A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

MATHEMATICS

H

Higher Tier **Paper 1 Non-Calculator**

8300/1H

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

For this paper you must have:
- **mathematical instruments.**

You must NOT use a calculator.

INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write 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.**

ADVICE

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

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1 **Simplify** $\left(a^5\right)^3$

Circle your answer. [1 mark]

$8a$ $15a$ a^8 a^{15}

2 $x \neq 0.4$

Circle the possible value of x. [1 mark]

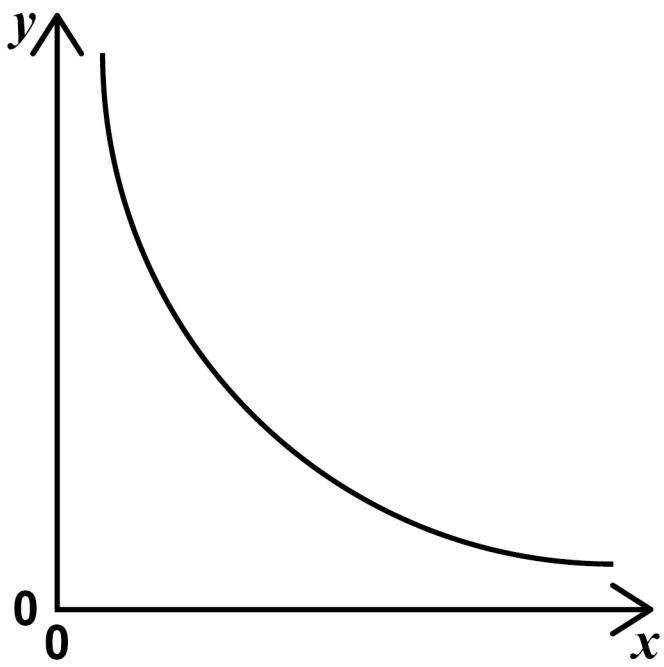
$\frac{4}{10}$ $\frac{20}{50}$ $\frac{26}{70}$ $\frac{120}{300}$

3 **Circle the solid that has 7 vertices. [1 mark]**

hexagonal prism hexagon-based pyramid

pentagonal prism pentagon-based pyramid

4 **Here is a sketch of a graph.**



Circle the equation of the graph.

k is a constant. [1 mark]

$y = kx$ $y = k + x$ $y = k - x$ $y = \frac{k}{x}$

5 **Write 200 as a product of prime factors.**

Give your answer in index form. [3 marks]

Answer _____

7

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. [2 marks]

Answer _____

[Turn over]

7 Use approximations to estimate the answer to

$$\frac{\sqrt{97} + 2.014^3}{0.49}$$

[3 marks]

Answer _____

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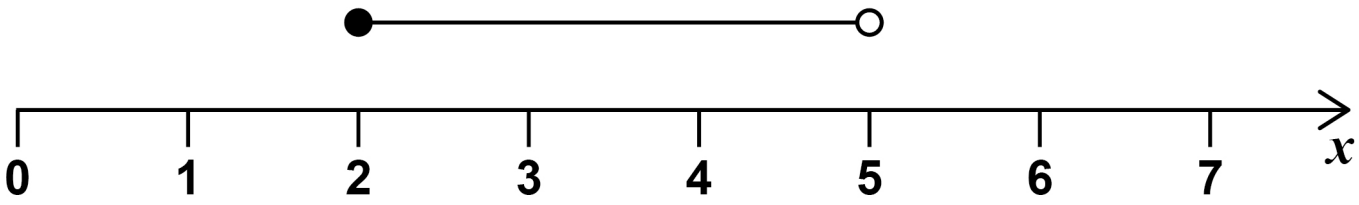
[Turn over]

