



Model Solutions

Please write clearly in block capitals.

Centre number

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Surname _____

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GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Tuesday 12 June 2018

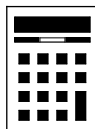
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



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.
- 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	
26–27	
TOTAL	

Advice

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



JUN1883003F01

Answer **all** questions in the spaces provided

1 Circle the value of the digit 7 in 9.17

$$0.07 = \frac{7}{100}$$

[1 mark]

$\frac{1}{70}$

$\frac{1}{7}$

$\frac{7}{10}$

$\frac{7}{100}$

2 Solve $3x = 2$

Circle your answer.

$$\begin{aligned} 3x &= 2 \\ \div 3 &\quad \div 3 \\ \hline x &= \frac{2}{3} \end{aligned}$$

[1 mark]

$x = -1$

$x = \frac{2}{3}$

$x = \frac{3}{2}$

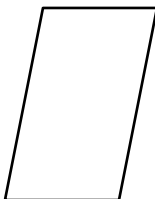
$x = 6$

3 Which of these shapes has **no** lines of symmetry?

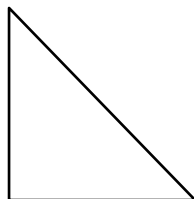
Circle the correct letter.

[1 mark]

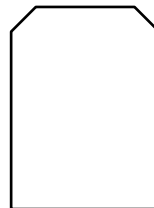
A



B



C



D



(all others have at least
one line of symmetry).



4 Circle the shortest length.

[1 mark]

1200 cm

0.13 km

110 m

140 000 mm

$$0.13 \text{ km} = 130 \text{ m}$$

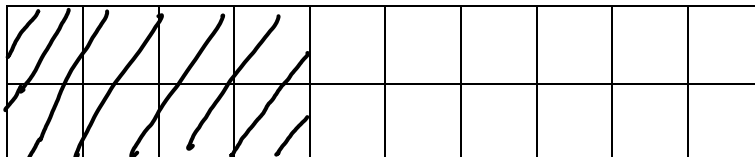
$$= 13000 \text{ cm}$$

$$110 \text{ m} = 11000 \text{ cm}$$

$$140000 \text{ mm} = 14000 \text{ cm}$$

5 (a) Shade $\frac{2}{5}$ of this grid.

[1 mark]



$$2 \times 10 = 20 \text{ Squares in total}$$

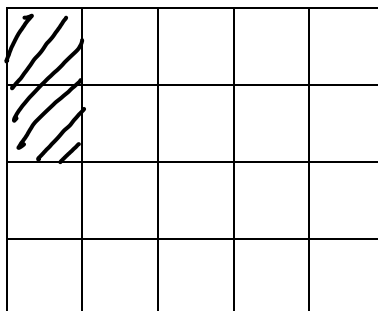
$$\frac{2}{5} \times 20 = 8 \text{ Shaded.}$$

5 (b) Shade 10% of this grid.

[1 mark]

$$5 \times 4 = 20 \text{ Squares in total}$$

$$\frac{10}{100} \times 20 = 2 \text{ Shaded}$$



6 Saj wants to go to all 19 home games at a football club.

For each game, a ticket costs £28

A season ticket

costs £379

and

gives entry to all 19 home games.

In total, how much does Saj save by buying a season ticket?

[3 marks]

