Please check the examination details below before entering your candidate information

Candidate surname	Other names
Solved by Mr. Pabitra	

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Wednesday 3 June 2026

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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Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

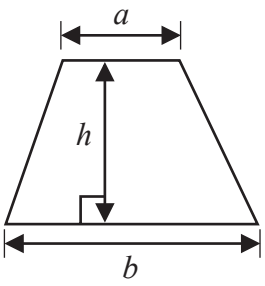
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

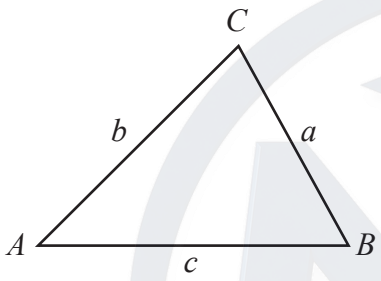
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle *ABC*

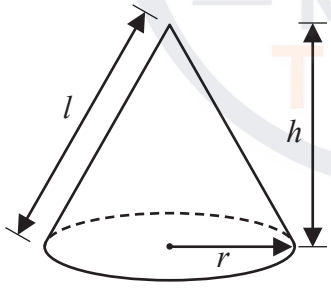
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

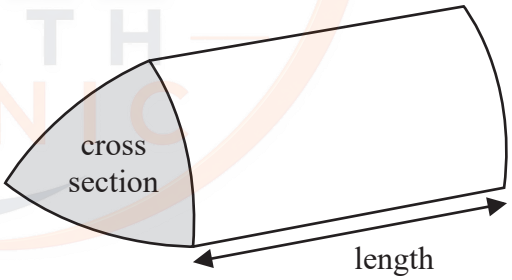
Area of triangle $= \frac{1}{2}ab\sin C$

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

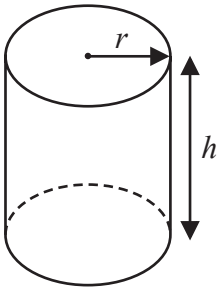
Curved surface area of cone $= \pi rl$



Volume of prism
= area of cross section × length

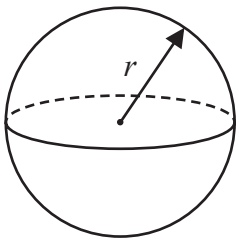


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi rh$



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 Write 4500 as a product of powers of its prime factors.
Show your working clearly.

2	4500
2	2250
3	1125
3	375
5	125
5	25
5	5
	1

$4500 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5$

$= 2^2 \times 3^2 \times 5^3$

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

(Total for Question 1 is 3 marks)

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MATH TONIC

Solved by Mr. Pabitra

2 The nth term of an arithmetic sequence is given by $8n - 5$

(a) Work out the ratio of the 40th term of the sequence to the 60th term of the sequence. Give your ratio in its simplest form.

40th term = $8 \times 40 - 5 = 315$

60th term = $8 \times 60 - 5 = 475$

Ratio 315 : 475

$\div 5$: 63 : 95 (63 = 3 × 3 × 7, 95 = 5 × 19, no common factor)

63 : 95

(3)

Here are the first five terms of a different arithmetic sequence.

3 8 13 18 23

(b) Find an expression for the nth term of this sequence.

Common difference = 8 − 3 = 5, so the nth term is 5n + something

When n = 1: 5 × 1 = 5, and 5 − 2 = 3 (first term)

nth term = 5n − 2

Check n = 2: 5 × 2 − 2 = 8 correct

5n − 2

(2)

(Total for Question 2 is 5 marks)

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Solved by Mr. Pabitra

3 The table shows information about the number of hours each of 40 candles burned.

Number of hours (h)	Frequency
$15 < h \leqslant 19$	2
$19 < h \leqslant 23$	5
$23 < h \leqslant 27$	12
$27 < h \leqslant 31$	15
$31 < h \leqslant 35$	6

Midpoint	f × midpoint
17	17 × 2 = 34
21	21 × 5 = 105
25	25 × 12 = 300
29	29 × 15 = 435
33	33 × 6 = 198
	Total = 1072

(a) Write down the modal class.

Highest frequency is 15

$27 < h \leq 31$

(1)

(b) Work out an estimate for the mean number of hours.

Use the midpoint of each class (see the table): 17, 21, 25, 29, 33

Total of f × midpoint = 34 + 105 + 300 + 435 + 198 = 1072

Total frequency = 40

$$\text{Mean} = \frac{\text{total of f} \times \text{midpoint}}{\text{total frequency}} = \frac{1072}{40} = 26.8 \text{ hours}$$

26.8 hours

(4)

(Total for Question 3 is 5 marks)

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Solved by Mr. Pabitra

4 Sara sells water bottles.

In July, she sold 450 water bottles.
In August, she sold 612 water bottles.

Work out the percentage increase in the number of water bottles she sold from July to August.

