Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Thursday 15 May 2025

Morning (Time: 1 hour 30 minutes)

Paper reference **1MA1/1H**

Mathematics

PAPER 1 (Non-Calculator)

Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB or B pencil, eraser, Formulae Sheet (enclosed). Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used**.

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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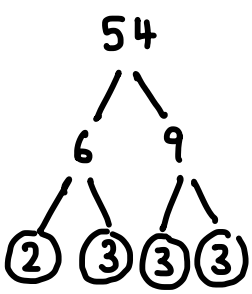
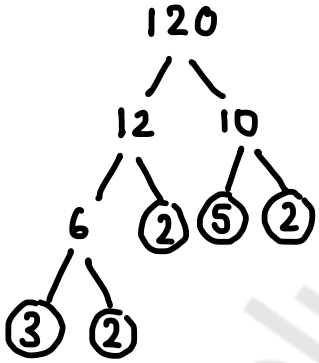
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Find the highest common factor (HCF) of 54 and 120





$54 = 2 \times 3 \times 3 \times 3$

$120 = 2 \times 2 \times 2 \times 3 \times 5$

$HCF = 2 \times 3$

$= 6$

6

(Total for Question 1 is 2 marks)

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2 There are only red counters, white counters, blue counters and green counters in a bag.

Chris is going to take at random a counter from the bag.

The table shows the probability that he will take a red counter and the probability that he will take a white counter.

Colour	red	white	blue	green
Probability	0.3	0.1		

= 1

2 : 1

There are twice as many blue counters as there are green counters in the bag.

(a) Work out the probability that Chris will take a blue counter.

1 − (0.3 + 0.1)

1 − 0.4 = 0.6

B : G
2 : 1

0.6 ÷ 3 = 0.2

B : G
0.4 : 0.2

0.4

(3)

There are 45 red counters in the bag.

(b) Work out the total number of counters in the bag.

45 ÷ 0.3

×10 ×10

450 ÷ 3 = 150

150

(2)

(Total for Question 2 is 5 marks)

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3 (a) Complete the table of values for $y = x^2 + x - 4$

x	–3	–2	–1	0	1	2
y	2	**–2**	–4	**–4**	**–2**	**2**

$y = (2)^2 + (2) - 4$
$= 4 + 2 - 4$
$= 2$

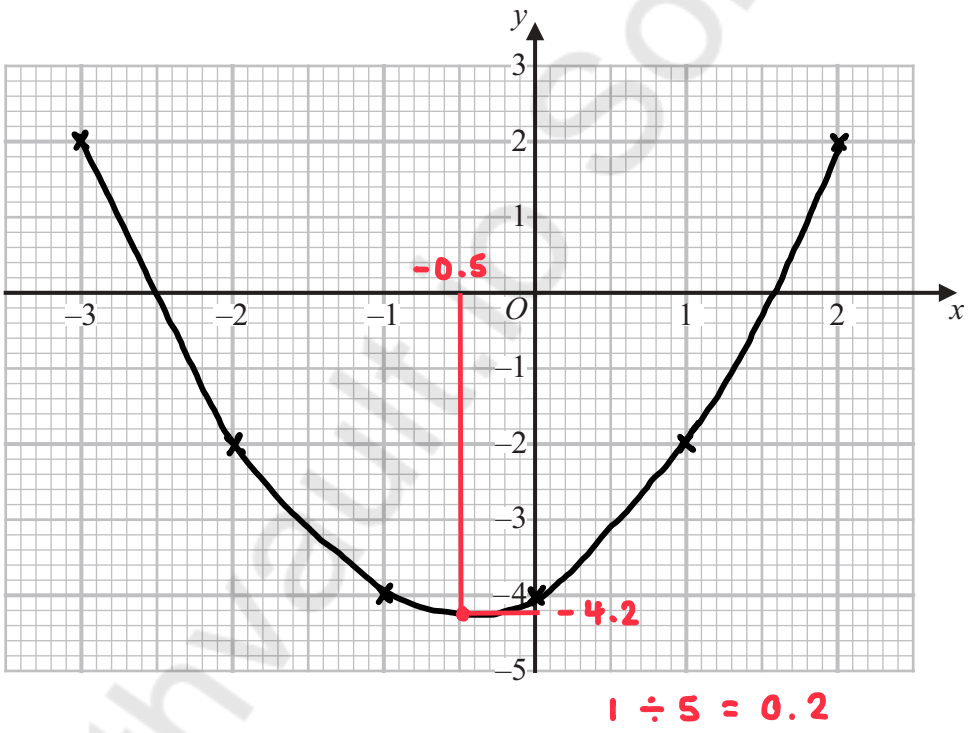
$y = (-2)^2 + (-2) - 4$
$= 4 - 2 - 4$
$= -2$

