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 **4MA1/1HR**

Mathematics A

PAPER 1HR
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 5 6 6 0 A 0 1 2 8

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International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

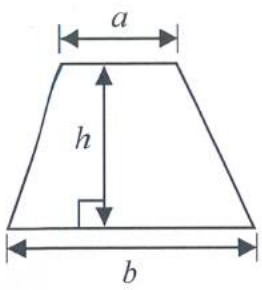
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

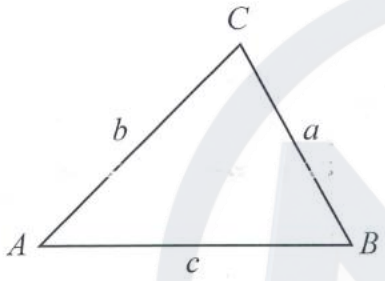
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle *ABC*

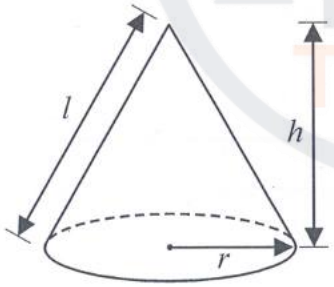
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

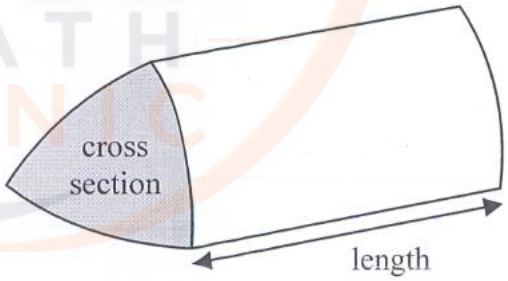
Area of triangle $= \frac{1}{2}ab\sin C$

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

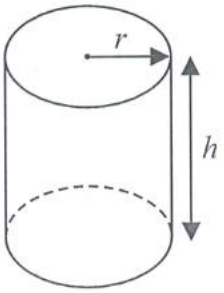
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

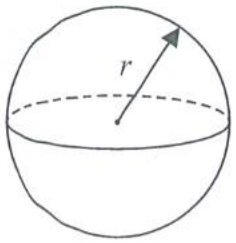


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



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

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



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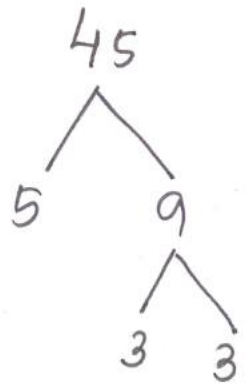
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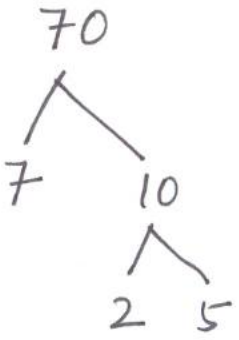
Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Find the lowest common multiple (LCM) of 45 and 70





$45 = 3^2 \times 5$

$70 = 2 \times 5 \times 7$

$LCM = 2 \times 3^2 \times 5 \times 7$

630

(Total for Question 1 is 2 marks)

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2 The length of a ship is 142.8 m, correct to 1 decimal place.

(i) Write down the lower bound of the length of the ship.

142.75 m

(1)

(ii) Write down the upper bound of the length of the ship.

142.85 m

(1)

(Total for Question 2 is 2 marks)

3 Show that $2\frac{1}{4} \times 1\frac{5}{7} = 3\frac{6}{7}$

$2\frac{1}{4} \times 1\frac{5}{7}$

$\frac{9}{4} \times \frac{12}{7}$

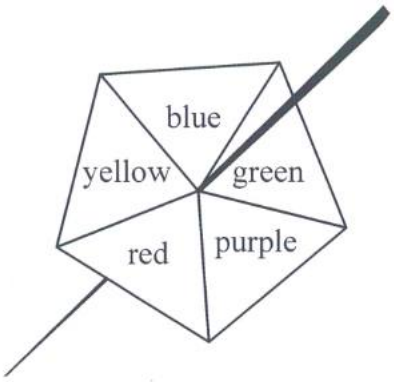
$\frac{27}{7} = 3\frac{6}{7}$

(Total for Question 3 is 3 marks)

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Solved by Mr. Pabitra

4 Here is a biased 5-sided spinner.
When the spinner is spun, it can land on blue or on green or on purple or on red or on yellow.



The table gives information about the probability of the spinner landing on each colour.

Colour	blue	green	purple	red	yellow
Probability	0.12	0.20	0.38	$4x$	x

Sophie spins the spinner once.