8 (a) **Solve** $5x + 6 > 3x + 15$ **[3 marks]**

Answer _____

8 (b) **Write down the inequality represented by the number line. [2 marks]**



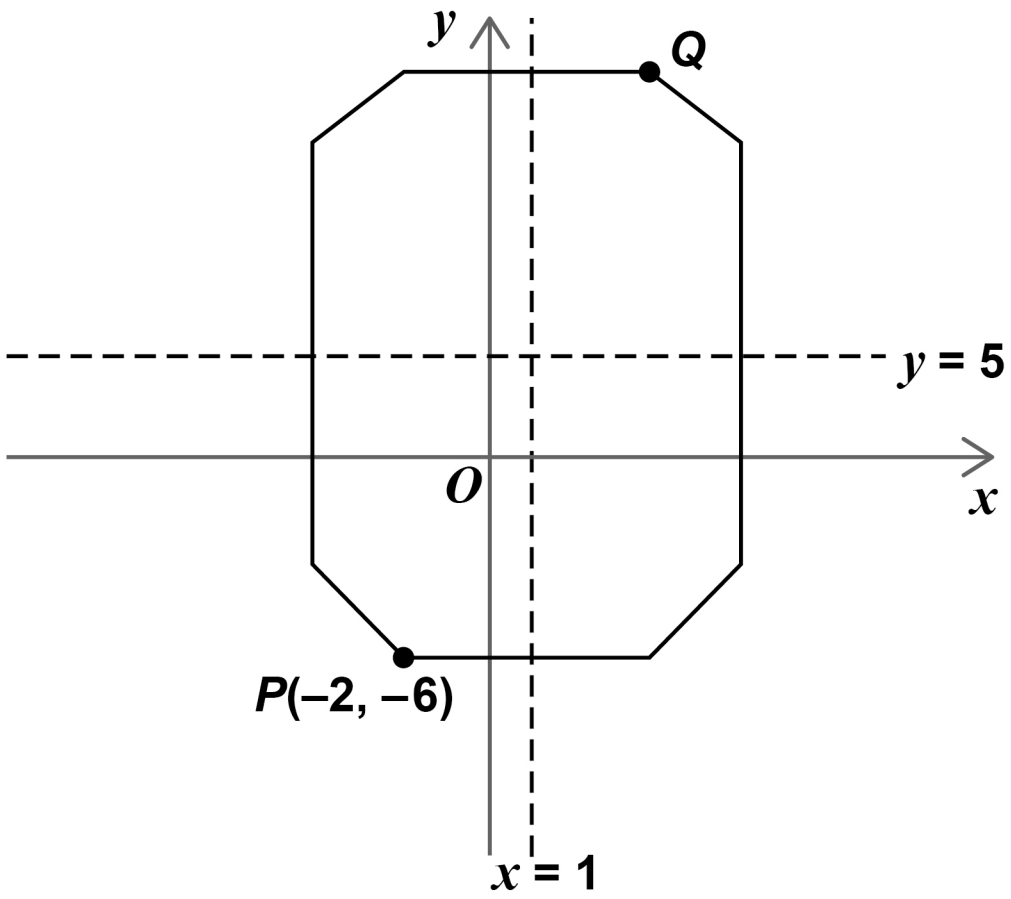
Answer _____

[Turn over]

10

9 **The diagram shows an octagon.**

The diagram is not drawn accurately.



$x = 1$ and $y = 5$ are lines of symmetry.

Work out the coordinates of point *Q*. [2 marks]

Answer (_____ , _____)

[Turn over]

10 (a) Work out 2000 × 70 000

Give your answer in standard form. [2 marks]

Answer _____

10 (b) Work out $\dfrac{1.8 \times 10^{2}}{3 \times 10^{-1}}$

Give your answer as an ordinary number.
[2 marks]

Answer _____

11 ***A*, *B*, *C* and *D* are junctions on a motorway.**

The diagram is not accurately.

distance *CD* = 3 × distance *AB*

distance *BC* = 25 miles

Salma drives from *A* to *C*.

She drives for 30 minutes at an average speed of 62 miles per hour.

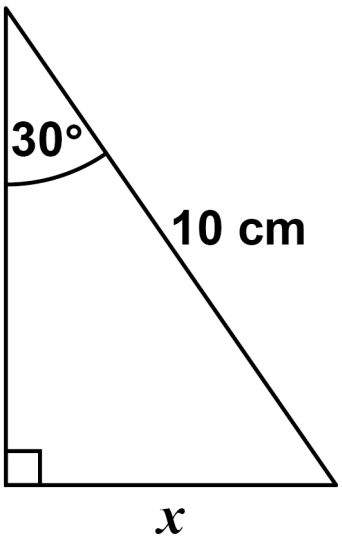
Work out the distance *AD*. [4 marks]

Answer _____ miles

[Turn over]

12 **Here is a right-angled triangle.**

The diagram is not drawn accurately.



Use trigonometry to work out the value of x.
[3 marks]

Answer _____ **cm**

7

13 Convert $\frac{5}{6}$ to a recurring decimal. [2 marks]

Answer _____

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

Circle your answer. [1 mark]

