Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
November 2023

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

TUESDAY 21 NOVEMBER, 9.15 am – 11.00 am

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

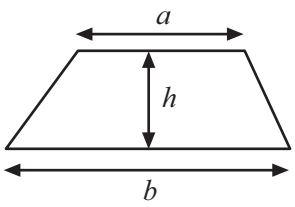
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all thirty-one**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

INFORMATION FOR CANDIDATES

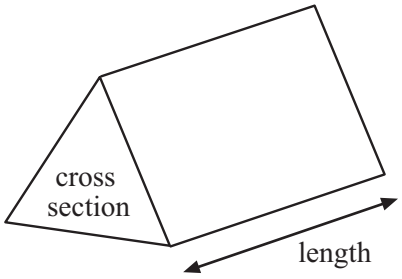
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

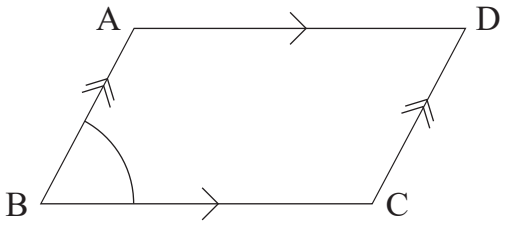
Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross section × length



1 Look at the shape drawn below.



(a) What is the name of the shape?

Answer parallelogram [1]

(b) Measure, in cm, the length of the side AD.

Answer 4.4 cm [1]

(c) What type of angle is angle ABC, marked on the diagram?

Answer acute [1]

(d) Insert the correct word to make this sentence true.

"The arrows tell us the lines BA and CD are parallel to each other." [1]

[Turn over

2 A roll of wallpaper was 10 metres long.

Four lengths, measuring 2.4 metres each, were cut from the roll.

What length of wallpaper was left?

Give your answer in **centimetres**.

$4 \times 2.4 = 9.6$ m
$10 - 9.6 = 0.4$ m
0.4 m $= 0.4 \times 100 = 40$ cm

Answer 40 cm [3]

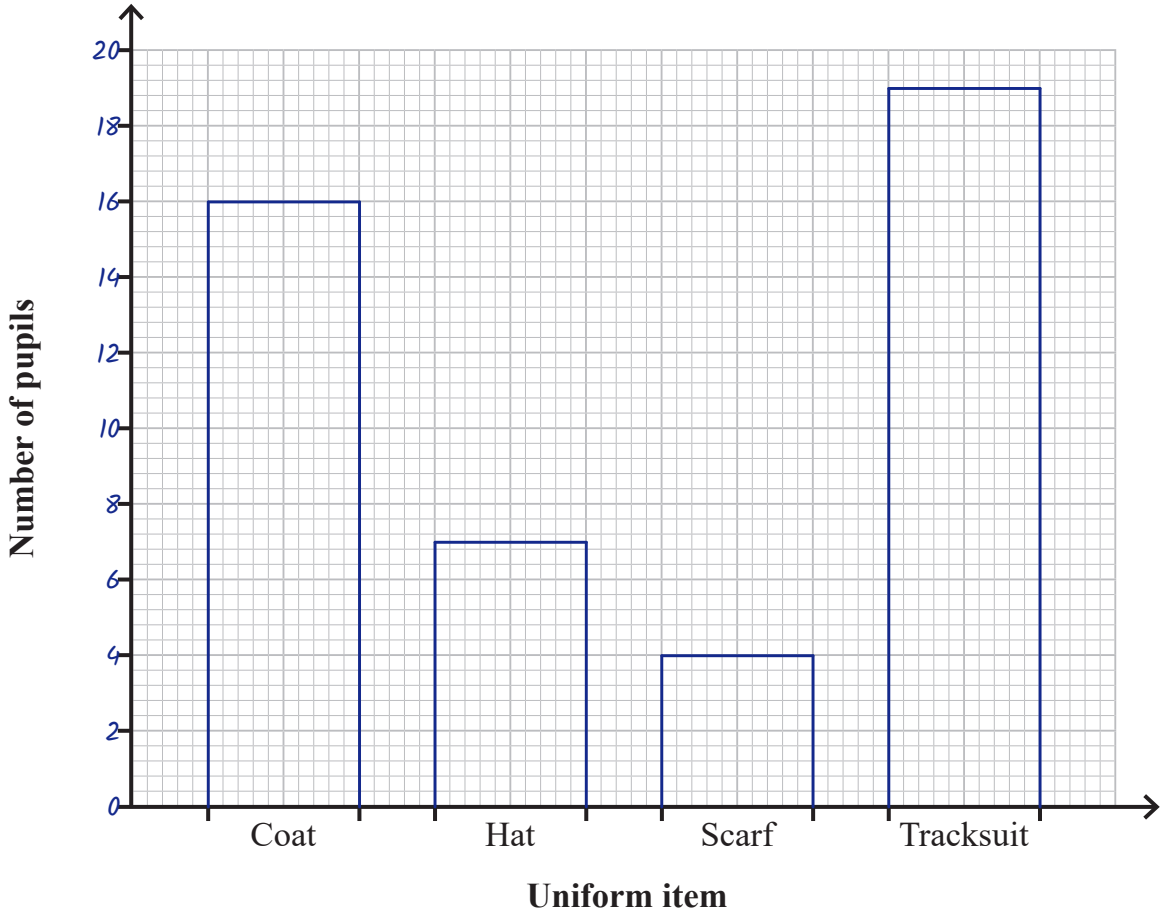
3 A school student council surveyed pupils about school uniform.