Cost of buying all : $19 \times £28 = £532$
tickets individually

Amount : $532 - 379 = £153$

Saved

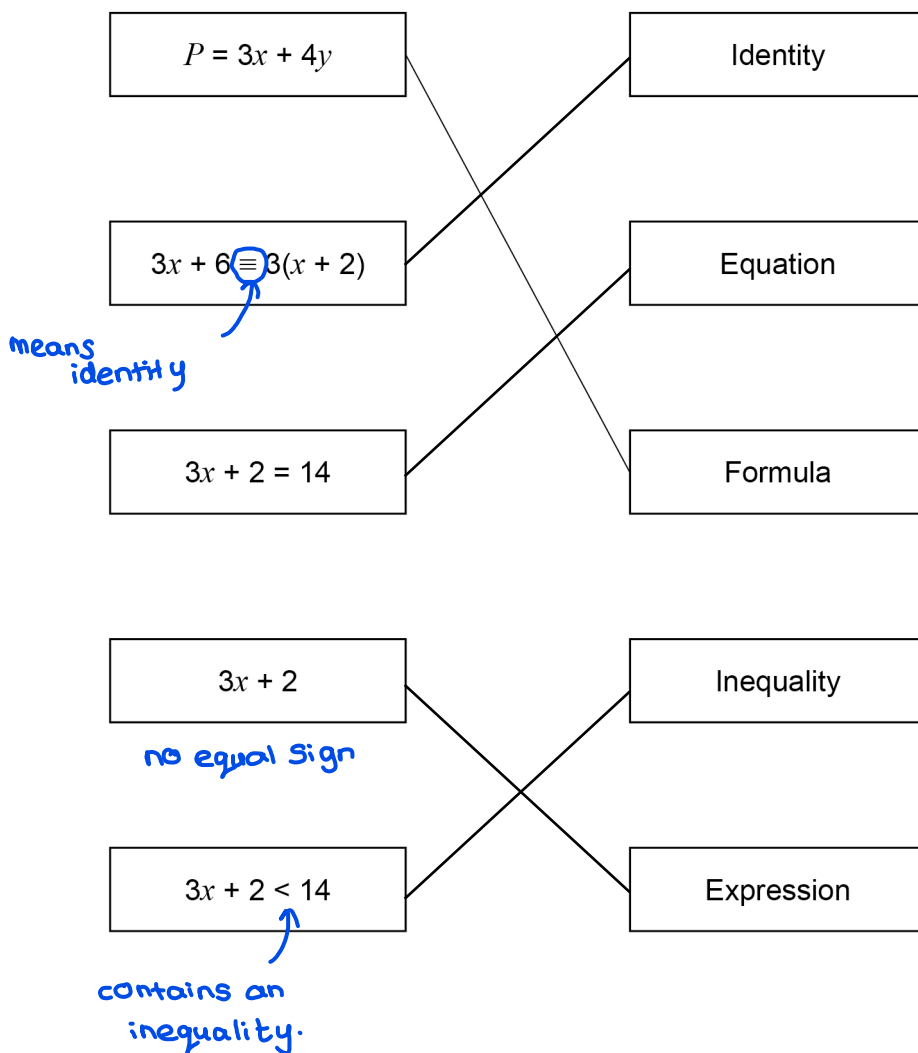
Answer £ 153



7 Link the algebra to the correct description.

One has been done for you.

[3 marks]



Turn over for the next question



8

Jim has six banknotes.

The value of each note is £5 or £10 or £20

He **can** make £20 with three notes. : $5 + 5 + 10$ He **can** make £55 with four notes. : $5 + 10 + 20 + 20$ He **cannot** make £25 with three notes.He **cannot** make £25 with four notes.

List the six notes.

[2 marks]

x can't make £25 with 3 notes: $\neq \pounds 10 + \pounds 10 + \pounds 5$ \therefore only one $\pounds 10$ note

x can't make £25 with 4 notes: $\neq \pounds 5 \times 3 + \pounds 10$ \therefore only two $\pounds 5$ notes

These combinations are not possible.

£ 5

£ 5

£ 10

£ 20

£ 20

£ 20



- 9 A music app has a shuffle play function.
This means that songs are played in a random order **without repeat**.

- 9 (a) Ruth puts 10 songs on shuffle play.
One of them is her favourite song.
Write down the probability that her favourite song plays first.

[1 mark]

Answer $\frac{1}{10}$

- 9 (b) Ted puts songs A, B and C on shuffle play.
List all the possible orders of songs A, B and C.
One has been done for you.

