



General Certificate of Secondary Education
November 2023

Centre Number

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Candidate Number

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Mathematics

Unit M2
(With calculator)

Foundation Tier



[GMC21]

GMC21

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 twenty-nine** 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.

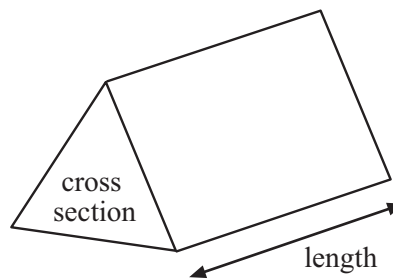


Formula Sheet

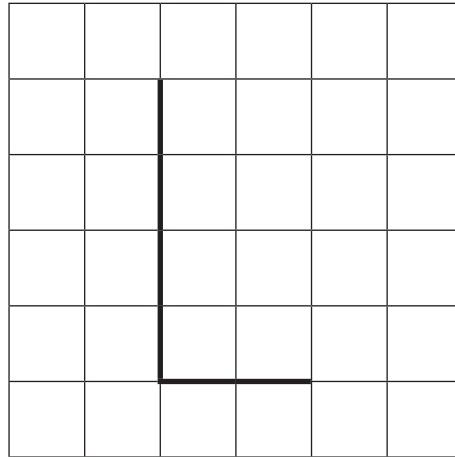
$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$



$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$



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

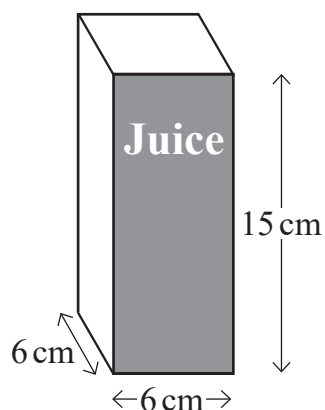


On the grid, complete the quadrilateral so that it has an area of 6 cm^2

[2]



- 2 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?

Answer _____ cm^2 [1]

- (b) Calculate the volume of the juice carton.

Answer _____ cm^3 [2]

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

Is he correct?

Explain your answer clearly.

Answer _____ because _____

[1]



3 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.

Answer _____ [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.

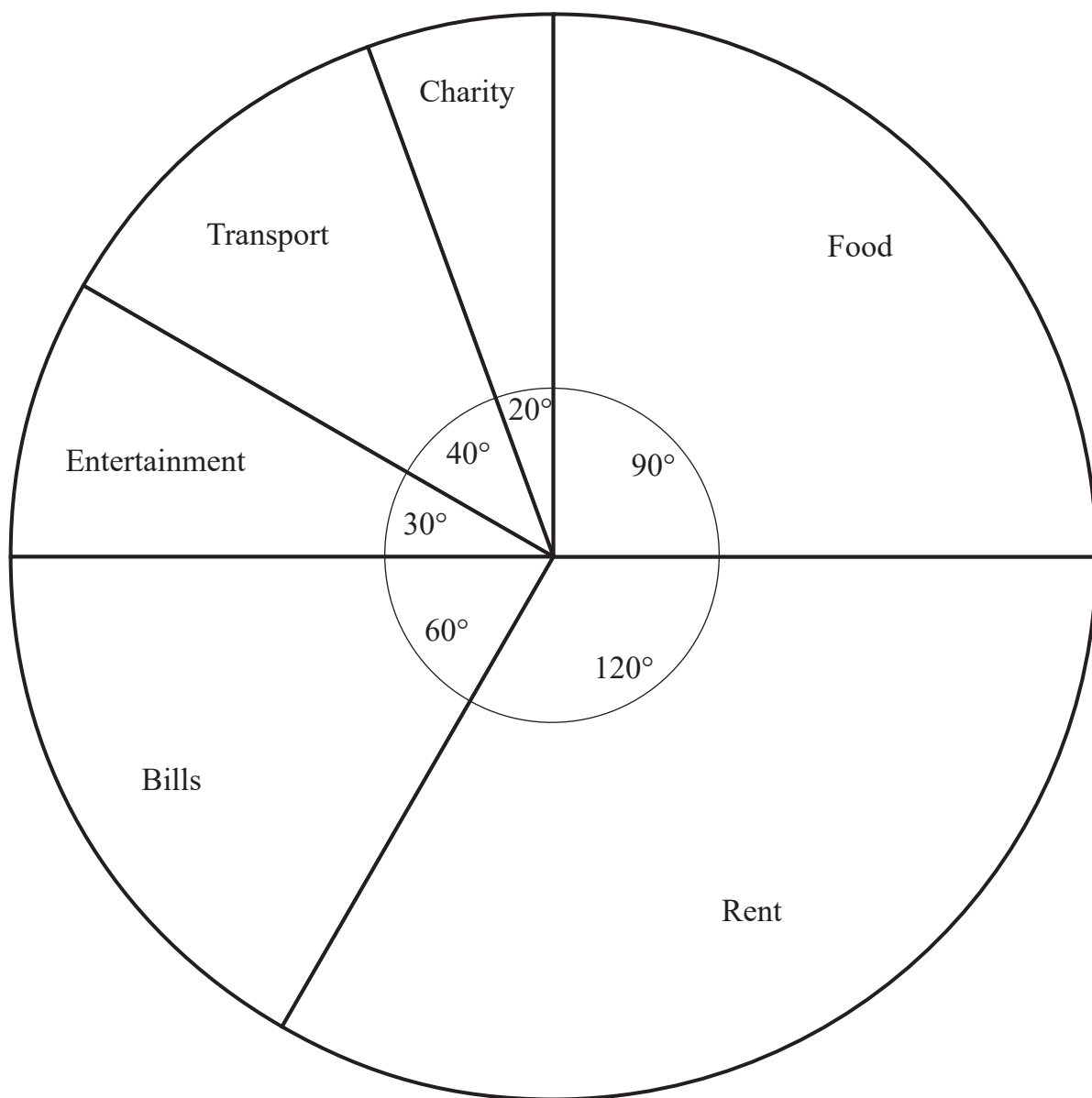
increase decrease stay the same

[1]

[Turn over



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



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

Answer _____ [1]



(b) The family spent £150 on bills.

(i) How much did they spend on entertainment?

Answer £ _____ [1]

(ii) How much did they spend in total?

Answer £ _____ [1]

5 (a) In Belleek the temperature on Monday was -2°C .

On Tuesday the temperature fell by 3°C .

What was the temperature on Tuesday?



Answer _____ $^{\circ}\text{C}$ [1]

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

Mike has the most T-shirts.

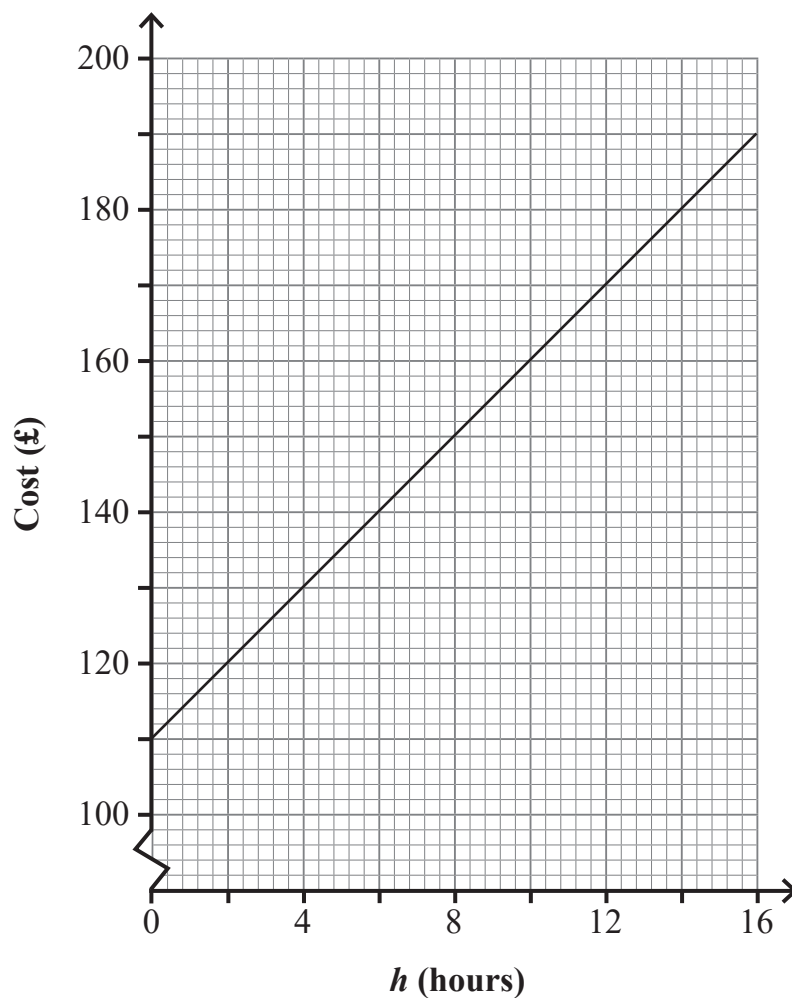
What is the **least** number of T-shirts Mike could have?