$\frac{7}{x}$ $\frac{7}{2x}$ $\frac{12}{x}$ $\frac{12}{x^2}$

15 $(x + a)(x + 3a) \equiv x^2 + bx + 75$

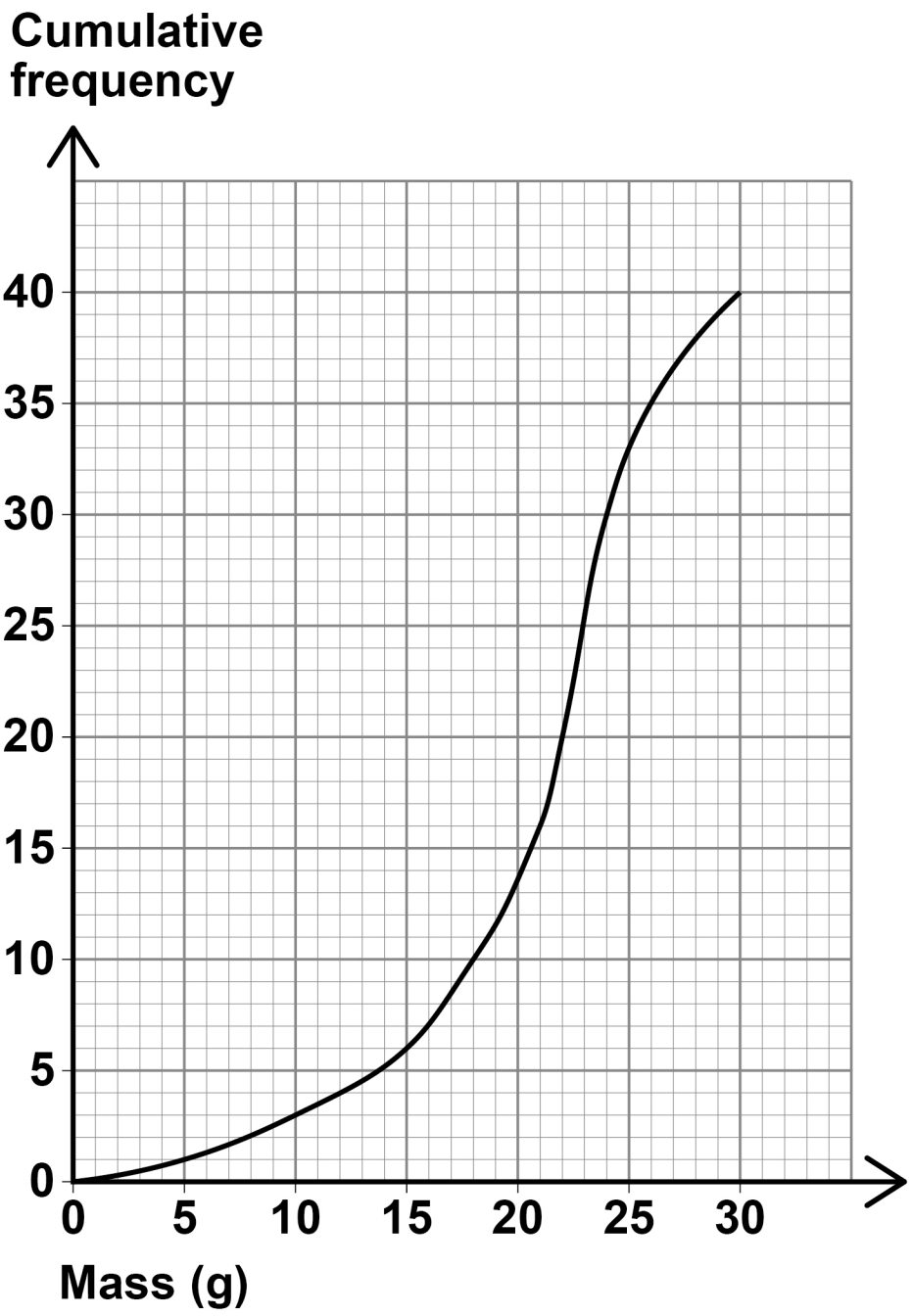
Work out the TWO possible values of b.
[3 marks]

Answer _____ and _____

[Turn over]

6

16 The cumulative frequency graph represents the masses of 40 necklaces.



16(a) A jeweller buys every necklace with mass GREATER THAN 21 grams.

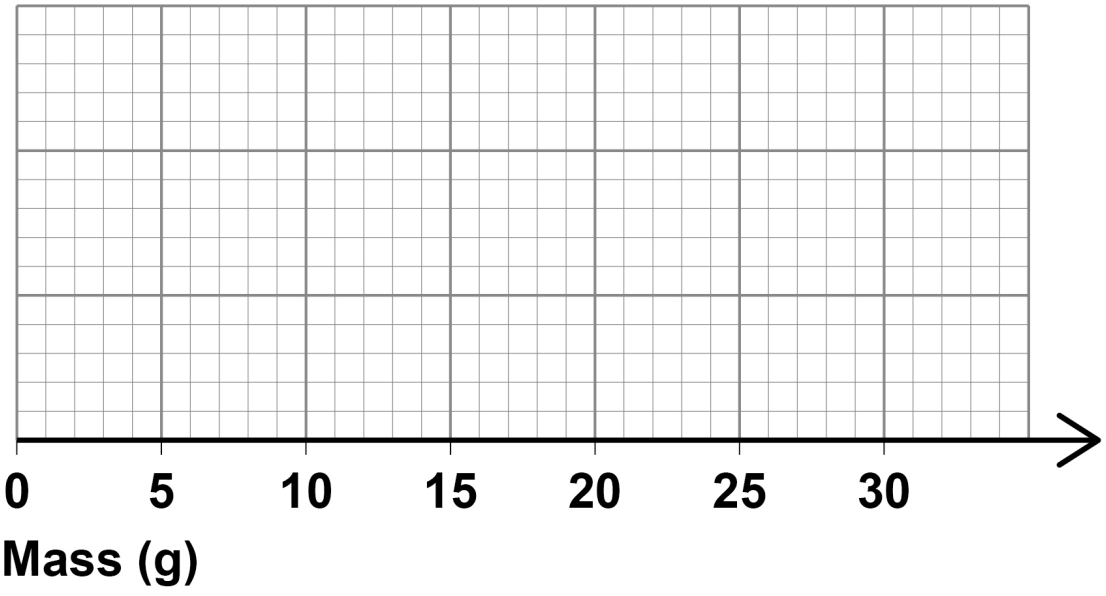
Use the graph to estimate how many she buys. [2 marks]

Answer _____

16(b) The lowest mass was 3 grams.

