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

Thursday 15 May 2025

Morning (Time: 2 hours)

Paper reference **4MA1/1H**

Mathematics A

PAPER 1H
Higher Tier

SOLVED BY MR. PABITRA



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

Solved by Mr. Pabitra | Math Tonic

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

Turn over

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P 7 8 9 0 3 A 0 1 2 8

Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

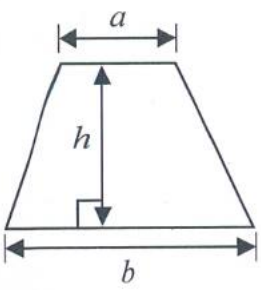
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

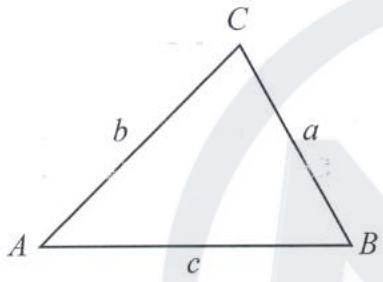
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle ABC

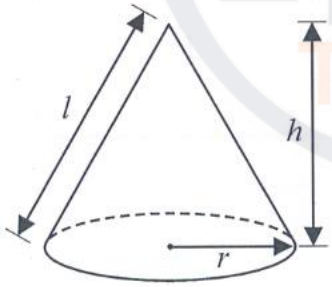
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

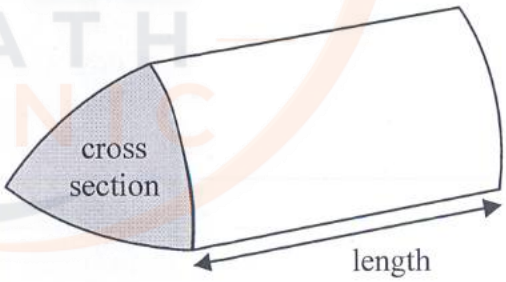
Area of triangle $= \frac{1}{2}ab\sin C$

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

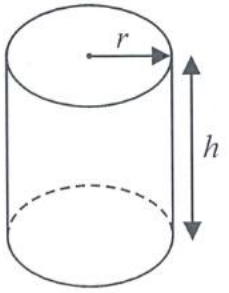
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

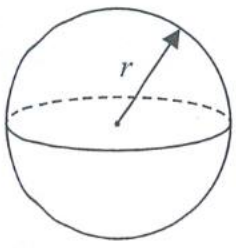


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



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

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



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Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table gives information about the distances 100 adults travel to work.

Distance (d km)	Frequency	mid value (x)
$0 < d \leqslant 5$	26	2·5
$5 < d \leqslant 10$	40	7·5
$10 < d \leqslant 15$	16	12·5
$15 < d \leqslant 20$	10	17·5
$20 < d \leqslant 25$	8	22·5

(a) Write down the modal class.

$5 < d \leqslant 10$

(1)

(b) Work out an estimate for the mean distance.

$$\frac{(2.5 \times 26) + (7.5 \times 40) + (12.5 \times 16) + (17.5 \times 10) + (8 \times 22.5)}{100}$$

$$\frac{920}{100}$$

9.2 km

(4)

(Total for Question 1 is 5 marks)

Solved by Mr. Pabitra

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2 Anna makes cups.
Each cup costs 6 Swiss francs to make.

Anna puts the cups into boxes to sell.
Each box contains 4 cups.

Anna sells 80 boxes of cups for a total of 2160 Swiss francs.

(a) Work out the percentage profit Anna makes.
Show your working clearly.

80 boxes of Cups = 2160 Swiss francs

1 box of Cup = $\frac{2160}{80}$ = 27 (Sell)

4 × 6 = 24 (make)

Percentage Profit = $\frac{27-24}{24} \times 100$

12.5 %
(4)

The height of each cup is 9 cm, correct to the nearest cm

(b) Write down the lower bound of the height.

8.5 cm
(1)

The weight of each cup is 120 g, correct to the nearest 10 g

(c) Write down the upper bound of the weight.

125 g
(1)

(Total for Question 2 is 6 marks)

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Solved by Mr. Pabitra

3

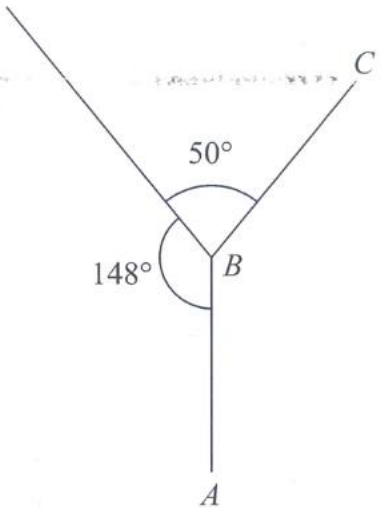


Diagram **NOT** accurately drawn

AB and BC are two sides of a regular polygon with n sides.

