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)

Monday 3 June 2024

Morning (Time: 1 hour 30 minutes)

Paper reference **1MA1/2H**

Mathematics

PAPER 2 (Calculator)

Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB or B pencil, eraser, calculator, 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 be used**.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

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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F:1/1/1/

P 7 6 9 2 5 A 0 1 2 4

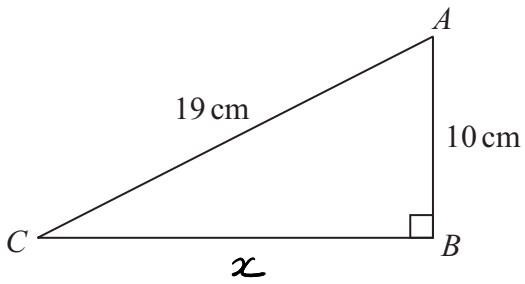
Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 *ABC* is a right-angled triangle.



Work out the length of *CB*.
Give your answer correct to 3 significant figures.

$x^2 = 19^2 - 10^2$

$x^2 = 261$

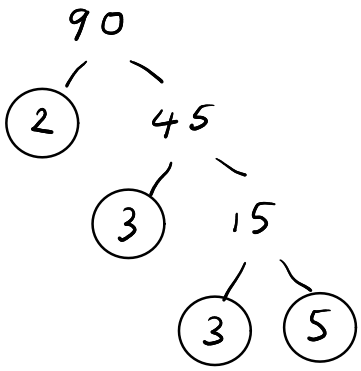
$x = \sqrt{261}$

$x = 16.155$

16.2 cm

(Total for Question 1 is 2 marks)

2 (a) Write 90 as a product of its prime factors.



$2 \times 3 \times 3 \times 5$

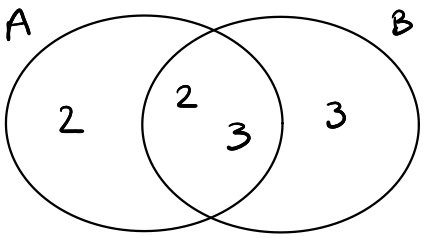
$2 \times 3 \times 3 \times 5$

(2)

$A = 2^2 \times 3$

$B = 2 \times 3^2$

(b) Write down the lowest common multiple (LCM) of A and B.



LCM = $2 \times 2 \times 3 \times 3$

$= 36$

36

(1)

(Total for Question 2 is 3 marks)

3 The number of hours, H, that some machines take to make 5000 bottles is given by

$$H = \frac{72}{n}$$ where n is the number of machines.

On Monday, 6 machines made 5000 bottles.
On Tuesday, 9 machines made 5000 bottles.

The machines took more time to make the bottles on Monday than on Tuesday.

How much more time?

Monday : $H = \frac{72}{6} = 12$ hours

Tuesday : $H = \frac{72}{9} = 8$ hours

$12 - 8 = 4$

4 hours

(Total for Question 3 is 2 marks)

4 There are only red discs, blue discs and yellow discs in a bag.
There are 24 yellow discs in the bag.

Mel is going to take at random a disc from the bag.

The probability that the disc will be yellow is 0.16

the number of red discs : the number of blue discs = 5 : 4

Work out the number of red discs in the bag.

$0.16 \times x = 24$ (x = total number of discs)

$x = \frac{24}{0.16}$

$= 150$

$150 - 24 = 126$ (Red and blue)

5 : 4 (9 parts)

$\frac{126}{9} = 14$ (each part is 14 discs)

$5 \times 14 = \underline{70}$ Red $4 \times 14 = 56$ Blue

70

(Total for Question 4 is 4 marks)