(a) Work out the probability that the spinner lands on blue or on green or on purple.

$0.12 + 0.20 + 0.38 = 0.7$

0.7

(1)

Max spins the spinner 350 times.

(b) Work out an estimate for the number of times the spinner lands on red.

$0.12 + 0.20 + 0.38 + 4x + x = 1$

$0.7 + 5x = 1$

$5x = 1 - 0.7$

$5x = 0.3$

$x = \frac{0.3}{5} = 0.06$

$P(\text{Red}) = 4 \times 0.06 = 0.24$

$350 \times 0.24 = 84$

84

(4)

(Total for Question 4 is 5 marks)

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DO NOT WRITE IN THIS AREA

Solved by Mr. Pabitra

5 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{3, 6, 9, 12\}$

$C = \{1, 3, 5, 7, 9, 11\}$

(a) List the members of the set

(i) $A \cup B$

$\{2, 3, 4, 6, 8, 9, 10, 12\}$

(ii) B'

$\{1, 2, 4, 5, 7, 8, 10, 11\}$

(2)

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{3, 6, 9, 12\}$

$C = \{1, 3, 5, 7, 9, 11\}$

$\mathscr{E}$	$\cap$	$\cup$	$\varnothing$	$\in$	$\notin$

(b) Write a symbol from the box on each dotted line to make each of the following a true statement.

(i) $A \cap C =$ $\varnothing$

(ii) 13 $\notin$ $\mathscr{E}$

(2)

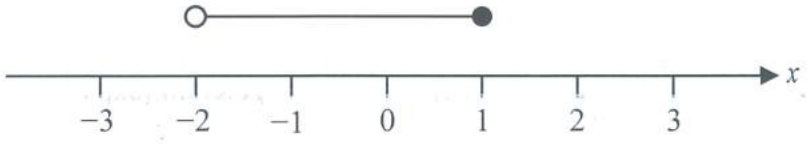
(Total for Question 5 is 4 marks)

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MATH TONIC

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6



(a) Write down the inequality shown on the number line.

$-2 < x \leq 1$

(2)

(b) Solve the inequality $7a - 5 \leqslant 3a + 28$
Show clear algebraic working.

$7a - 5 \leq 3a + 28$

$4a - 5 \leq 28$

$4a \leq 33$

$a \leq \frac{33}{4}$

$a \leq 8 \cdot 25$

(2)

(Total for Question 6 is 4 marks)

7 Change a speed of $50x$ metres per second to a speed in kilometres per hour.

$50x$ meter / second

$50x \times \frac{18}{5}$ Km/hr $= 180x$

$1 \frac{km}{hr} = \frac{1000}{3600}$ m/s

$1 \frac{km}{hr} = \frac{5}{18}$ m/s

$\frac{18}{5}$ Km/hr $= 1$ m/s

$180x$ km/h

(Total for Question 7 is 3 marks)

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Solved by Mr. Pabitra

8 (a) Simplify $a^6 \times a^{10}$

a^{16}

(1)

(b) Simplify $c^{30} \div c^{12}$

c^{18}

(1)

(c) (i) Factorise $y^2 - 10y + 21$

$(y-3)(y-7)$

$(y-3)(y-7)$

(2)

(ii) Hence, solve $y^2 - 10y + 21 = 0$

$y = 3, \quad y = 7$

(1)

(Total for Question 8 is 5 marks)

