

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname StemUp Model Solution

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Wednesday 14 June 2023

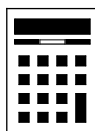
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



J U N 2 3 8 3 0 0 3 F 0 1

Answer **all** questions in the spaces provided.1 (a) Solve $5x = 15$

[1 mark]

$$x = 15 \div 5$$

$$x = 3$$

1 (b) Solve $y + 7 = 50$

[1 mark]

$$y = 50 - 7$$

$$y = 43$$

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

[1 mark]

$$c = 8 \times 4$$

$$c = 32$$



2 Here is a list of numbers.

10 8 2 11 12 15 4 4

2 (a) Write down the mode.

[1 mark]

Answer 4

2 (b) Work out the median.

[2 marks]

2 4 4 8 10 11 12 15

Median = $(8 + 10) \div 2 = 9$

Answer 9

2 (c) Work out the range.

[1 mark]

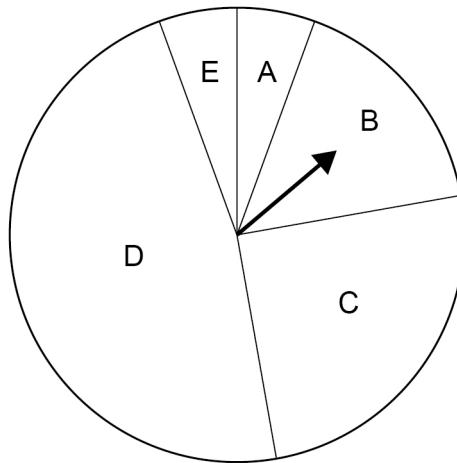
$15 - 2 = 13$

Answer 13

Turn over for the next question



- 3 (a) A fair spinner with five sections is spun.



Complete these statements.

[2 marks]

The spinner is **most likely** to land on section D

The spinner is **equally likely** to land on sections A and E



3 (b) Two different spinners are spun.

One spinner has sections labelled with colours.

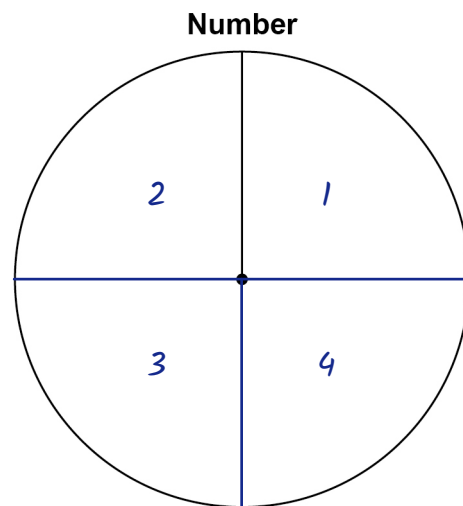
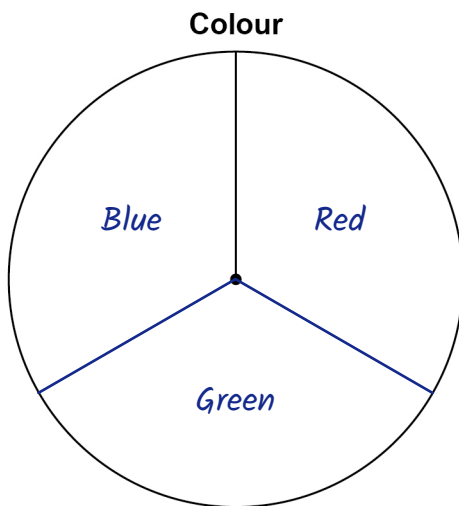
The other spinner has sections labelled with numbers.

Here is a list of **all** the possible outcomes.

Red 1	Red 2	Red 3	Red 4
Blue 1	Blue 2	Blue 3	Blue 4
Green 1	Green 2	Green 3	Green 4

Show the possible sections on the two spinners.