Work out the value of n
Show your working clearly.

$A\hat{B}C = 360 - (148 + 50)$

$A\hat{B}C = 162°$

Each interior Angle $= 162°$

Exterior Angle $= 180 - 162 = 18°$

$n = \frac{360}{18} = 20$

$n =$ 20

(Total for Question 3 is 4 marks)

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Solved by Mr. Pabitra

4 $x^5 \times x^7 = x^m$

(a) Find the value of m

$m =$ 12

(1)

$y^8 \div y^3 = y^n$

(b) Find the value of n

$n =$ 5

(1)

(c) Simplify fully $(5a^4r^2)^3$

$5^3 \times (a^4)^3 \times (r^2)^3$

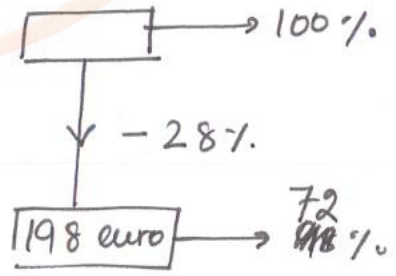
$125a^{12}r^6$

(2)

(Total for Question 4 is 4 marks)

5 In a sale, normal prices are reduced by 28%
The sale price of a watch is 198 euros.

Work out the normal price of the watch.



72% ⟶ 198

1% ⟶ $\frac{198}{72}$

100% ⟶ $\frac{198}{72} \times 100$

275

275 euros

(Total for Question 5 is 3 marks)

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MATH TONIC
Solved by Mr. Pabitra

6 (a) Solve $x - 4 = \dfrac{3 + 2x}{6}$

Show clear algebraic working.

$$6(x-4) = 3+2x$$

$$6x - 24 = 3 + 2x$$

$$6x - 2x = 3 + 24$$

$$4x = 27$$

$$x = \frac{27}{4}$$

$x =$ 27/4 **(3)**

(b) (i) Factorise $y^2 - 11y + 30$

$(y-6)(y-5)$

$(y-6)(y-5)$ **(2)**

(ii) Hence solve $y^2 - 11y + 30 = 0$

$y = 6, \ y = 5$ **(1)**

(Total for Question 6 is 6 marks)

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MATHTONIC
Solved by Mr. Pabitra

7 Here is a solid cylinder.

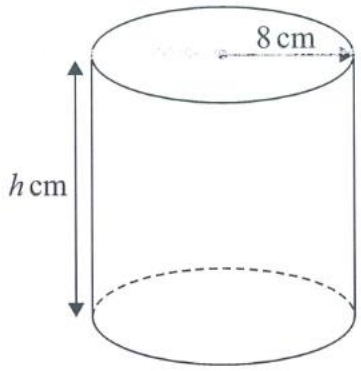


Diagram **NOT** accurately drawn

The radius of the cylinder is 8 cm
The height of the cylinder is h cm

The volume of the cylinder is 3892 cm^3

Work out the value of h
Give your answer correct to one decimal place.

Volume = 3892

$\pi \times r^2 \times h = 3892$

$\pi \times 8^2 \times h = 3892$

$h = \frac{3892}{\pi \times 8^2}$

$h = 19.4$ cm

$h =$ 19.4 cm

(Total for Question 7 is 3 marks)

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Solved by Mr. Pabitra

8 (a) Write 520 million in standard form.

5.2×10^8

(1)

(b) Write 8.79×10^{-5} as an ordinary number.

0.0000879

(1)

(c) Work out $(5 \times 10^{42}) \times (7 \times 10^{-180})$
Give your answer in standard form.

$35 \times 10^{42} \times 10^{-180}$

35×10^{-138}

3.5×10^{-137}

3.5×10^{-137}

(2)

(Total for Question 8 is 4 marks)

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Solved by Mr. Pabitra

9

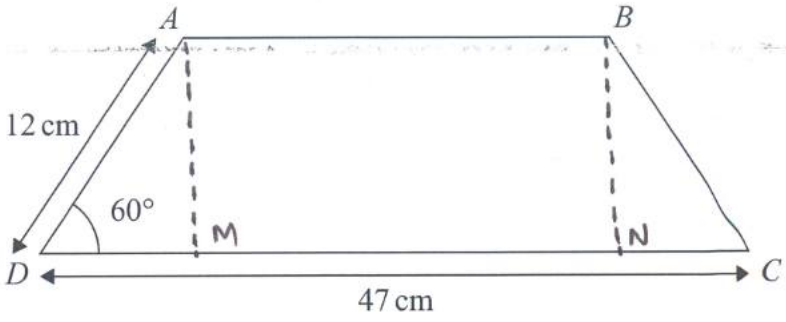


Diagram **NOT** accurately drawn

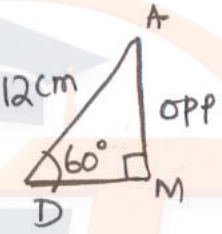
ABCD is a trapezium with one line of symmetry.