[2 marks]

A B C

B A C

C A B

A C B

B C A

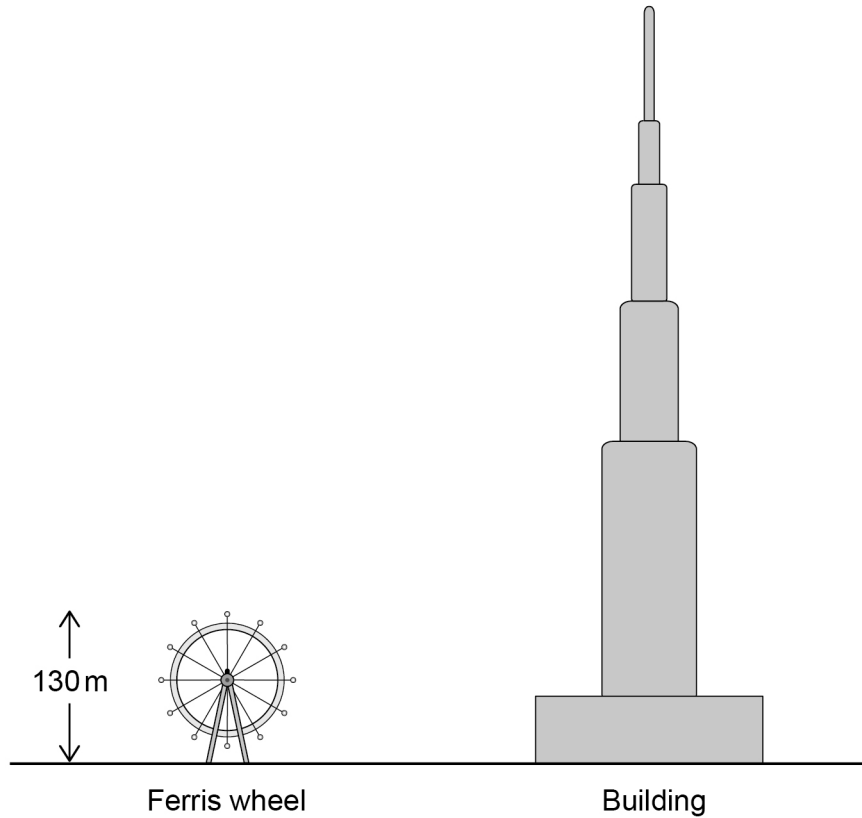
C B A

(no repeats)

Turn over for the next question



10 Here is a scale drawing.



The Ferris wheel has a height of 130 m

Work out the height of the building.

[3 marks]

measure heights using a ruler :

Ferris wheel = 2cm Building = 10cm



2cm represents = 130m

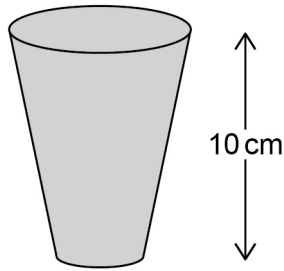
1cm represents = 65m

height of building = $10 \times 65\text{m} = 650\text{m}$

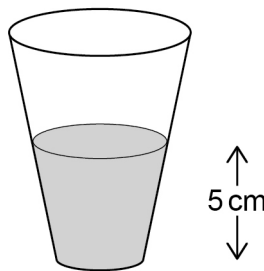
Answer 650 m



11 Jo has a full cup of coffee.



She drinks some of it.



She says,

“Half of the coffee is still in the cup, because 5 cm is half of 10 cm”

Is she correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

The radius of the cup is not constant
throughout its height.