The highest mass was 28 grams.

Draw a box plot to represent the data. [3 marks]



[Turn over]

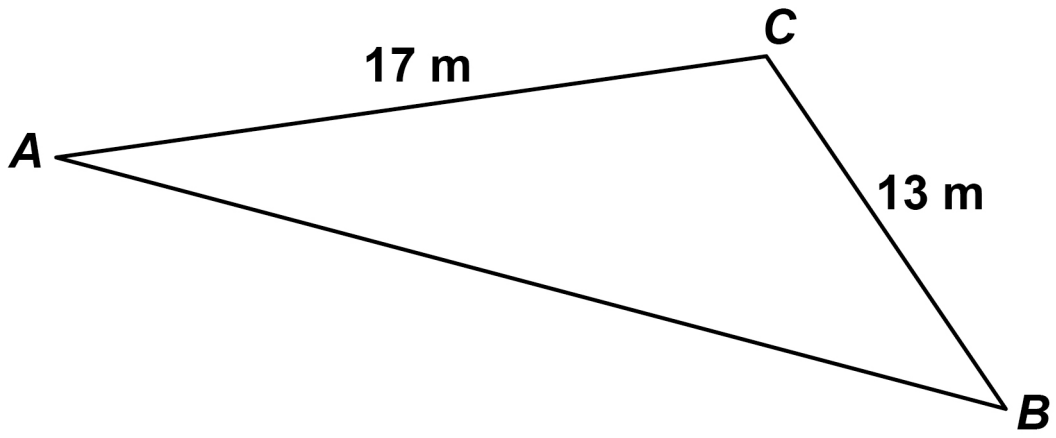
17 **Circle the vector that translates the point (–2, 7) to the point (3, –1) [1 mark]**

$\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ $\begin{pmatrix} 5 \\ -8 \end{pmatrix}$ $\begin{pmatrix} -5 \\ 8 \end{pmatrix}$ $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$

6

18 (a) **Here is a triangle.**

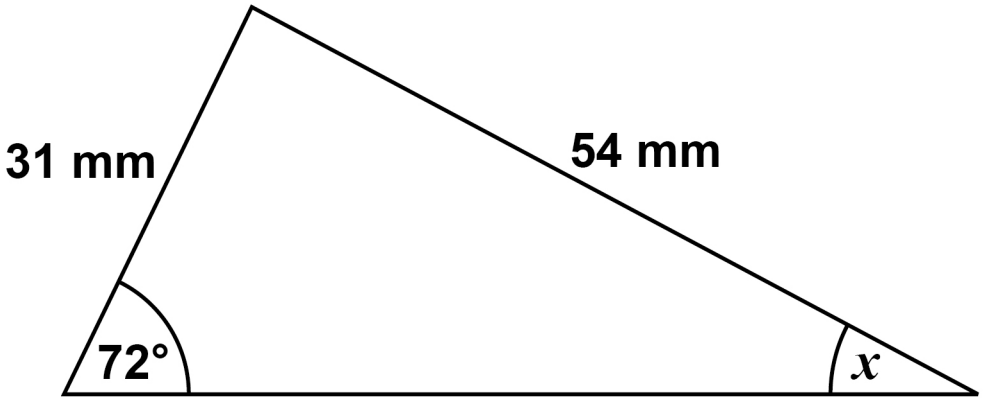
The diagram is not drawn accurately.



Give a reason why the length of side *AB* CANNOT be 35 m [1 mark]

18 (b) **Here is a different triangle.**

The diagram is 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?
[1 mark]

[Turn over]

