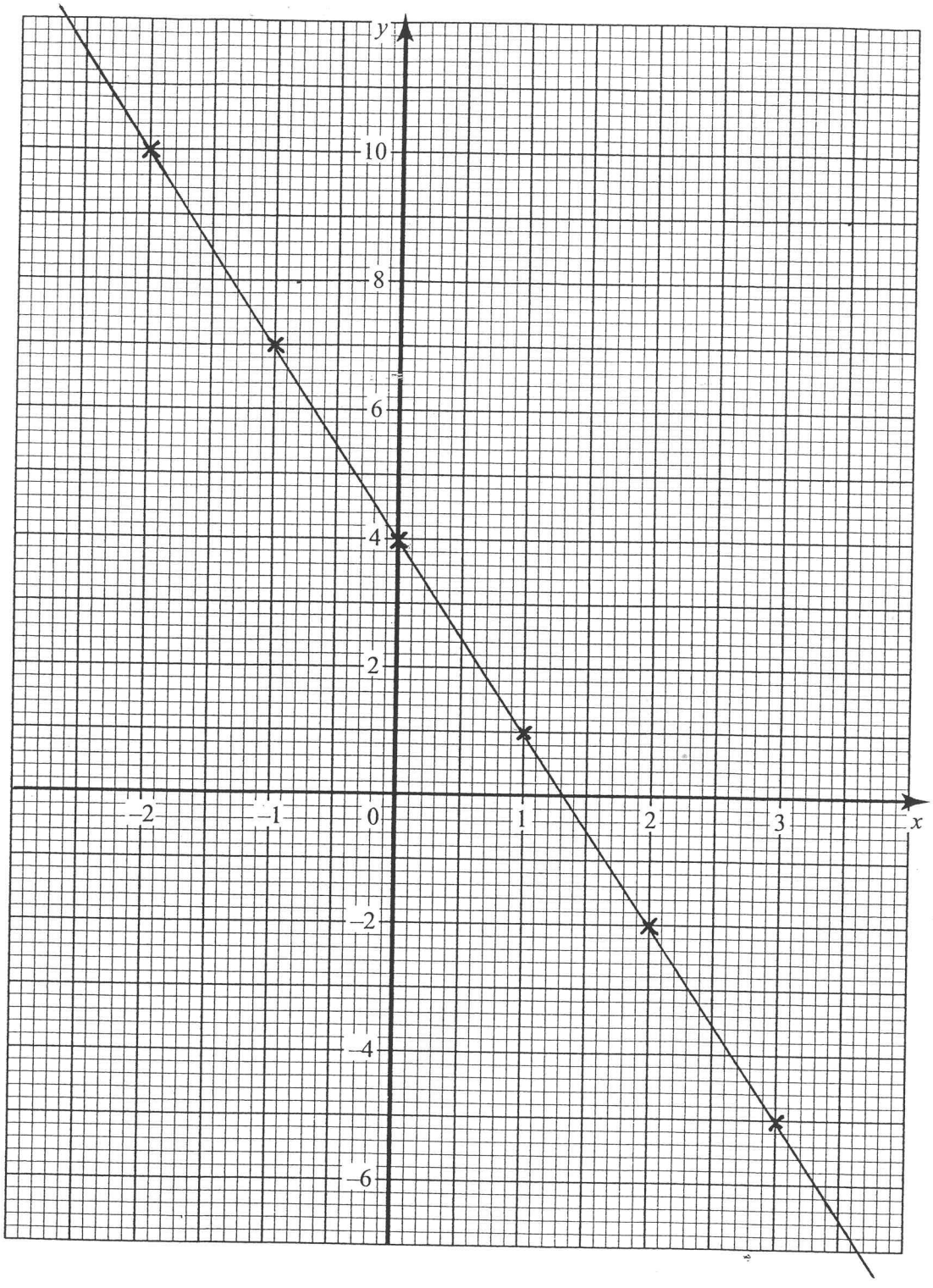
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UNIT T2
OVERLAYS QUESTION 1



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UNIT T2
OVERLAYS QUESTION 4



GCSE MATHEMATICS SUMMER 2011
UNIT T2
OVERLAY QUESTION 14



GCSE NEW SPEC MATHEMATICS SUMMER 2011
UNIT T2
OVERLAYS QUESTION 17