Each pupil was asked to choose which new uniform item they preferred.

The results are displayed in the table below.

Uniform item	Number of pupils
Coat	16
Hat	7
Scarf	4
Tracksuit	19

Complete the bar chart to display these results.



[3]

[Turn over

4 Jayden wanted to order a pair of trainers online.

Information about online stores selling the trainers is given below.

Store name	Price	Delivery charge	Delivery time
Run Fast	£80	£10	2–3 days
Trainer Town	£95	Free	Next day
Feet First	£80	£5	3–5 days
Sole City	£90	Free	2–3 days

(a) Which store has the lowest **total** cost for the trainers?

Answer Feet First [1]

Run Fast £90, Trainer Town £95, Feet First £85, Sole City £90

(b) Which stores had the same **total** cost for the trainers?

Answer Run Fast and Sole City [1]

(c) Jayden decided to order from Trainer Town.

Using the information in the table, suggest a reason why.

Answer It is the only store with next day delivery [1]

5 **(a)** A bank's sort code is made up of three 2-digit numbers.

The first 2-digit number is a square number in the twenties.

The second 2-digit number is a multiple of 13 in the thirties.

The final 2-digit number is a factor of 90 in the forties.

Use this information to complete the sort code.

2	5	–	3	9	–	4	5

$5^2 = 25$, $13 \times 3 = 39$, $90 \div 2 = 45$

[3]

(b) Joni's bank account number is

91462832

What is the place value of the 1?

Circle the correct answer.

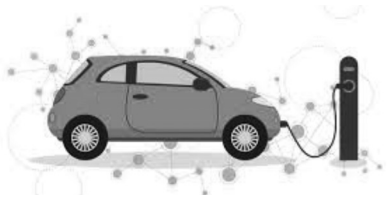
Ten millions *Thousands* *Hundred thousands* *Millions* *Ten thousands*

[1]

6 Lisa drove her electric car 670 miles last month.

She charges her car with electricity every night.

Each unit of electricity provides 5 miles of charge.



One unit of electricity = 5 miles

Electricity costs 26.5 pence per unit.

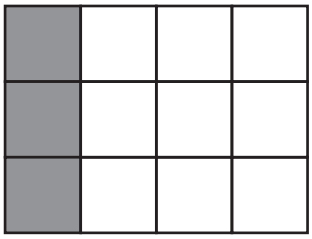
How much did it cost Lisa to charge her car last month?

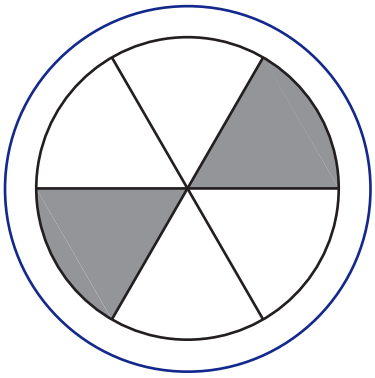
670 ÷ 5 = 134 units
134 × 26.5 = 3551 pence
3551p ÷ 100 = £35.51

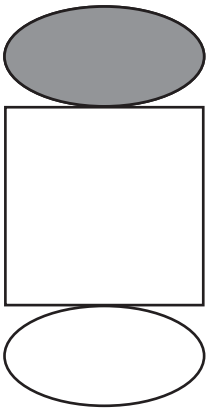
Answer £ 35.51 [4]

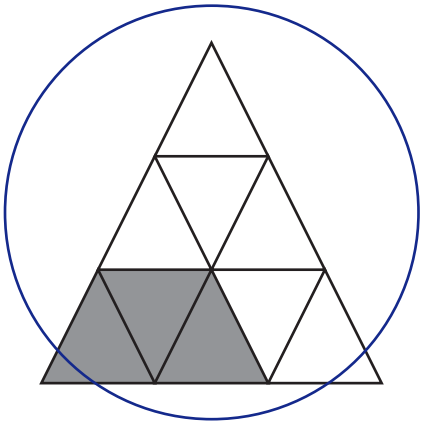
7 Which of these diagrams have shading equivalent to $\frac{1}{3}$?

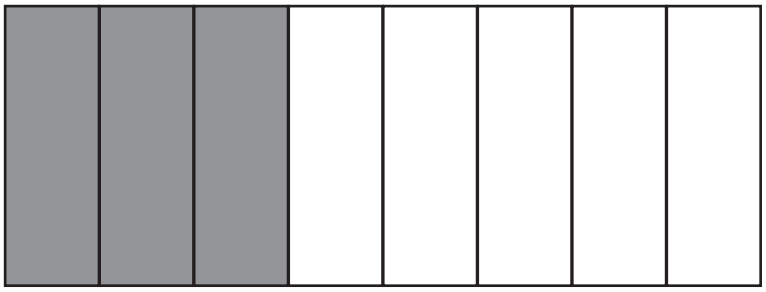
Circle your answers.