Increase = 612 − 450 = 162 bottles

$$\text{Percentage increase} = \frac{\text{increase}}{\text{original}} \times 100 = \frac{162}{450} \times 100$$

$$= 0.36 \times 100 = 36\ \%$$

36 ..... %

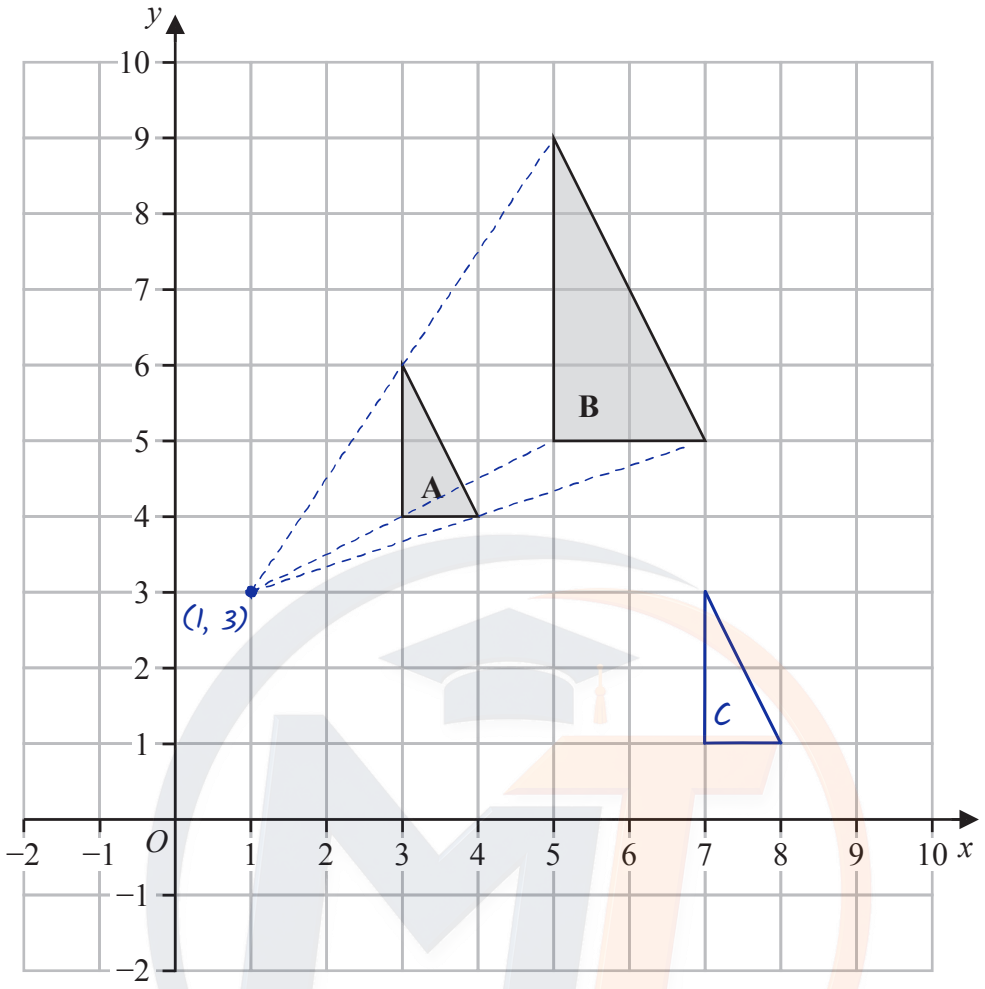
(Total for Question 4 is 3 marks)

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Solved by Mr. Pabitra

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5



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

Enlargement, scale factor 2, centre (1, 3)

(B is twice the size of A; lines from B back through A meet at (1, 3))

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$

Label your triangle **C**

(1)

(Total for Question 5 is 4 marks)

Solved by Mr. Pabitra

6 *ABCDE* is a pentagon.

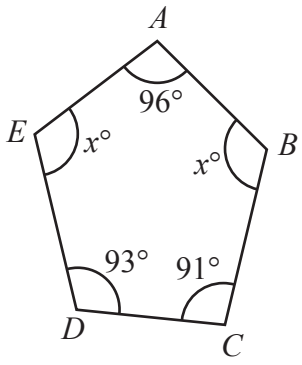


Diagram **NOT** accurately drawn

angle $EAB = 96°$ angle $BCD = 91°$ angle $CDE = 93°$ angle DEA = angle $ABC = x°$

Work out the value of x

Sum of interior angles of a pentagon = (5 − 2) × 180° = 540°

x + x + 96 + 91 + 93 = 540

2x + 280 = 540

2x = 260

x = 130

$x =$ 130

(Total for Question 6 is 3 marks)

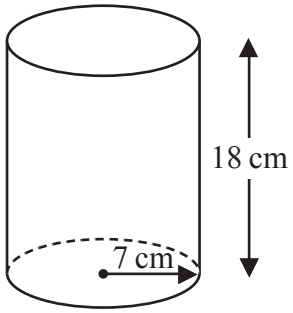
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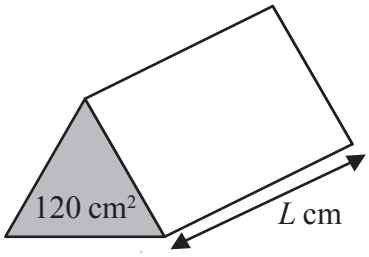
Solved by Mr. Pabitra

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7 The diagram shows a cylinder and a prism.

