Please check the examination details below before entering your candidate information

Candidate surname: Solved by Mr. Pabitra | Other names:

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Friday 7 November 2025

Morning (Time: 2 hours)

Paper reference **4MA1/2H**

Mathematics A

PAPER 2H

Higher Tier



You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Solved by Mr. Pabitra | Math Tonic

Turn over ▶

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P 7 9 7 8 9 A 0 1 2 8

Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

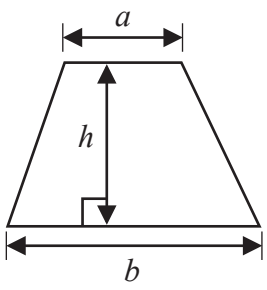
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

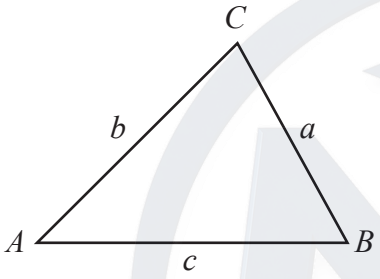
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Area of trapezium $= \frac{1}{2}(a+b)h$



Trigonometry



In any triangle ABC

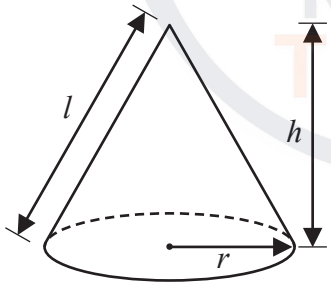
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

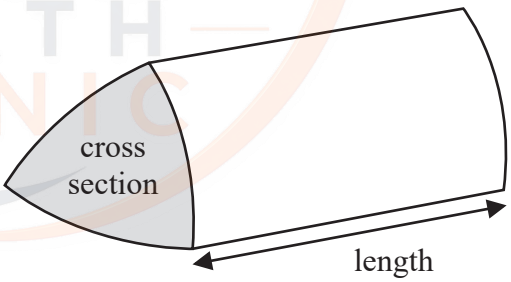
Area of triangle $= \frac{1}{2}ab\sin C$

Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

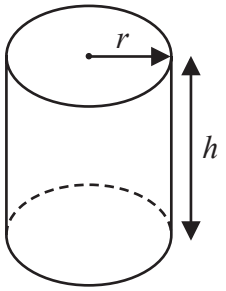


Volume of prism
= area of cross section × length



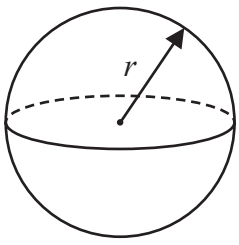
Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi rh$



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



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Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The point P has coordinates (3, 4)
The point Q has coordinates (9, 16)

M is the midpoint of the line PQ

Find the coordinates of M

Midpoint $= \left(\frac{3+9}{2}, \frac{4+16}{2}\right) = (6, 10)$

(6 , 10)

(Total for Question 1 is 2 marks)

2 Solve the simultaneous equations

$$5x + y = 11$$
$$3x - y = 9$$

Show clear algebraic working.

$5x + y = 11$ (1)

$3x - y = 9$ (2)

(1) + (2): $8x = 20$

$x = 2.5$

Substitute into (1): $5 \times 2.5 + y = 11$

$12.5 + y = 11$, $y = -1.5$

Check in (2): $3 \times 2.5 - (-1.5) = 7.5 + 1.5 = 9$ correct

$x =$ 2.5

$y =$ −1.5

(Total for Question 2 is 3 marks)

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Solved by Mr. Pabitra

3 A box contains only

9 red bricks
43 blue bricks
and some yellow bricks

$\frac{7}{20}$ of the bricks are yellow bricks.

Each brick weighs 35 grams.

Work out the total weight of the yellow bricks.

Red and blue = 9 + 43 = 52 bricks. These are $1 - \frac{7}{20} = \frac{13}{20}$ of the bricks

$\frac{13}{20}$ of total = 52, total = $52 \times \frac{20}{13}$ = 80 bricks

Yellow bricks = 80 − 52 = 28

Total weight of yellow bricks = 28 × 35 = 980 g

980 grams

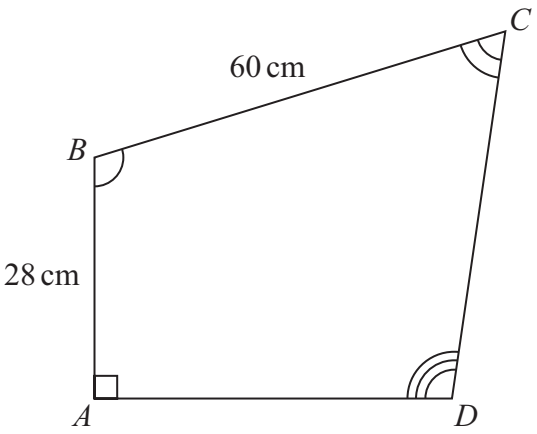
(Total for Question 3 is 4 marks)

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Solved by Mr. Pabitra

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4 Here are three similar quadrilaterals.