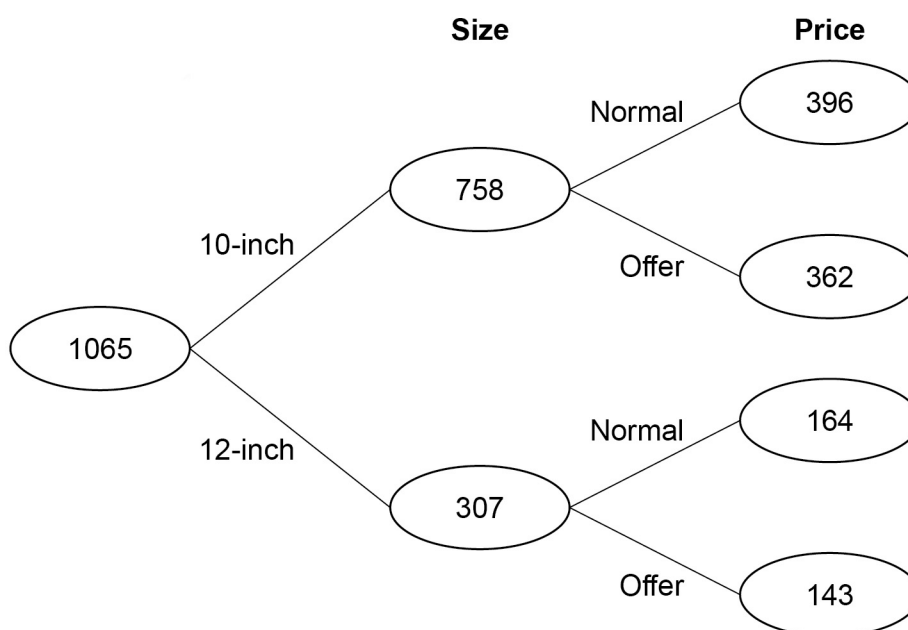


- 12** A takeaway sells 10-inch pizzas and 12-inch pizzas.
Here is some information about the numbers sold in two weeks.

Week 1

10-inch	512
12-inch	231
Total	743

Week 2



- 12 (a)** In each week a proportion of the pizzas sold were 10-inch.

In which week was this proportion greater?

Show working to support your answer.

[2 marks]

$$\text{week 1: } \frac{512}{743} = 0.689$$

$$\text{week 2: } \frac{758}{1065} = 0.712$$

$$0.712 > 0.689$$

Answer Week 2



12 (b) The table shows the profit or loss the takeaway makes on each pizza.

	Normal price	Offer price
10-inch	£3.74 profit	51p loss
12-inch	£5.29 profit	4p loss

In week 1 the total profit was £1895.55

At the end of week 1 the takeaway spent £175 on adverts.

Was the **increase** in profit in week 2 more than the cost of the adverts?

You **must** show your working.

[4 marks]

Profit in week 2:

$$396 \times £3.74 = £1481.04$$

$$164 \times £5.29 = £867.56$$

} Normal price

$$362 \times £0.51 = £184.62$$

$$143 \times £0.04 = £5.72$$

} Loss due to offers

$$\text{profit in week 2: } 1481.04 + 867.56 - 184.62 - 5.72$$

$$= £2158.26$$

$$\text{Increase in profit} = 2158.26 - 1895.55$$

$$\text{profit in week 2} = £262.71 > £175$$

↖ cost of adverts.

Answer Yes



13 A car travels 3.5 miles in 5 minutes.

Work out the average speed in miles per hour.

[3 marks]

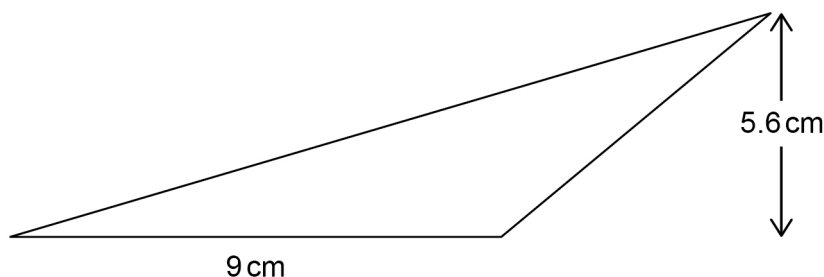
$$5 \text{ minutes} = \frac{5}{60} = \frac{1}{12} \text{ hours}$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{3.5 \text{ miles}}{\frac{1}{12} \text{ hrs}} = 3.5 \times 12 = 42 \text{ mph}$$

Answer 42 mph

14 A triangle has base 9 cm and perpendicular height 5.6 cm

Not drawn
accurately



Work out the area of the triangle.

[2 marks]

$$\text{area} = \frac{1}{2}(9 \times 5.6) = 25.2$$

Area of a triangle = $\frac{1}{2}$ (base \times perpendicular height).