$y = (0)^2 + (0) - 4$
$= -4$

$y = (1)^2 + (1) - 4$
$= 1 + 1 - 4$
$= -2$

(2)

(b) On the grid, draw the graph of $y = x^2 + x - 4$ for values of x from –3 to 2



(2)

(c) Write down the coordinates of the turning point of the graph of $y = x^2 + x - 4$

(**-0.5** , **-4.2**)

(1)

(Total for Question 3 is 5 marks)

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4 There are 280 chocolates in a box.
There are only dark chocolates, milk chocolates and white chocolates.

$\frac{1}{7}$ of the 280 chocolates are dark chocolates.

The number of milk chocolates : the number of white chocolates = 1 : 3

The number of white chocolates : the number of dark chocolates = n : 1

(a) Work out the value of n.
You must show all your working.

Dark = $\frac{1}{7}$ of 280

= 280 ÷ 7

= 40

Milk & White = 280 - 40

= 240

M : W

1 : 3

Total 4 parts

240 ÷ 4 = 60

M : W

60 : 180

W : D

180 : 40

÷40 ÷40

4.5 : 1

$\frac{180}{40} = \frac{18}{4} = \frac{9}{2}$

$n =$ 4.5

(5)

10 milk chocolates from the box are eaten.

(b) Does this affect your answer to part (a)?
Give a reason for your answer.

No. The number of dark and white chocolates has not changed.

(1)

(Total for Question 4 is 6 marks)

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5 Work out $5.7 \times 10^2 + 9.8 \times 10^3$
Give your answer in standard form.

$5.7 \times 10^2 = 5.7 \times 100$
$= 570$

$9.8 \times 10^3 = 9.8 \times 1000$
$= 9800$

$$\begin{array}{r} {}^{1}9800 \\ +\ 570 \\ \hline 10370 \end{array}$$

1.037×10^4

1.037×10^4

(Total for Question 5 is 3 marks)

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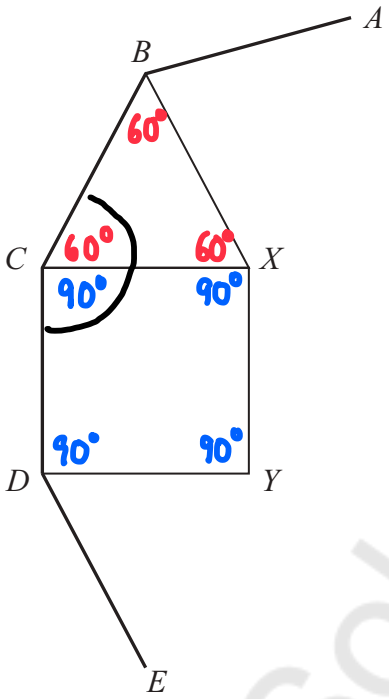
6 *AB*, *BC*, *CD* and *DE* are four sides of a regular polygon with *n* sides.



BCX is an equilateral triangle.
CDYX is a square.

Work out the value of *n*.
You must show all your working.