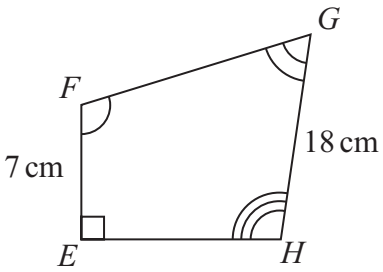
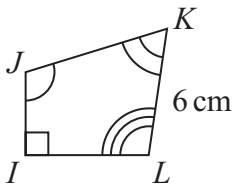


Diagram **NOT** accurately drawn



Work out the length of *JK*

ABCD to EFGH: AB = 28 matches EF = 7, scale factor = 7 ÷ 28 = 1/4

EFGH to IJKL: GH = 18 matches KL = 6, scale factor = 6 ÷ 18 = 1/3

JK matches FG, which matches BC = 60 cm

FG = 60 × 1/4 = 15 cm

JK = 15 × 1/3 = 5 cm

5 cm

(Total for Question 4 is 3 marks)

Solved by Mr. Pabitra

5 Otis sells ice creams.

On Friday, Otis sells 75 ice creams.
On Saturday, Otis sells 87 ice creams.

(a) Work out the percentage increase in the number of ice creams Otis sells from Friday to Saturday.

Increase = 87 − 75 = 12

Percentage increase = $\frac{12}{75}$ × 100 = 16 %

16 ..... %

(3)

Claudia buys an ice cream machine for 960 Swiss francs.

The value of the ice cream machine depreciates by 20% each year.

(b) Work out the value of the ice cream machine at the end of 3 years.

Depreciates by 20%, so each year the value is × 0.8

Value after 3 years = 960×0.8^3

= 960 × 0.512 = 491.52 Swiss francs

491.52 ..... Swiss francs

(3)

(Total for Question 5 is 6 marks)

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Solved by Mr. Pabitra

6 A large circle with centre O contains 3 identical small circles.
Each circle touches two other circles.

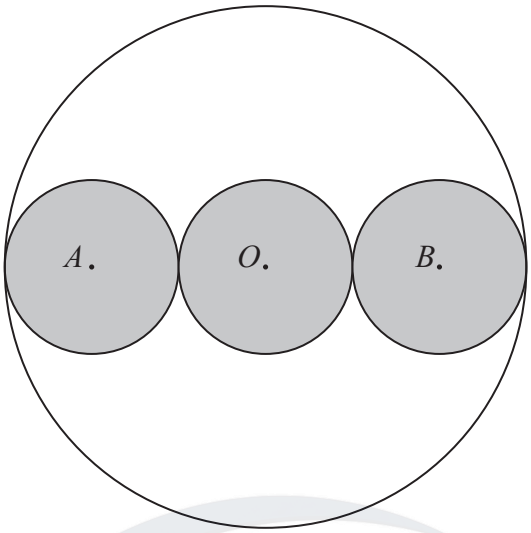


Diagram **NOT** accurately drawn

A, O and B are the centres of the small circles.
AOB is a straight line.

The circumference of the large circle is 160 cm

Work out the area of one small circle.
Give your answer correct to 3 significant figures.

Circumference of large circle = $\pi D = 160$, $\quad D = \frac{160}{\pi} = 50.929...$ cm

3 small diameters fit across the large diameter: $d = 50.929... \div 3 = 16.976...$ cm

Radius of a small circle $r = 16.976... \div 2 = 8.488...$ cm

Area = $\pi r^2 = \pi \times 8.488...^2 = 226.353...$

$= 226$ cm^2 (3 s.f.)

226 ..... cm^2

(Total for Question 6 is 5 marks)

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Solved by Mr. Pabitra

7 (i) Factorise $x^2 + 2x - 48$

Two numbers that multiply to −48 and add to 2: 8 and −6

$x^2 + 2x - 48 = (x + 8)(x - 6)$

$(x + 8)(x - 6)$

(2)

(ii) Hence, solve $x^2 + 2x - 48 = 0$

$x + 8 = 0$ or $x - 6 = 0$

$x = -8,\ x = 6$

(1)

(Total for Question 7 is 3 marks)

---

8 (a) Write 5.76×10^4 as an ordinary number.

$5.76 \times 10\,000 = 57\,600$

$57\,600$

(1)

(b) Work out $\dfrac{3 \times 10^5 + 8 \times 10^3}{4 \times 10^{-2}}$

Give your answer in standard form.

Numerator: $3 \times 10^5 + 8 \times 10^3 = 300\,000 + 8000 = 308\,000$

$\dfrac{308\,000}{0.04} = 7\,700\,000 = 7.7 \times 10^6$

7.7×10^6

(2)

(Total for Question 8 is 3 marks)

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Solved by Mr. Pabitra

9 Mark has three bags, bag A, bag B and bag C

Bag A contains 120 counters.
The probability of taking at random a red counter from bag A is 0.45

Bag B contains 80 counters.
The probability of taking at random a red counter from bag B is 0.3

Bag C is empty.

Mark puts all the counters from bag A and bag B into bag C

Mark takes at random a counter from bag C

Work out the probability that he takes a red counter.