angle $ADC = 60°$ $AD = 12\,\text{cm}$ $DC = 47\,\text{cm}$

Work out the area of the trapezium.
Give your answer correct to 3 significant figures.
Show your working clearly.

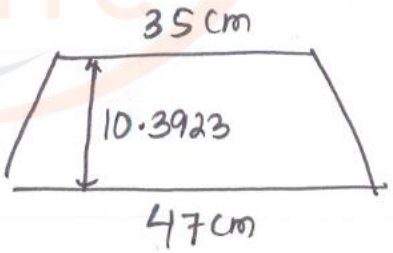
$AM = 12 \times \sin 60$

$AM = 10.3923$



height of trapezium $DM = \sqrt{12^2 - 10.3923^2} = 6$

$AB = 47 - 6 - 6 = 35$



Area of trapezium

$\frac{1}{2} \times (35 + 47) \times (10.3923)$

$426\ \text{cm}^2$

426 cm²

(Total for Question 9 is 5 marks)

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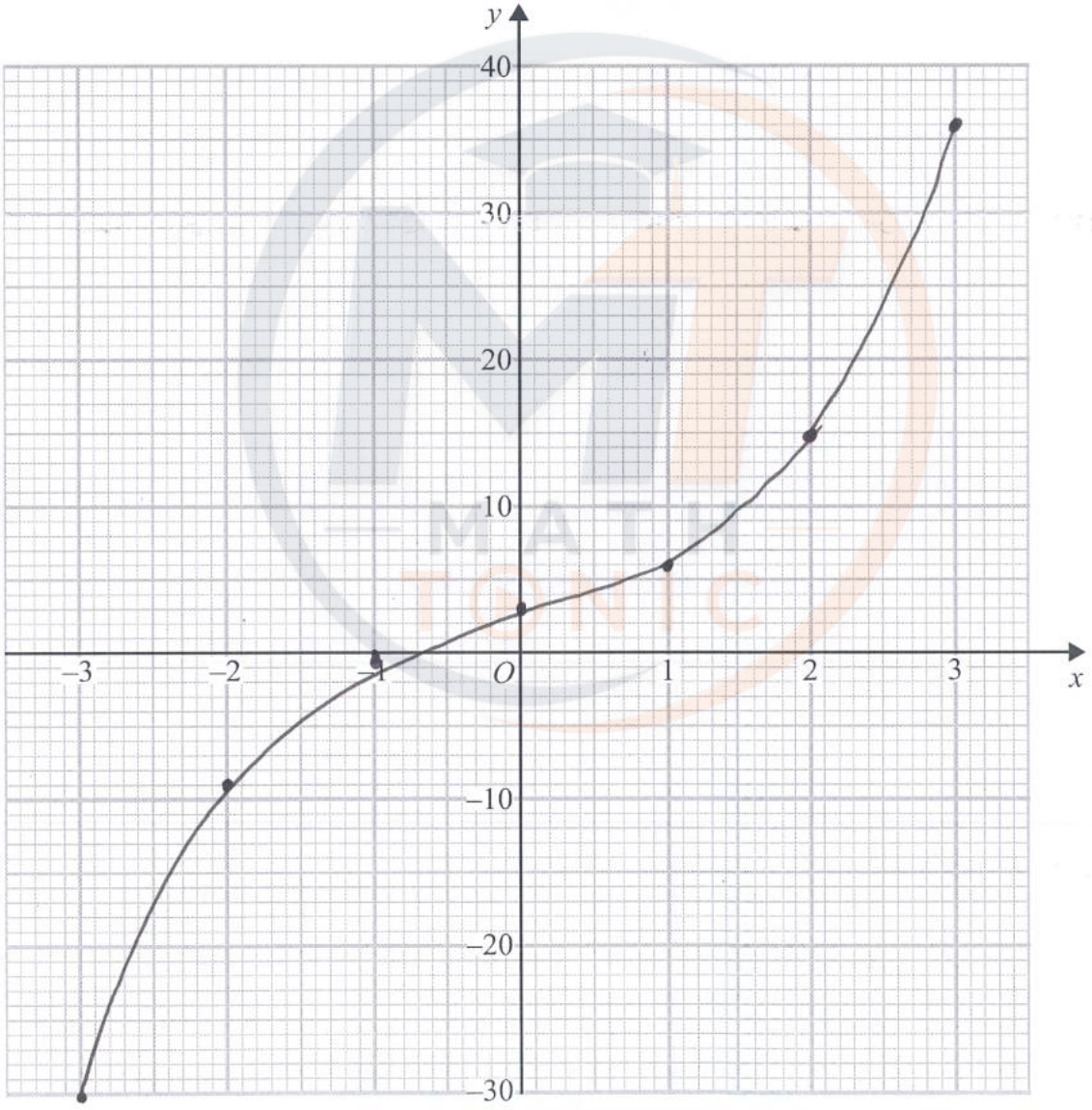
Solved by Mr. Pabitra