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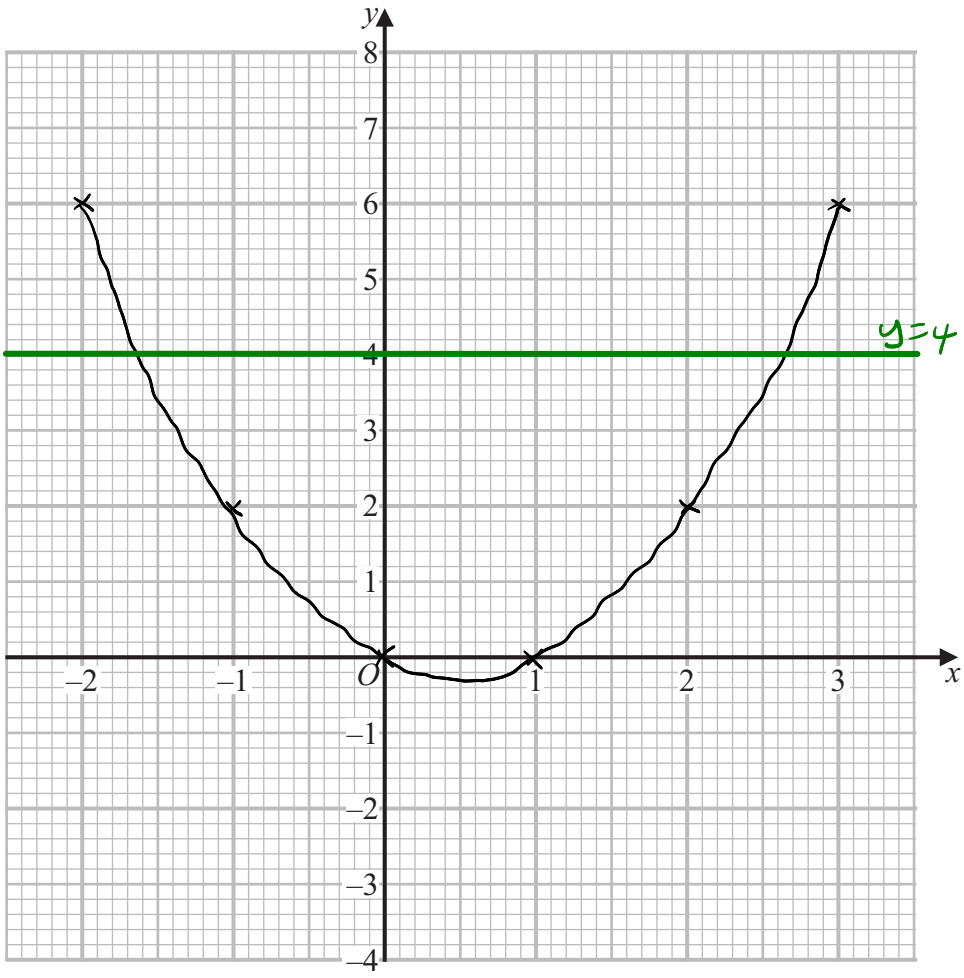
5 (a) Complete the table of values for $y = x^2 - x$

x	–2	–1	0	1	2	3
y	6	2	0	0	2	6

(2)

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



(2)

(c) Use your graph to find estimates for the solutions of the equation $x^2 - x = 4$

$x = 2.6$ and -1.6

(2.5 to 2.7 and -1.7 to -1.5)

(2)

(Total for Question 5 is 6 marks)

6 Andy, Luke and Tina share some sweets in the ratio $1:6:14$

Tina gives $\frac{3}{7}$ of her sweets to Andy.

Tina then gives $12\frac{1}{2}\%$ of the rest of her sweets to Luke.

Tina says,

"Now all three of us have the same number of sweets."

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

$\frac{3}{7} \times 14 = 6$ Tina gives 6 parts to Andy

$7 : 6 : 8$

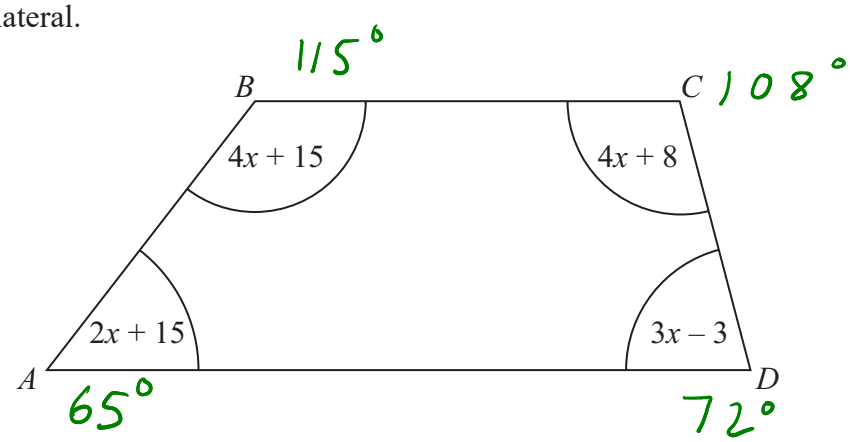
$12.5\% \times 8 = 1$ Tina gives 1 part to Luke

$7 : 7 : 7$

Yes, they all have the same number of parts.

(Total for Question 6 is 4 marks)

7 *ABCD* is a quadrilateral.



115°

108°

65°

72°

All angles are measured in degrees.

Show that *ABCD* is a trapezium.