Interior angle = 60° + 90°
= 150°

Exterior angle = 180° − 150°
= 30°

Exterior angle = $\frac{360°}{n}$

$30° = \frac{360°}{n}$

$n = \frac{360°}{30°} = 12$

n = 12

(Total for Question 6 is 4 marks)

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7 (a) Simplify $\dfrac{3(2-m)^2}{(2-m)^1}$

$$\frac{3(2-m)(2-m)}{(2-m)} = 3(2-m) = 6-3m$$

$6-3m$

(1)

(b) Solve $7 + x \leqslant \dfrac{5x}{2} - 8$

$\times 2 \quad \times 2$

$14 + 2x \leqslant 5x - 16$

$-2x \quad -2x$

$14 \leqslant 3x - 16$

$+16 \quad +16$

$30 \leqslant 3x$

$\div 3 \quad \div 3$

$10 \leqslant x$

OR

$x \geqslant 10$

$x \geqslant 10$

(3)

(c) Solve $9 < 2y + 4 < 12$

$-4 \quad -4 \quad -4$

$5 < 2y < 8$

$\div 2 \quad \div 2 \quad \div 2$

$2.5 < y < 4$

$2.5 < y < 4$

(2)

(Total for Question 7 is 6 marks)

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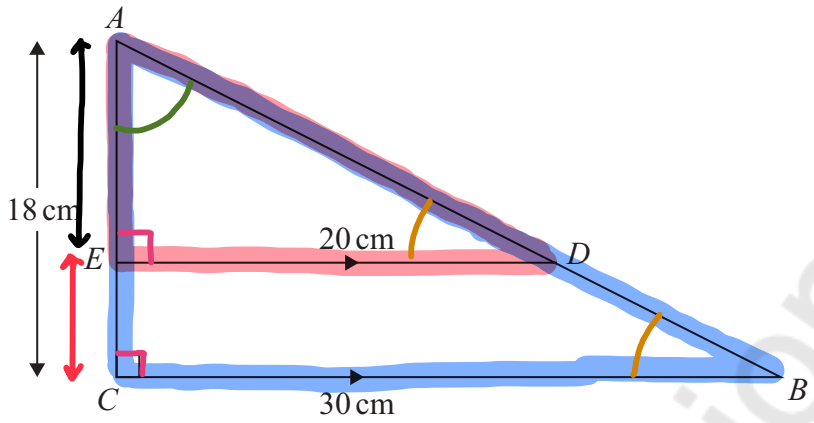
8 *ABC* is a right-angled triangle.



AEC and *ADB* are straight lines.
ED is parallel to *CB*.

(a) Prove that triangle *ABC* is similar to triangle *ADE*.

- Angle A is common
- Angle AED = angle ACB corresponding angles are equal.
- Angle ADE = angle ABC corresponding angles are equal.

3 equal angles.

(2)

ED = 20 cm *CB* = 30 cm *AC* = 18 cm

(b) Work out the length of *EC*.

$$\text{Scale factor} = \frac{CB}{ED} = \frac{30}{20} = 1.5$$

$$AE = AC \div 1.5$$
$$= 18 \div 1.5$$
$$\times 10 \quad \times 10$$
$$= 180 \div 15$$
$$= 12 \text{ cm}$$

$$EC = AC - AE$$
$$= 18 - 12$$
$$= 6 \text{cm}$$

6 cm

(3)

(Total for Question 8 is 5 marks)