Red counters in bag A = $0.45 \times 120 = 54$

Red counters in bag B = $0.3 \times 80 = 24$

Bag C: red = $54 + 24 = 78$, total = $120 + 80 = 200$

$P(\text{red}) = \frac{78}{200} = \frac{39}{100} = 0.39$

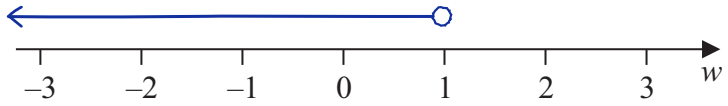
0.39

(Total for Question 9 is 3 marks)

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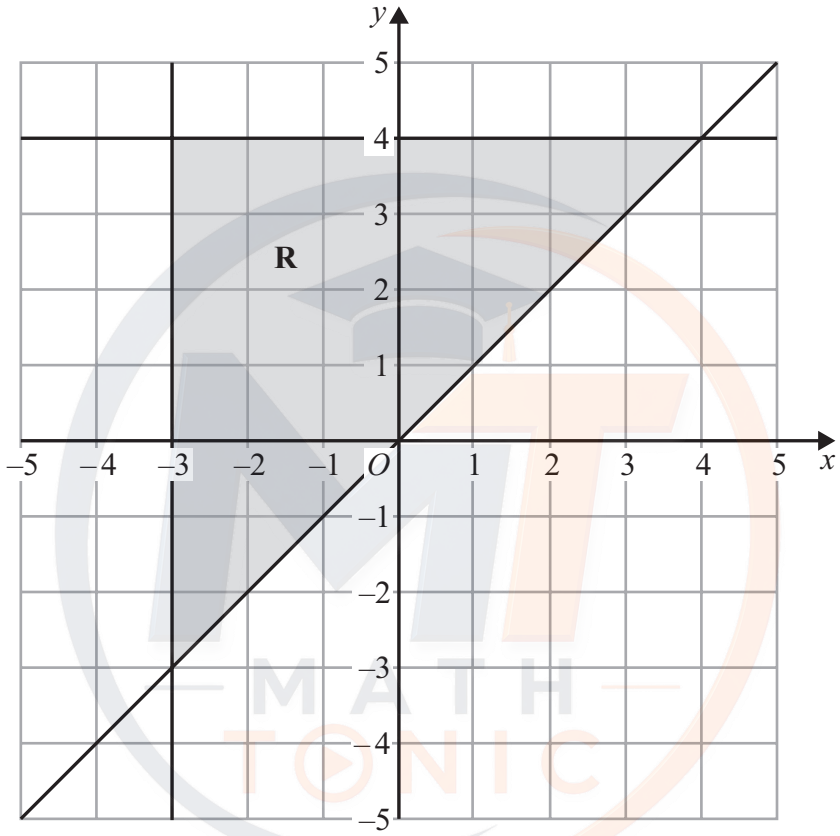
Solved by Mr. Pabitra

10 (a) On the number line, represent the inequality $w < 1$



(1)

The region **R**, shown shaded in the diagram, is bounded by three straight lines.



(b) Write down the three inequalities that define the region **R**

R is to the right of the line x = −3, below y = 4 and above the line y = x

$x \geq -3$

$y \leq 4$

$y \geq x$

(3)

(Total for Question 10 is 4 marks)

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Solved by Mr. Pabitra

11 The diagram shows a right-angled triangle ABC

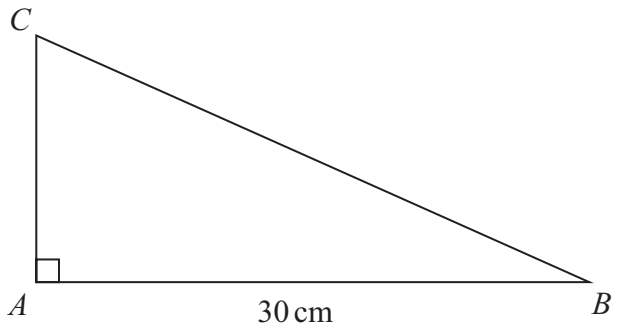


Diagram **NOT** accurately drawn

Area of triangle $ABC = 240\,\text{cm}^2$

Work out the perimeter of triangle ABC

Area $= \frac{1}{2} \times AB \times AC = 240$

$\frac{1}{2} \times 30 \times AC = 240$, $15 \times AC = 240$, $AC = 16$ cm

$BC^2 = AB^2 + AC^2 = 30^2 + 16^2 = 900 + 256 = 1156$

$BC = \sqrt{1156} = 34$ cm

Perimeter $= 30 + 16 + 34 = 80$ cm

80 ..... cm

(Total for Question 11 is 4 marks)