Answer 25.2 cm²



15 Four positive whole numbers add up to 36
One of the numbers is a multiple of 7
The other three numbers are equal.

Work out the result when the four numbers are multiplied.

[3 marks]

$$\begin{array}{l} 36 - 7 = 29 \\ 36 - 14 = 22 \\ 36 - 21 = 15 \end{array} \left. \vphantom{\begin{array}{l} 36 - 7 = 29 \\ 36 - 14 = 22 \\ 36 - 21 = 15 \end{array}} \right\} 29, 22 \text{ are not divisible by } 3.$$
$$\uparrow \quad \rightarrow \quad \frac{15}{3} = 5, \text{ the other 3 numbers are all } 5.$$

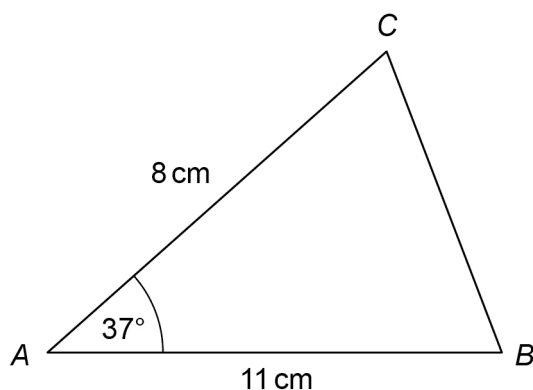
The multiple of 7 is 21

$$21 \times 5 \times 5 \times 5 = 2625$$

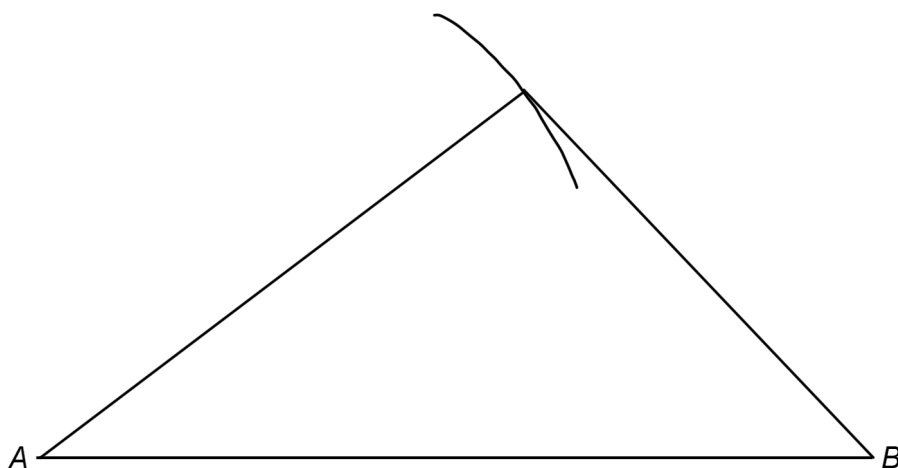
Answer 2625



16

A sketch of triangle ABC is shown.Not drawn
accuratelyIn the space below, complete an accurate drawing of triangle ABC .**[2 marks]**

- x Use compass to draw an arc of radius 8 cm .
- x Use protractor to find point on arc that makes an angle of 37° with AB .
- x Join this point to B to complete the triangle.



17 Simplify $7x - (3x - 2x)$
Circle your answer.

$$= 7x - 3x + 2x = 6x \quad [1 \text{ mark}]$$

$7x - 1$

$2x$

$6x$

$8x$

18 A competition
took place in 1983
takes place every six years.

Circle the year in which it will also take place.