Diagram **NOT** accurately drawn





The radius of the cylinder is 7 cm
The height of the cylinder is 18 cm

The area of the cross section of the prism, shown shaded in the diagram, is 120 cm^2
The length of the prism is L cm

The volume of the cylinder is equal to the volume of the prism.

Work out the value of L
Give your answer correct to 3 significant figures.

Volume of cylinder $= \pi r^2 h = \pi \times 7^2 \times 18$

$= 882\pi = 2770.88\ldots\ cm^3$

Volume of prism = area of cross section × length $= 120 \times L$

$120L = 2770.88\ldots$

$L = \frac{2770.88\ldots}{120} = 23.090\ldots$

$L = 23.1$ (3 s.f.)

$L =$ 23.1

(Total for Question 7 is 3 marks)

Solved by Mr. Pabitra

8 A golf club increases the cost of membership by 17%
After the increase, the cost of membership is 3276 zloty.

Work out the cost of membership before the increase.

After the increase: 100% + 17% = 117% = 1.17

1.17 × original cost = 3276

Original cost = $\frac{3276}{1.17}$ = 2800 zloty

2800 zloty

(Total for Question 8 is 3 marks)

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Solved by Mr. Pabitra

9 (a) Find the value of $7n^0$ where $n > 0$

$n^0 = 1$ (any non-zero number to the power 0 is 1), so $7 \times 1 = 7$

7

(1)

(b) Simplify fully $\left(2m^5p^4\right)^3$

$2^3 \times m^{5\times3} \times p^{4\times3}$

$= 8m^{15}p^{12}$

$8m^{15}p^{12}$

(2)

(c) Factorise fully $18c^5w^2 + 30cw^3$

HCF of 18 and 30 is 6; common letters: c and w^2

$18c^5w^2 + 30cw^3 = 6cw^2(3c^4 + 5w)$

$6cw^2(3c^4 + 5w)$

(2)

(d) Factorise $x^2 + 6x - 27$

Two numbers that multiply to −27 and add to 6: 9 and −3

$x^2 + 6x - 27 = (x + 9)(x - 3)$

$(x + 9)(x - 3)$

(2)

(Total for Question 9 is 7 marks)

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Solved by Mr. Pabitra

10 Johan owns a car.

The current value of the car is 32 000 euros.
The value of the car will now depreciate by 15% per year.

Lena is going to save up and buy Johan's car in 3 years' time.
She has already saved 2516 euros.

She will save an equal amount of money each month for the next 3 years.

Work out how much money Lena needs to save each month.

Value after 3 years = $32\,000 \times 0.85^3$ (100% − 15% = 85%)

$= 32\,000 \times 0.614125 = 19\,652$ euros

Lena still needs: $19\,652 - 2516 = 17\,136$ euros

Number of months = $3 \times 12 = 36$

Each month = $\frac{17\,136}{36}$ = 476 euros

476 ..... euros

(Total for Question 10 is 4 marks)

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Solved by Mr. Pabitra

11 Find the highest prime number that is a factor of 3.6×10^{24}

$3.6 \times 10^{24} = 36 \times 10^{23}$

$36 = 2^2 \times 3^2$, $10 = 2 \times 5$

so $3.6 \times 10^{24} = 2^2 \times 3^2 \times 2^{23} \times 5^{23} = 2^{25} \times 3^2 \times 5^{23}$

Prime factors are 2, 3 and 5. Highest = 5

5

(Total for Question 11 is 2 marks)

12 $\mathscr{E} = \{\text{integers } x \text{ such that } 20 \leqslant x \leqslant 32\}$

$A = \{x \text{ such that } x < 27\}$

$B = \{x \text{ such that } 25 \leqslant x \leqslant 30\}$

(a) List the members of the set $A \cap B$

$A = \{20, 21, 22, 23, 24, 25, 26\}$ $B = \{25, 26, 27, 28, 29, 30\}$

25, 26

(1)

(b) List the members of the set $(A \cup B)'$

$A \cup B = \{20, 21, \ldots, 30\}$, so $(A \cup B)' = \{31, 32\}$

31, 32

(1)

(Total for Question 12 is 2 marks)

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Solved by Mr. Pabitra

13 Leo collects apples from three trees.
The incomplete table gives some information about the apples he collects from these trees.

Tree	Number of apples	Mean weight of apples (grams)	Total weight of apples (grams)
A	12	150	1800
B	20	135	2700
C	18	145	2610

Work out the mean weight of all the apples Leo collects from these three trees.

Tree A: total weight = 12 × 150 = 1800 g

Tree B: mean weight = 2700 ÷ 20 = 135 g

Tree C: number of apples = 2610 ÷ 145 = 18

Total weight = 1800 + 2700 + 2610 = 7110 g

Total number of apples = 12 + 20 + 18 = 50

Mean = $\frac{7110}{50}$ = 142.2 g

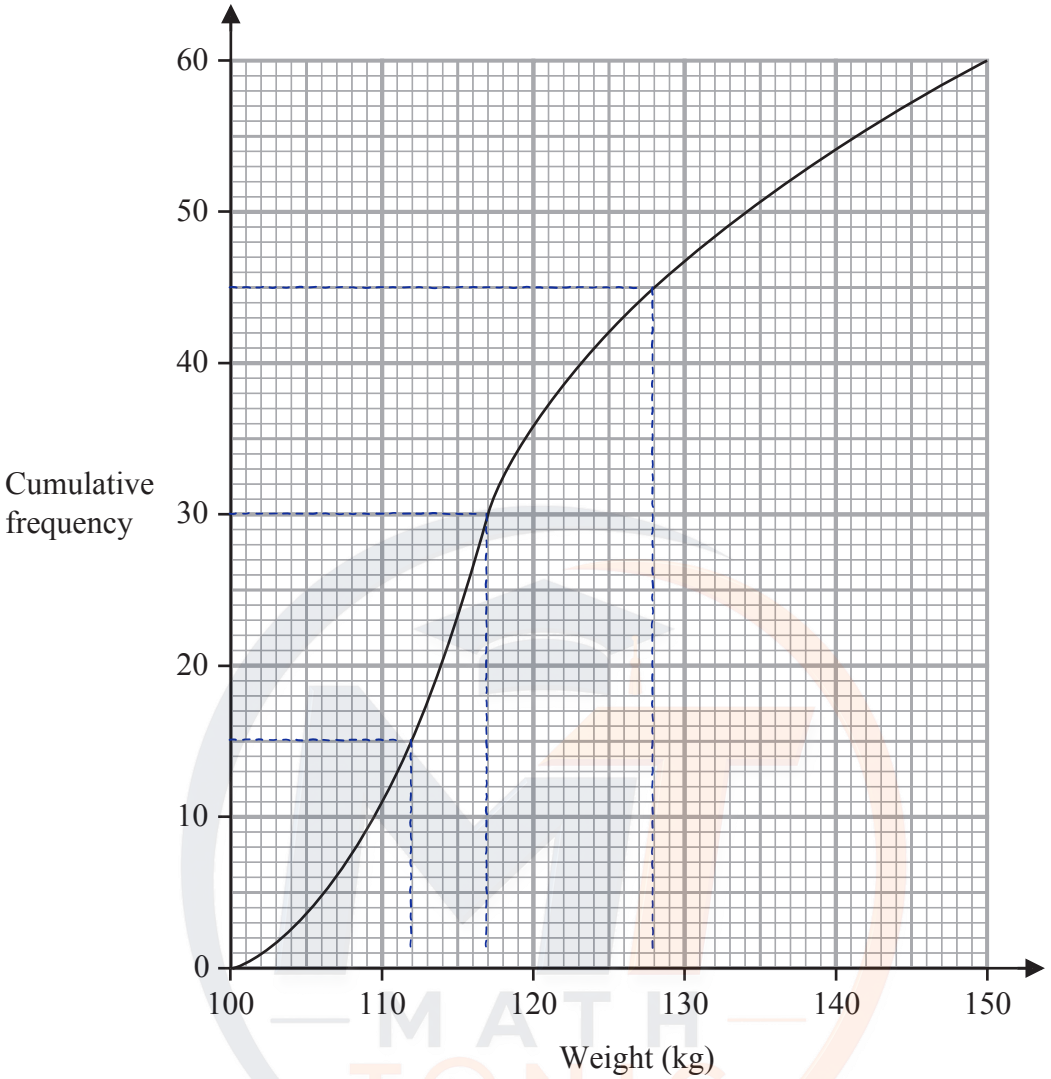
142.2 ..... grams

(Total for Question 13 is 4 marks)

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Solved by Mr. Pabitra

14 The cumulative frequency graph gives information about the weights, in kg, of 60 crates.



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

Median = 60 ÷ 2 = 30th value. Read across from 30: 117 kg

117 kg

(1)

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

LQ: 60 ÷ 4 = 15th value = 112 kg UQ: 3 × 15 = 45th value = 128 kg

IQR = UQ − LQ = 128 − 112 = 16 kg

16 kg

(2)

(Total for Question 14 is 3 marks)

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Solved by Mr. Pabitra

15 The diagram shows a sector $OABC$ of a circle, centre O

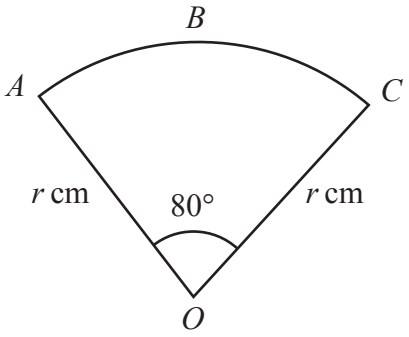


Diagram **NOT** accurately drawn

$OA = OC = r$ cm angle $AOC = 80^\circ$

The area of the sector $OABC$ is 32π cm^2

Work out the perimeter of the sector $OABC$
Give your answer correct to one decimal place.

Area of sector $= \frac{80}{360} \times \pi r^2 = 32\pi$

$\frac{2}{9} r^2 = 32$ (divide both sides by π)

$r^2 = 32 \times \frac{9}{2} = 144$, $r = 12$ cm

Arc $ABC = \frac{80}{360} \times 2\pi \times 12 = \frac{16}{3}\pi = 16.755...$ cm

Perimeter = arc + 2 radii = $16.755... + 12 + 12$

$= 40.755...$ = 40.8 cm (1 d.p.)

40.8 cm

(Total for Question 15 is 4 marks)

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Solved by Mr. Pabitra

16 The functions f and g are such that

$$f(x) = 4 + x \qquad g(x) = 3x^2 + 2$$

(a) Find g(4)

$g(4) = 3 \times 4^2 + 2 = 48 + 2 = 50$

50

(1)

(b) Find $f^{-1}(7)$

$f^{-1}(7)$: find x so that $f(x) = 7$

$4 + x = 7$

$x = 3$

3

(2)

(c) Express gf(x) in the form $ax^2 + bx + c$ where a, b and c are integers.

$gf(x) = g(4 + x) = 3(4 + x)^2 + 2$

$= 3(16 + 8x + x^2) + 2$

$= 48 + 24x + 3x^2 + 2$

$= 3x^2 + 24x + 50$

gf(x) = $3x^2 + 24x + 50$

(2)

(Total for Question 16 is 5 marks)

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Solved by Mr. Pabitra

17 Use algebra to show that $0.5\dot{3}\dot{9} = \frac{89}{165}$

Let $x = 0.5393939...$

$10x = 5.393939...$ (1)

$1000x = 539.393939...$ (2)

(2) − (1): $990x = 534$

$x = \frac{534}{990} = \frac{89}{165}$ (divide top and bottom by 6)

so $0.5393939... = \frac{89}{165}$ as required

(Total for Question 17 is 2 marks)

18 Make x the subject of the formula $a = \frac{3w - x^2}{x^2 + 6}$

$a(x^2 + 6) = 3w - x^2$ (multiply both sides by $x^2 + 6$)

$ax^2 + 6a = 3w - x^2$

$ax^2 + x^2 = 3w - 6a$

$x^2(a + 1) = 3w - 6a$

$x^2 = \frac{3w - 6a}{a + 1}$

$x = \pm\sqrt{\frac{3w - 6a}{a + 1}}$

$x = \pm\sqrt{\frac{3w - 6a}{a + 1}}$

(Total for Question 18 is 4 marks)

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Solved by Mr. Pabitra

19 B, D and E are points on a circle.

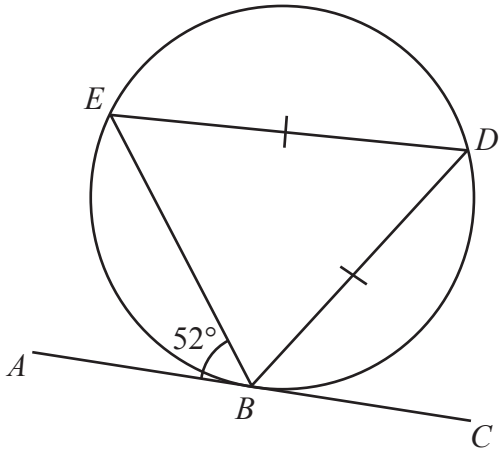


Diagram **NOT** accurately drawn

ABC is the tangent to the circle at B

angle $ABE = 52°$ $ED = BD$

Work out the size of angle BED

Angle EDB = angle ABE = 52° (alternate segment theorem)

ED = BD, so triangle BDE is isosceles: angle BED = angle DBE

angle BED = $\frac{180 - 52}{2} = \frac{128}{2} = 64°$

64 °

(Total for Question 19 is 2 marks)

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Solved by Mr. Pabitra

20 A box only contains green counters and red counters.

Nuno chooses at random a counter from the box.
He puts the counter back into the box.

Nuno then chooses at random a second counter from the box.

The probability that Nuno chooses at least one red counter is $\frac{39}{64}$

Work out the probability that Nuno chooses exactly one red counter.