[2 marks]



Turn over for the next question

Turn over ►



- 4 A reel holds 9.5 metres of ribbon.
2 pieces of ribbon are cut from the reel.
Each piece is 20 centimetres long.
What length of ribbon is left on the reel?
State the units of your answer.

[3 marks]

$$9.5 \text{ m} = 9.5 \times 100 = 950 \text{ cm}$$

$$2 \text{ pieces} = 2 \times 20 = 40 \text{ cm}$$

$$950 - 40 = 910 \text{ cm}$$

Answer 910 cm



- 5 (a) The term-to-term rule for a sequence is

subtract 1 then multiply by 5

The 1st term is 4

Work out the 3rd term.

[2 marks]

$$1st\ term = 4$$

$$2nd\ term = (4 - 1) \times 5 = 15$$

$$3rd\ term = (15 - 1) \times 5 = 70$$

Answer 70

- 5 (b) The term-to-term rule for a different sequence is

add 20 then divide by 2

The 2nd term is 50

Work out the 1st term.

[2 marks]

Inverse: multiply by 2 then subtract 20

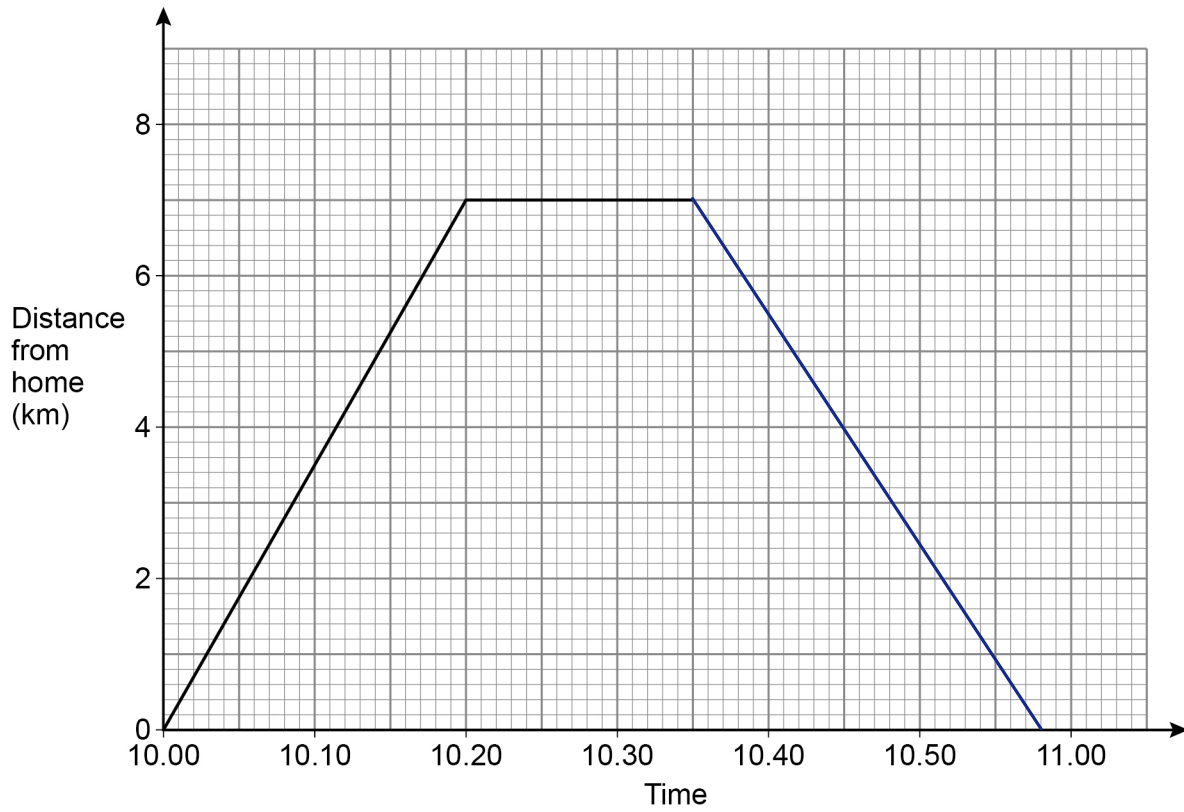
$$50 \times 2 = 100$$

$$100 - 20 = 80$$

Answer 80



- 6** Scarlett leaves home at 10.00 to cycle to the supermarket.
Here is part of a distance-time graph of her trip to the supermarket.