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Solved by Mr. Pabitra

9 The diagram shows triangle PQR

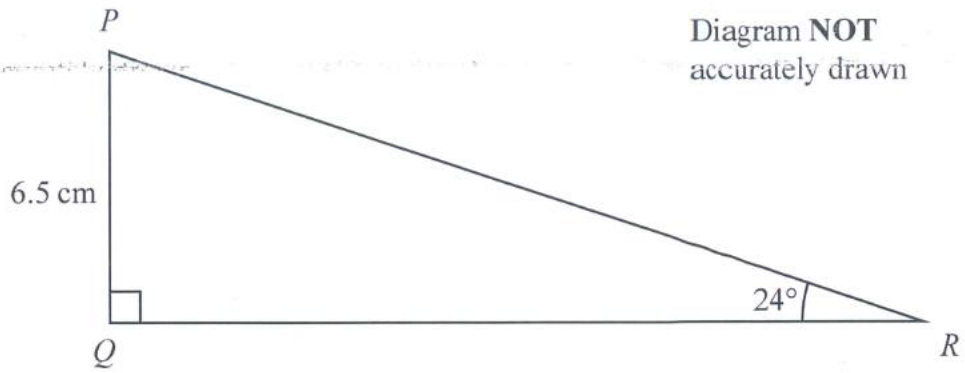


Diagram **NOT** accurately drawn

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

$$\tan 24 = \frac{6.5}{QR}$$

$$QR = \frac{6.5}{\tan 24}$$

$$QR = 14.6$$

14.6 cm

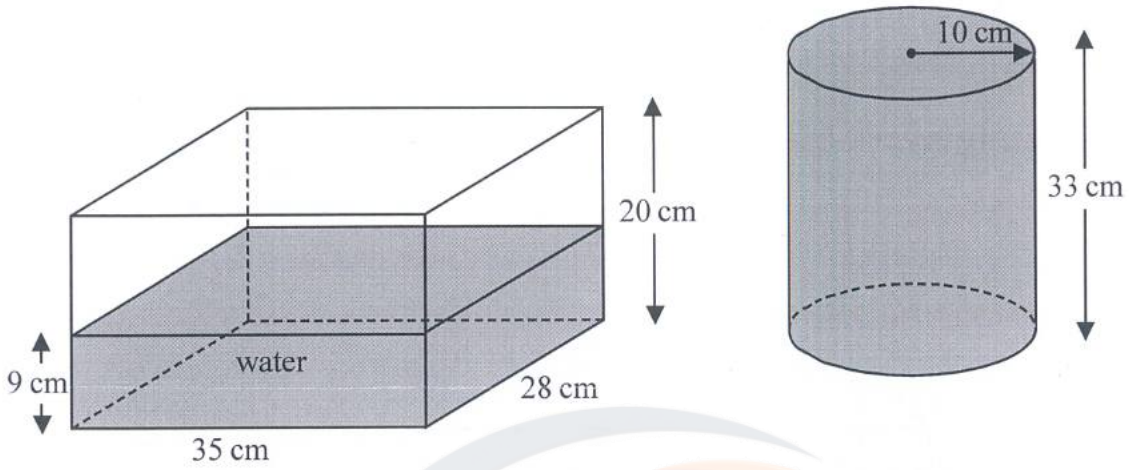
(Total for Question 9 is 3 marks)

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Solved by Mr. Pabitra

10 The diagram shows two water containers.
One is a cuboid and one is a cylinder.

Diagram **NOT** accurately drawn



The cuboid measures 35 cm by 28 cm by 20 cm
The surface of the water in the cuboid is 9 cm above the base of the cuboid.

The cylinder has a radius of 10 cm and a height of 33 cm
The cylinder is completely full of water.

Izzy is going to pour all the water from the cylinder into the cuboid.

Show that the cuboid will not be completely full of water.

volume of water (in Cuboid) = $9 \times 35 \times 28 = 8820\ cm^3$

Total volume of Cuboid = $35 \times 28 \times 20 = 19600\ cm^3$

volume of space remaining (Cuboid) = $19600 - 8820 = 10780\ cm^3$.

volume of water (Cylinder) = $\pi \times 10^2 \times 33 = 10367.25\ cm^3$.

$10780 > 10367.25$

$10780 - 10367.25 = 412.75$

So, the Cuboid will not be Completely full of water.

(Total for Question 10 is 3 marks)

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11 Zhou invests some money for 2 years.
He invests \$2500 with Bank A and \$3000 with Bank B.

Bank A
Invests \$2500
amount of money invested : total amount of interest after 2 years = 20 : 3

Bank B
Invests \$3000
4% per year compound interest for 2 years

Zhou receives more **interest** from Bank A than from Bank B.

How much more?

BANK A

Invested : Interest

20 : 3

×125 ↓ ×125

2500 : 375

= [illegible]

BANK B

Amount = $P\left(1+\frac{r}{100}\right)^n$

$= 3000\left(1+\frac{4}{100}\right)^2$

Amount = 3244.8

Interest = 3244.8 − 3000

= 244.80

More : 375 − 244.80

= 130.20

\$ 130.20

(Total for Question 11 is 5 marks)

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Solved by Mr. Pabitra

12 The table gives information about the ages of 80 people in a cinema.

Age (n years)	Frequency
$10 < n \leqslant 20$	12
$20 < n \leqslant 30$	15
$30 < n \leqslant 40$	20
$40 < n \leqslant 50$	18
$50 < n \leqslant 60$	9
$60 < n \leqslant 70$	6

(a) Complete the cumulative frequency table.