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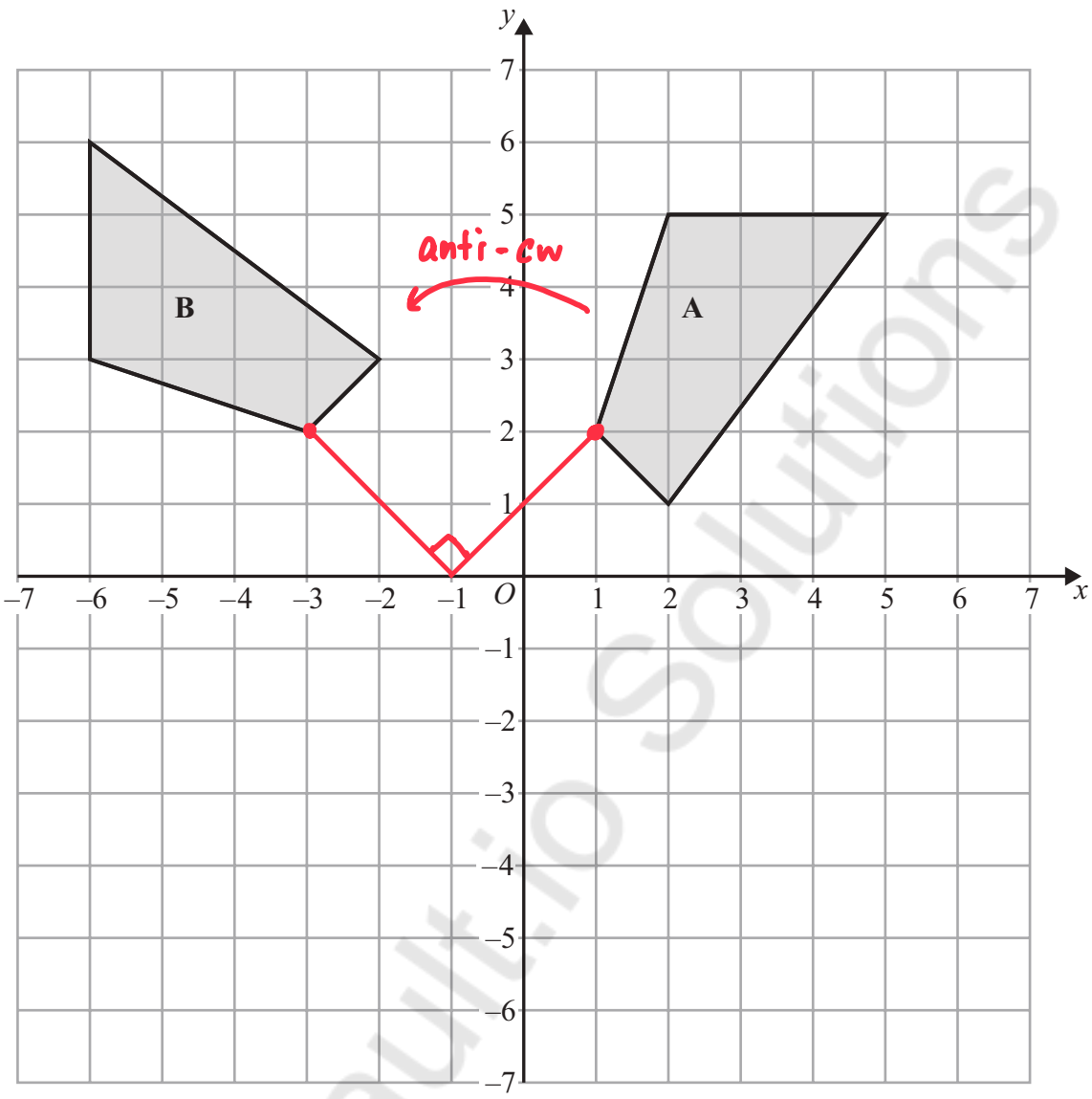
9



(a) Describe fully the single transformation that maps shape **A** onto shape **B**.

Rotation 90° anti-clockwise about (-1, 0)

(2)