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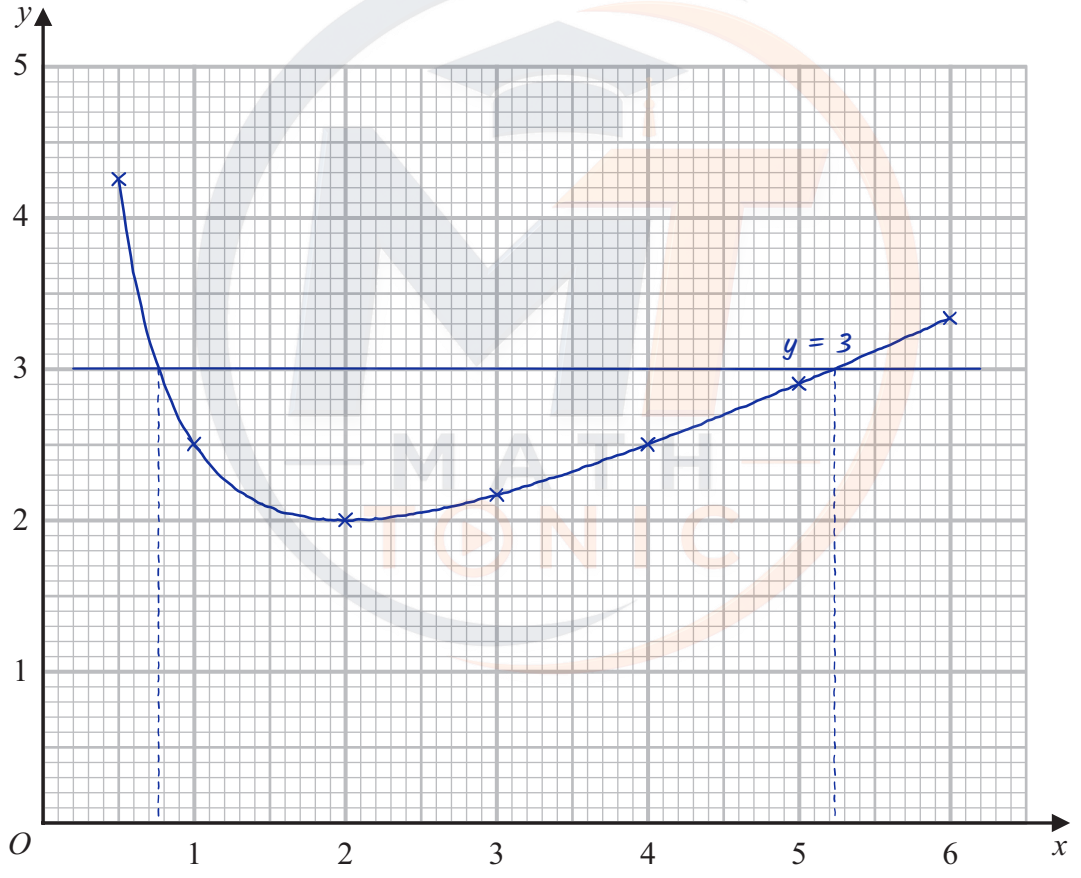
12 (a) Complete the table of values for $y = \frac{1}{2}\left(x + \frac{4}{x}\right)$

$x = 1$: $\frac{1}{2}(1 + 4) = 2.5$ $\quad$ $x = 2$: $\frac{1}{2}(2 + 2) = 2$

x	0.5	1	2	3	4	5	6
y	4.25	2.5	2	2.17	2.5	2.9	3.33

(1)

(b) Draw the graph of $y = \frac{1}{2}\left(x + \frac{4}{x}\right)$ for $0.5 \leqslant x \leqslant 6$



(2)

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Solved by Mr. Pabitra

P 7 9 7 8 9 A 0 1 2 2 8

(c) By drawing a suitable line on the grid, find estimates for the solutions of the equation $x + \frac{4}{x} = 6$

Give your answers correct to one decimal place.

$x + \frac{4}{x} = 6$ so $\frac{1}{2}(x + \frac{4}{x}) = 3$

Draw the line $y = 3$ on the grid. It meets the curve at $x = 0.8$ and $x = 5.2$

0.8 and 5.2

(2)

(Total for Question 12 is 5 marks)

13 (a) Simplify fully $\left(\frac{125x^6}{y^{15}}\right)^{\frac{2}{3}}$

$125^{2/3} = (\sqrt[3]{125})^2 = 5^2 = 25$, $(x^6)^{2/3} = x^4$, $(y^{15})^{2/3} = y^{10}$

$\frac{25x^4}{y^{10}}$

(2)

Given that $4^n = \frac{4^m}{64^p}$

(b) Express n in terms of m and p

$64 = 4^3$, so $64^p = 4^{3p}$

$4^n = \frac{4^m}{4^{3p}} = 4^{m-3p}$ so $n = m - 3p$

$n =$ $m - 3p$

(2)