2

19 Items made at a factory have to pass two checks.

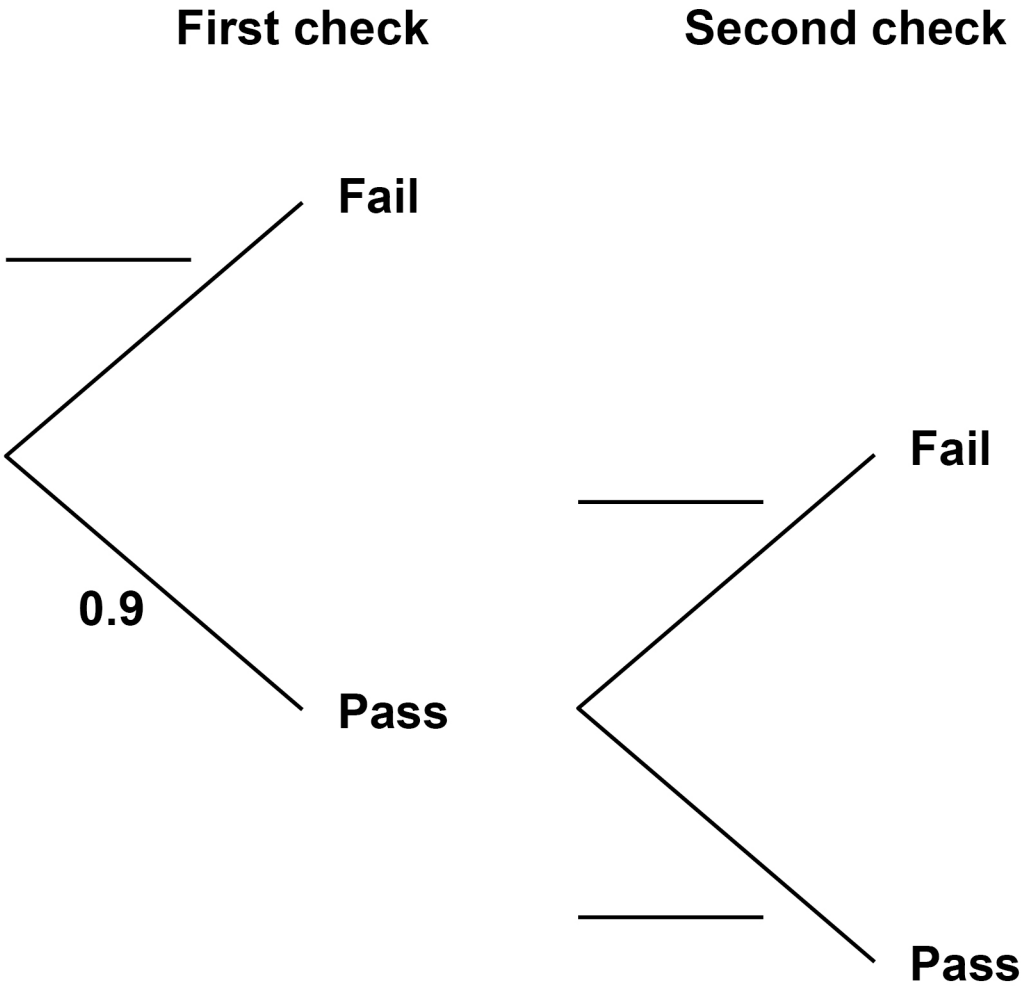
90% pass the first check.

The items that fail are scrapped.

99% of the items that pass the first check pass the second check.

The items that fail are scrapped.

19(a) Complete the tree diagram. [2 marks]



19 (b) **An item is chosen at random before the checks.**

Work out the probability that the item is scrapped. [3 marks]

Answer _____

[Turn over]

20 **Which ONE of these is a unit of density?**

Circle your answer. [1 mark]

cm^2/g **cm^3/g** **g/cm^2** **g/cm^3**

6

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[Turn over]

21 **The first two terms of a quadratic sequence are 10 and 17**

Here is some information about the sequence.

	1st term	2nd term	3rd term	4th term
Sequence	10	17	.....	.....
First difference		+7	+13	.....
Second difference			+6	+6

Work out an expression for the nth term of the sequence. [4 marks]

Answer _____

[Turn over]

22 **Work out the value of** $\left(\frac{5}{7}\right)^{-2}$

Give your answer as a mixed number. [3 marks]

Answer _____

23 Rearrange $y = \frac{1}{\sqrt{x+1}}$ to make x the subject.

[3 marks]

Answer _____

[Turn over]

10

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

f(4) = 7

f(10) = 22

Work out the values of c and d. [3 marks]

c = _____ d = _____

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

Circle the expression for $hg(x)$ **[1 mark]**

$\frac{2x^2 - x}{2}$ $\frac{2x - 1}{2}$ $x^2 - x$ $x - 1$

[Turn over]

25 Show that $\frac{\sqrt{150}-\sqrt{6}}{\sqrt{2}\times\sqrt{3}}$ simplifies to an integer.

[3 marks]

7

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[Turn over]

26 $d = 2f$

$$\frac{e-f}{d-e} = \frac{1}{4}$$

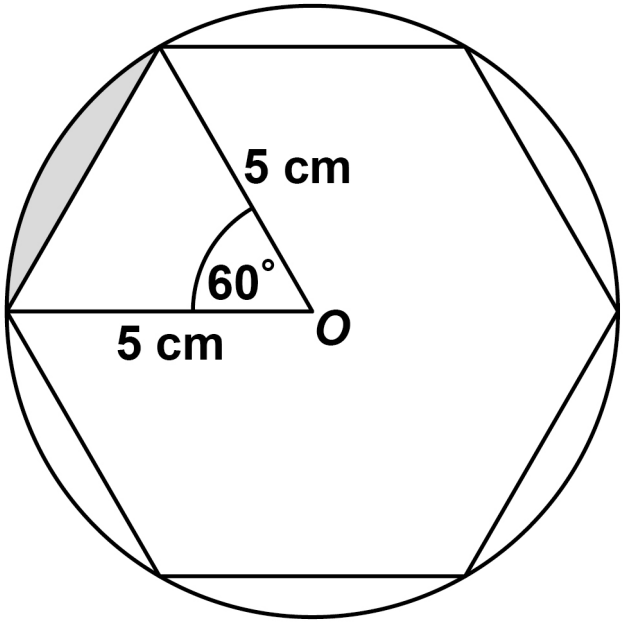
Work out the ratio $e : f$ [3 marks]

Answer _____ : _____

[Turn over]

27 **The vertices of a regular hexagon lie on a circle with centre *O* and radius 5 cm**

The diagram is not drawn accurately.