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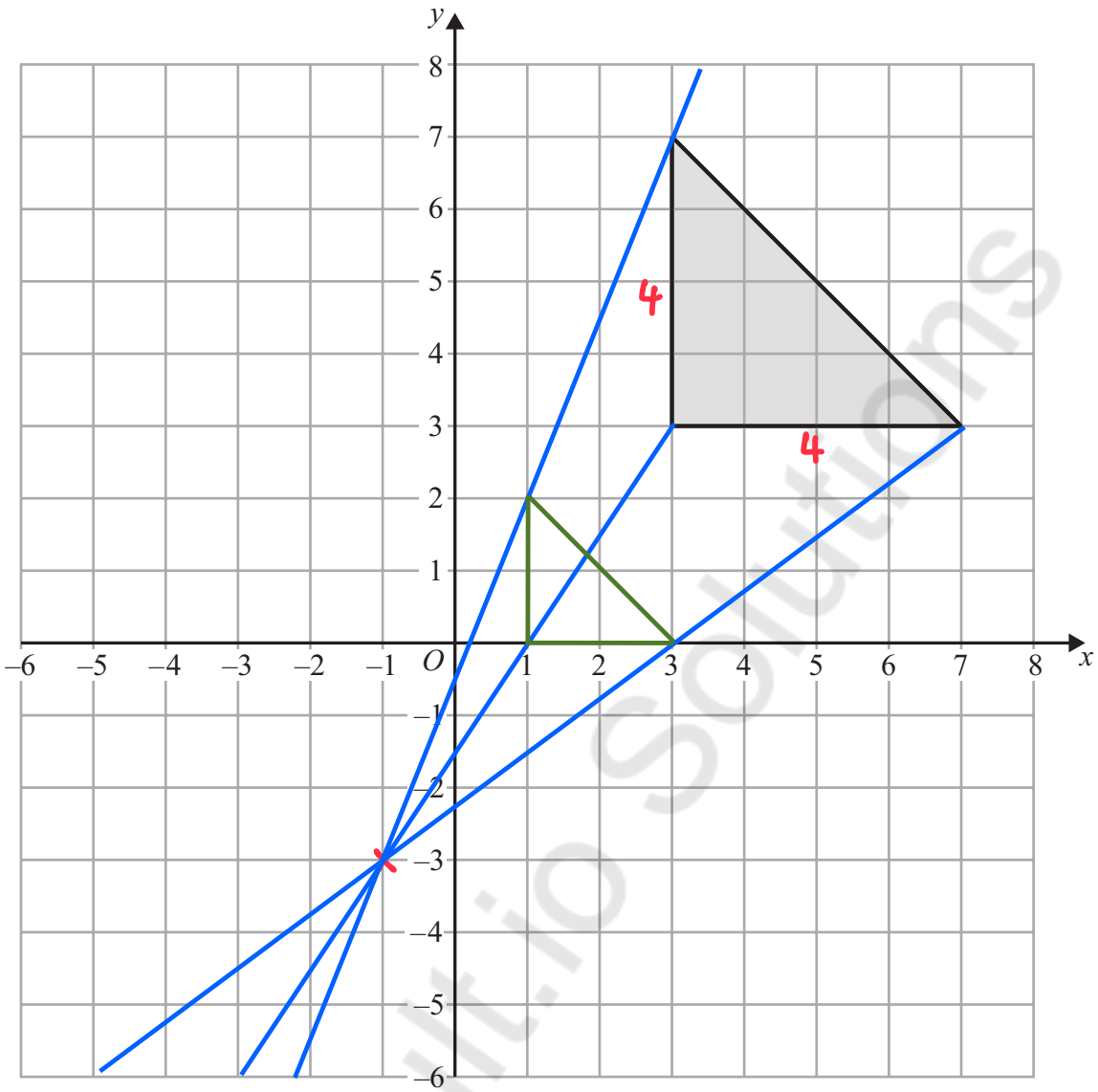

(b) Enlarge the triangle by scale factor $\frac{1}{2}$ centre (–1, –3)

(2)

(Total for Question 9 is 4 marks)

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10 Prove that the difference in the squares of two consecutive even numbers is always a multiple of 4

Even = $2n$, $2n + 2$

Squares = $(2n)^2$, $(2n + 2)^2$

Difference = $(2n + 2)^2 - (2n)^2$

$= (2n + 2)(2n + 2) - (2n)^2$

$= 4n^2 + 4n + 4n + 4 - 4n^2$

$= 4n^2 + 8n + 4 - 4n^2$

$= 8n + 4$

$4(2n + 1)$ ∴ multiple of 4

(Total for Question 10 is 3 marks)

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11 T is inversely proportional to w.

w is directly proportional to the cube root of d.