- 6 (a)** She arrives at the supermarket at 10.20
How far is the supermarket from her home?

[1 mark]

Answer 7 km

- 6 (b)** She leaves the supermarket at 10.35
How long does she stay at the supermarket?

[1 mark]

Answer 15 minutes



- 6 (c)** Scarlett cycles home at a constant speed using the same route.
It takes her 3 minutes longer than her journey to the supermarket.
Complete the distance-time graph.

[2 marks]

Journey there took 20 minutes, so home takes $20 + 3 = 23$ minutes

Leaves at 10.35, so arrives home at 10.58

- 7** This week, Liam works
25 hours at £10.20 per hour
and
extra hours at the weekend at £11.80 per hour.

Here are the extra hours he works at the weekend.

Saturday	7 am to 10 am
Sunday	1 pm to 3 pm

In **total**, how much is he paid this week?

[4 marks]

Basic pay: $25 \times £10.20 = £255$

Saturday 7am to 10am = 3 hours

Sunday 1pm to 3pm = 2 hours

Extra hours = $3 + 2 = 5$ hours

Extra pay: $5 \times £11.80 = £59$

Total = $£255 + £59 = £314$

Answer £ 314.00

Turn over ►

- 8 Three oranges have masses of 60 g, 70 g and 85 g

Show that their **total** mass is between $\frac{1}{5}$ and $\frac{1}{4}$ of a kilogram.

[3 marks]

$$\text{Total mass} = 60 + 70 + 85 = 215 \text{ g}$$

$$\frac{1}{5} \text{ of a kilogram} = 1000 \div 5 = 200 \text{ g}$$

$$\frac{1}{4} \text{ of a kilogram} = 1000 \div 4 = 250 \text{ g}$$

$$200 \text{ g} < 215 \text{ g} < 250 \text{ g, so the total is between } \frac{1}{5} \text{ and } \frac{1}{4} \text{ of a kg}$$

- 9 For each statement, tick the correct box.

[3 marks]

	Always true	Sometimes true	Never true
One of the three angles of a triangle is 90°	☐	☒	☐
One of the three angles of a triangle is obtuse	☐	☒	☐
One of the three angles of a triangle is reflex	☐	☐	☒



10 (a) Simplify fully $p^2 \times p$

[1 mark]

$$p^2 \times p = p^{2+1}$$

Answer p^3

10 (b) Simplify fully $3a + 5c - a + 6c$

[2 marks]

$$3a - a = 2a \quad 5c + 6c = 11c$$

Answer $2a + 11c$

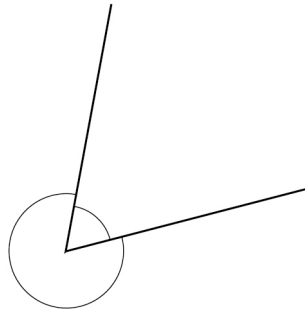
Turn over for the next question

Turn over ►



11

Two angles around a point are shown.

Not drawn
accuratelyThe angles are in the ratio $2 : 7$ Show that the larger angle is 280° **[2 marks]**

$$2 + 7 = 9 \text{ parts}$$

Angles around a point add up to 360°

$$360 \div 9 = 40^\circ \text{ for 1 part}$$

$$\text{Larger angle} = 7 \times 40 = 280^\circ$$

$$\text{Check: smaller angle} = 2 \times 40 = 80^\circ, \quad 80 + 280 = 360^\circ$$



12 (a) $c > 4$ $d < 4$ $c - d = 6$

Work out a possible pair of values for c and d .