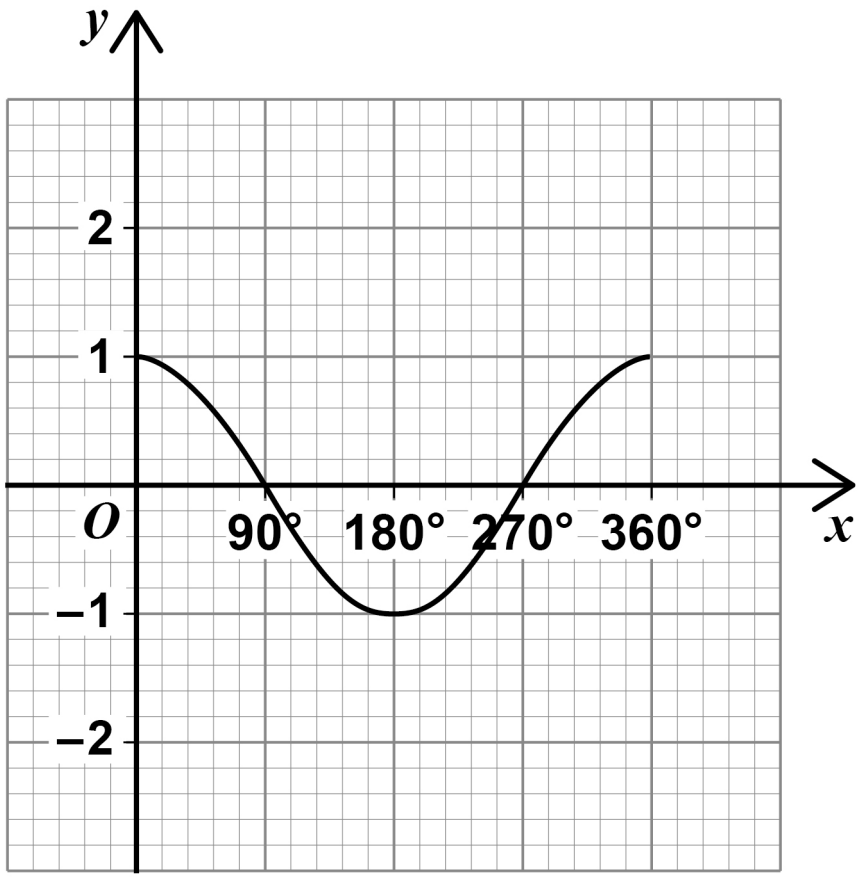
Work out the shaded area.

Give your answer in the form $\frac{a\pi - b\sqrt{c}}{12}$ **where** a, b **and** c **are integers. [4 marks]**