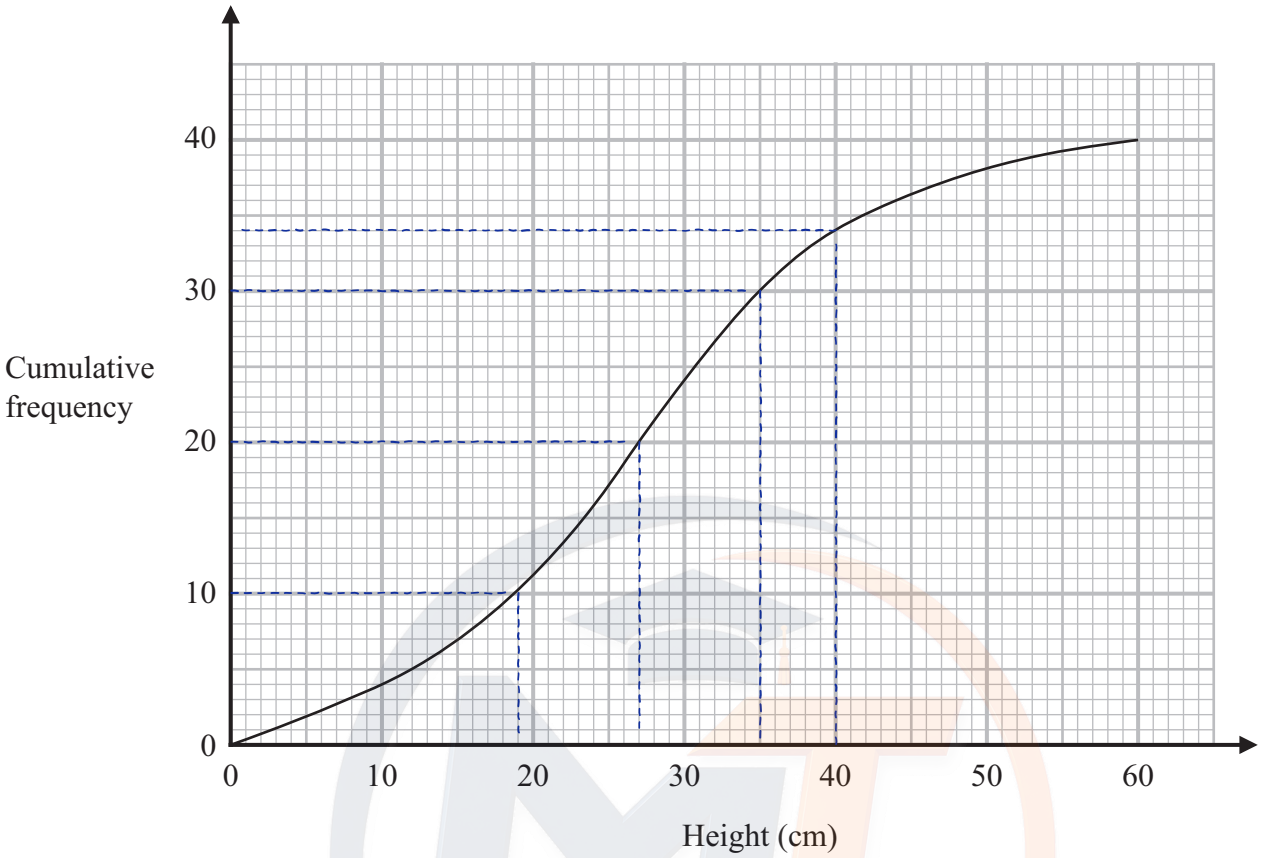
(Total for Question 13 is 4 marks)

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MATH TONIC

Solved by Mr. Pabitra

14 The cumulative frequency graph shows information about the heights of 40 plants that Greta has grown.



(a) Use the graph to find an estimate for the median height.

Median = 40 ÷ 2 = 20th plant; read across from 20; 27 cm

27 cm

(1)

(b) Use the graph to find an estimate for the interquartile range of the heights.

LQ: 40 ÷ 4 = 10th plant = 19 cm UQ: 3 × 10 = 30th plant = 35 cm

IQR = 35 − 19 = 16 cm

16 cm

(2)

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MATH TONIC

Solved by Mr. Pabitra

Plants with a height greater than 40 cm are premium plants.
Greta sells all the premium plants for 30 euros each.

(c) Work out the total amount of money Greta receives for the premium plants.

Read up from 40 cm: cumulative frequency = 34

Premium plants (more than 40 cm) = 40 − 34 = 6

Money = 6 × 30 = 180 euros

180 ..... euros

(2)

(Total for Question 14 is 5 marks)