$2x + 15 + 4x + 15 + 4x + 8 + 3x - 3 = 360$

$13x + 35 = 360$

$13x = 325$

$x = 25$

Angle ABC and BAD = 180°

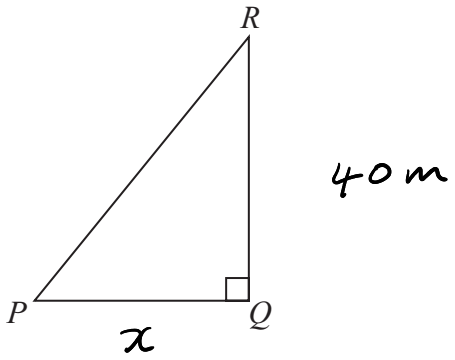
Angle BCD and ADC = 180°

∴ BC and AD are parallel, therefore

ABCD is a trapezium.

(Total for Question 7 is 4 marks)

8 A playground is in the shape of a right-angled triangle.



Dan makes a scale drawing of the playground.
He uses a scale of 1 cm represents 5 m

The area of the playground on the scale drawing is 28 cm^2

The real length of QR is 40 m

Work out the real length of PQ.

S.F Length $\times 5$

S.F Area $\times 25$

$28 \times 25 = 700 \text{ m}^2$

$\frac{1}{2} \times (40) = 700$

$x = \frac{700}{20}$

$= 35$

35 m

(Total for Question 8 is 3 marks)

9 A number N is rounded to 2 significant figures.
The result is 7.3

(a) Write down the least possible value of N.

7.25

(1)

Leila says,

"The value of N cannot be greater than 7.349 because 7.350 would round up to 7.4"

(b) Is Leila correct?
You must give a reason for your answer.

N could be greater than 7.349 , it could be 7.3499

(1)

(Total for Question 9 is 2 marks)

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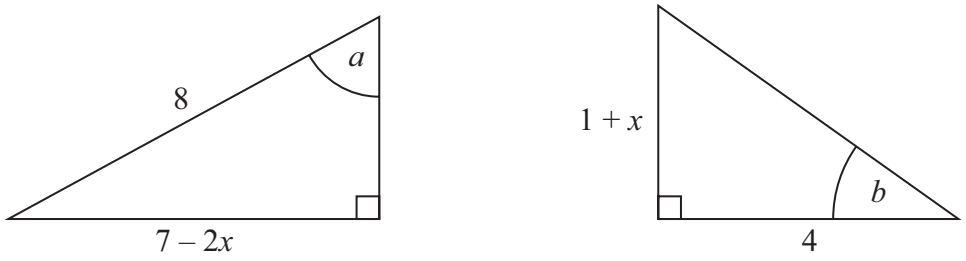
10 The diagram shows two right-angled triangles.



All lengths are measured in centimetres.

Given that

$\sin a = \tan b$

work out the value of x.

$\sin\theta = \frac{O}{H}$ $\tan\theta = \frac{O}{A}$

$\sin a = \frac{7-2x}{8}$ $\tan b = \frac{1+x}{4}$

$$\frac{7-2x}{8} = \frac{1+x}{4}$$

$$4(7-2x) = 8(1+x)$$

$$28 - 8x = 8 + 8x$$

$$20 = 16x$$

$$x = \frac{20}{16} = \frac{5}{4}$$

$x =$ $\frac{5}{4}$

(Total for Question 10 is 3 marks)

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11 The frequency table gives information about the weights of 60 parcels.

Weight (w kg)	Frequency
$0 < w \leqslant 2$	7
$2 < w \leqslant 4$	21
$4 < w \leqslant 6$	15
$6 < w \leqslant 8$	11
$8 < w \leqslant 10$	6