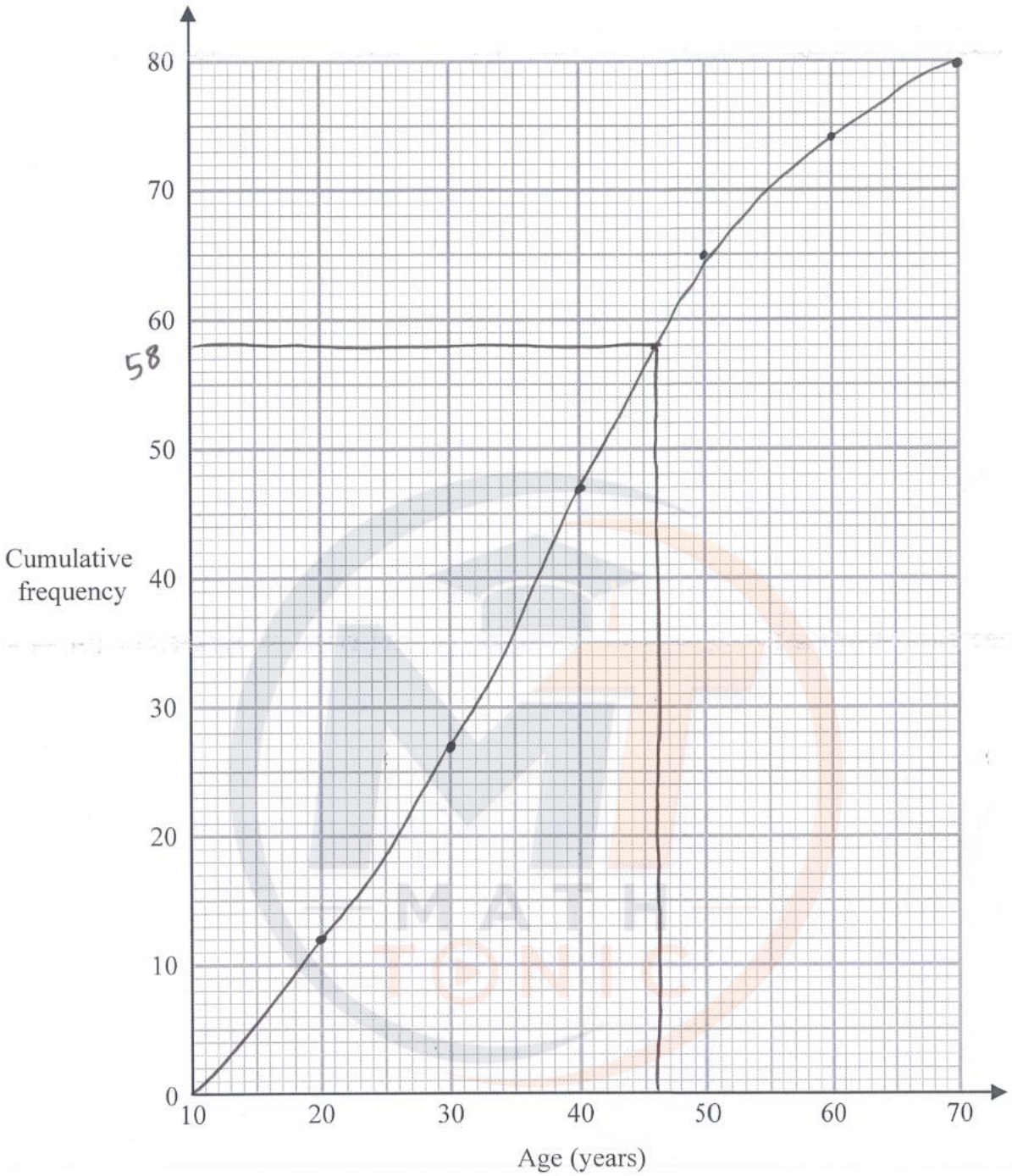
Age (n years)	Cumulative frequency
$10 < n \leqslant 20$	12
$10 < n \leqslant 30$	27
$10 < n \leqslant 40$	47
$10 < n \leqslant 50$	65
$10 < n \leqslant 60$	74
$10 < n \leqslant 70$	80

(1)

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Solved by Mr. Pabitra

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



(2)

(c) Use your graph to find an estimate for the percentage of the 80 people who are more than 46 years of age.
Give your answer correct to the nearest whole number.

$\frac{80-58}{80} \times 100 = 27.5\%$

28 %

(3)

(Total for Question 12 is 6 marks)

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Solved by Mr. Pabitra

13 Here are the numbers of eggs laid by some hens on each of 11 days in June.

9 10 12 15 17 18 19 19 20 25 26

Work out the interquartile range of the numbers of eggs.