[1 mark]

2083

2036

2049

2023

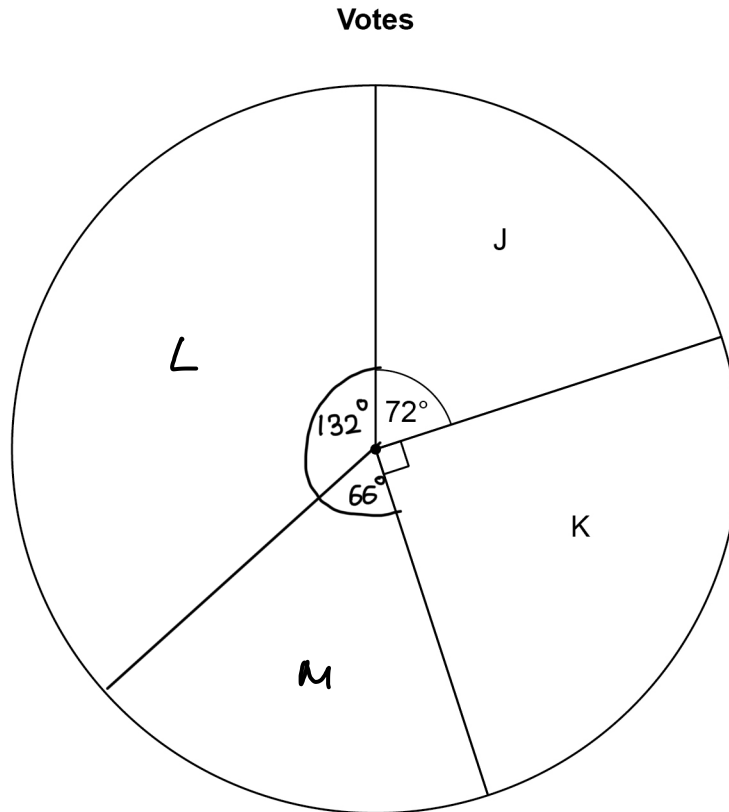
1983
1989
1995
2001
2007
2013
2019
2025
2031
2037
2043
2049

+6

Turn over for the next question



- 19 In an election there were four candidates, J, K, L and M.
Fran is drawing a pie chart to show the results.
The sectors for J and K have been drawn.



- 19 (a) Twice as many people voted for L as voted for M.
Complete the pie chart.

[3 marks]

$$360 - (72 + 90) = 360 - 72 - 90 = 198^\circ \leftarrow \text{remain (L+M)}$$

$$L : M$$

$$2 : 1 \rightarrow 3 \text{ parts ; } \frac{198}{3} = 66^\circ \text{ per part}$$

$$132^\circ : 66^\circ$$



19 (b) Altogether, 16 200 people voted.

How many voted for J?

$$\frac{72}{360} \times 16200 = 3240 \text{ people}$$

[2 marks]

Fraction of circle represented by J

Answer 3240

20 The probability that A is the outcome of an experiment is 0.2

Circle the probability that A is **not** the outcome.

[1 mark]

$$1 - 0.2 = 0.8$$

0

0.2

0.5

0.8

21 Rearrange $e = 2f$ to make f the subject.

Circle your answer.

[1 mark]

$$\begin{aligned} e &= 2f \\ \div 2 \quad \left(\frac{e}{2} = f \right) \quad \div 2 \end{aligned}$$

$$f = 2e$$

$$f = \frac{2}{e}$$

$$f = e - 2$$

$$f = \frac{e}{2}$$

Turn over for the next question



22 Here is a rule for a sequence.

After the first two terms, each term is half the sum of the previous two terms

22 (a) Here is a sequence that follows this rule.

2 10 6 8 7

Show that the 6th term is the first one that is **not** a whole number.

[3 marks]

$$4^{\text{th}} \text{ term} = \frac{10+6}{2} = \frac{16}{2} = 8$$

$$5^{\text{th}} \text{ term} = \frac{6+8}{2} = \frac{14}{2} = 7$$

$$6^{\text{th}} \text{ term} = \frac{8+7}{2} = \frac{15}{2} = 7.5$$

↑ Not a whole number



22 (b) A different sequence follows the same rule.

The 1st term is 4

The 3rd term is 9.5

4 9.5

Work out the 2nd term.