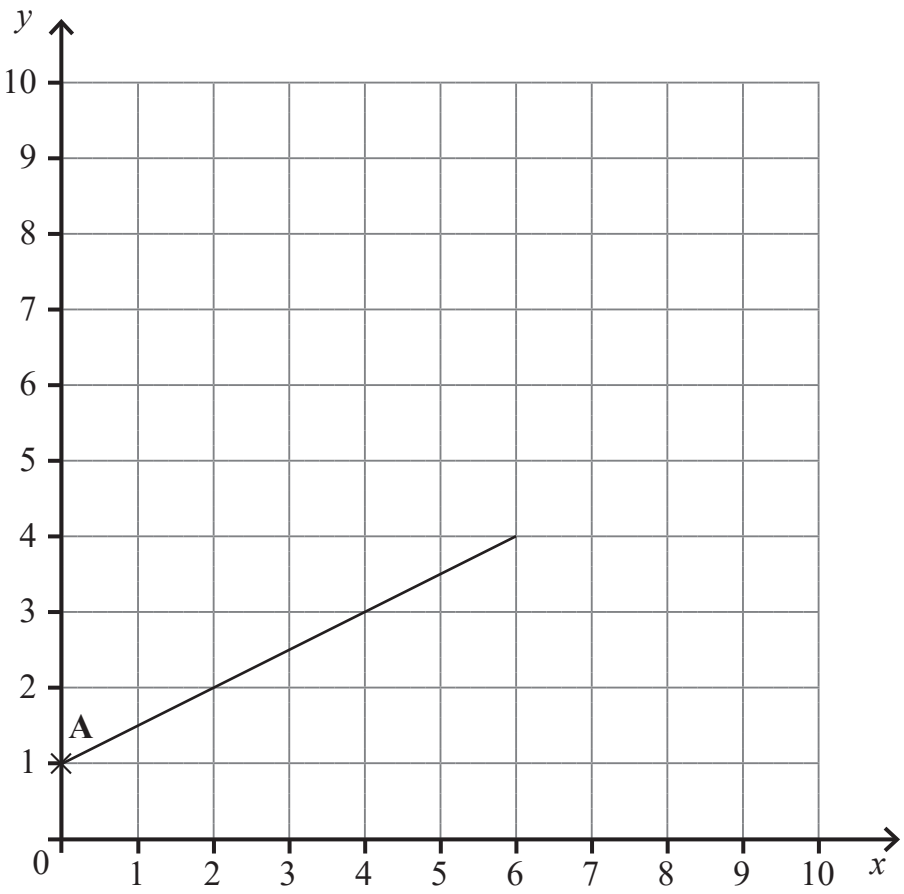




[2]

[Turn over

8 Part of a straight line is drawn on the coordinate grid.



(a) What are the coordinates of the point marked **A**?

Answer (0 , 1) [1]

(b) The line continues.

Which one of these points lies on the line?

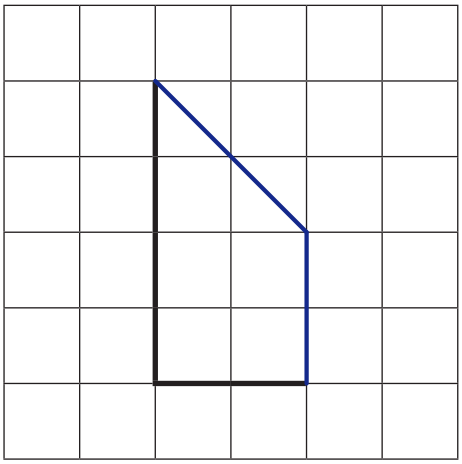
Circle your answer.

up 1 for every 2 across: (6, 4) → (8, 5) → (10, 6)

(7, 5) (9, 5) (10, 6) [1]

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9 Part of a quadrilateral is drawn on a centimetre-squared grid to design a logo.

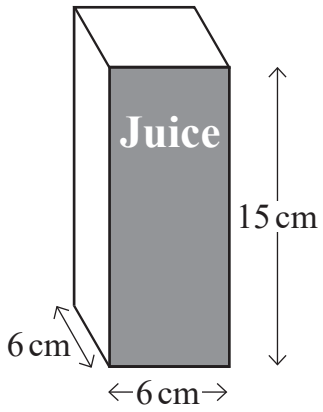


On the grid, complete the quadrilateral so that it has an area of 6 cm^2 [2]

Area = rectangle 2 × 2 + triangle ½ × 2 × 2
= 4 + 2 = 6 cm²

[Turn over

10 A juice carton is in the shape of a cuboid, as shown in the diagram below.



(a) What is the area of the front face of the juice carton?