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

x	-3	-2	-1	0	1	2	3
y	-30	-9	0	3	6	15	36

(1)

(b) On the grid, draw the graph of $y = x^3 + 2x + 3$ for $-3 \leqslant x \leqslant 3$



(2)

(Total for Question 10 is 3 marks)

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Solved by Mr. Pabitra

11 $OABC$ is a sector of a circle, centre O

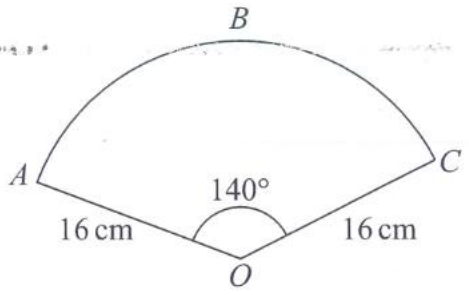


Diagram **NOT** accurately drawn

angle $AOC = 140°$
$OA = OC = 16$ cm

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

$\frac{140}{360} \times \pi \times 16^2$

313 cm^2

(Total for Question 11 is 2 marks)

12 Express $\frac{5}{4} + \frac{x-3}{6x}$ as a single fraction in its simplest form.

$\frac{5 \times 6x + 4(x-3)}{4 \times 6x}$

$\frac{30x + 4x - 12}{24x}$

$\frac{34x - 12}{24x} = \frac{2(17x-6)}{24x} = \frac{17x-6}{12x}$

(Total for Question 12 is 3 marks)

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Solved by Mr. Pabitra

13 Charlotte bought an apartment for $750 000

In the first year, the value of the apartment decreased by 4%

In the second year, the value of the apartment decreased by 6.5%

In the third year, the value of the apartment increased by x%

At the end of the third year, the value of Charlotte's apartment was $698 445

Work out the value of x

$$750000\left(1-\frac{4}{100}\right)\times\left(1-\frac{6.5}{100}\right)\times\left(1-\frac{x}{100}\right)=698445$$

$$0.96\times0.935\times\left(1-\frac{x}{100}\right)=\frac{698445}{750000}$$

$$0.8976\times\left(1-\frac{x}{100}\right)=0.93126$$

$$1-\frac{x}{100}=\frac{0.93126}{0.8976}$$

$$1-\frac{x}{100}=1.0375$$

$$\frac{x}{100}=1-1.0375$$

$$\frac{x}{100}=0.0375$$

$$x=100\times0.0375$$

$$x=3.75$$

$x =$ 3.75

(Total for Question 13 is 3 marks)

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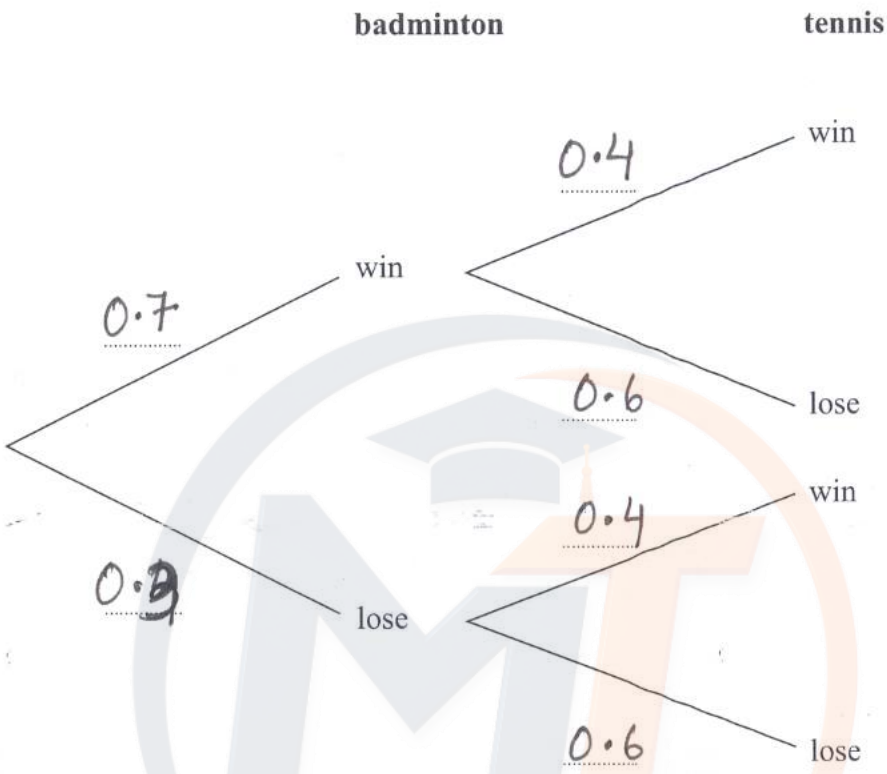
Solved by Mr. Pabitra