$Q_1 = \left(\frac{1}{4} \times 11\right)^{th} = 2.75^{th} = 3^{rd}$ term $= 12$

$Q_3 = \left(\frac{3}{4} \times 11\right)^{th} = 8.25^{th} = 9^{th}$ term $= 20$

$Q_3 - Q_1 = 20 - 12$

$= 8$

8

(Total for Question 13 is 2 marks)

14 Work out $6.7 \times 10^{135} + 3 \times 10^{134}$

Give your answer in standard form.

$6.7 \times 10^{134} \times 10 + 3 \times 10^{134}$

$10^{134}[6.7 \times 10 + 3]$

70×10^{134}

7×10^{135}

7×10^{135}

(Total for Question 14 is 2 marks)

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15 (a) Solve $\frac{5a+8}{3} - \frac{2a+5}{4} = 23$

Show clear algebraic working.

$$\frac{4(5a+8) - 3(2a+5)}{3\times 4} = 23$$

$$\frac{20a+32-6a-15}{12} = 23$$

$$\frac{14a+17}{12} = 23$$

$$14a+17 = 12\times 23$$

$$14a+17 = 276$$

$$14a = 276-17$$

$$14a = 259$$

$$a = \frac{259}{14}$$

$$a = 18.5$$

$a =$ 18.5

(4)

(b) Express $\left(\frac{\sqrt{y}}{3}\right)^{-1}$ in the form cy^n where c and n are numbers to be found.

$$\left(\frac{y^{1/2}}{3}\right)^{-1} = \frac{y^{-1/2}}{3^{-1}} = 3y^{-0.5}$$

-0.5

(2)

(Total for Question 15 is 6 marks)

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Solved by Mr. Pabitra

16 Use algebra to show that the recurring decimal $0.6\dot{1}\dot{2} = \frac{101}{165}$

$x = 0.612\,1212\ldots$

$\times 10$ ( ) $\times 10$

$10x = 6.12\,1212\ldots$ ✓

$\times 100$ ( ) $\times 100$

$1000x = 612.12\,1212\ldots$ ✓

$1000x = 612.121212\ldots$

$10x = 6.121212\ldots$

$990x = 606$

$x = \frac{606}{990}$

$x = \frac{101}{165}$

(Total for Question 16 is 2 marks)

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Solved by Mr. Pabitra

17 Prove that, for any three numbers which are consecutive multiples of 4, the difference between the square of the largest number and the square of the smallest number is always a multiple of 64

Show clear algebraic working.

$4n$ ✓ $\quad 4n+4 \quad$ $4n+8$ ✓

$(4n+8)^2 - (4n)^2$

$(4n+8)(4n+8) - 16n^2$

$16n^2 + 64n + 64 - 16n^2$

$64n + 64$

$64(n+1)$, yes it is multiple of 64

(Total for Question 17 is 3 marks)

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MATH TONIC

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18 F is inversely proportional to the cube of r

$F = 6$ when $r = 2$

(a) Find a formula for F in terms of r

$$F \propto \frac{1}{r^3}$$

$$F = \frac{K}{r^3}$$

$$\boxed{F = \frac{48}{r^3}}$$

$$6 = \frac{K}{2^3}$$

$$K = 6 \times 2^3$$

$$K = 6 \times 8$$

$$K = 48$$

$F = 48/r^3$

(3)

(b) Find the value of r when $F = 3072$

$$F = \frac{48}{r^3}$$

$$3072 = \frac{48}{r^3}$$

$$r^3 = \frac{48}{3072}$$

$$r = \sqrt[3]{\frac{48}{3072}}$$

$r = 1/4$

(2)

(Total for Question 18 is 5 marks)

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Solved by Mr. Pabitra

19 Kannika has 9 counters.
There is a number on each counter.



Kannika puts the 9 counters in a bag.
She takes at random a counter from the bag and does not replace the counter.
She then takes at random a second counter from the bag.

Work out the probability that the sum of the numbers on the two counters is less than 5

① ⟶ 2 No.
② ⟶ 1 No
③ ⟶ 3 No
⑤ ⟶ 1 No.
⑥ ⟶ 2 Nos.