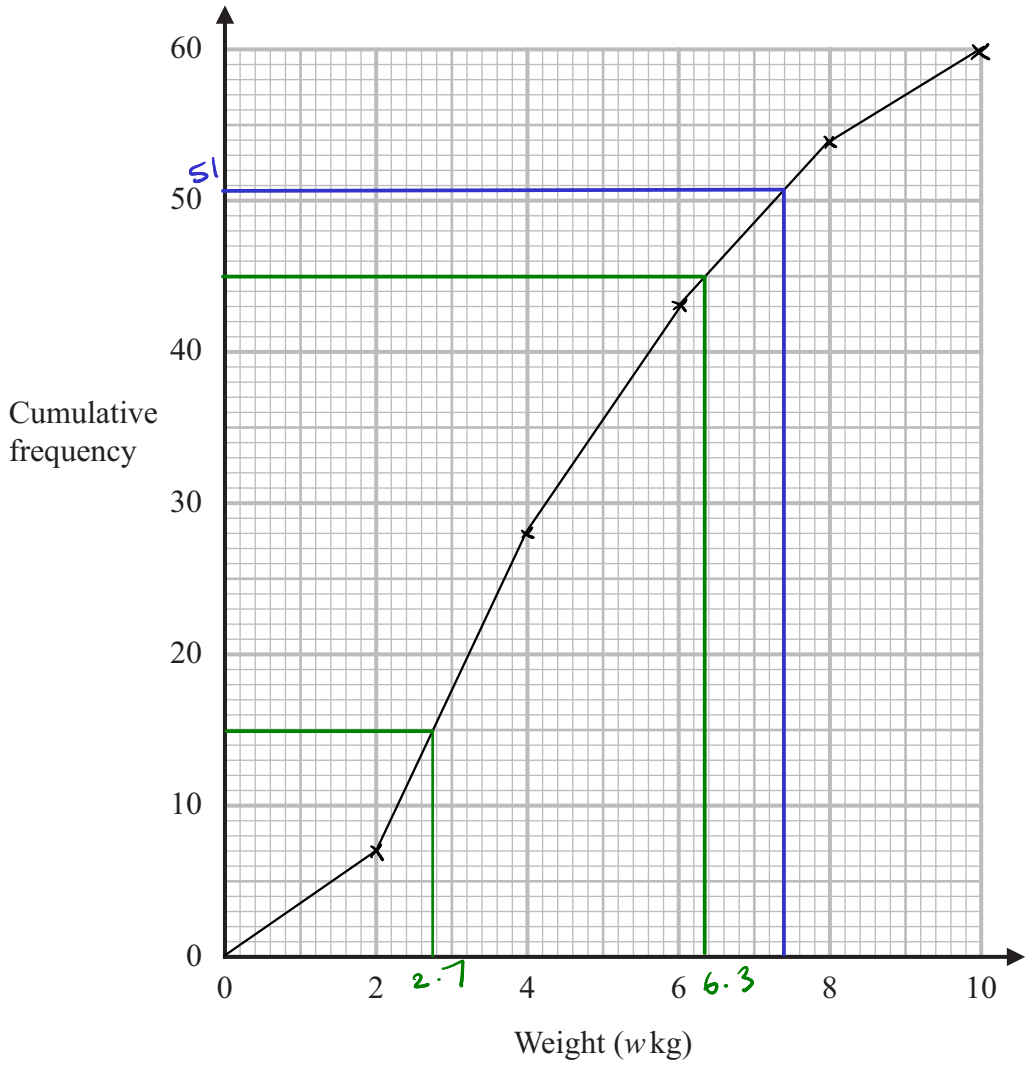
(a) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$0 < w \leqslant 2$	7
$0 < w \leqslant 4$	28
$0 < w \leqslant 6$	43
$0 < w \leqslant 8$	54
$0 < w \leqslant 10$	60

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)



(c) Use your graph to find an estimate for the interquartile range.

6.3 − 2.7

3.6 kg

(2)

(3.4 to 4)

(d) Use your graph to find an estimate for the number of these parcels with a weight greater than 7.4 kg.

60 − 51 = 9

9

(2)

(7 to 10)

(Total for Question 11 is 7 marks)

12 f is inversely proportional to d^2

$f = 3.5$ when $d = 8$

$$f = \frac{k}{d^2}$$

(a) Find an equation for f in terms of d.

$$3.5 = \frac{k}{8^2}$$

$$k = 224$$

$$f = \frac{224}{d^2}$$

(2)

(b) Find the positive value of d when $f = 10$
Give your answer correct to 3 significant figures.

$$10 = \frac{224}{d^2}$$

$$10d^2 = 224$$

$$d^2 = 22.4$$

$$d = \sqrt{22.4} = 4.73$$

$d =$ 4.73

(2)

(Total for Question 12 is 4 marks)