Let P(green) = p. P(no red) = P(green, green) = p^2

$p^2 = 1 - \frac{39}{64} = \frac{25}{64}$

$p = \frac{5}{8}$ so P(red) = $1 - \frac{5}{8} = \frac{3}{8}$

P(exactly one red) = P(R, G) + P(G, R)

$= \frac{3}{8} \times \frac{5}{8} + \frac{5}{8} \times \frac{3}{8} = \frac{15}{64} + \frac{15}{64}$

$= \frac{30}{64} = \frac{15}{32}$

$\frac{15}{32}$

(Total for Question 20 is 3 marks)

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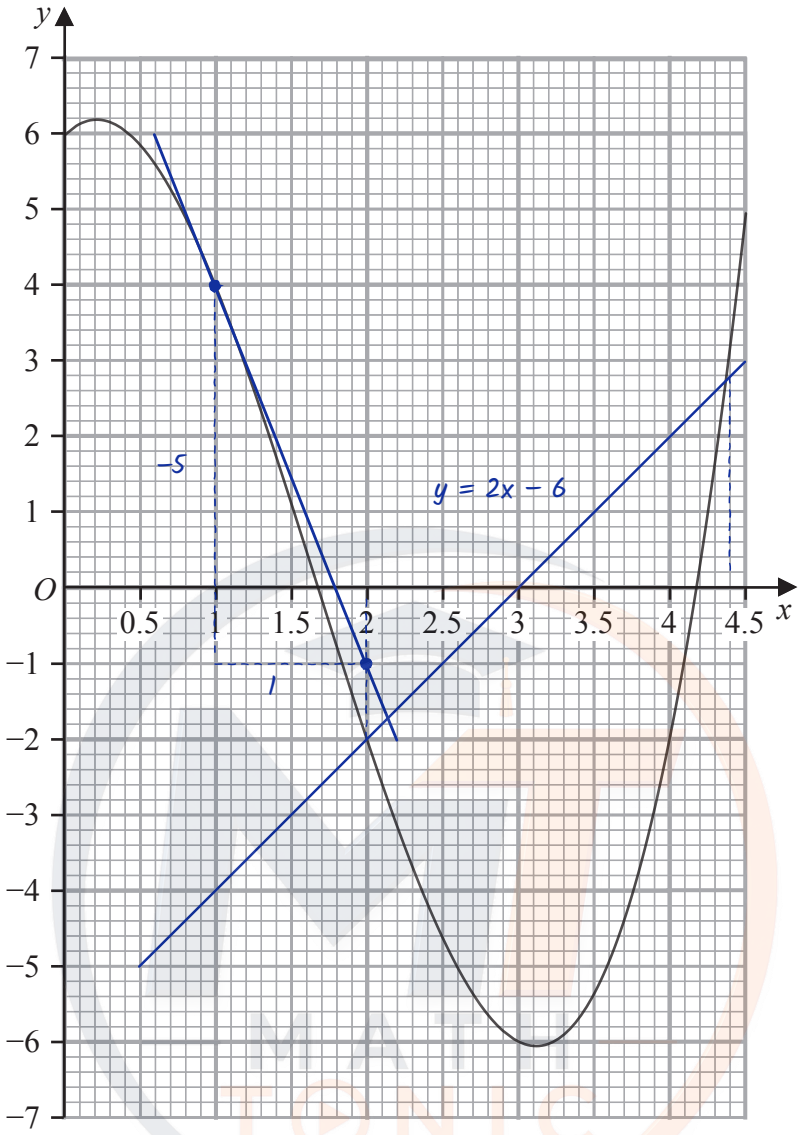
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TURN OVER FOR QUESTION 21

MATH TONIC

Solved by Mr. Pabitra

21 The curve with equation $y = f(x)$ is drawn on a grid.



(a) By drawing a suitable straight line (at least 3 cm long) on the grid, work out an estimate for the gradient of the curve at the point where $x = 1$
Show your working clearly.

−5

(2)

Tangent drawn at x = 1: it passes through (1, 4) and (2, −1)

Gradient = $\frac{\text{change in } y}{\text{change in } x} = \frac{-1-4}{2-1} = \frac{-5}{1} = -5$

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Solved by Mr. Pabitra

(b) By drawing a suitable straight line on the grid, find the solutions of the equation $x = 3 + \frac{1}{2}f(x)$

Show your working clearly.

$x = 3 + \frac{1}{2}f(x)$

$2x = 6 + f(x)$ so $f(x) = 2x - 6$

Draw the line $y = 2x - 6$ on the grid: (0.5, −5), (2, −2), (4, 2)

The line meets the curve at $x = 2$ and $x = 4.4$

2 and 4.4

(3)

(Total for Question 21 is 5 marks)