$(1, 1) = \frac{2}{9} \times \frac{1}{8} = \frac{2}{72}$

$(1, 2) = \frac{2}{9} \times \frac{1}{8} = \frac{2}{72}$

$(2, 1) = \frac{1}{9} \times \frac{2}{8} = \frac{2}{72}$

$(1, 3) = \frac{2}{9} \times \frac{3}{8} = \frac{6}{72}$

$(3, 1) = \frac{3}{9} \times \frac{2}{8} = \frac{6}{72}$

$P(\text{sum less than } 5) = \frac{18}{72} = \frac{1}{4}$

$\frac{1}{4}$

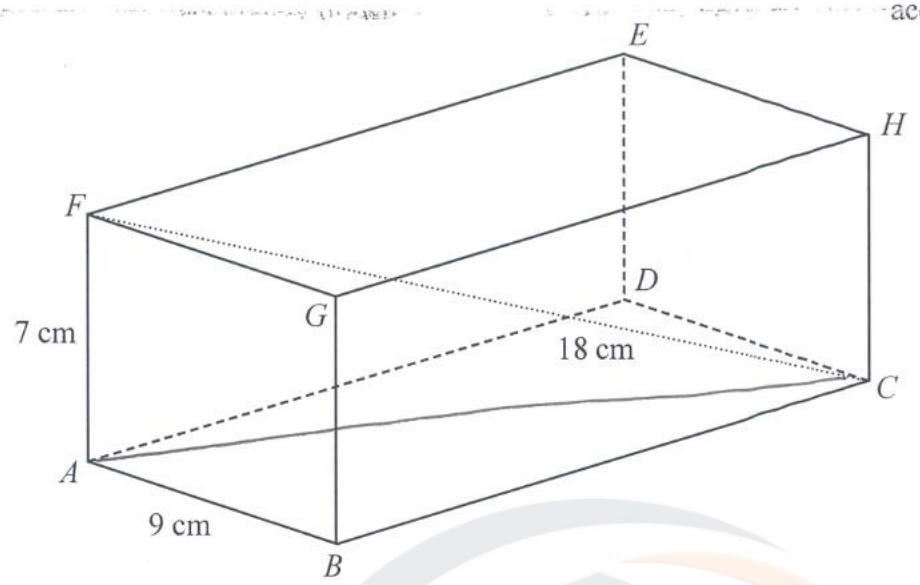
(Total for Question 19 is 3 marks)

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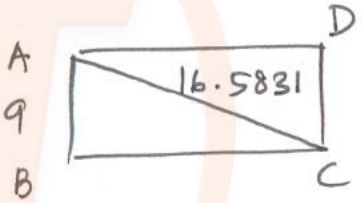
20 The diagram shows cuboid *ABCDEFGH*

Diagram **NOT** accurately drawn



$AB = 9\,\text{cm}$ $AF = 7\,\text{cm}$ $FC = 18\,\text{cm}$

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



$AC^2 = FC^2 - FA^2$

$AC = \sqrt{18^2 - 7^2}$

$AC = 16.5831$

~~BB~~ $BC = \sqrt{16.5831^2 - 9^2}$

$BC = 13.9$ cm

13.9 cm

(Total for Question 20 is 3 marks)

Solved by Mr. Pabitra

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21 The curve with equation $y = f(x)$ has one turning point.
The coordinates of this turning point are $(-6, 9)$

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

$(-6/3, 9)$

$(-2, 9)$

(-2 , 9)

(1)

The curve **C** with equation $y = g(x)$ is transformed to give the curve **S** with equation $y = g(x + a) + b$

The point $(4, -5)$ on **C** is mapped to the point $(1, -16)$ on **S**

(b) Write down the value of a and the value of b

$y = g(x)$ $\quad 4, -5$

$y = g(x+a)+b \quad (4-a, -5+b) = (1, -16)$

$4 - a = 1$ $\quad -5 + b = -16$

$a = 3$ $\quad b = -16 + 5$

$b = -11$

$a =$ 3

$b =$ −11

(2)

(Total for Question 21 is 3 marks)

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Solved by Mr. Pabitra

22 Solve the simultaneous equations

$$x^2 + y^2 = 41$$
$$2x + y = 3$$

Show clear algebraic working.

$y = 3 - 2x$

$x^2 + y^2 = 41$

$x^2 + (3-2x)^2 = 41$

$x^2 + 9 - 12x + 4x^2 = 41$

$5x^2 - 12x + 9 - 41 = 0$

$5x^2 - 12x - 32 = 0$

$(5x+8)(x-4) = 0$

$5x + 8 = 0$ | $x - 4 = 0$

$x = -8/5$ | $x = 4$

$y = 3 - 2x$ | $y = 3 - 2x$

$y = 3 - 2 \times -8/5$ | $y = 3 - 2 \times 4$

$y = 3 + 16/5$ | $y = 3 - 8$

$y = \frac{31}{5}$ | $y = -5$

$x = -8/5, \ y = 31/5$

$x = 4, \ y = -5$

(Total for Question 22 is 5 marks)