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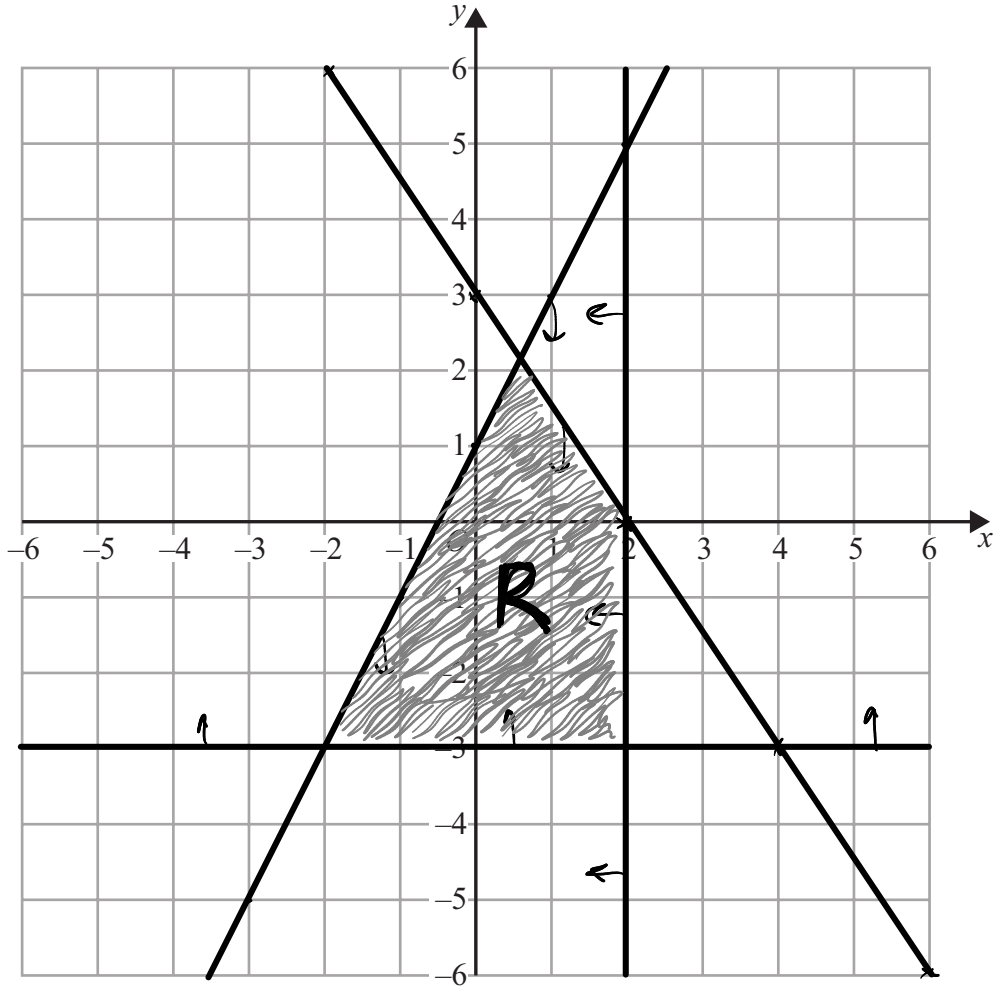
13



On the grid, shade the region **R** that satisfies all the following inequalities.

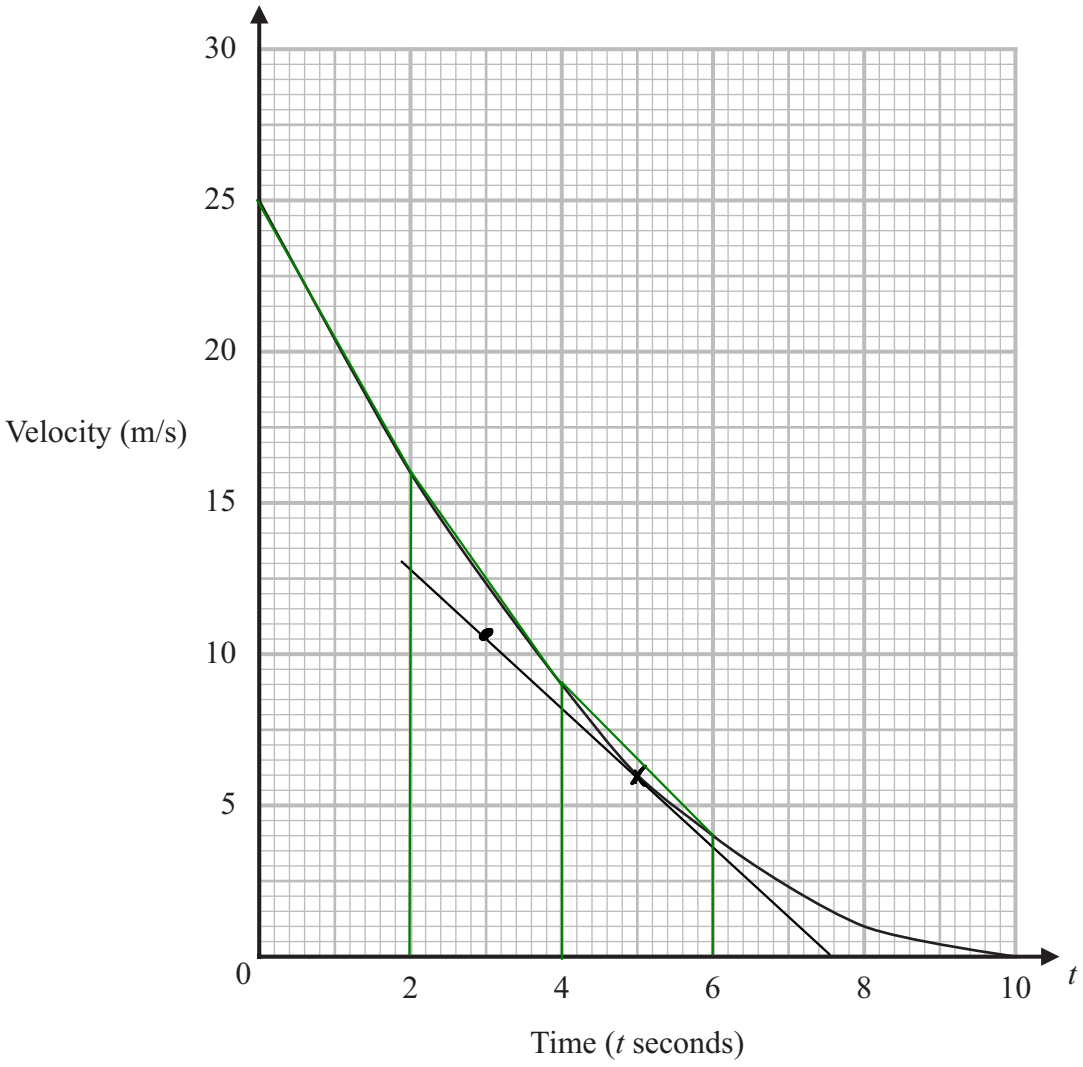
$x \leqslant 2$ $y \geqslant -3$ $y \leqslant 2x + 1$ $3x + 2y \leqslant 6$