14 Ricardo is going to play one game of badminton and one game of tennis.

He can either win or lose each game.

The probability that he will win the game of badminton is 0.7
The probability that he will win the game of tennis is 0.4

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Ricardo loses both games.

$0.3 \times 0.6 = 0.18$

0.18

(2)

(Total for Question 14 is 4 marks)

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Solved by Mr. Pabitra

15 $(\sqrt{3})^5 = k\sqrt{3}$ where k is an integer.

(a) Find the value of k

$$(\sqrt{3})^5 = K \times \sqrt{3}$$

$$\sqrt{3} \times \sqrt{3} \times \sqrt{3} \times \sqrt{3} \times \sqrt{3} = K \times \sqrt{3}$$

$$9\sqrt{3} = K\sqrt{3}$$

$k =$ 9

(1)

(b) Show that $\dfrac{21}{3-\sqrt{2}}$ can be written in the form $c + \sqrt{d}$

where c and d are integers.
Show each stage of your working clearly.

$$\frac{21(3+\sqrt{2})}{(3-\sqrt{2})(3+\sqrt{2})}$$

$$\frac{21(3+\sqrt{2})}{3^2-(\sqrt{2})^2}$$

$$\frac{21(3+\sqrt{2})}{9-2}$$

$$\frac{21(3+\sqrt{2})}{7} = 3(3+\sqrt{2})$$

$$= 9 + 3\sqrt{2}$$

$$= \boxed{9 + \sqrt{18}}$$

(3)

(Total for Question 15 is 4 marks)

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Solved by Mr. Pabitra

16 $f(x) = 9 - \sqrt{x}$ where $x \geqslant 0$

$g(x) = 4x^2$

(a) Find f(9)

$f(9) = 9 - \sqrt{9} = 9 - 3 = 6$

6

(1)

(b) Solve $fg(x) < 0$

Show clear algebraic working.

$fg(x) = 9 - \sqrt{4x^2}$

$= 9 - 2x$

$fg(x) < 0$

$9 - 2x < 0$

$-2x < -9$

$\frac{-2x}{-2} > \frac{-9}{-2}$

$x > 9/2$

$x > 4.5$

$x > 4.5$

(3)

(Total for Question 16 is 4 marks)