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DO NOT WRITE IN THIS AREA

Solved by Mr. Pabitra

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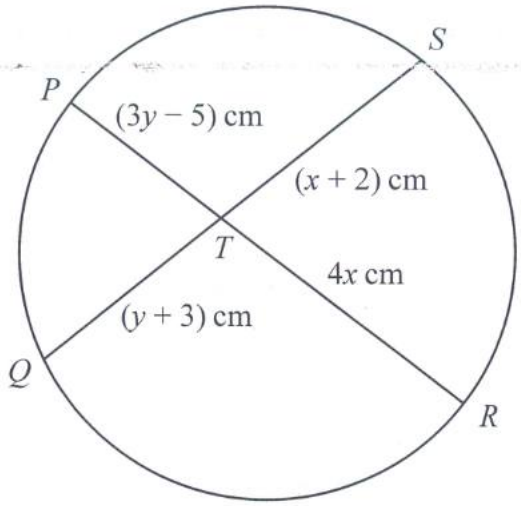


Diagram **NOT** accurately drawn

PTR and *QTS* are chords of a circle.

$PT = (3y - 5)$ cm $QT = (y + 3)$ cm $RT = 4x$ cm $ST = (x + 2)$ cm

Find an expression for y in terms of x

$$QT \times TS = RT \times TP$$
$$(y+3)(x+2) = 4x(3y-5)$$
$$xy + 2y + 3x + 6 = 12xy - 20x$$
$$xy + 2y - 12xy = -20x - 3x - 6$$
$$y[x + 2 - 12x] = -23x - 6$$
$$y(-11x + 2) = -23x - 6$$
$$y = \frac{-23x - 6}{-11x + 2} \text{ or } \frac{23x + 6}{11x - 2}$$

$y =$ $\frac{23x+6}{11x-2}$

Total for Question 23 is 5 marks)

Solved by Mr. Pabitra

24 The first 3 terms of an arithmetic series are

$$(2x + 5) \qquad (3y - 4) \qquad (4x - 2)$$

where x and y are constants.

The sum of the first 9 terms of the series is 216

Find the value of x and the value of y
Show clear algebraic working.

$t_2 - t_1 = t_3 - t_2$

$3y-4-(2x+5) = 4x-2-(3y-4)$

$3y-4-2x-5 = 4x-2-3y+4$

$3y-2x-9 = 4x-3y+2$

$-9-2 = 6x-6y$

$6x-6y = -11$

$6x = -11+6y$

$\boxed{x = -\frac{11}{6}+y}$

$a = 2x+5$

$d = 3y-4-(2x+5)$

$d = 3y-4-2x-5$

$d = 3y-2x-9$

$d = 3y-2\left[-\frac{11}{6}+y\right]-9$

$d = 3y+\frac{11}{3}-2y-9$

$\boxed{d = y-\frac{16}{3}}$

$a = 2x+5$

$a = 2x\left(-\frac{11}{6}+y\right)+5$

$a = -\frac{11}{3}+2y+5$

$\boxed{a = \frac{4}{3}+2y}$

$S_9 = 216$

$\frac{9}{2}\left[2\left(\frac{4}{3}+2y\right)+(9-1)\left(y-\frac{16}{3}\right)\right] = 216$

$\frac{9}{2}\left[\frac{8}{3}+4y+8\left(y-\frac{16}{3}\right)\right] = 216$

$\frac{8}{3}+4y+8y-\frac{128}{3} = 216 \times \frac{2}{9}$

$12y - 40 = 48$

$12y = 48+40$

$12y = 88$

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Solved by Mr. Pabitra

$y = \frac{88}{12} = \frac{22}{3}$

$x = -\frac{11}{6} + y$

$x = -\frac{11}{6} + \frac{22}{3}$

$x = \frac{11}{2}$

$x =$ 11/2

$y =$ 22/3

(Total for Question 24 is 6 marks)