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MATH TONIC

Solved by Mr. Pabitra

15 A, B, C and D are points on a circle with centre O

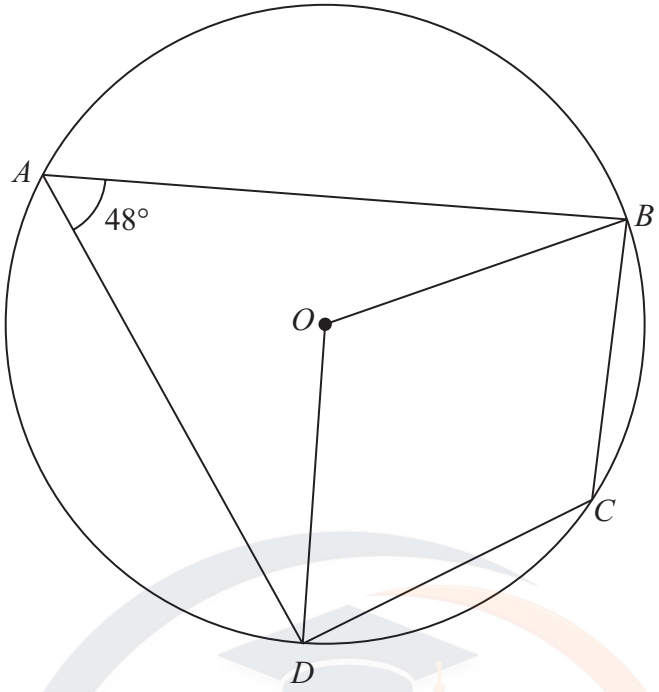


Diagram **NOT** accurately drawn

Angle $DAB = 48°$

(a) (i) Work out the size of the obtuse angle DOB

Obtuse angle DOB = 2 × 48 = 96°

96 °

(1)

(ii) Give a reason for your answer.

The angle at the centre is twice the angle at the circumference.

(1)

(b) (i) Work out the size of angle BCD

Angle BCD = 180 − 48 = 132°

132 °

(1)

(ii) Give a reason for your answer.

Opposite angles of a cyclic quadrilateral add up to 180°.

(1)

(Total for Question 15 is 4 marks)

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MATH TONIC

Solved by Mr. Pabitra

16 Use algebra to show that $0.3\dot{7}\dot{8} = \frac{25}{66}$

Let $x = 0.3787878...$

$10x = 3.787878...$ (1)

$1000x = 378.787878...$ (2)

(2) − (1): $990x = 375$

$x = \frac{375}{990} = \frac{25}{66}$ (divide top and bottom by 15)

so $0.3787878... = \frac{25}{66}$ as required

(Total for Question 16 is 2 marks)

17 T is inversely proportional to $\sqrt{m}$

$T = 15$ when $m = 36$

Find a formula for T in terms of m

$T = \frac{k}{\sqrt{m}}$ (inversely proportional to $\sqrt{m}$)

$15 = \frac{k}{\sqrt{36}} = \frac{k}{6}$, $k = 90$

$T = \frac{90}{\sqrt{m}}$

$T = \frac{90}{\sqrt{m}}$

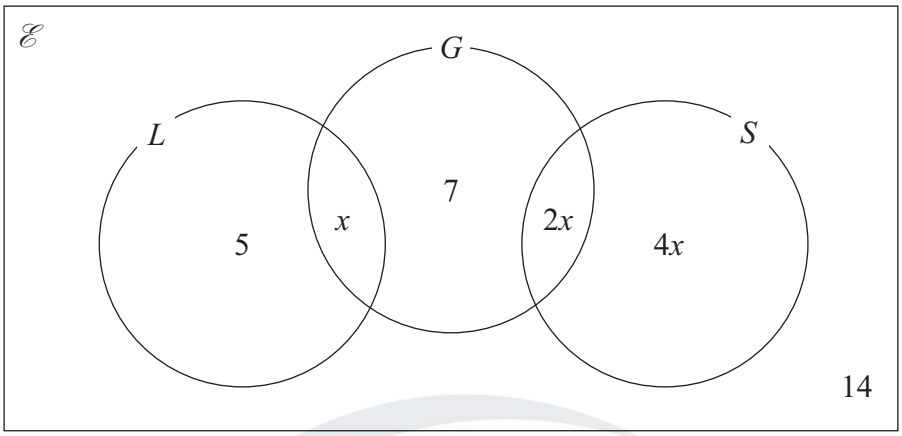
(Total for Question 17 is 3 marks)

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Solved by Mr. Pabitra

18 Bianca asked 40 students which of the languages Latin (L), Greek (G) and Sanskrit (S) they study.

The Venn diagram gives some information about her results.
It shows the number of students in each subset.



One of these students is selected at random.
Work out the probability that this student studies Latin or Sanskrit.

All 40 students: $5 + x + 7 + 2x + 4x + 14 = 40$

$7x + 26 = 40$, $7x = 14$, $x = 2$

Latin or Sanskrit (or both): $5 + x + 2x + 4x = 5 + 2 + 4 + 8 = 19$

P(Latin or Sanskrit) $= \frac{19}{40}$

$\frac{19}{40}$

(Total for Question 18 is 3 marks)

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Solved by Mr. Pabitra

19 The functions f and g are such that

$$f(x) = 3x - 2 \qquad g(x) = \frac{x}{2x - 1}$$

(a) Find g(3)

$g(3) = \frac{3}{2 \times 3 - 1} = \frac{3}{5}$

$\frac{3}{5}$

(1)

(b) Find gf(x)
Give your answer in its simplest form.

$gf(x) = g(3x - 2) = \frac{3x - 2}{2(3x - 2) - 1}$

$= \frac{3x - 2}{6x - 4 - 1} = \frac{3x - 2}{6x - 5}$

gf(x) = $\frac{3x - 2}{6x - 5}$

(2)

(Total for Question 19 is 3 marks)

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MATH TONIC

Solved by Mr. Pabitra

20 Here is a quadratic equation.

$$ax^2 + 4x + c = 0$$

The solutions of this equation are given by $x = \dfrac{-4 \pm 2\sqrt{39}}{10}$

Find the value of a and the value of c
Show your working clearly.