[2 marks]

$$c = 9 \text{ which is greater than } 4, \quad d = 3 \text{ which is less than } 4$$

$$c - d = 9 - 3 = 6$$

$$c = \underline{\quad 9 \quad} \quad d = \underline{\quad 3 \quad}$$

12 (b) w is greater than 1 **and** less than 2
 x is greater than 0 **and** less than 1

$$w + x = 2.6$$

Work out a possible pair of values for w and x .

[2 marks]

$$w = 1.9 \text{ (between 1 and 2)}, \quad x = 0.7 \text{ (between 0 and 1)}$$

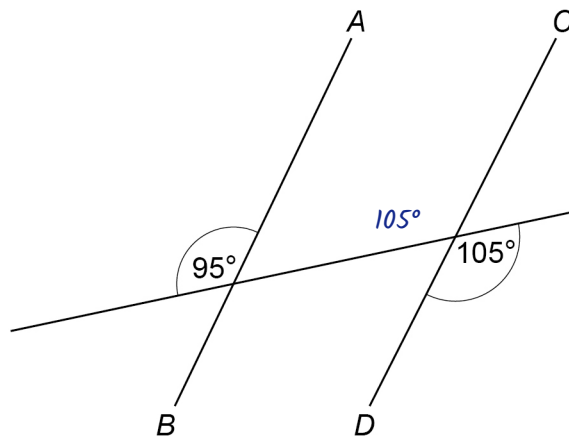
$$w + x = 1.9 + 0.7 = 2.6$$

$$w = \underline{\quad 1.9 \quad} \quad x = \underline{\quad 0.7 \quad}$$



13

Here are three straight lines.

Not drawn
accuratelyAre the lines AB and CD parallel?

Tick a box.

Yes

☐

No

☒

Show working to support your answer.

[2 marks]

Vertically opposite angles are equal, so the angle above the line

on the left of CD is also 105° (marked on the diagram).

This corresponds to the 95° angle at AB , but $95^\circ \neq 105^\circ$.

Corresponding angles are not equal, so AB and CD are not parallel.