Turn over for Question 25

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Solved by Mr. Pabitra

25

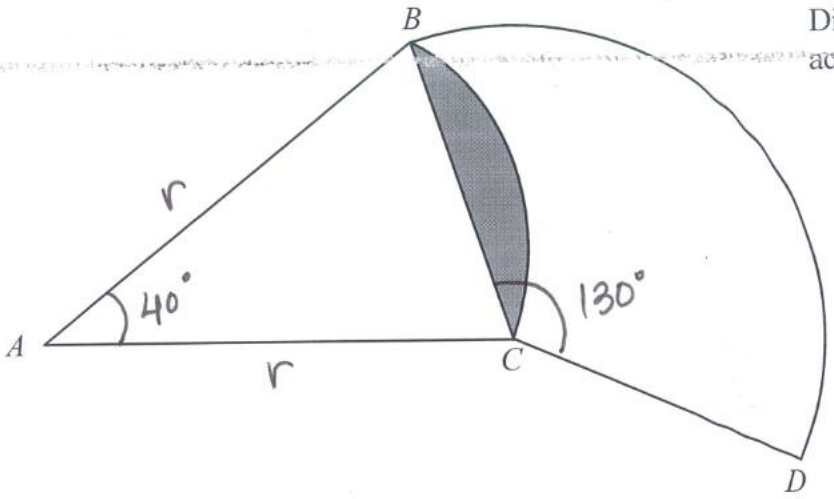


Diagram **NOT** accurately drawn

BAC is a sector of a circle, centre *A*

BCD is a sector of a circle, centre *C*

Angle *BAC* = 40°
Angle *BCD* = 130°
Area of shaded segment = 28 cm²

Find the length of the arc *BD*
Give your answer correct to 3 significant figures.

Area of Sector (ABC) − Area of triangle ABC = Area of shaded

$$\frac{40}{360} \times \pi r^2 - \frac{1}{2} \times r^2 \times \sin 40 = 28$$

$$r^2 \left[\frac{40}{360} \times \pi - \frac{1}{2} \times \sin 40 \right] = 28$$

$$r^2 \times 0.027672 = 28$$

$$r^2 = \frac{28}{0.027672} = 1011.853$$

$$r = \sqrt{1011.853}$$

$$r = 31.8096 \text{ cm}$$

Solved by Mr. Pabitra

P 7 5 6 6 0 A 0 2 6 2 8

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Cosine Rule:

$BC = \sqrt{31.8096^2 + 31.8096^2 - 2 \times 31.8096 \times 31.8096 \times \cos 40}$

$BC = 21.8$

length of Arc BD

$\frac{130}{360} \times 2 \times \pi \times 21.8$

49.46 cm

(Total for Question 25 is 6 marks)

Turn over for Question 26

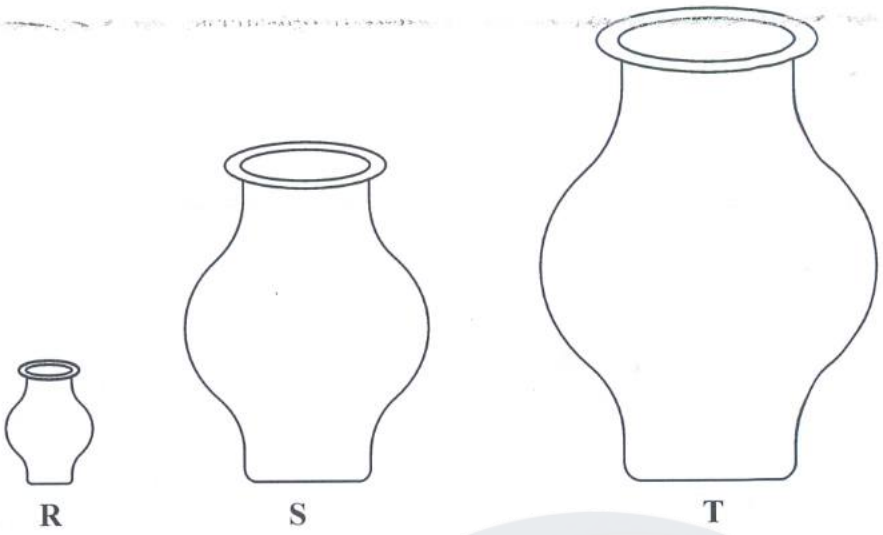
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MATH TONIC

Solved by Mr. Pabitra

26 **R**, **S** and **T** are three similar vases.

Diagram **NOT** accurately drawn



The volume of vase **S** is 72.8% more than the volume of vase **R**

The height of vase **R** is h cm
The height of vase **T** is $6h$ cm

The surface area of vase **S** is A cm^2
The surface area of vase **T** is kA cm^2

Work out the value of k

(Between S and R)

Volume Scale factor = 1.728

Length Scale factor = $\sqrt[3]{1.728}$

= 1.2

Between R and T

Length Scale factor = 6

	R : S : T
Length SF	1 : 1.2 : 6
	5 : 6 : 30 (whole nums)
Area Scale factor	5^2 : 6^2 : 30^2
	25 : 36 : 900

$\frac{900}{36} = 25$

$k =$ 25

(Total for Question 26 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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Solved by Mr. Pabitra