Formula: $x = \dfrac{-4 \pm \sqrt{4^2 - 4ac}}{2a}$ compare with $\dfrac{-4 \pm 2\sqrt{39}}{10}$

$2a = 10, \quad a = 5$

$\sqrt{16 - 4 \times 5 \times c} = 2\sqrt{39} = \sqrt{4 \times 39} = \sqrt{156}$

$16 - 20c = 156$

$-20c = 140, \quad c = -7$

$a =$ 5

$c =$ −7

(Total for Question 20 is 3 marks)

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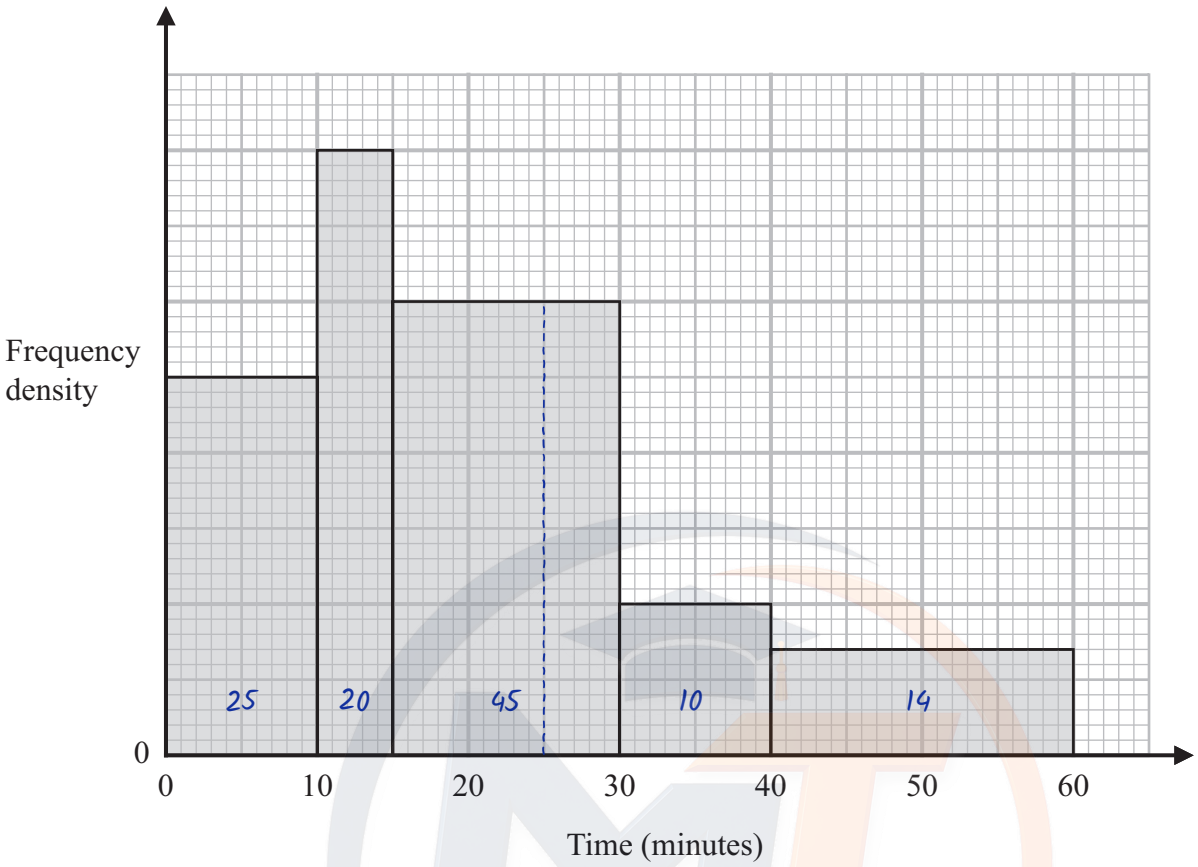
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MATH TONIC

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21 The histogram shows information about the times, in minutes, that some trains arrived late at a station one day.



20 of these trains arrived between 10 minutes late and 15 minutes late.

No trains arrived more than 60 minutes late.

Work out an estimate for the number of these trains that arrived at least 25 minutes late.

10 to 15 bar: frequency density = 20 ÷ 5 = 4, so 1 small square up = 0.1

15 to 30: fd = 3.0 30 to 40: fd = 1.0 40 to 60: fd = 0.7

At least 25 minutes late:

25 to 30: 3.0 × 5 = 15

30 to 40: 1.0 × 10 = 10

40 to 60: 0.7 × 20 = 14

Total = 15 + 10 + 14 = 39 trains

39

(Total for Question 21 is 3 marks)

Solved by Mr. Pabitra

22 Curve **C** has equation $y = x^3 - 16x + 7$

At two points on **C**, the gradient is 11
The tangents to **C** at these two points have equations of the form $y = ax + b$

Work out the two possible values of b
Show clear algebraic working.