Label the region **R**.

x	0	2	4
y	3	0	-3

(Total for Question 13 is 3 marks)

14 The graph shows the velocity of a car, in metres per second, t seconds after it starts to slow down.



(a) Calculate an estimate for the acceleration of the car when $t = 5$
You must show all your working.

gradient

(3, 10.5) (5, 6)

x_1 y_1 x_2 y_2

$$m = \frac{6 - 10.5}{5 - 3}$$

-2.25 m/s^2

(3)

(−2.0 to −2.8)

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(b) Work out an estimate for the distance the car travels in the first 6 seconds after it starts to slow down.
Use 3 strips of equal width.

$\frac{1}{2}(16+25) \times 2 = 41$

$\frac{1}{2}(9+16) \times 2 = 25$

$\frac{1}{2}(4+9) \times 2 = 13$

$41 + 25 + 13$

79 m

(3)

(Total for Question 14 is 6 marks)

15 Given that a is a prime number, rationalise the denominator of $\frac{1}{\sqrt{a}+1}$

Give your answer in its simplest form.

$\frac{1}{(\sqrt{a}+1)} \frac{(\sqrt{a}-1)}{(\sqrt{a}-1)}$

$\frac{\sqrt{a}-1}{a-\sqrt{a}+\sqrt{a}-1} = \frac{\sqrt{a}-1}{a-1}$

$\frac{\sqrt{a}-1}{a-1}$

(Total for Question 15 is 2 marks)

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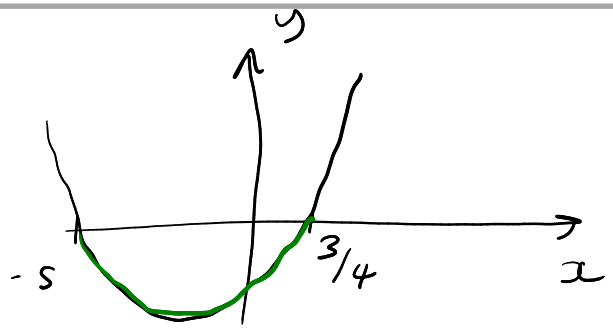
16 Solve $(4x - 3)(x + 5) < 0$

$x = \frac{3}{4}$ $x = -5$

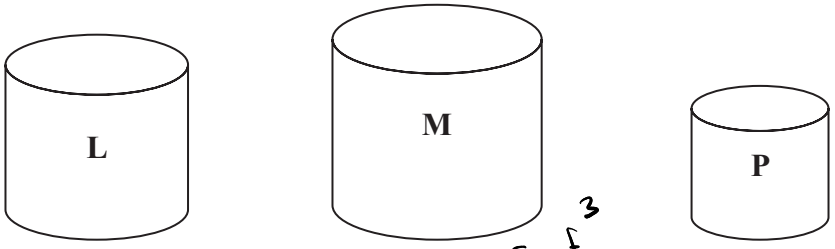


Less than zero under the x axis

$-5 < x < \frac{3}{4}$

(Total for Question 16 is 2 marks)

17 **L**, **M** and **P** are three similar solid cylinders made from the same material.