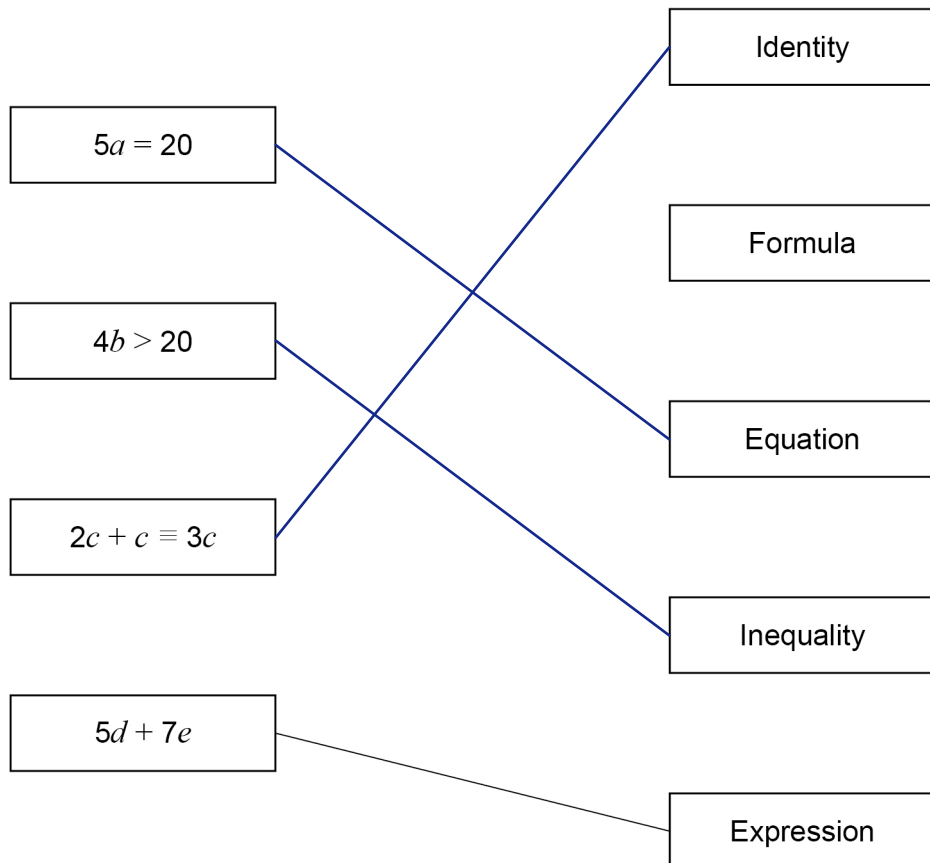


14

Match the algebra to the correct description.

One has been done for you.

[3 marks]



Turn over for the next question

5

Turn over ►



15

Popcorn is sold in bags.

8 small bags have a total mass of 496 g

5 small bags and 2 large bags have a total mass of 638 g

Work out the mass of a large bag.

[4 marks]

$$1 \text{ small bag} = 496 \div 8 = 62 \text{ g}$$

$$5 \text{ small bags} = 5 \times 62 = 310 \text{ g}$$

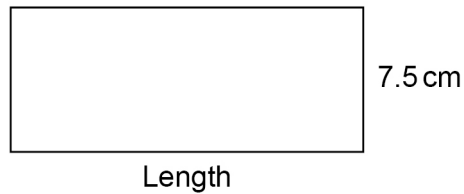
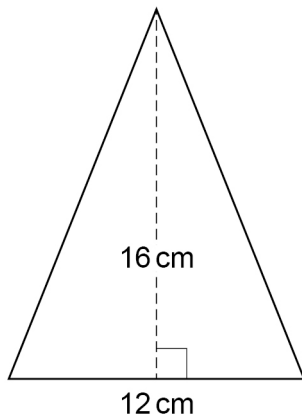
$$2 \text{ large bags} = 638 - 310 = 328 \text{ g}$$

$$1 \text{ large bag} = 328 \div 2 = 164 \text{ g}$$

Answer 164 g

16

The rectangle and the triangle have the same area.

Not drawn
accurately

Work out the length of the rectangle.

[3 marks]

$$\text{Area of triangle} = \frac{1}{2} \times 12 \times 16 = 96 \text{ cm}^2$$

$$\text{Area of rectangle} = 96 \text{ cm}^2$$

$$\text{Length} = 96 \div 7.5 = 12.8 \text{ cm}$$

Answer 12.8 cm

Turn over for the next question

Turn over ►



- 17** Match the name to the correct sequence.
One has been done for you.

[2 marks]

Name	Sequence
Quadratic sequence	4, 5, 9, 14, 23...
Linear sequence	-3, 1, 5, 9, 13...
Fibonacci-type sequence	-4, -1, 1, 5, 12...
	8, 11, 16, 23, 32...

(Handwritten blue lines connect 'Quadratic sequence' to '8, 11, 16, 23, 32...', 'Linear sequence' to '-3, 1, 5, 9, 13...', and 'Fibonacci-type sequence' to '-4, -1, 1, 5, 12...')

- 18** The number of hedgehogs in England is expected to **reduce** by 4% each year.
Assume there are now 1 000 000 hedgehogs in England.
Work out the expected number of hedgehogs in England after **five** years.
You **must** show your working.