$6 \times 15 = 90$

Answer 90 cm^2 [1]

(b) Calculate the volume of the juice carton.

$V = 6 \times 6 \times 15$
$= 540$

Answer 540 cm^3 [2]

(c) John says "The carton will hold more than half a litre of juice."

Is he correct?

Explain your answer clearly.

½ litre = 500 ml = 500 cm^3, 540 > 500

Answer Yes because 540 cm^3 is more than 500 cm^3 and half a litre is 500 ml = 500 cm^3 [1]

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11 A restaurant owner recorded the number of meals served each night for 8 nights, as shown below.

26 18 17 32 29 30 19 21

(a) Calculate the mean number of meals served per night.

26 + 18 + 17 + 32 + 29 + 30 + 19 + 21 = 192
192 ÷ 8 = 24

Answer 24 [3]

(b) The next night the restaurant served 23 meals.

Without doing any further calculations, decide what will happen to the mean.

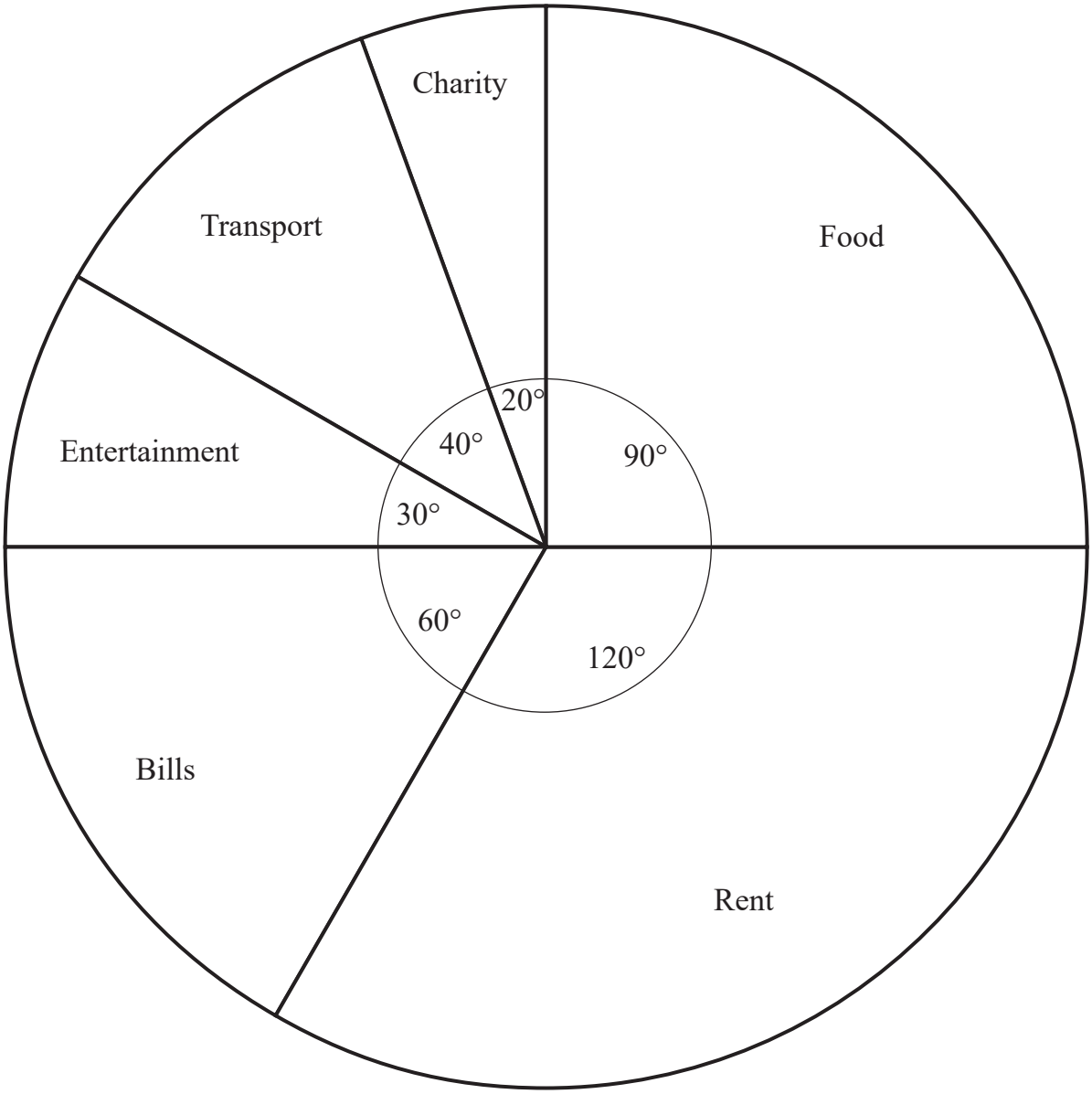
Circle the correct answer.

increase (decrease) stay the same

[1]

[Turn over

12 A family recorded what they spent their money on last week.



(a) What fraction of their spending was on rent?