Answer _____ cm^2

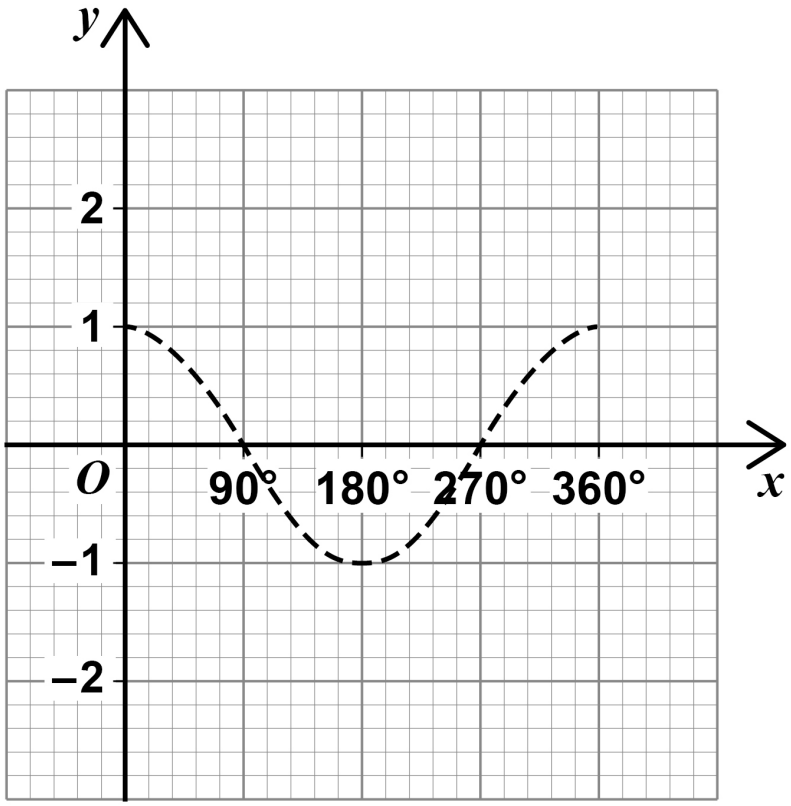
7

28 Here is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$

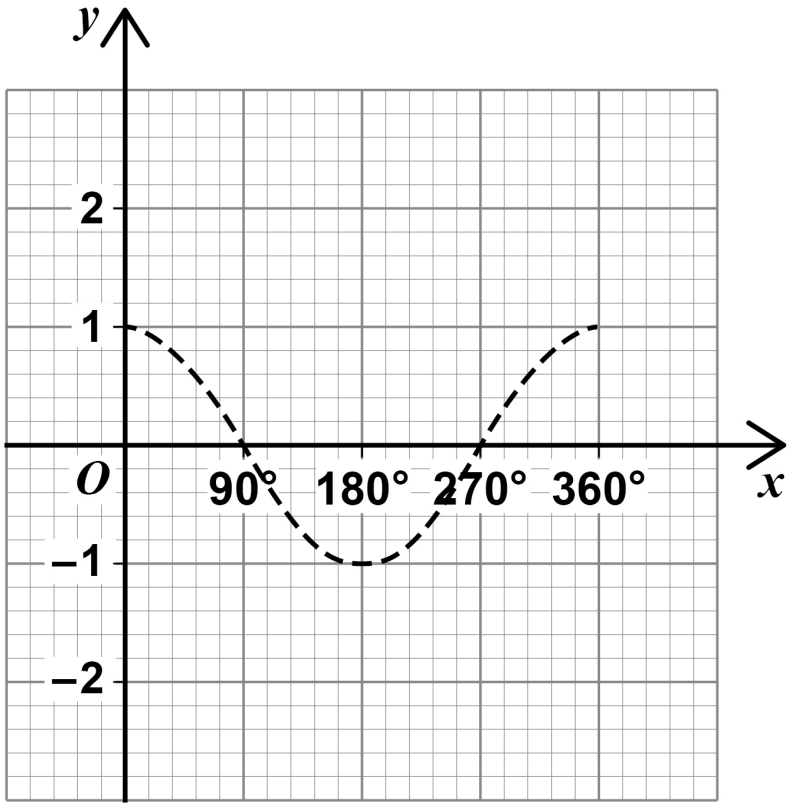


In parts (a) and (b) the graph of $y = \cos x$ is shown as a dashed line.

28(a) On the grid on the opposite page, draw the graph of $y = \cos (x – 90°)$ for $0° \leqslant x \leqslant 360°$ [1 mark]

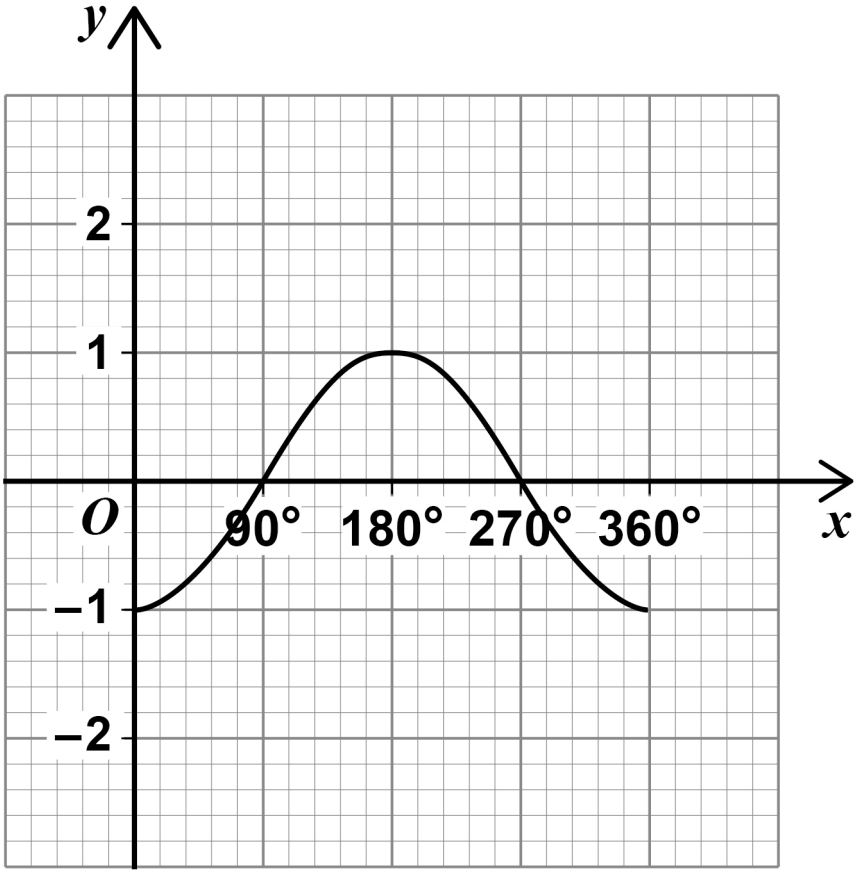


28 (b) On the grid below, draw the graph of $y = 1 + \cos x$ for $0° \leqslant x \leqslant 360°$ [1 mark]



28 (c) Rita tries to draw the graph of $y = \cos(-x)$ for $0° \leqslant x \leqslant 360°$

Here is her graph.