When $w = 6$, $T = 20$
When $w = 1$, $d = 8$

Find the value of d when $T = 48$

$T \propto \frac{1}{w}$

$T = \frac{k}{w}$

$20 = \frac{k}{6}$ (x 6 / x 6)

$120 = k$

$T = \frac{120}{w}$

$w \propto \sqrt[3]{d}$

$w = k\sqrt[3]{d}$

$1 = k \times \sqrt[3]{8}$

$1 = k \times 2$

$1 = 2k$ (÷2 / ÷2)

$\frac{1}{2} = k$

$w = \frac{1}{2}\sqrt[3]{d}$

$T = \frac{120}{\frac{1}{2}\sqrt[3]{d}}$

$48 = \frac{120}{\frac{1}{2}\sqrt[3]{d}}$

$48 = \frac{240}{\sqrt[3]{d}}$

$48\sqrt[3]{d} = 240$

$\sqrt[3]{d} = \frac{240}{48}$

$\sqrt[3]{d} = 5$

$d = 5^3$

$= 125$

$d =$ 125

(Total for Question 11 is 5 marks)

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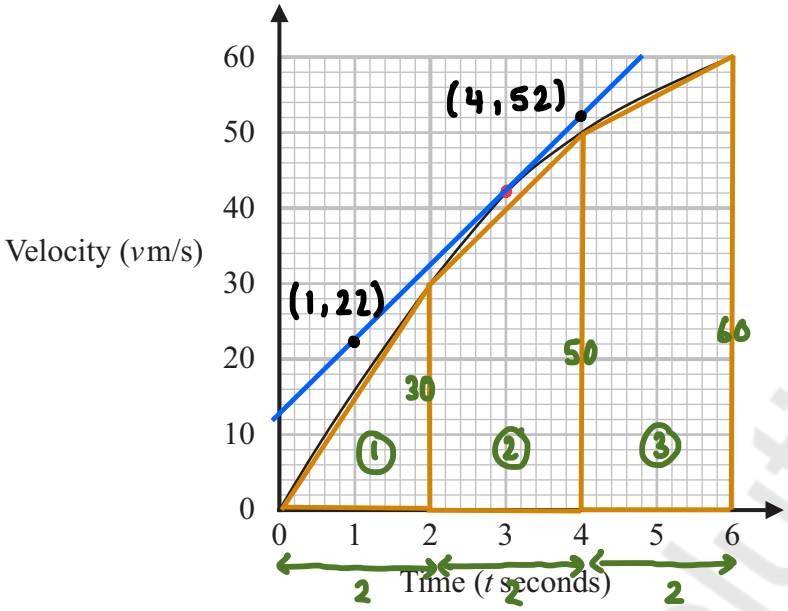
12 The graph shows the velocity, v m/s, of a particle t seconds after it starts to move.



(a) (i) Work out an estimate of the gradient of the graph at $t = 3$
You must show how you get your answer.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

(1, 22) x_1 y_1 (4, 52) x_2 y_2

$$= \frac{52 - 22}{4 - 1}$$

$$= \frac{30}{3}$$

$$= 10$$

10

(3)

(ii) What does this gradient represent?

Rate of change of velocity OR acceleration.

(1)

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(b) Work out an estimate for the distance the particle travelled in the first 6 seconds.
Use 3 strips of equal width.

① $A = \frac{1}{2}bh$

$= \frac{1}{2} \times 2 \times 30$

$= 30$

② $A = \frac{(a+b)}{2} \times h$

$= \frac{(30+50)}{2} \times 2$

$= 40 \times 2$

$= 80$

③ $A = \frac{(a+b)}{2} \times h$

$= \frac{(50+60)}{2} \times 2$

$= 110$

Total $= 30 + 80 + 110$

$= 220\text{ m}$

220 m

(3)

(Total for Question 12 is 7 marks)

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13 $x = 0.\dot{2}$ $y = 0.6\dot{8}\dot{1}$

Work out the value of xy.
Give your answer as a fraction in its simplest form.