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MATH TONIC

Solved by Mr. Pabitra

22 The diagram shows a quadrilateral $OABC$ where O, A, B and C represent the positions of four houses.

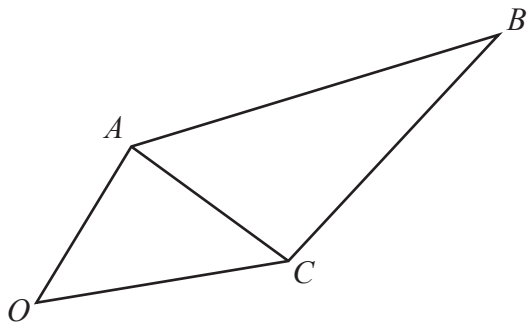


Diagram **NOT** accurately drawn

$\overrightarrow{OA} = \begin{pmatrix} 2 \\ 8 \end{pmatrix}$ $\overrightarrow{OB} = \begin{pmatrix} 21 \\ 14 \end{pmatrix}$ $\overrightarrow{OC} = \begin{pmatrix} 12 \\ 3 \end{pmatrix}$

Ria walks directly from A to B
Anna walks directly from A to C and then walks directly from C to B

$\overrightarrow{OA}$, $\overrightarrow{OB}$ and $\overrightarrow{OC}$ are given in metres.

Work out how much further Anna walks than Ria walks.
Give your answer correct to one decimal place.

$\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = \begin{pmatrix} 21 \\ 14 \end{pmatrix} - \begin{pmatrix} 2 \\ 8 \end{pmatrix} = \begin{pmatrix} 19 \\ 6 \end{pmatrix}$

$AB = \sqrt{19^2 + 6^2} = \sqrt{397} = 19.924\ldots$ m

$\overrightarrow{AC} = \overrightarrow{OC} - \overrightarrow{OA} = \begin{pmatrix} 12 \\ 3 \end{pmatrix} - \begin{pmatrix} 2 \\ 8 \end{pmatrix} = \begin{pmatrix} 10 \\ -5 \end{pmatrix}$

$AC = \sqrt{10^2 + (-5)^2} = \sqrt{125} = 11.180\ldots$ m

$\overrightarrow{CB} = \overrightarrow{OB} - \overrightarrow{OC} = \begin{pmatrix} 21 \\ 14 \end{pmatrix} - \begin{pmatrix} 12 \\ 3 \end{pmatrix} = \begin{pmatrix} 9 \\ 11 \end{pmatrix}$

$CB = \sqrt{9^2 + 11^2} = \sqrt{202} = 14.212\ldots$ m

Ria walks $AB = 19.924\ldots$ m

Anna walks $AC + CB = 11.180\ldots + 14.212\ldots = 25.393\ldots$ m

Difference $= 25.393\ldots - 19.924\ldots = 5.468\ldots$

$= 5.5$ m (1 d.p.)

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5.5 ..... metres

(Total for Question 22 is 4 marks)

MATH TONIC

23 The straight line **L** has equation $y = 3x - 2$

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

Find the coordinates of the points where **L** and **C** intersect.
Show clear algebraic working.

Substitute $y = 3x - 2$ into the equation of the curve:

$x^2 + (3x - 2)^2 - 2(3x - 2) = 12$

$x^2 + 9x^2 - 12x + 4 - 6x + 4 = 12$

$10x^2 - 18x + 8 = 12$

$10x^2 - 18x - 4 = 0$

$5x^2 - 9x - 2 = 0$ (divide by 2)

$(5x + 1)(x - 2) = 0$

$x = 2$ or $x = -0.2$

When $x = 2$: $y = 3 \times 2 - 2 = 4$

When $x = -0.2$: $y = 3 \times (-0.2) - 2 = -2.6$

(2 , 4) and (−0.2 , −2.6)

(Total for Question 23 is 5 marks)

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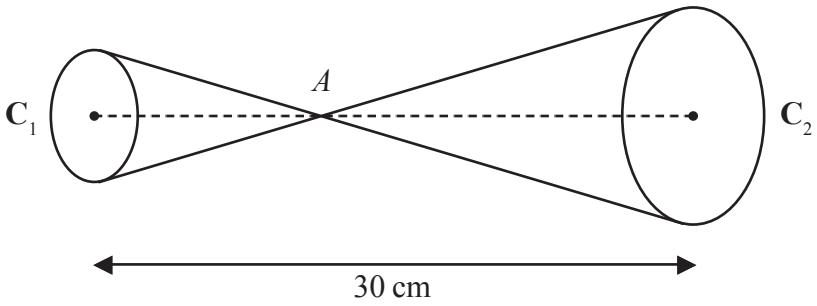
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MATH TONIC

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24 The diagram shows two cones $\mathbf{C}_1$ and $\mathbf{C}_2$

Diagram **NOT** accurately drawn



The vertex of $\mathbf{C}_1$ coincides with the vertex of $\mathbf{C}_2$ at the point A
$\mathbf{C}_1$ and $\mathbf{C}_2$ have the same axis of symmetry.

height of $\mathbf{C}_1$ + height of $\mathbf{C}_2$ = 30 cm

total surface area of $\mathbf{C}_1$: total surface area of $\mathbf{C}_2$ = 4 : 9

volume of $\mathbf{C}_1$ = 23.04π cm^3

Work out the radius of the base of $\mathbf{C}_2$
Show your working clearly.