L has a mass of 64 g
M has a mass of 125 g

volume S.F = S.F^3

M has a total surface area of 144 cm^2
P has a total surface area of 16 cm^2

area SF = SF^2

Work out

height of cylinder **L** : height of cylinder **M** : height of cylinder **P**

L : M
volume 64 : 125
length 4 : 5 ×3
3× 12 : 15

M : P
area 144 : 16
length 12 : 4
5× 3 : 1 ×5
15 : 5

L : M : P
12 : 15 : 5

12 : 15 : 5

(Total for Question 17 is 4 marks)

18 There are only 4 red counters, 3 yellow counters and 1 green counter in a bag.

Tony takes at random three counters from the bag.

Work out the probability that there are now more yellow counters than red counters in the bag.
You must show all your working.

RRR
RRG
RGR
GRR

$P(RRR) = \frac{4}{8} \times \frac{3}{7} \times \frac{2}{6} = \frac{1}{14}$

$P(RRG) = \frac{4}{8} \times \frac{3}{7} \times \frac{1}{6} = \frac{1}{28}$

$P(RGR) = \frac{1}{28}$

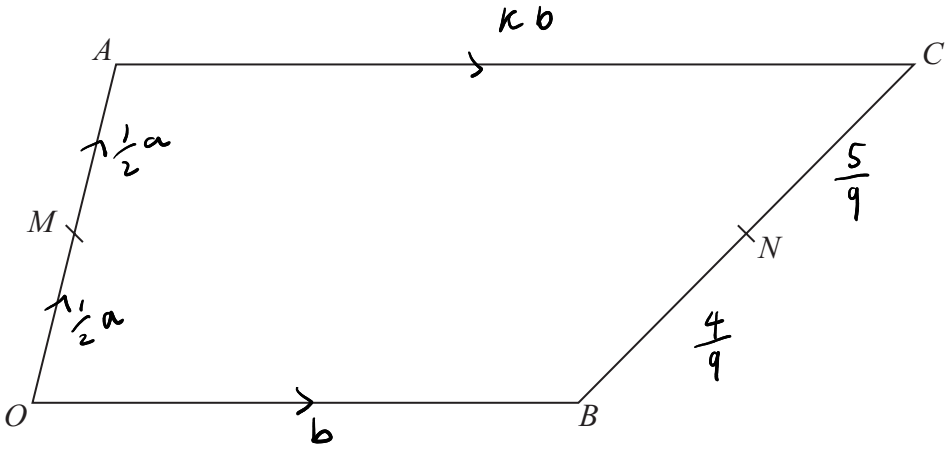
$P(GRR) = \frac{1}{28}$

$\frac{1}{14} + \frac{1}{28} + \frac{1}{28} + \frac{1}{28} = \frac{5}{28}$

$\frac{5}{28}$

(Total for Question 18 is 5 marks)

19 The diagram shows quadrilateral $OACB$.



M is the midpoint of OA.
N is the point on BC such that $BN : NC = 4 : 5$

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$ $\overrightarrow{AC} = k\mathbf{b}$ where k is a positive integer.

(a) Express $\overrightarrow{MN}$ in terms of k, **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{BC} = -\mathbf{b} + \mathbf{a} + k\mathbf{b}$

$\overrightarrow{BN} = \frac{4}{9}(-\mathbf{b} + \mathbf{a} + k\mathbf{b})$

$\overrightarrow{MN} = -\frac{1}{2}\mathbf{a} + \mathbf{b} + \frac{4}{9}(-\mathbf{b} + \mathbf{a} + k\mathbf{b})$

$= -\frac{1}{2}\mathbf{a} + \mathbf{b} - \frac{4}{9}\mathbf{b} + \frac{4}{9}\mathbf{a} + \frac{4}{9}k\mathbf{b}$

$= -\frac{1}{18}\mathbf{a} + \frac{5}{9}\mathbf{b} + \frac{4}{9}k\mathbf{b}$

$-\frac{1}{18}\mathbf{a} + \frac{5}{9}\mathbf{b} + \frac{4}{9}k\mathbf{b}$

(4)

(b) Is MN parallel to OB?
Give a reason for your answer.

No. $\overrightarrow{MN}$ cannot be a multiple of $\overrightarrow{OB}$ it has an $\mathbf{a}$ component.

(1)

(Total for Question 19 is 5 marks)

20 The curve **C** has equation $y = 2x^2 - 12x + 7$

Find the coordinates of the turning point on **C**.