$x = 0.\dot{2}$

$10x = 2.\dot{2}$

$10x - x = 9x$

$2.\dot{2} - 0.\dot{2} = 2$

$9x = 2$

$x = \frac{2}{9}$

$y = 0.6\dot{8}\dot{1}$

$10y = 6.\dot{8}\dot{1}$

$100y = 68.\dot{1}\dot{8}$

$1000y = 681.\dot{8}\dot{1}$

$1000y - 10y = 990y$

$681.\dot{8}\dot{1} - 6.\dot{8}\dot{1} = 675$

$990y = 675$

$y = \frac{675}{990}$

$xy = \frac{2}{9} \times \frac{675}{990}$

$= \frac{1350}{8910}$

$= \frac{135}{891}$ ÷27 ÷27

$= \frac{5}{33}$

$\frac{5}{33}$

(Total for Question 13 is 5 marks)

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14 There are nine balls labelled 1 to 9 in a box.

Lee will take at random two balls from the box.

Lee says,

> "The probability that the sum of the numbers on the two balls will be an even number is greater than the probability that the product of the numbers will be an even number."

multiplication

Is Lee correct?
You must show how you get your answer.

1 2 3 4 5 6 7 8 9

Even Sum

Odd + Odd

Even + Even

Even Product

Even × odd

Odd × even

Even × even

$p(00) = \frac{5}{9} \times \frac{4}{8}$

$= \frac{20}{72}$

$1 - p(00) = 1 - \frac{20}{72}$

$= \frac{52}{72}$

$p(\text{even product}) = \frac{52}{72}$

$p(EE) = \frac{4}{9} \times \frac{3}{8}$

$= \frac{12}{72}$

$p(\text{even sum}) = \frac{20}{72} + \frac{12}{72}$

$= \frac{32}{72}$

No. $\frac{52}{72} > \frac{32}{72}$

(Total for Question 14 is 5 marks)

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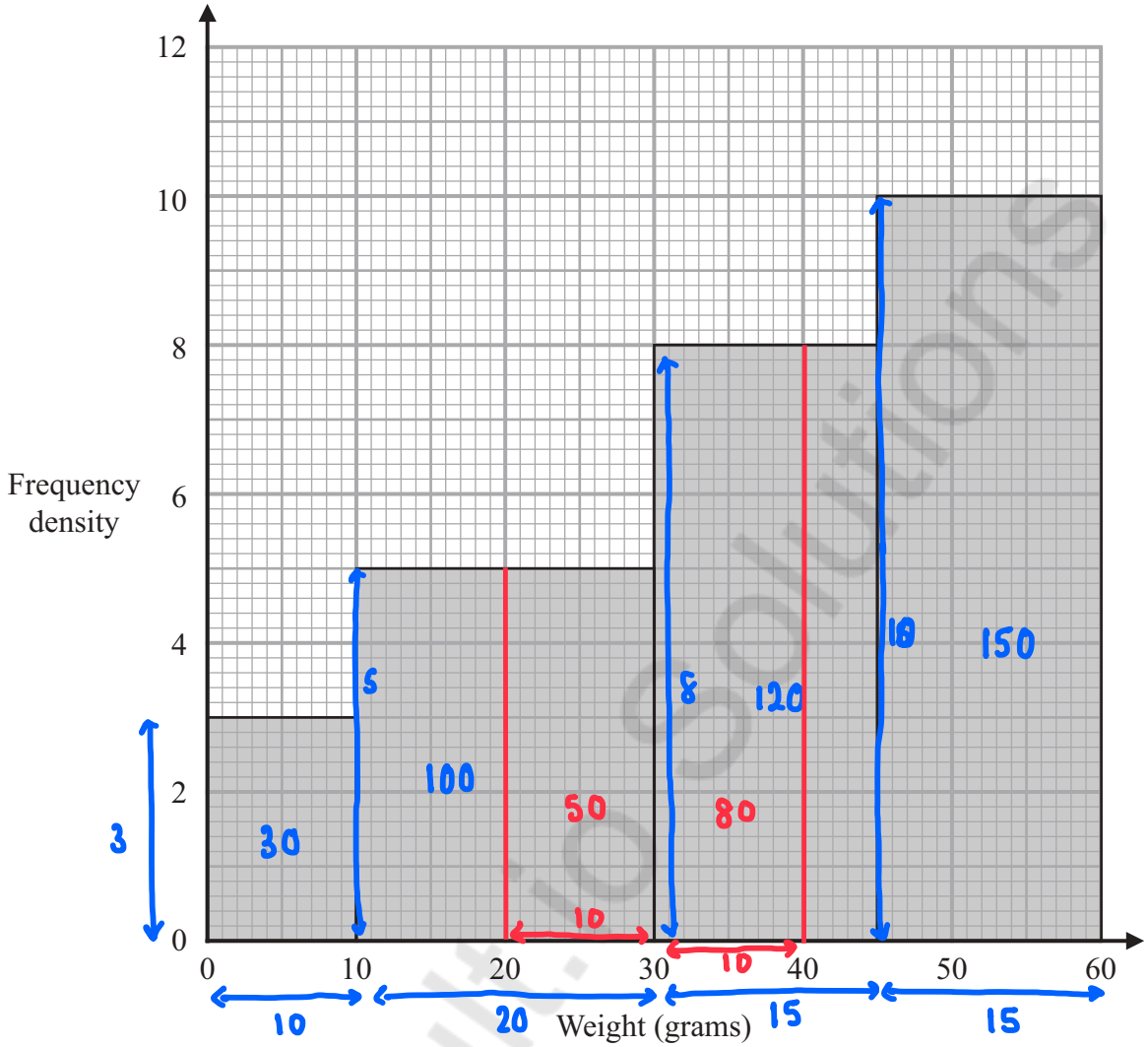
15 The histogram gives information about the weights, in grams, of some biscuits.