[3 marks]

$$\text{Reduce by 4\%: multiplier} = 1 - 0.04 = 0.96$$

$$\text{After 5 years: } 1\,000\,000 \times 0.96^5$$

$$= 815\,372.6976$$

$$= 815\,373 \text{ hedgehogs (to the nearest whole number)}$$

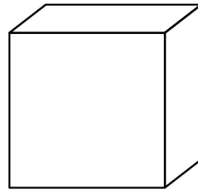
Answer 815 373



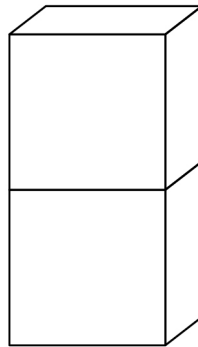
19

Here is cuboid A.

A

Cuboid B is made from **two** of cuboid A.

B



volume of A : volume of B = 1 : 2

Matthew says,

“surface area of A : surface area of B must be 1 : 2 because B is made of 2 of A.”

Is Matthew correct?

Tick **one** box.
☐

Yes

☒

No

☐

Cannot tell

Give a reason for your answer.

[2 marks]

No. When the two cuboids are joined, one face of each cuboid

is hidden where they touch, so two faces are covered.

If A has 6 faces, B only has $6 + 6 - 2 = 10$ faces on show,

so the ratio of surface areas is $6 : 10 = 3 : 5$, not $1 : 2$.



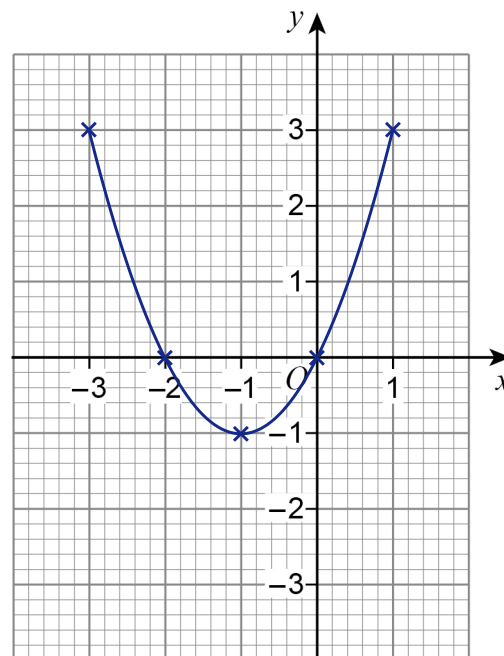
20 (a) Complete the table of values for $y = x^2 + 2x$

[2 marks]

x	-3	-2	-1	0	1
y	3	0	-1	0	3

20 (b) Draw the graph of $y = x^2 + 2x$ for values of x from -3 to 1

[2 marks]



21

Jing has £2450

She saves some and gives the rest to her four brothers.

money saved : money given to brothers = 2 : 5

She gives each of her **four** brothers the **same** amount.

Does each brother receive more than £430 ?