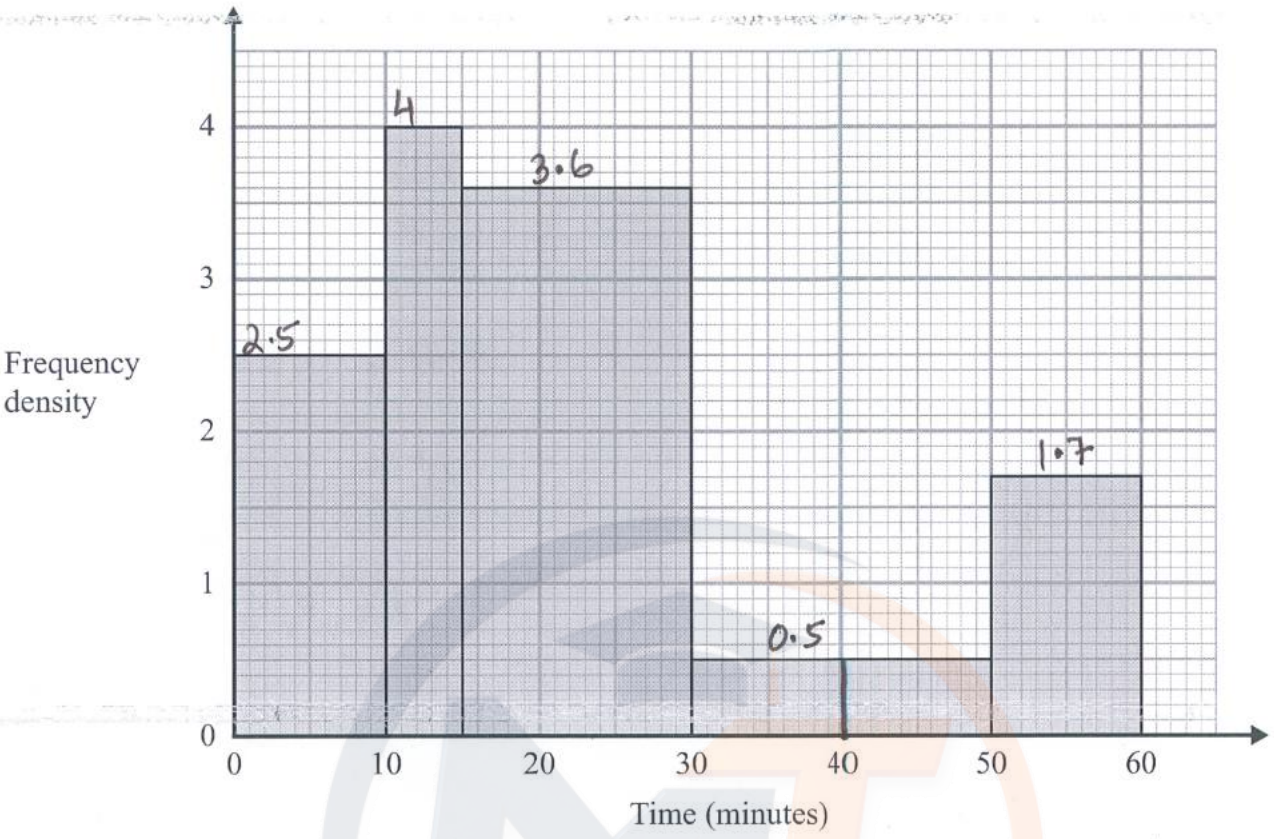
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MATH TONIC

Solved by Mr. Pabitra

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17 The histogram shows information about the times, in minutes, that some people were in a shop.



Work out an estimate for the proportion of these people who were in the shop for more than 40 minutes.

frequency : $(2.5 \times 10) + (4 \times 5) + (3.6 \times 15) + (0.5 \times 20)$
$+ (1.7 \times 10) = 126$ people.

for More than 40 minutes

$(0.5 \times 10) + (1.7 \times 10) = 22$

$$\frac{22}{126} = \frac{11}{63}$$

11/63

(Total for Question 17 is 3 marks)

Solved by Mr. Pabitra

18 y is inversely proportional to x^3

$y = 4$ when $x = 3$

Work out the value of x when $y = 864$

$y \propto \frac{1}{x^3}$

$y = K \times \frac{1}{x^3}$

$4 = K \times \frac{1}{3^3}$

$K = 4 \times 27$

$K = 108$

$y = 108 \times \frac{1}{x^3}$

$864 = 108 \times \frac{1}{x^3}$

$x^3 = \frac{108}{864}$

$x = \sqrt[3]{\frac{108}{364}}$

$x = 1/2 = 0.5$

$x =$ 0.5

(Total for Question 18 is 4 marks)

19 The equation of a curve is $y = f(x)$

There is only one minimum point on the curve.
The coordinates of this minimum point are $(8, -12)$

Write down the coordinates of the minimum point on the curve with equation

(i) $y = f(x) + 3$

(8, 9)

(8 , −12+3)

(1)

(ii) $y = f(2x)$

(4, −12)

(8/2 , −12)

(1)

(Total for Question 19 is 2 marks)

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MATH TONIC

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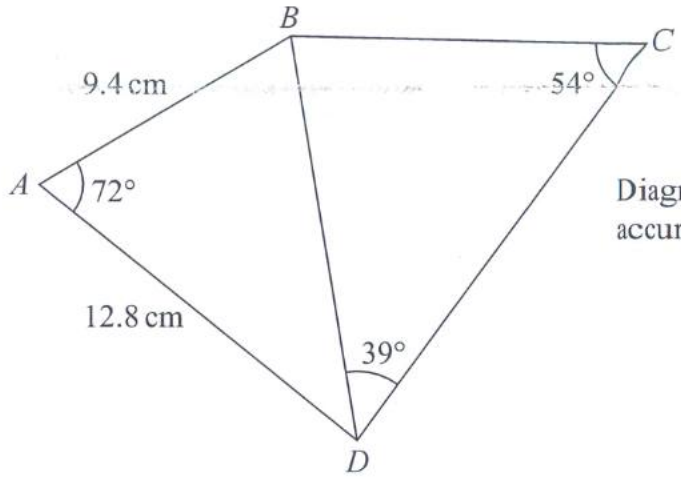