One of these biscuits is taken at random.

Work out an estimate for the probability that the biscuit will have a weight between 20 grams and 40 grams.

Frequency = class width × frequency density

Total biscuits = 30 + 100 + 120 + 150
= 400

20g ↔ 40g = 50 + 80
= 130

Probability = $\frac{130}{400}$

$\frac{130}{400}$

(Total for Question 15 is 4 marks)

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16 (a) Rationalise the denominator of $\frac{35}{\sqrt{7}}$

Give your answer in its simplest form.

$$\frac{35}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{35\sqrt{7}}{7} = 5\sqrt{7}$$

$5\sqrt{7}$

(2)

$\frac{\sqrt{27}-1}{2-\sqrt{3}}$ can be written in the form $a + b\sqrt{3}$ where a and b are integers.

(b) Work out the value of a and the value of b.

$$\sqrt{27} = \sqrt{9} \times \sqrt{3}$$
$$= 3 \times \sqrt{3}$$
$$= 3\sqrt{3}$$

$$\frac{3\sqrt{3}-1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{(3\sqrt{3}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$$

$$= \frac{6\sqrt{3}+9-2-\sqrt{3}}{4+2\sqrt{3}-2\sqrt{3}-3}$$

$$= \frac{5\sqrt{3}+7}{1}$$

$$= 5\sqrt{3}+7$$

$$= 7+5\sqrt{3}$$

$a =$ 7

$b =$ 5

(4)

(Total for Question 16 is 6 marks)

Turn over for Question 17

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17 $g(x) = 1 - 3x$ $h(x) = 2x^2 - 1$

Show that $3gh(x) + hg(x) = 0$ has just one solution for x.

$gh(x) = 1 - 3(2x^2 - 1)$

$= 1 - 6x^2 + 3$

$= 4 - 6x^2$

$3gh(x) = 3(4 - 6x^2)$

$= 12 - 18x^2$

$hg(x) = 2(1-3x)^2 - 1$

$= 2(1-3x)(1-3x) - 1$

$= 2(1 - 3x - 3x + 9x^2) - 1$

$= 2(1 - 6x + 9x^2) - 1$

$= 2 - 12x + 18x^2 - 1$

$= 1 - 12x + 18x^2$

$12 - 18x^2 + 1 - 12x + 18x^2 = 0$

$13 - 12x = 0$

$-12x = -13$

$x = \frac{13}{12}$

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(Total for Question 17 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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