Rent = 120° $\frac{120}{360} = \frac{1}{3}$

Answer $\frac{1}{3}$ [1]

(b) The family spent £150 on bills.

(i) How much did they spend on entertainment?

Bills 60° = £150, so 30° = £150 ÷ 2

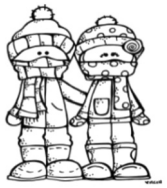
Answer £ 75 [1]

(ii) How much did they spend in total?

360 ÷ 60 = 6, 6 × £150

Answer £ 900 [1]

13 **(a)** In Belleek the temperature on Monday was –2°C.



On Tuesday the temperature fell by 3°C.

What was the temperature on Tuesday?

−2 − 3 = −5

Answer −5 °C [1]

(b) Mike, Nuala and Ollie have 30 T-shirts in total.

Mike has the most T-shirts.

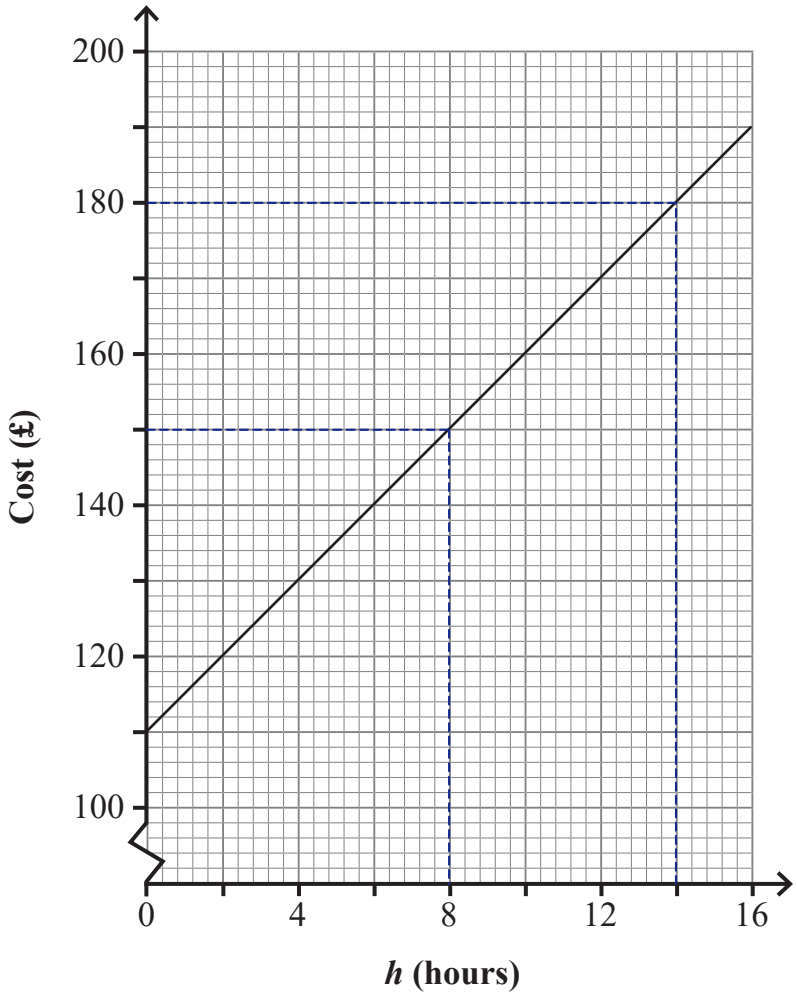
What is the **least** number of T-shirts Mike could have?

30 ÷ 3 = 10 each if shared equally
Mike has the most, e.g. 11, 10, 9

Answer 11 [2]

[Turn over

14 The cost to hire a party bus for h hours is shown on the graph.



(a) What is the cost for 14 hours?

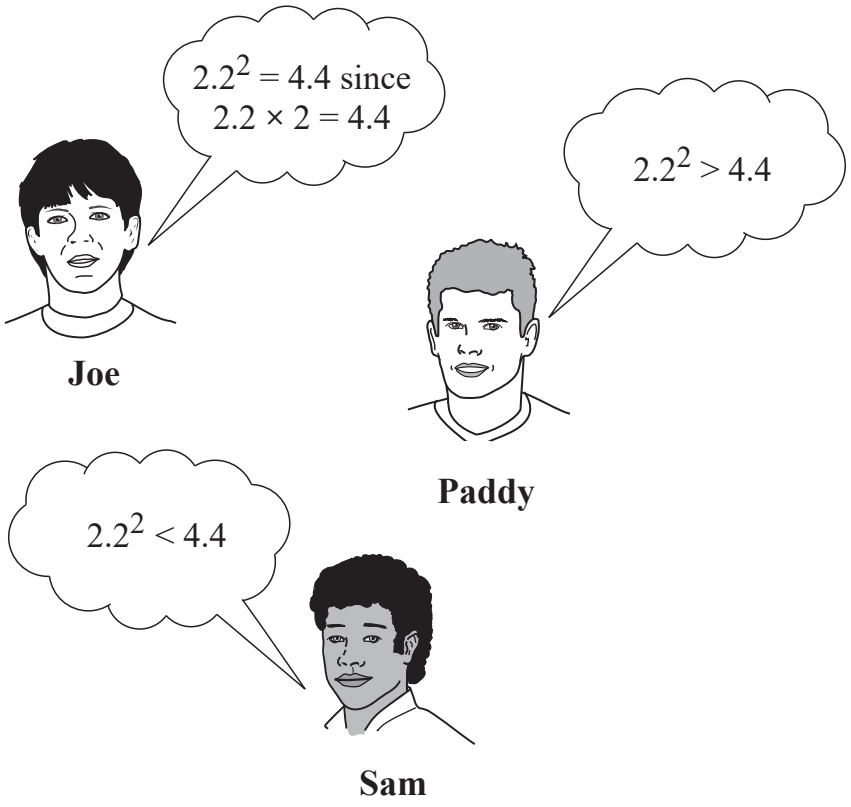
Answer £ 180 [1]

(b) Jim paid £150

How many hours did he hire the party bus for?

Answer 8 hours [1]

15 **(a)** Who is correct, Joe, Paddy or Sam?



$2.2 \times 2.2 = 4.84 > 4.4$

Answer Paddy [1]

(b) **(i)** Write the following statement using digits and symbols.

three plus two multiplied by five does not equal twenty-five

Answer $3 + 2 \times 5 \neq 25$ [1]

(ii) What is the correct answer to **three plus two multiplied by five**?

$2 \times 5 = 10, \quad 3 + 10 = 13$

Answer 13 [1]

[Turn over

16 **(a)** Zara earns £18 000 a year as a trainee hairdresser.



When her training is complete she will receive a 6% pay rise.

How much will this pay rise be worth per **month** to Zara?

6% of £18 000 = 18 000 × 6 ÷ 100
= £1080 per year
1080 ÷ 12 = £90 per month

Answer £ 90 [3]

(b) Zara pays £360 rent each month.

Her landlord plans to increase Zara's rent by $\frac{2}{9}$

How much **extra** will Zara have to pay each month?

$\frac{2}{9}$ of £360: 360 ÷ 9 = 40, 40 × 2 = 80

Answer £ 80 [1]

17 Part of a rail timetable is shown below.

Northbound departures	Monday to Friday				
London Euston	07:36	11:33	12:33	15:33	19:33
Milton Keynes Central	08:09	12:10	13:10	16:11	20:10
Nuneaton	08:44	12:45	13:45	16:44	20:43
Preston	10:17	14:13	15:09	18:20	22:11
Kirkham and Wesham	10:27	14:23	15:19	18:30	22:21
Poulton-le-Fylde	10:37	14:33	15:28	18:39	22:31
Blackpool North (arrive)	10:44	14:40	15:36	18:47	22:38

Amy boards the train in Nuneaton at 13:45

(a) What time will she arrive in Blackpool North?

Train leaving Nuneaton 13:45 arrives 15:36

Answer *15:36* [1]

(b) How long does her journey take?

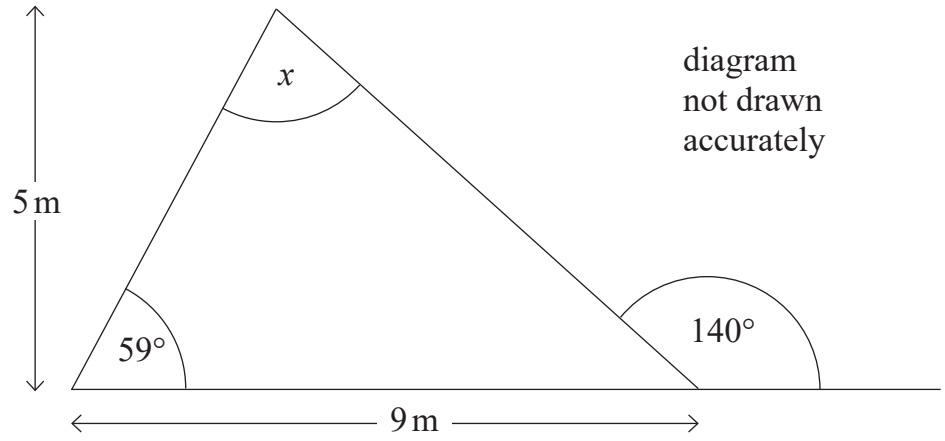
Give your answer in hours and minutes.

13:45 → 14:00 = 15 min
14:00 → 15:00 = 1 hr
15:00 → 15:36 = 36 min
Total = 1 hr 51 min

Answer *1* hr *51* min [2]

[Turn over

18



(a) Calculate the size of angle x.

180 − 140 = 40° (angles on a straight line)
x = 180 − (59 + 40) (angles in a triangle)
x = 81°

Answer 81 ° [3]

(b) Calculate the area of the triangle.

Give the correct unit of measurement with your answer.