$\frac{dy}{dx} = 3x^2 - 16$

Gradient is 11: $3x^2 - 16 = 11$

$3x^2 = 27$, $x^2 = 9$, $x = 3$ or $x = -3$

$x = 3$: $y = 3^3 - 16 \times 3 + 7 = 27 - 48 + 7 = -14$

Tangent $y = 11x + b$ through $(3, -14)$: $-14 = 33 + b$, $b = -47$

$x = -3$: $y = (-3)^3 - 16 \times (-3) + 7 = -27 + 48 + 7 = 28$

Tangent $y = 11x + b$ through $(-3, 28)$: $28 = -33 + b$, $b = 61$

-47 and 61

(Total for Question 22 is 6 marks)

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Solved by Mr. Pabitra

23 Shape **P** is similar to shape **Q**

The table shows some information about shape **P** and shape **Q**

	Surface area (cm^2)	Volume (cm^3)
Shape **P**	200	672
Shape **Q**	450	

Work out the volume of shape **Q**

Area scale factor $= \frac{450}{200} = \frac{9}{4}$

Length scale factor $= \sqrt{\frac{9}{4}} = \frac{3}{2}$

Volume scale factor $= (\frac{3}{2})^3 = \frac{27}{8}$

Volume of Q $= 672 \times \frac{27}{8} = 2268\ cm^3$

2268 ..... cm^3

(Total for Question 23 is 3 marks)

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Solved by Mr. Pabitra

24 $D = \dfrac{n}{p - q}$

n = 10.3 correct to 1 decimal place
p = 7.24 correct to 2 decimal places
q = 4.39 correct to 2 decimal places

By considering bounds, work out the value of D to a suitable degree of accuracy.
Show your working clearly.

Bounds: $10.25 \leq n < 10.35$

$7.235 \leq p < 7.245$ $\quad$ $4.385 \leq q < 4.395$

Upper bound of D: largest n, smallest p, largest q

$UB = \dfrac{10.35}{7.235 - 4.395} = \dfrac{10.35}{2.84} = 3.644...$

Lower bound of D: smallest n, largest p, smallest q

$LB = \dfrac{10.25}{7.245 - 4.385} = \dfrac{10.25}{2.86} = 3.583...$

UB = 3.6 to 2 s.f., $\quad$ LB = 3.6 to 2 s.f.

Both bounds agree to 2 s.f., so D = 3.6

3.6

(Total for Question 24 is 5 marks)

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MATH TONIC

Solved by Mr. Pabitra

25 The first term of an arithmetic series is 10
The 20th term of the series is 86

The sum of the first N terms of the series is 5194

Work out the value of N
Show your working clearly.

20th term: $a + 19d = 86$, $10 + 19d = 86$, $19d = 76$, $d = 4$

$S_N = \frac{N}{2}[2a + (N-1)d] = \frac{N}{2}[20 + 4(N-1)] = \frac{N}{2}(4N + 16) = 2N^2 + 8N$

$2N^2 + 8N = 5194$

$N^2 + 4N - 2597 = 0$

$(N - 49)(N + 53) = 0$

$N = 49$ or $N = -53$ (N must be positive)

$N = 49$

$N =$ 49

(Total for Question 25 is 5 marks)

Turn over for Question 26

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Solved by Mr. Pabitra

26 A solid cone is joined to a solid hemisphere to make the solid shown below.

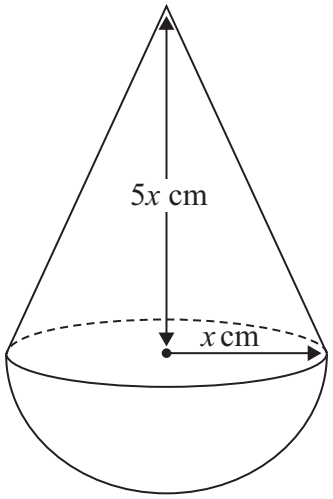


Diagram **NOT** accurately drawn

The cone is made from copper.
The density of copper is 9 g/cm^3

The hemisphere is made from a different metal.

The total mass of the solid is 4752π grams
The total volume of the solid is 504π cm^3

Work out the density of the hemisphere.
Show your working clearly.

Cone volume $= \frac{1}{3}\pi x^2 \times 5x = \frac{5}{3}\pi x^3$ Hemisphere $= \frac{2}{3}\pi x^3$

Total volume: $\frac{5}{3}\pi x^3 + \frac{2}{3}\pi x^3 = \frac{7}{3}\pi x^3 = 504\pi$

$x^3 = 504 \times \frac{3}{7} = 216$, $x = 6$

Cone volume $= \frac{5}{3}\pi \times 216 = 360\pi$ cm^3

Hemisphere volume $= \frac{2}{3}\pi \times 216 = 144\pi$ cm^3

Mass of cone $= 9 \times 360\pi = 3240\pi$ g

Mass of hemisphere $= 4752\pi - 3240\pi = 1512\pi$ g

Density of hemisphere $= \frac{\text{mass}}{\text{volume}} = \frac{1512\pi}{144\pi} = 10.5$ g/cm^3

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10.5 g/cm^3

(Total for Question 26 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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MATH TONIC

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