Answer _____ [2]

[Turn over



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



(a) What is the cost for 14 hours?

Answer £ _____ [1]

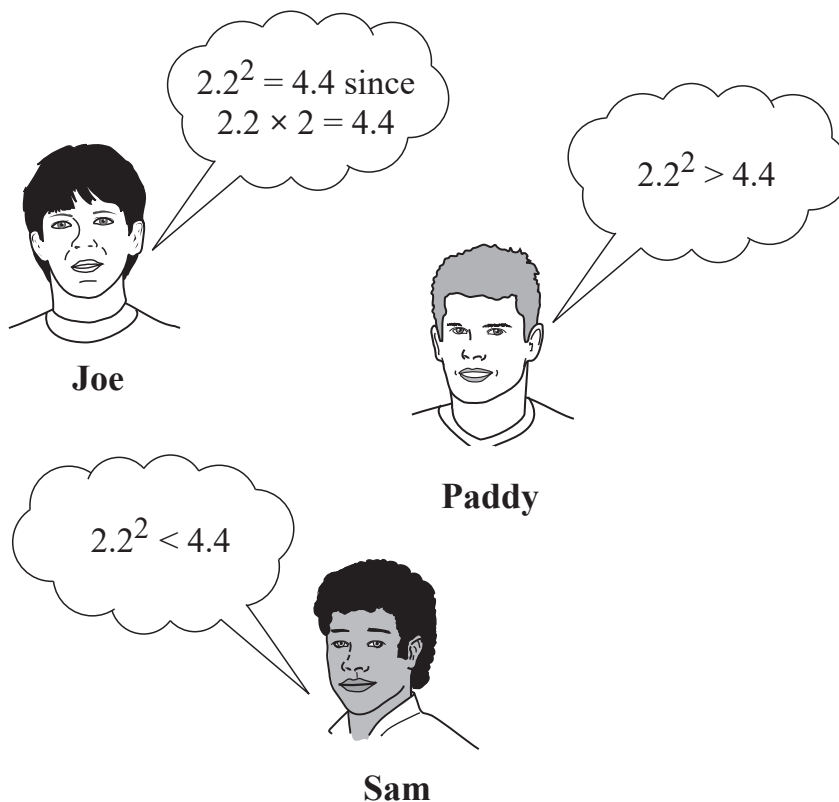
(b) Jim paid £150

How many hours did he hire the party bus for?

Answer _____ hours [1]



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



Answer _____ [1]

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

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

Answer _____ [1]

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

Answer _____ [1]

[Turn over



- 8 (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?

Answer £ _____ [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?

Answer £ _____ [1]



9 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?

Answer _____ [1]

(b) How long does her journey take?

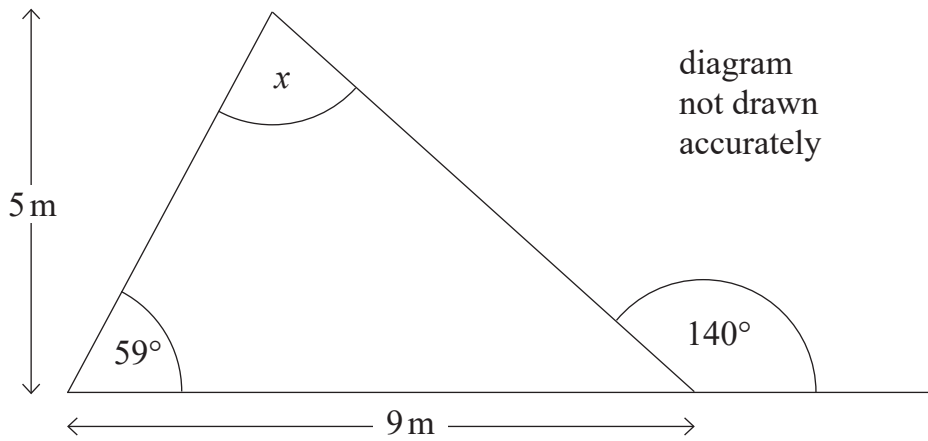
Give your answer in hours and minutes.

Answer _____ hr _____ min [2]

[Turn over



10



(a) Calculate the size of angle x .

Answer _____ ° [3]

(b) Calculate the area of the triangle.

Give the correct unit of measurement with your answer.

Answer _____ [3]



11 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?

Answer _____ seconds [1]

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

Answer _____ 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.

Answer _____ [1]

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

Answer _____ [1]

[Turn over



12 A cashier counted the notes in the till.

Type of note	Number of notes	
£5	12	
£10	9	
£20	3	
£50	1	

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

Answer £ _____ [2]

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

Answer £ _____ [1]

13 From the list

6 15 16 25 27 29 36

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

(b) Which is a multiple of 12? Answer _____ [1]

(c) Which is a power of 2? Answer _____ [1]

(d) Which two numbers have a product of 375? Answer _____ and _____ [1]



14 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?

Answer _____ [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.

Answer _____ [2]

[Turn over



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

Answer _____ [2]

(b) Expand $4(3 - 2p)$

Answer _____ [2]

(c) Factorise $5k + 15$

Answer _____ [1]

16 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 _____ [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 _____ [1]



17 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?

Answer _____ [3]

[Turn over



- 18 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 _____
_____ [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 _____ [1]

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

Qualitative

Quantitative

[1]





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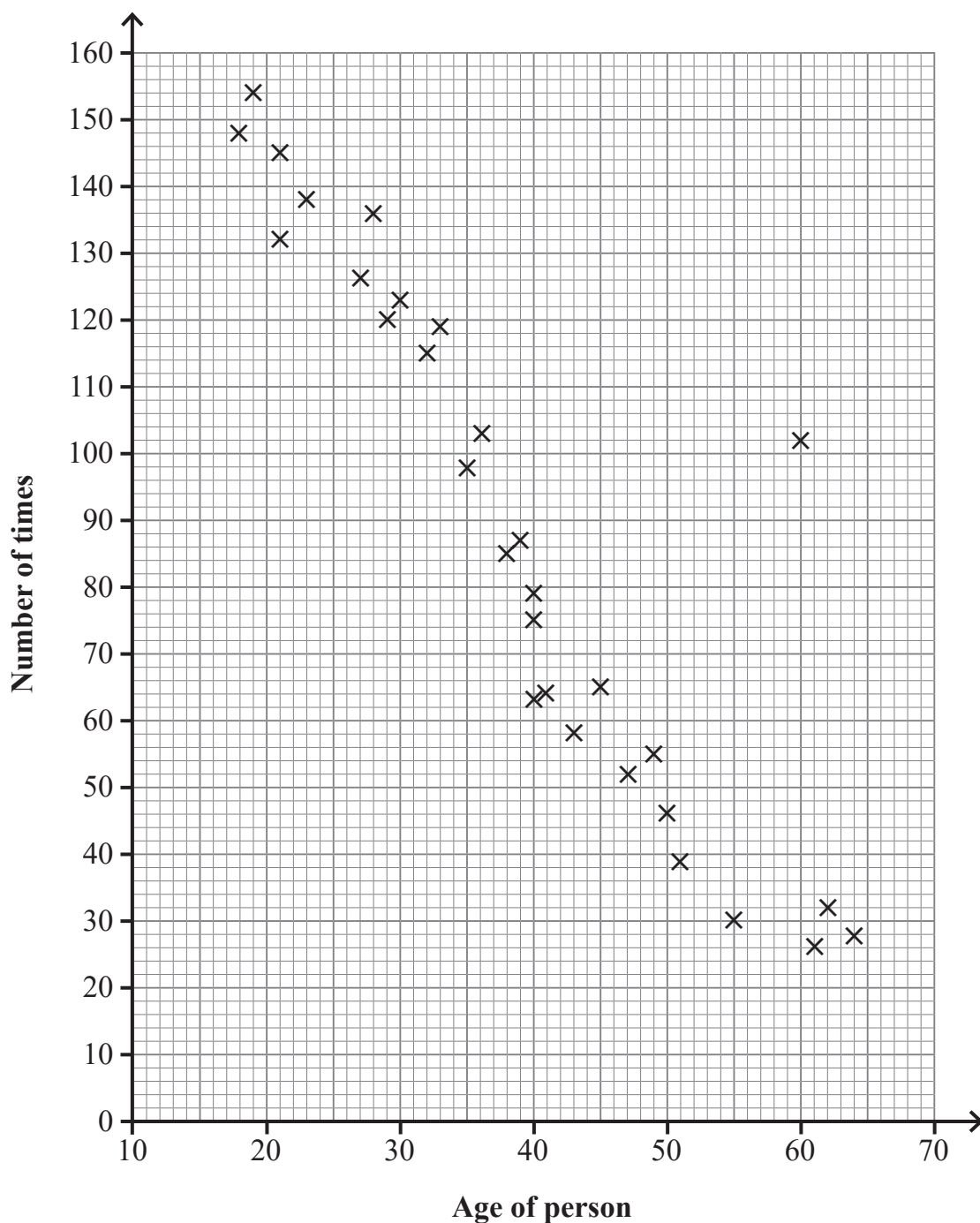
[Turn over

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- 19 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 _____ [1]



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

Answer _____ [1]

(c) Describe the correlation between the age of a person and the number of times they checked their phone.

Answer _____ [1]

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

Answer _____
_____ [1]

(e) Insert the correct word to complete the following sentence.

The data point at (60, 102) is an _____ . [1]

20 Solve $5y + 3 = 2y - 9$

Answer $y =$ _____ [3]

[Turn over]



21 Pete's wage was £480 last week.

£72 was for working overtime.

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

Answer _____ % [3]



22 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?

Answer _____ [3]

[Turn over



- 23 A sports referee trains by running diagonally across a rectangular pitch, as shown in the diagram below.

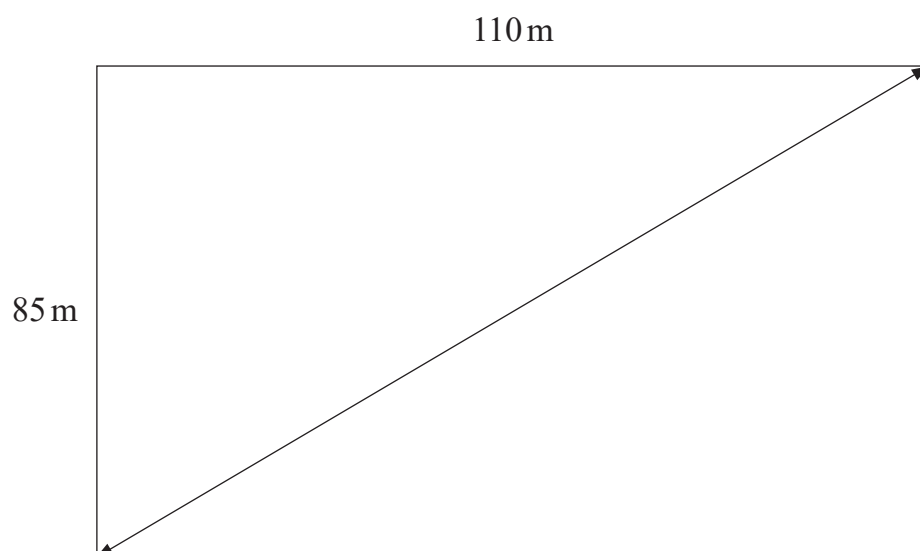


diagram
not drawn
to scale

The referee wants to run a distance of **at least** 1 km.

How many diagonal runs are needed?

Answer _____ [5]



24 Find the area of the kite below.

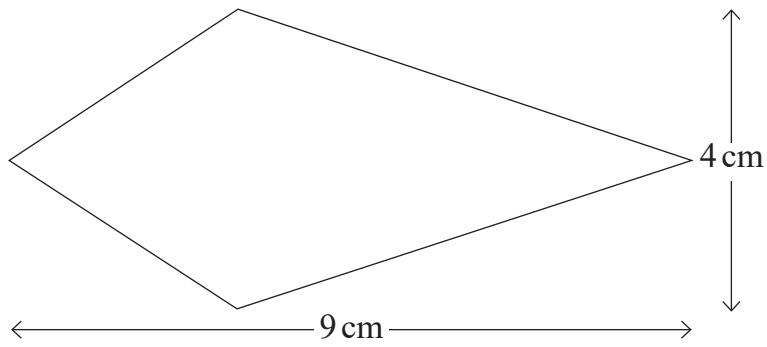


diagram
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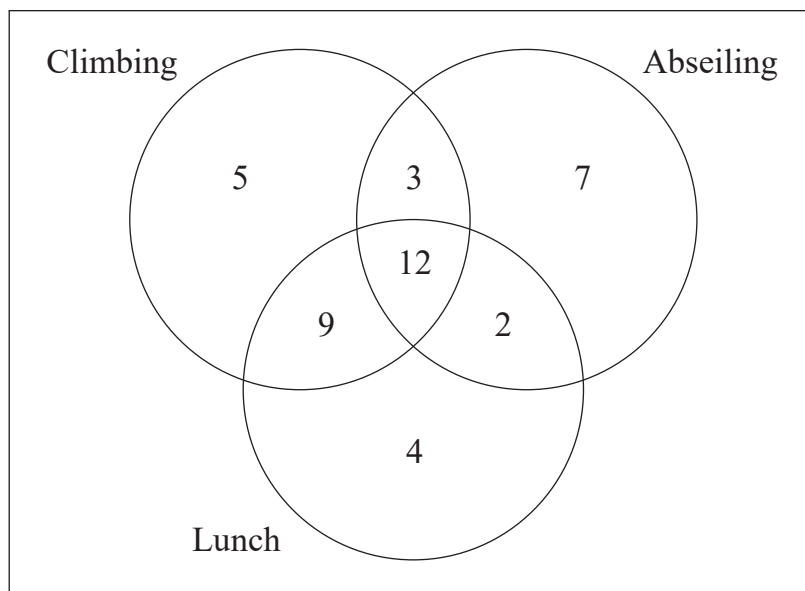
Answer _____ cm^2 [2]



25 A company took 42 employees on a team-building day.

Each person was able to choose which sporting activities to do and whether or not to have lunch.

The Venn diagram shows what choices they made.



(a) How many people did not take part in either of the sporting activities?

Answer _____ [1]

(b) How many people did not have lunch?

Answer _____ [1]



(c) The cost for someone to take part in one sporting activity and have lunch was £16

How much did the company pay for people who took part in one sporting activity and had lunch?

Answer £ _____ [2]

26 C has the coordinates $(-2, 4)$ and D has the coordinates $(8, 7)$.

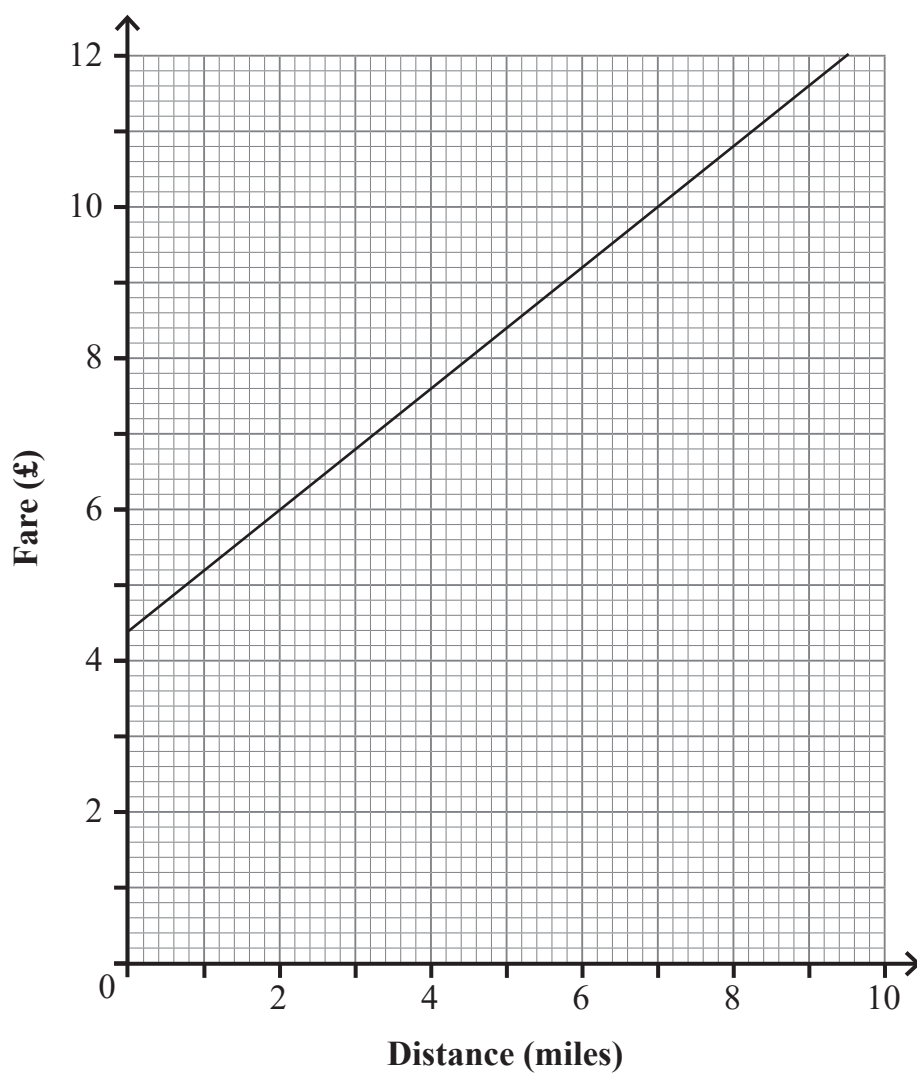
Find the coordinates of the midpoint of the line CD.

Answer (_____ , _____) [2]

[Turn over



27 The graph represents the fare (in £) for a taxi journey of a distance in miles.



(a) Paula was charged £8.40 for her journey to work.

How many miles did Paula travel?

Answer _____ miles [1]

(b) What is the cost per mile charged by the taxi firm?

Answer _____ [2]



28 (a) Raymond's car insurance quote is £1200 for a year.

He is entitled to 30% off for his no claims discount.

If he pays online, he will get a 5% discount off this reduced price.

How much will the online price be?

Answer £ _____ [3]

(b) Raymond's father says the total discount was 35%

Is he correct?

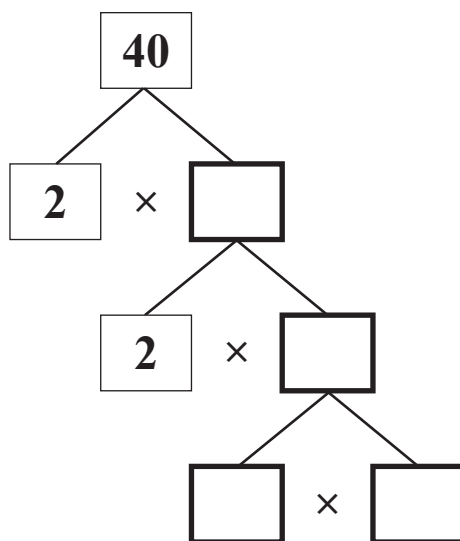
You must show work to justify your answer.

Answer _____ [2]

[Turn over



29 (a) Complete the following to show the prime factor decomposition of 40



[1]

(b) Find the highest common factor (HCF) of 24 and 40

Answer _____ [2]

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