[3 marks]

$$\frac{4 + 2^{\text{nd}} \text{ term}}{2} = 9.5$$

$\times 2$ (left arrow) $\times 2$ (right arrow)

$$4 + 2^{\text{nd}} \text{ term} = 19$$

-4 (left arrow) -4 (right arrow)

$$2^{\text{nd}} \text{ term} = 15$$

Answer 15

Turn over for the next question



23

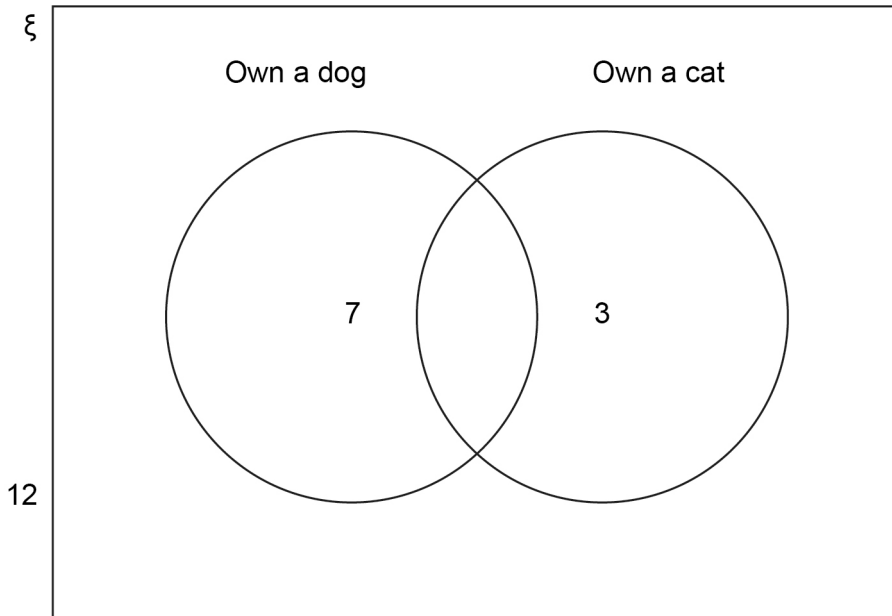
In a group of 20 people

7 own a dog

3 own a cat

12 do not own a dog or a cat.

Aidan shows this information on a Venn diagram.



Make **two** criticisms of his Venn diagram.

[2 marks]

Criticism 1 12 should be inside the rectangle
(but outside the circles).

Criticism 2 The numbers add up to 22, not 20. Therefore
there should be a number in the overlapping
parts.



24

a is a common factor of 72 and 120

b is a common multiple of 6 and 9

Work out the highest possible value of $\frac{a}{b}$

[4 marks]

	<u>72</u>		<u>120</u>	common	: 18, 36, 54, ...
1	72	1	120	multiples	of 6 and 9
2	36	2	60		
3	24	3	40		
4	18	4	30		
6	12	5	24		\therefore largest value of $\frac{a}{b} = \frac{24}{18}$
8	9	6	20		$= \frac{4}{3}$
		8	15		
		10	12		

factors in common: 1, 2, 3, 4, 6, 8, 12, 24 ← Highest

Answer $\frac{4}{3}$

Turn over for the next question

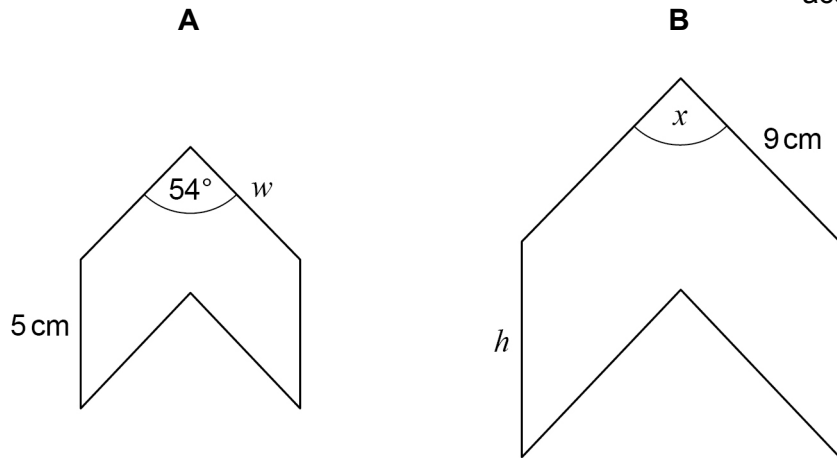


25

A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

Not drawn
accurately



Work out the values of x , h and w .