You **must** show your working.**[4 marks]**

$$\text{Total parts} = 2 + 5 = 7$$

$$1 \text{ part} = 2450 \div 7 = \text{£}350$$

$$\text{Given to brothers} = 5 \times 350 = \text{£}1750$$

$$\text{Each brother} = 1750 \div 4 = \text{£}437.50$$

$$\text{£}437.50 > \text{£}430$$

Yes, each brother receives more than £430

Turn over for the next question

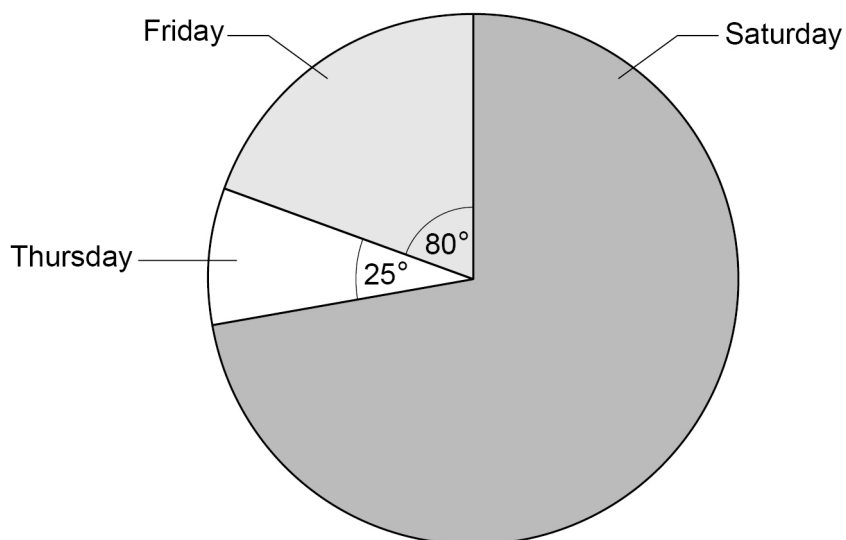
Turn over ►



22

The pie chart shows information about people at a fair during three days.

Not drawn
accurately



There were 132 **more** people on Friday than on Thursday.

Work out the number of people on Saturday.

[3 marks]

$$\text{Friday} - \text{Thursday} = 80^\circ - 25^\circ = 55^\circ$$

55° represents 132 people

$$1^\circ = 132 \div 55 = 2.4 \text{ people}$$

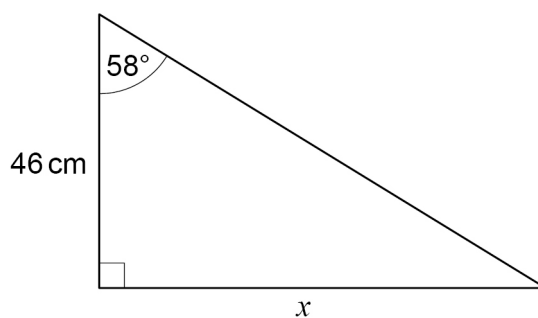
$$\text{Saturday} = 360^\circ - 80^\circ - 25^\circ = 255^\circ$$

$$255 \times 2.4 = 612 \text{ people}$$

Answer 612



23

Use trigonometry to work out the value of x .Not drawn
accurately

[3 marks]

$$\tan 58^\circ = \text{opp} \div \text{adj} = x \div 46$$

$$x = 46 \times \tan 58^\circ$$

$$x = 73.6153883\dots$$

$$x = 73.6 \text{ (1 dp)}$$

$$x = \underline{\quad 73.6 \quad} \text{ cm}$$

Turn over for the next question

Turn over ►



24 Millie is estimating the value of $\frac{1}{(\sqrt[3]{8.34})^2 \times 10.21}$

She rounds each decimal number to 1 significant figure.

24 (a) Work out Millie's estimate.

You **must** show your working.

[2 marks]

$$8.34 \approx 8 \text{ and } 10.21 \approx 10 \text{ (1 significant figure)}$$

$$\sqrt[3]{8} = 2, \text{ so } (\sqrt[3]{8})^2 = 2^2 = 4$$

$$\text{Estimate} = 1 \div (4 \times 10) = 1 \div 40$$

$$= 0.025$$

Answer 0.025

24 (b) Millie says,

"My estimate must be more than the exact value."

Without working out the exact value, give a reason how she can know this.

[1 mark]

Both 8.34 and 10.21 were rounded down, so her denominator

is smaller than the exact one. Dividing 1 by a smaller number

gives a bigger answer, so the estimate is more than the exact value.



25 (a) Factorise $x^2 + 8x + 15$

[2 marks]

Two numbers that multiply to 15 and add to 8: 3 and 5

Answer $(x + 3)(x + 5)$

25 (b) Write down the **two** solutions of $(y + 2)(y - 4) = 0$

[1 mark]

Answer $y = -2, y = 4$

END OF QUESTIONS



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outside the
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ANSWER IN THE SPACES PROVIDED**



Question number	Additional page, if required. Write the question numbers in the left-hand margin.
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2 8



2 3 6 6 8 3 0 0 / 3 F