Diagram **NOT** accurately drawn

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

Cosine Rule:

$BD^2 = AB^2 + AD^2 - 2 \times AB \times AD \times \cos A$

$BD^2 = 9.4^2 + 12.8^2 - 2 \times 9.4 \times 12.8 \times \cos 72$

$BD = \sqrt{177.838}$

$BD = 13.3$ cm

$B\hat{D}C = 180 - (39 + 54)$

$= 87°$

$\frac{BC}{\sin 39°} = \frac{13.3}{\sin 54}$

$BC = \frac{13.3}{\sin 54} \times \sin 39$

$BC = 10.4$

10.4 cm

(Total for Question 20 is 5 marks)

Solved by Mr. Pabitra

21 A box contains 20 counters.

9 of the counters are red
7 of the counters are yellow
4 of the counters are green

Alex takes at random three counters from the box.

Work out the probability that exactly two of the three counters are the same colour.

$P(\text{Red}) = 9/20 \quad P(\text{Yellow}) = 7/20 \quad P(\text{Green}) = 4/20$

Exactly two out of three counters are the same colour

$$1 - \left[P(RRR) + P(YYY) + P(GGG) + P(RGY) \right]$$

$$1 - \left[\left(\frac{9}{20} \times \frac{8}{19} \times \frac{7}{18}\right) + \left(\frac{7}{20} \times \frac{6}{19} \times \frac{5}{18}\right) + \left(\frac{4}{20} \times \frac{3}{19} \times \frac{2}{18}\right) + \left(6 \times \frac{9}{20} * \frac{7}{19} \times \frac{4}{18}\right) \right]$$

$\frac{51}{76}$

$\frac{51}{76}$

(Total for Question 21 is 3 marks)

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MATH TONIC

Solved by Mr. Pabitra

22 Solve the simultaneous equations

$$x^2 + 3y + y^2 = 7$$
$$y = x + 2$$

Show clear algebraic working.

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

$x^2 + 3x + 6 + x^2 + 4x + 4 = 7$

$2x^2 + 7x + 10 - 7 = 0$

$2x^2 + 7x + 3 = 0$

$(2x+1)(x+3) = 0$

$2x + 1 = 0$ $\qquad$ $x + 3 = 0$

$x = -1/2$ $\qquad$ $x = -3$

$y = x + 2$ $\qquad$ $y = x + 2$

$y = -1/2 + 2$ $\qquad$ $y = -3 + 2$

$y = 3/2$ $\qquad$ $y = -1$

$x = -1/2, \ y = 3/2$

$x = -3, \ y = -1$

(Total for Question 22 is 5 marks)

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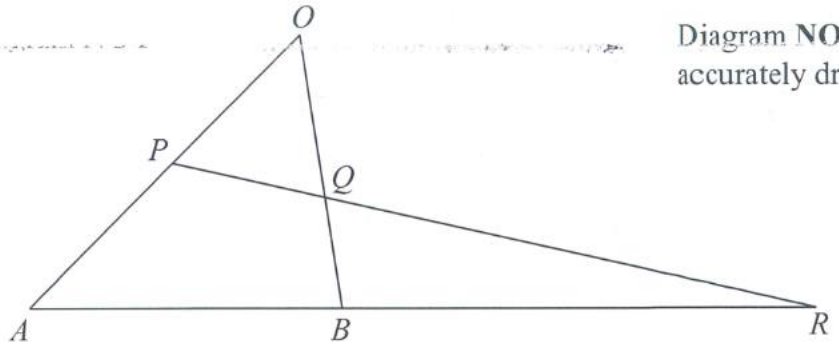


Diagram **NOT** accurately drawn

OAB is a triangle.
P is the midpoint of *OA*
Q is a point on *OB*

ABR and *PQR* are straight lines.

$\overrightarrow{OA} = 12\mathbf{a}$ $\overrightarrow{OB} = 8\mathbf{b}$

(a) Express $\overrightarrow{AB}$ in terms of **a** and **b**

$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$\overrightarrow{AB} = -12a + 8b$

$\overrightarrow{AB} = 8b - 12a$

$8b - 12a$

(1)

$AB : BR = 1 : 2$ $\overrightarrow{OQ} = n\mathbf{b}$

(b) Use a vector method to find the value of *n*

$\overrightarrow{AR} = \overrightarrow{AB} + \overrightarrow{BR}$

$\overrightarrow{AR} = 8b - 12a + 16b - 24a$

$\boxed{\overrightarrow{AR} = 24b - 36a}$

$AB : BR$

$1 : 2$

$\overrightarrow{BR} = 2 \times \overrightarrow{AB}$

$\overrightarrow{BR} = 2[8b - 12a]$

$\overrightarrow{BR} = 16b - 24a$

$\overrightarrow{OQ} = x \times \overrightarrow{OB}$

$\overrightarrow{OQ} = x \times 8b$

$\overrightarrow{OQ} = 8bx$ ——— (i)