Give a reason why Rita's graph is incorrect.
[1 mark]

3

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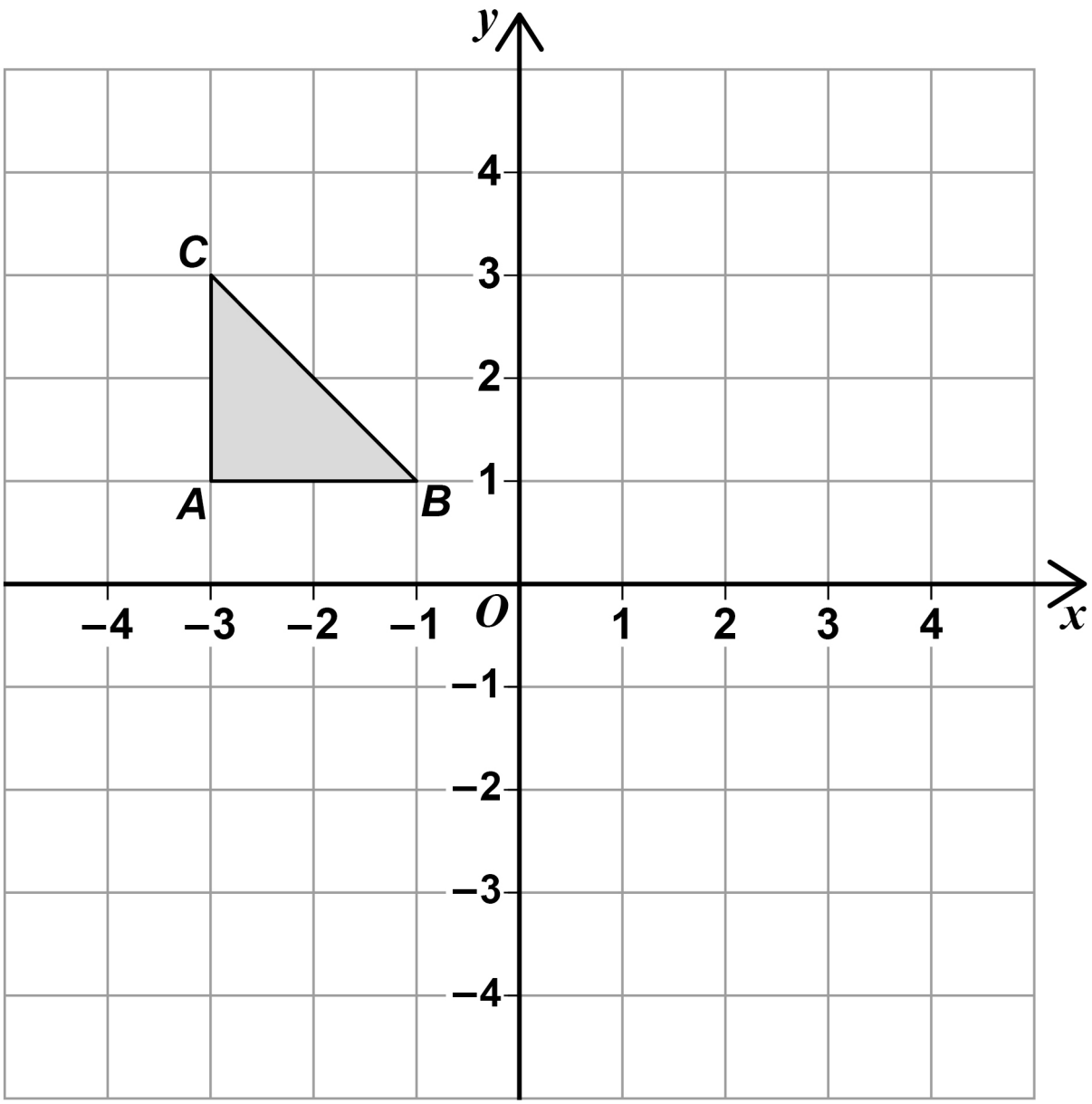
[Turn over]

29 Here is triangle ABC on a grid.



Describe a SINGLE transformation of the triangle so that

point *B* is invariant

point *A* moves to (1, 1)

point *C* moves to (1, –1)

[3 marks]

END OF QUESTIONS

3

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.
Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
4–6	
7–11	
12–15	
16–18	
19–21	
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25–27	
28–30	
32–35	
36–38	
40–43	
44–46	
48–49	
TOTAL	