[3 marks]

$x = 54^\circ$ ← angle stays the same when enlarged.

$9 = w \times 1.5 \rightarrow w = \frac{9}{1.5} = 6 \text{ cm}$

$h = 5 \times 1.5 = 7.5 \text{ cm}$

$x = 54$ degrees

$h = 7.5$ cm

$w = 6$ cm



- 26 Investment A Save £150 per month for 2 years.
2.5% interest is added to the total amount saved.
- Investment B Invest £3500
Compound interest is added at 3% per year.

After 2 years, how much **more** is investment B worth than investment A?

[4 marks]

Investment A:

$$\text{Saved} \Rightarrow 150 \times 12 \times 2 = \text{£}3600$$

$$+ \text{Interest} \Rightarrow 3600 \times 1.025 = \text{£}3690$$

Investment B: *← compound interest for 2 years.*

$$3500 \times (1.03)^2 = \text{£}3713.15$$

$$\therefore 3713.15 - 3690 = 23.15$$

↑
B

↑
A

Answer £ 23.15

Turn over for the next question



27 (a) Show that the lines $y = 3x + 7$ and $2y - 6x = 8$ are parallel.

Do **not** use a graphical method.

$$y = mx + c$$

↑
gradient

[3 marks]

Gradient of $y = 3x + 7 \Rightarrow 3$

Gradient of $2y - 6x = 8$

$$2y = 8 + 6x$$

$$y = 3x + 4 \Rightarrow \text{gradient is } 3$$

They have the same gradient, so are parallel.

27 (b) Is the point $(-5, -6)$ above, below or on the line $y = 3x + 7$?

Tick **one** box.

Above

Below

On the line

You **must** show your working.

Do **not** use a graphical method.

[2 marks]

$$x = -5 \Rightarrow y = 3(-5) + 7$$

$$y = -15 + 7$$

$$y = -8$$

when $x = -5$; $y = -8$. Hence $(-5, -6)$ is
above the line.



28 The cost of a ticket increases by 10% to £19.25

Work out the original cost.

[3 marks]

$110\% = £19.25$
 $10\% = £1.75$
 $100\% = £17.50$

Answer £ 17.50

Turn over for the next question



29 The n th term of a sequence is $12n - 5$

Work out the numbers in the sequence that
have two digits
and
are **not** prime.

[3 marks]

n	1	2	3	4	5	6	7	8
$12n - 5$	7	19	31	43	55	67	79	91
	↑ 1 digit	↑ prime	↑ prime	↑ prime	↑ 5×11	↑ prime	↑ prime	↑ 7×13

So; 55 and 91 have 2 digits and are not
prime.

Answer 55, 91



Do not write
outside the
box

30 $a = \begin{pmatrix} 6 \\ -10 \end{pmatrix}$ $b = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $c = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$

30 (a) Work out $a + b + c$

$$\begin{pmatrix} 6 \\ -10 \end{pmatrix} + \begin{pmatrix} -1 \\ 2 \end{pmatrix} + \begin{pmatrix} -4 \\ 7 \end{pmatrix} = \begin{pmatrix} 6-1-4 \\ -10+2+7 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad [2 \text{ marks}]$$

Answer $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$

30 (b) Show that $a + 2c = kb$, where k is an integer.

$$a + 2c = \begin{pmatrix} 6 \\ -10 \end{pmatrix} + 2 \begin{pmatrix} -4 \\ 7 \end{pmatrix} = \begin{pmatrix} 6-8 \\ -10+14 \end{pmatrix} = \begin{pmatrix} -2 \\ 4 \end{pmatrix} \quad [2 \text{ marks}]$$

$$\begin{pmatrix} -2 \\ 4 \end{pmatrix} = 2 \begin{pmatrix} -1 \\ 2 \end{pmatrix} = 2b$$

$$\therefore k = 2$$

END OF QUESTIONS



There are no questions printed on this page

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outside the
box*

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