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MATH TONIC

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$\overrightarrow{OQ} = \overrightarrow{OP} + \overrightarrow{PQ}$

$= 6a + y \times \overrightarrow{PR}$

$= 6a + y(\overrightarrow{PA} + \overrightarrow{AR})$

$= 6a + y(6a + 24b - 36a)$

$= 6a + 6ay + 24by - 36ay$

$\overrightarrow{OQ} = 6a - 30ay + 24by$ ——— (ii)

$\overrightarrow{OP}$ is midpoint of $\overrightarrow{OA}$

$\overrightarrow{OP} = \frac{1}{2} \times 12a$

$\overrightarrow{OP} = 6a$

$\overrightarrow{PA} = 6a$

(i) and (ii) are equal

$8bx = 6a - 30ay + 24by$

$0a + 8xb = (6 - 30y)a + 24yb$

Comparing the Coefficients

$6 - 30y = 0$

$6 = 30y$

$y = 6/30$

$\boxed{y = 1/5}$

$8x = 24y$

$8x = 24 \times 1/5$

$x = 24 \times 1/5 \times 1/8$

$\boxed{x = 3/5}$

from equn (i)

$\overrightarrow{OQ} = 8bx$

$= 8 \times b \times 3/5$

$\overrightarrow{OQ} = \frac{24}{5}b$

$\boxed{\overrightarrow{OQ} = 4.8b}$

$\boxed{n = 4.8}$

$n =$ 4.8 (4)

(Total for Question 23 is 5 marks)

Turn over for Question 24

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24 An arithmetic series has 30 terms.

The first term is a
The common difference is d

The 20th term is 123
The sum of the 30 terms is 2880

Work out the value of a and the value of d
Show clear algebraic working.

$t_{20} = 123$

$a + (20-1)d = 123$

$a + 19d = 123$ —— (i)

$S_{30} = 2880$

$\frac{30}{2}[2a + (30-1)d] = 2880$

$15[2a + 29d] = 2880$

$2a + 29d = 192$ —— (ii)

(i) $\times 2 \Rightarrow 2a + 38d = 246$

(ii) $\Rightarrow 2a + 29d = 192$

$9d = 54$

$d = \frac{54}{9}$

$\boxed{d = 6}$

$a + 19d = 123$

$a + 19 \times 6 = 123$

$a + 114 = 123$

$a = 123 - 114$

$\boxed{a = 9}$

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8

$a =$ 9

$d =$ 6

(Total for Question 24 is 5 marks)

Turn over for Question 25

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25 $PQRS$ is a square.

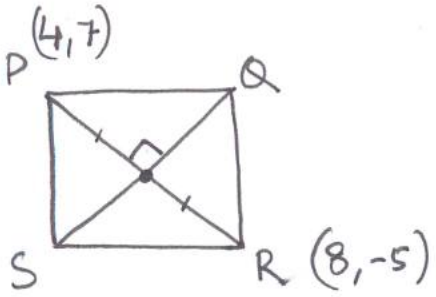
PR is a diagonal of the square.

P is the point with coordinates $(4, 7)$
R is the point with coordinates $(8, -5)$

Find an equation of the straight line that passes through the points Q and S
Give your answer in the form $ay = bx + c$ where a, b and c are integers.

Gradient of PR

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-7}{8-4} = \frac{-12}{4} = -3$$

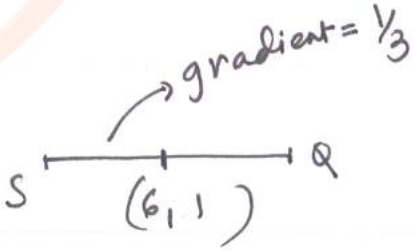


Gradient of QS

$$m_1 \times m_2 = -1$$
$$-3 \times m_2 = -1$$
$$m_2 = \frac{1}{3}$$

midpoint of PR

$$\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$
$$\left(\frac{4+8}{2}, \frac{7-5}{2}\right)$$
$$(6, 1)$$



Equation of QS:

$$y = mx + c$$
$$y = \frac{1}{3}x + c$$

at (6,1)

$$1 = \frac{1}{3} \times 6 + c$$
$$1 = 2 + c$$
$$c = -1$$

$$y = \frac{1}{3}x - 1$$
$$3y = x - 3$$

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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