Area = ½ × base × height
= 9 × 5 ÷ 2
= 22.5 m²

Answer 22.5 m² [3]

19 A PE teacher recorded the time each pupil in class 11A took to run 200 m.

The results are displayed in the stem and leaf diagram below.

23	7				
24	1	4	5	8	
25	2	3	7	7	9
26	3	5			
27	1	2	8		
28	5	6	6	7	
29	3	3			

Key: 25 | 2 = 25.2 seconds

(a) What was the median time taken?

21 times, median = 11th = 26.3

Answer 26.3 seconds [1]

(b) What was the range of the times recorded?

29.3 – 23.7 = 5.6

Answer 5.6 seconds [1]

(c) The results for class 11B are summarised as follows.

Median = 28.3 seconds Range = 3.5 seconds

Use this information to say whether each of these statements is true or false.

(i) On average, pupils in class 11A were faster than pupils in class 11B.

26.3 < 28.3

Answer true [1]

(ii) Pupils' times in class 11A were more consistent than in class 11B.

5.6 > 3.5

Answer false [1]

[Turn over

20 A cashier counted the notes in the till.

Type of note	Number of notes	
£5	12	5 × 12 = 60
£10	9	10 × 9 = 90
£20	3	20 × 3 = 60
£50	1	50 × 1 = 50

(a) What was the total value of the notes in the till?

60 + 90 + 60 + 50 = 260

Answer £ 260 [2]

(b) What was the mean value of the notes in the till?

12 + 9 + 3 + 1 = 25 notes
260 ÷ 25 = 10.40

Answer £ 10.40 [1]

21 From the list

6 15 16 25 27 29 36

(a) Which is a cube number? Answer 27 [1]

(b) Which is a prime number? Answer 29 [1]

(c) Which is a multiple of 12? Answer 36 [1]

(d) Which is a power of 2? Answer 16 [1]

(e) Which two numbers have a product of 375? Answer 15 and 25 [1]

22 Rebecca has a 5 kg sack of rice.

She pours the rice into smaller bags, each bag holding 360 g.

(a) How many bags can Rebecca fill completely from the sack of rice?

5 kg = 5000 g
5000 ÷ 360 = 13.888...
so 13 bags filled completely

Answer 13 [2]

(b) Sue bought a 10 kg sack of rice.

She thinks the maximum number of smaller bags she could fill would be **exactly** double the number Rebecca filled using the 5 kg sack.

Is Sue correct?

You must show work to justify your answer.

10 kg = 10 000 g
10 000 ÷ 360 = 27.777... so 27 bags
Double Rebecca = 2 × 13 = 26 bags
27 ≠ 26, Sue is not correct as she can fill 27 bags

Answer No [2]

[Turn over

23 Calculate

(a) $\sqrt{4^3}$ = √64

Answer 8 [1]

(b) $\frac{3(2.6^2 - 1.3)}{5.7}$ giving your answer correct to 1 decimal place.

3 × (6.76 − 1.3) ÷ 5.7 = 16.38 ÷ 5.7 = 2.873684211

Answer 2.9 [2]

24 A lorry needs to be driven 156 miles to a ferry port.

It needs to arrive at 4pm.

The lorry is driven at an average speed of 48 mph.

What is the latest time the journey should start?

time = distance ÷ speed
156 ÷ 48 = 3.25 hours
0.25 × 60 = 15 min, so 3 hours 15 min
4 pm − 3 h 15 min = 12:45 pm

Answer 12:45 pm [3]

25 Harry wanted to investigate the relationship between how much money people spent on fuel for their car and how many miles they drove.

To get some data, he decided to post a survey to some people for them to fill in and return.

(a) Describe a possible problem with Harry's **method** of collecting data.

Answer *People may not fill in and return the survey so he may not get enough data back* [1]

(b) He posted the survey to 10 people.

Explain why it may be unwise for Harry to draw any **conclusions** from his data.