$y = 2(x^2 - 6x) + 7$

$= 2((x-3)^2 - 9) + 7$

$= 2(x-3)^2 - 18 + 7$

$= 2(x-3)^2 - 11$

$(3, -11)$

(3 , −11)

(Total for Question 20 is 3 marks)

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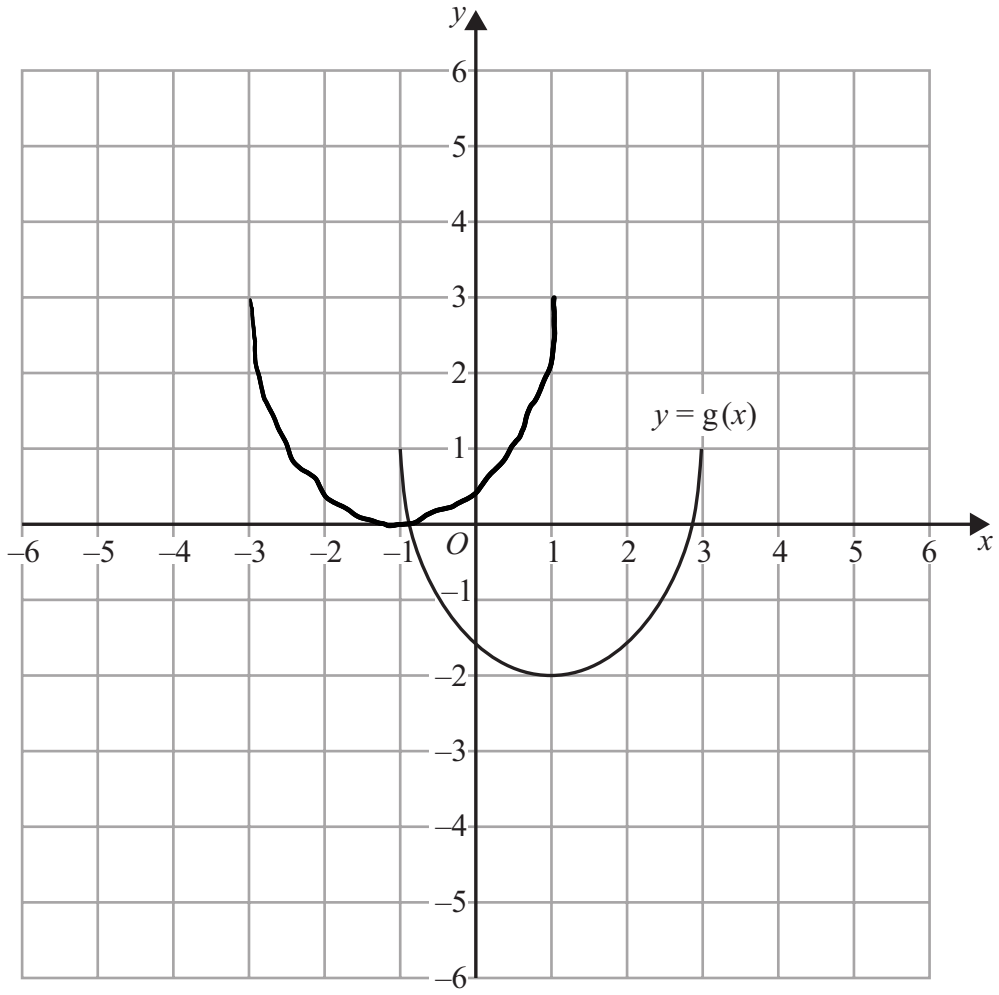
21 The graph of $y = g(x)$ is shown on the grid.

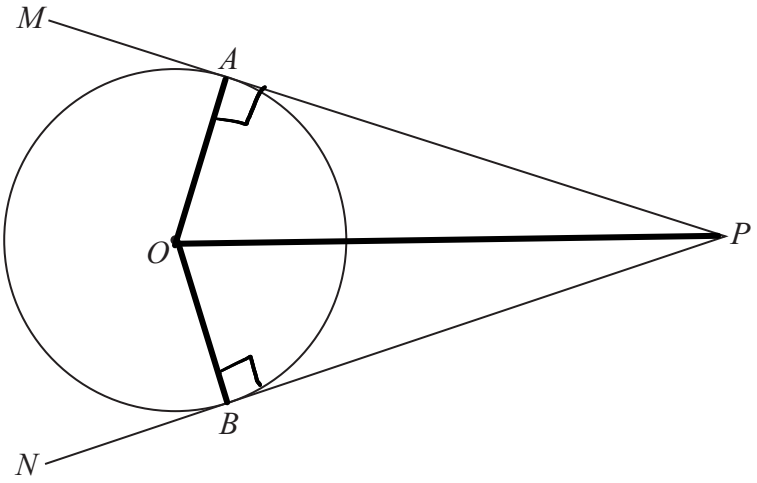


On the grid, draw the graph of $y = g(-x) + 2$

(Total for Question 21 is 2 marks)

Turn over for Question 22

22 A and B are points on a circle, centre O.



MAP and NBP are tangents to the circle.

Prove that $AP = BP$

OA = OB (Both radius)

OP is common to both triangles

OBP and OAP are both 90° Tangent meets radius at a right angle.

Triangles OBP and OAP are congruent

RHS ∴ AP = BP

(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS