

Answer **all** questions in the spaces provided.

Do not write
outside the
box

- 1** Simplify $(a^5)^3$
Circle your answer.

[1 mark]

$8a$

$15a$

a^8

a^{15}

- 2** $x \neq 0.4$
Circle the possible value of x .

[1 mark]

$\frac{4}{10}$

$\frac{20}{50}$

$\frac{26}{70}$

$\frac{120}{300}$

- 3** Circle the solid that has 7 vertices.

[1 mark]

hexagonal
prism

hexagon-based
pyramid

pentagonal
prism

pentagon-based
pyramid

- 23 (a) The first three terms of a geometric progression are $\frac{\sqrt{3}}{2}$ $\frac{3}{4}$ $\frac{3\sqrt{3}}{8}$

Work out the next term.

[1 mark]

Answer _____

- 23 (b) The n th term of a sequence is $(2 + \sqrt{3})^n$

Show that the third term is $26 + 15\sqrt{3}$

[3 marks]

20

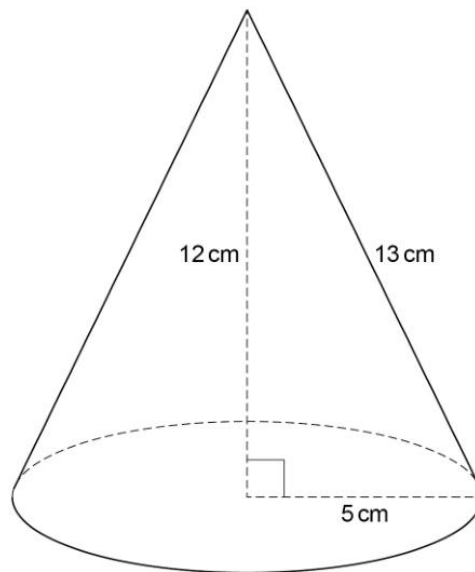
$$5x^3 + ax^2 + bx + c \equiv kx^3 + (2 - k)x^2 + (a^2 - 1)x + \frac{c}{2}$$

Work out the values of a , b and c .

[3 marks]

$a =$ _____ $b =$ _____ $c =$ _____

- 7 Here is a cone.



- 7 (a)

Curved surface area of a cone = $\pi r l$
 where r is the radius and l is the slant height

Beth tries to work out the curved surface area in terms of π

$$\begin{aligned}\text{Curved surface area of the cone} &= \pi \times 5 \times 12 \\ &= 60\pi \text{ cm}^2\end{aligned}$$

What mistake has she made?

[1 mark]

- 7 (b) Adam uses $\pi = 3$ to estimate the area of the **base** of the cone.

Work out his estimate.

[2 marks]

Answer _____ cm^2

- 7 (c) Beth uses $\pi = 3.14$ to estimate the area of the **base** of the cone.

Is Beth's estimate more than or less than Adam's estimate?

Tick a box.

More than

☐

Less than

☐

outside the
box

outside the
box

Give a reason for your answer.

[1 mark]

3

The vector $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$ translates A to B.

Write down the vector that translates B to A.

[1 mark]

Answer

 $\begin{pmatrix} \\ \end{pmatrix}$

outside the
box

1 Work out $12^2 \div \left(\frac{1}{3} \times \sqrt{36}\right)$

[3 marks]

Answer _____

- 15 Show that $(3x + 4)(2x - 5) - 11x(x - 2) + 5(x^2 - 3x - 1)$ simplifies to an integer.

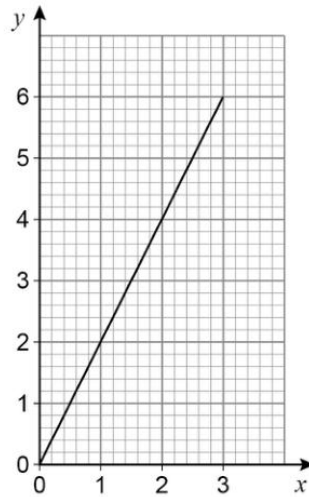
DOX

[4 marks]

14

Craig wants to draw a graph, for values of x from -3 to 3 ,
where the x -coordinate and y -coordinate are always in the ratio $2 : 1$

Here is his graph.



Make two criticisms of Craig's graph.

[2 marks]

Criticism 1 _____

Criticism 2 _____

6

Here is some information about the time spent on social media by 40 women and 40 men last week.

box

Time spent, t (hours)	Number of women	Number of men
$2 < t \leq 5$	12	10
$5 < t \leq 8$	11	17
$8 < t \leq 11$	14	9
$11 < t \leq 14$	2	4
$14 < t \leq 17$	1	0

Tick **one** box for each statement.

[3 marks]

	Definitely true	Might be true	Cannot be true
Three of the women spent more than 11 hours on social media.	☐	☐	☐
The range for the men is 15 hours.	☐	☐	☐
The women have a higher median than the men.	☐	☐	☐

24 (a) $f(x) = cx + d$

$$f(10) = 22$$

[3 marks]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

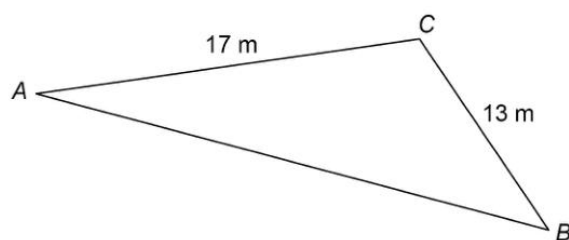
24 (b) $g(x) = 2x$ and $h(x) = \frac{x-1}{2}$

[1 mark]

$x-1$

outside the
box

- 18 (a) Here is a triangle.

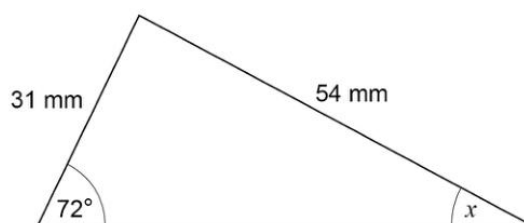


Not drawn
accurately

Give a reason why the length of side *AB* **cannot** be 35 m

[1 mark]

- 18 (b) Here is a different triangle.



Not drawn
accurately

Leah tries to use the sine rule to work out the size of angle x .
Here are the first two lines of her working.

$$\frac{x}{\sin 31} = \frac{54}{\sin 72}$$

$$x = \frac{54 \sin 31}{\sin 72}$$

What error has she made in this working?

14 Simplify $\frac{3}{x} + \frac{4}{x}$

Circle your answer.

[1 mark]

$$\frac{7}{x}$$

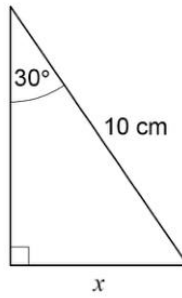
$$\frac{7}{2x}$$

$$\frac{12}{x}$$

$$\frac{12}{x^2}$$

12

Here is a right-angled triangle.



Not drawn
accurately

box

Use trigonometry to work out the value of x .

[3 marks]

Answer _____ cm

6

Lily's age is 2 years and 4 months.

Hugo's age is 1 year and 8 months.

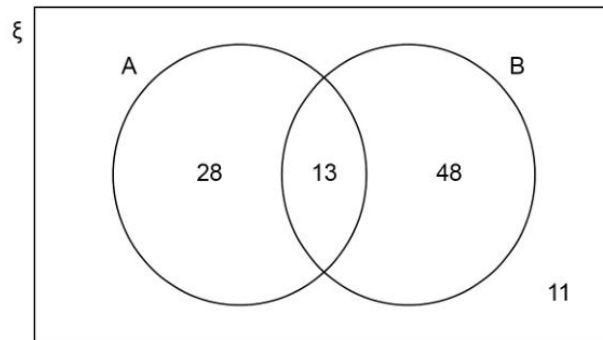
Write Lily's age in months as a fraction of Hugo's age in months.

Give your fraction in its simplest form.

*box***[2 marks]**

- 11 The Venn diagram represents 100 items.

Write in the
box



- 11 (a) Write down $P(A \cap B)$

[1 mark]

Answer _____

- 11 (b) Work out $P(A')$

[1 mark]

Answer _____

- 11 (c) Work out $P(A \cup B)$

[1 mark]

Answer _____

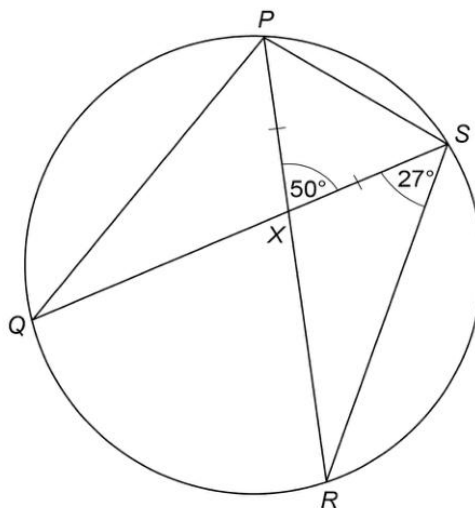
20

P, Q, R and S are points on a circle.

PXR and QXS are straight lines.

$PX = SX$

box



Not drawn
accurately

Prove that QS is **not** a diameter of the circle.

[4 marks]

15

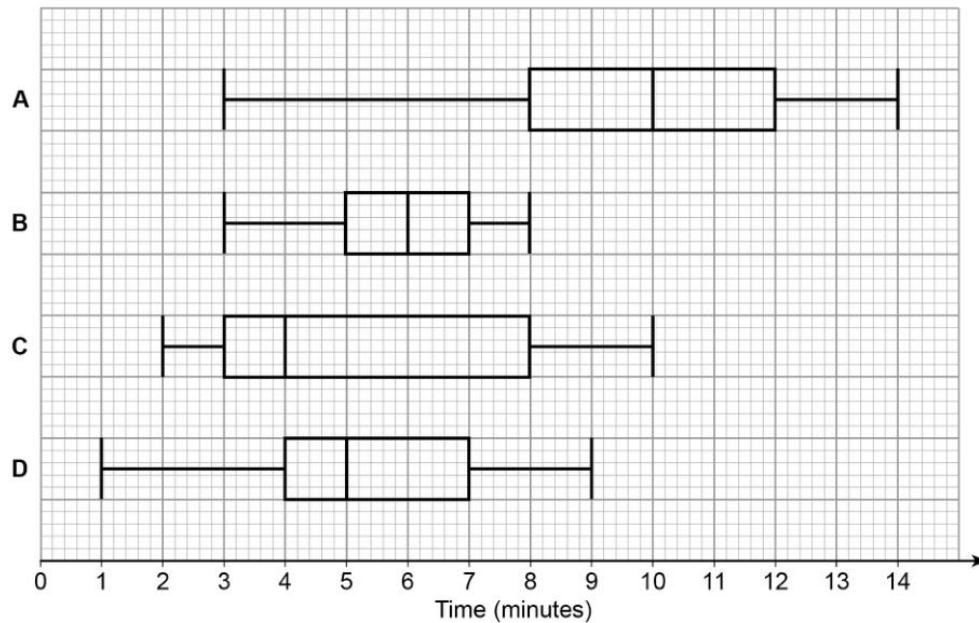
In a survey, queuing times at supermarket checkouts were recorded.

One morning, samples of 50 customers were taken at supermarkets A, B, C and D.

The box plots represent the results.

box

Queuing times



- 15 (a) On average, which supermarket had the lowest queuing times?
Give a reason for your answer.

[2 marks]

Supermarket _____

Reason _____

- 15 (b) At which supermarket were the queuing times most consistent?
Give a reason for your answer.

[2 marks]

Supermarket _____

Reason _____

box

16

The value of y is 20% more than the value of x .

Circle the ratio $x : y$

[1 mark]

box

5 : 6

6 : 5

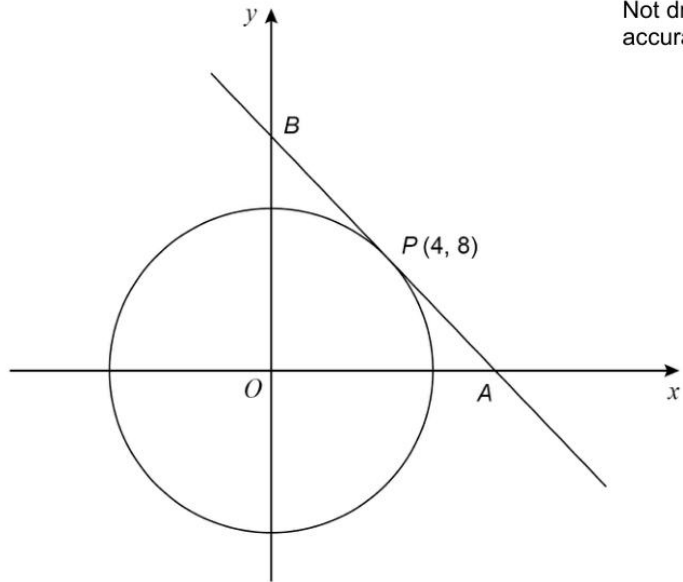
4 : 5

5 : 4

25

$P(4, 8)$ is a point on a circle, centre O .

The tangent at P intersects the axes at points A and B .



Not drawn
accurately

- 25 (a) Show that the gradient of the tangent is $-\frac{1}{2}$

[2 marks]

- 25 (b) Work out the length AB .

Give your answer in the form $a\sqrt{5}$ where a is an integer.

You **must** show your working.

[4 marks]

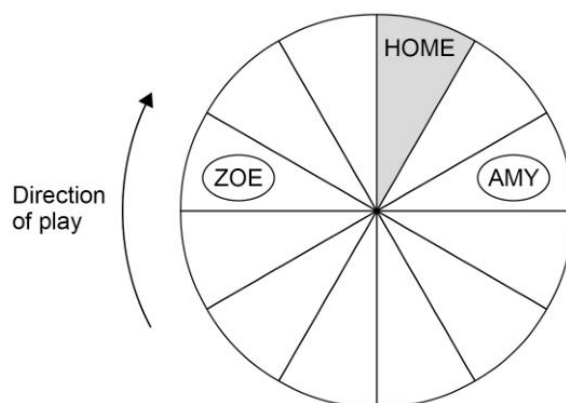
Answer _____ units

26

Zoe and Amy are playing a board game.

- They each have one disc and take turns to roll a fair, ordinary dice.
- The player moves their disc **clockwise** the number of spaces shown on the dice.
- The winner is the first player whose disc is on HOME at the end of a turn.

Here is the board after Amy's turn.



Work out the probability that Zoe wins within her next two turns.

[4 marks]

Answer _____

24 (a) Simplify fully $\frac{6}{a} - \frac{11}{4a}$

[2 marks]

Answer _____

24 (b) Simplify fully $(y^2 - 3y) \times \frac{y^2 + 10y + 21}{y^2 - 9}$

[4 marks]

Answer _____

13 Solve $\frac{2w}{15} = \frac{4}{5}$

[2 marks]

$w =$ _____

Answer **all** questions in the spaces provided

Do not write
outside the
box

- 1** Circle the calculation that decreases 250 by 15%

[1 mark]

$250 \div 1.15$

250×0.15

250×0.85

$250 \div 0.85$

- 2** Solve $3x = 2x$
Circle your answer.

[1 mark]

$x = -1$

$x = 0$

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

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

- 27 A journey has two stages.

	Distance (km)	Average speed (km/h)	Time (h)
Stage 1	30	a	$\frac{30}{a}$
Stage 2	30	b	$\frac{30}{b}$

Show that the average speed for the **whole** journey, in km/h, is $\frac{2ab}{a+b}$

[3 marks]

23

Write 0.13 as a fraction in its simplest form.

[3 marks]

DOX

Answer _____

- 19 Work out how many 5-digit **odd** numbers can be made using these digits **once** each.

2

4

6

7

9

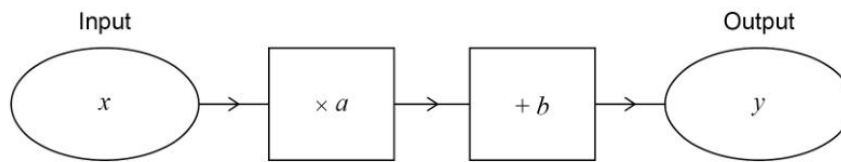
Do **not** list them.

[2 marks]

Answer _____

- 13 (a) Here is a number machine.

outside the
box



Show that when the input increases by 2 the output increases by $2a$.

[2 marks]

- 13 (b) $f(x) = kx^2$ where k is a constant.

Kai says that $\frac{f(6)}{f(2)}$ is equal to $f(3)$ because $\frac{6}{2} = 3$

Is he correct?

Show working to support your answer.

[2 marks]