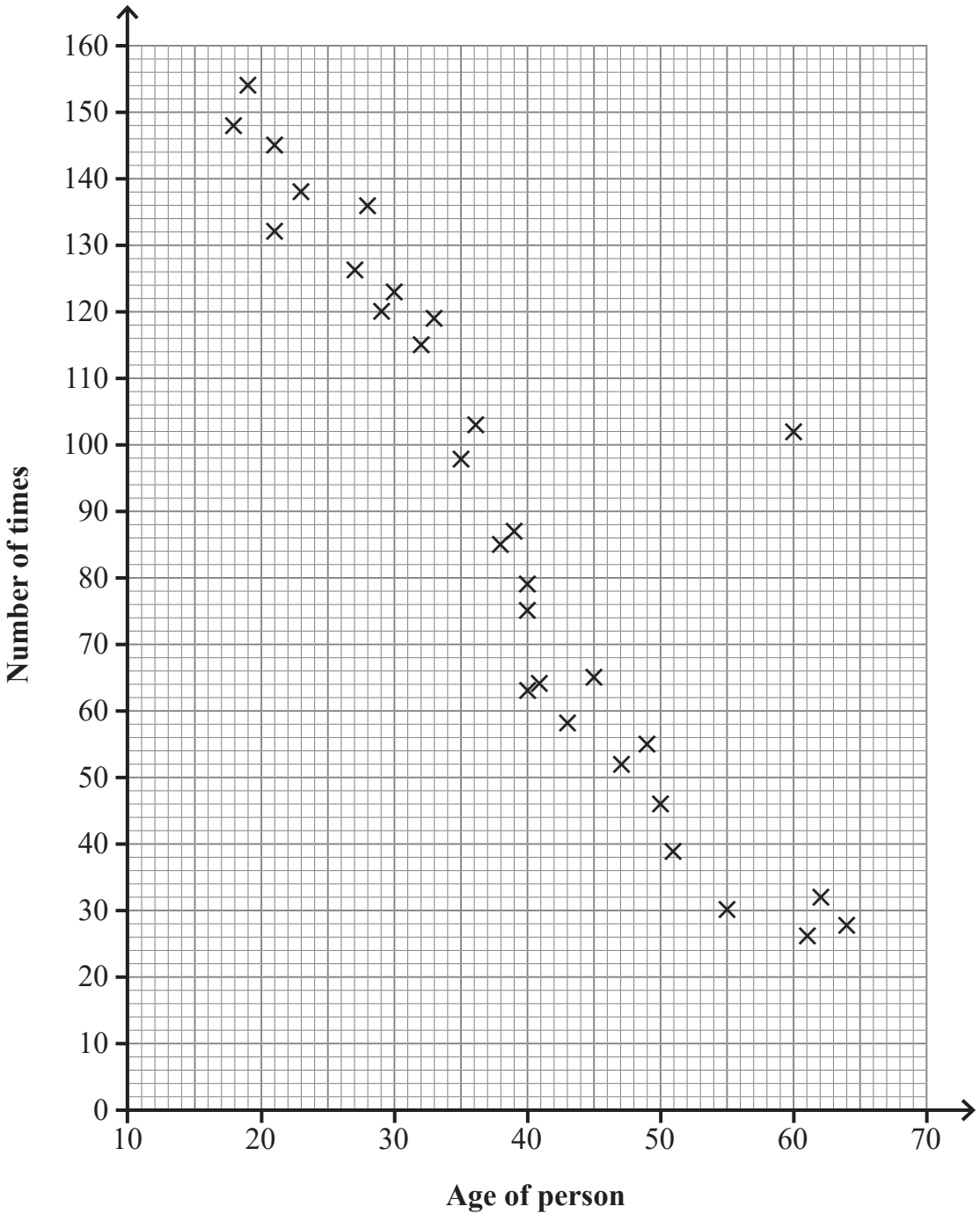
Answer *The sample of 10 people is too small* [1]

(c) Circle the correct word to describe the data Harry collected.

Qualitative (Quantitative)

[1]

26 The scatter graph shows information about how many times a day people checked their phones.



(a) What was the greatest number of times someone checked their phone?

Answer 154 [1]

(b) How many times did the person aged 49 check their phone?

Answer 55 [1]

(c) Write a suitable sentence to describe the **relationship** between the age of a person and the number of times they checked their phone.

Answer The older the person, the fewer times they checked their phone (negative correlation) [1]

27 **(a)** Simplify $5x + 2y - 7x + 4y$

$5x - 7x = -2x$
$2y + 4y = 6y$

Answer $-2x + 6y$ [2]

(b) Factorise $5k + 15$

Answer $5(k + 3)$ [1]

[Turn over

28 A packet of biscuits contains x biscuits.

In a special offer an extra 2 biscuits are added to each packet.

(a) Write an expression, in terms of x, for the number of biscuits in each special offer packet.

Answer $x + 2$ [1]

(b) Alice buys 3 packets in the special offer.

Write an expression, in terms of x, for the total number of biscuits she will have.

Answer $3(x + 2)$ [1]

29 Pete's wage was £480 last week.

£72 was for working overtime.

What percentage of his wage was **not** for working overtime?

$\frac{72}{480} \times 100 = 15\%$ (overtime)

$100 - 15 = 85\%$

Answer 85 % [3]

30 Which of the following is closest in value to $\frac{3}{5}$?

57% $\frac{13}{20}$ 0.62

You must show your working clearly.

3 ÷ 5 = 0.6 = 60%
57% is 3% away
13 ÷ 20 = 0.65 = 65% is 5% away
0.62 = 62% is 2% away, so 0.62 is closest

Answer 0.62 [2]

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31 An English exam consists of 2 papers.

Paper 1 has 85 marks available.

Paper 2 has 80 marks available.

To pass the English exam, a student must get $\frac{2}{3}$ of the total marks.

David's percentage score in Paper 1 is 60%.

How many of the 80 marks does he need in Paper 2 to pass the English exam?

Total = 85 + 80 = 165 marks

$\frac{2}{3}$ × 165 = 110 marks needed to pass

Paper 1: 60% of 85 = 0.6 × 85 = 51 marks

Paper 2: 110 − 51 = 59 marks

Answer *59* [3]

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Question Number	**Marks**
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Examiner Number

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