Area ratio 4 : 9, so length ratio = $\sqrt{4} : \sqrt{9} = 2 : 3$

Height of $C_1 = \frac{2}{5} \times 30 = 12$ cm, height of $C_2 = \frac{3}{5} \times 30 = 18$ cm

Volume of $C_1 = \frac{1}{3} \times \pi \times r^2 \times 12 = 23.04\pi$

$4r^2 = 23.04$

$r^2 = 5.76$, $r = 2.4$ cm (radius of C_1)

Radius of $C_2 = 2.4 \times \frac{3}{2} = 3.6$ cm

3.6 ..... cm

(Total for Question 24 is 5 marks)

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25 An arithmetic series has first term 3 and common difference 8

The nth term of the series is U_n
The sum of the first n terms of the series is S_n

Given that $S_{5k} - S_{3k} = 25\,560$

find the value of U_{4k}
Show clear algebraic working.

$S_n = \frac{n}{2}[2a + (n-1)d] = \frac{n}{2}[6 + 8(n-1)] = \frac{n}{2}(8n - 2) = 4n^2 - n$

$S_{5k} = 4(5k)^2 - 5k = 100k^2 - 5k$

$S_{3k} = 4(3k)^2 - 3k = 36k^2 - 3k$

$100k^2 - 5k - (36k^2 - 3k) = 25\,560$

$64k^2 - 2k - 25\,560 = 0$

$32k^2 - k - 12\,780 = 0$ (divide by 2)

$k = \frac{1 \pm \sqrt{1 + 4 \times 32 \times 12780}}{64} = \frac{1 \pm \sqrt{1635841}}{64} = \frac{1 \pm 1279}{64}$

$k = 20$ or $k = -19.96...$ (k must be a positive integer, so $k = 20$)

$U_{4k} = U_{80} = a + (80 - 1)d = 3 + 79 \times 8 = 635$

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Solved by Mr. Pabitra

635

(Total for Question 25 is 5 marks)

Turn over for Question 26

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Solved by Mr. Pabitra

26 The curve **P** has equation $y = f(x)$
The coordinates of the minimum point on **P** are $(-5, 4)$

(a) Write down the coordinates of the minimum point on the curve with equation $y = 3f(x)$

y-values are multiplied by 3: 4 × 3 = 12

(−5 , 12)

(1)

The curve ***Q*** has equation $y = 2 - (x + 3)^2$

The curve ***R*** has equation $y = 2 - (3 - x)^2$

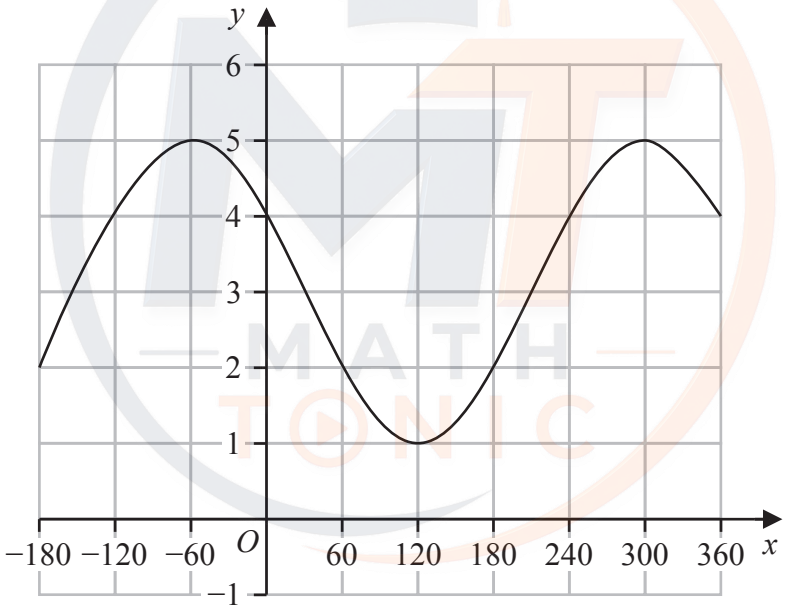
(b) Describe fully the single transformation that maps ***Q*** to ***R***

Reflection in the y-axis (the line x = 0)

(replace x by −x: $2 - (-x + 3)^2 = 2 - (3 - x)^2$)

(1)

The graph of $y = a\cos(x + b)° + c$ for $-180 \leqslant x \leqslant 360$ is drawn on the grid.



Maximum = 5, minimum = 1

$a = \frac{5 - 1}{2} = 2$ (amplitude) $c = \frac{5 + 1}{2} = 3$ (middle line)

cos has its maximum at 0°. Here the maximum is at x = −60

so −60 + b = 0, b = 60

Check: minimum at x = 120: 120 + 60 = 180, cos 180° = −1 correct

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Solved by Mr. Pabitra

Given that $a > 0$ and $0 < b < 360$

(c) find the value of a, the value of b and the value of c

(working is under the graph on page 30)

$a =$ 2

$b =$ 60

$c =$ 3

(3)

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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