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 4 June 2025

Morning (Time: 2 hours)

Paper reference **4MA1/2HR**

Mathematics A

PAPER 2HR
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 2 A 0 1 2 8

Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

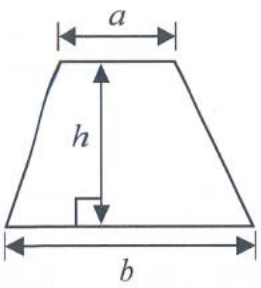
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

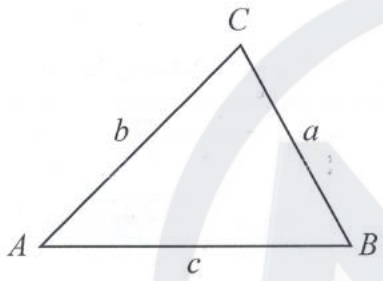
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle ABC

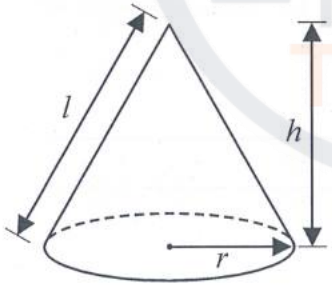
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

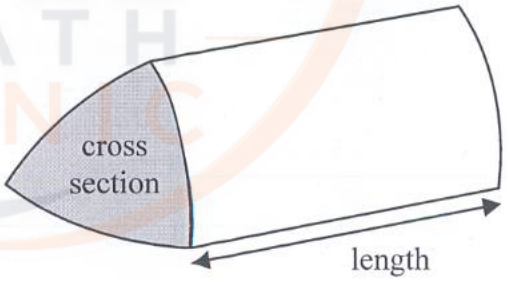
Area of triangle $= \frac{1}{2}ab\sin C$

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

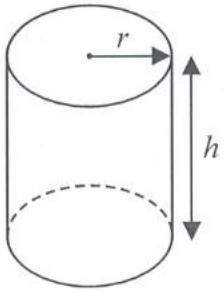
Curved surface area of cone $= \pi r l$



Volume of prism
= area of cross section × length

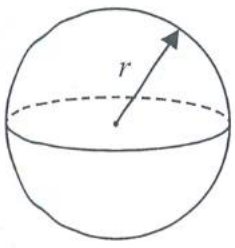


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi r h$



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

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



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Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Factorise fully $18c - 45cd$

$9c(2-5d)$

(2)

(b) Solve $\frac{5-2x}{6} = 3x - 4$

Show clear algebraic working.

$5-2x = 6(3x-4)$

$5-2x = 18x-24$

$5+24 = 18x+2x$

$29 = 20x$

$\frac{29}{20} = x$

$x = \frac{29}{20} = 1\frac{9}{20}$

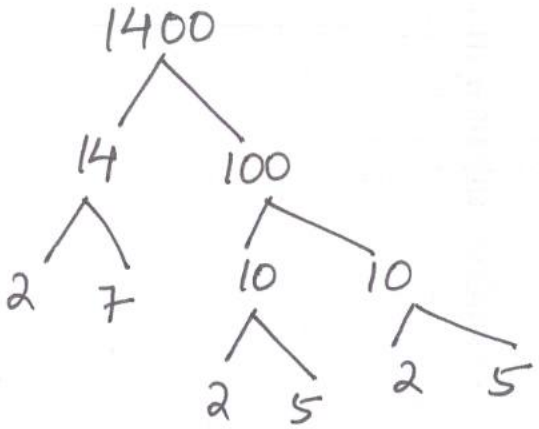
(3)

(Total for Question 1 is 5 marks)

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Solved by Mr. Pabitra

2 Write 1400 as a product of powers of its prime factors.
Show your working clearly.



$1400 = 2^3 \times 5^2 \times 7$

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

(Total for Question 2 is 3 marks)

3 Solve the simultaneous equations

$$3x + 2y = 10$$
$$3x - 4y = 16$$

Show clear algebraic working.

$3x + 2y = 10$

$3x - 4y = 16$

$- \quad + \quad -$

$6y = -6$

$\boxed{y = -1}$

$3x + 2y = 10$

$3x + 2 \times (-1) = 10$

$3x - 2 = 10$

$3x = 10 + 2$

$3x = 12$

$\boxed{x = 4}$

$x =$ 4

$y =$ −1

(Total for Question 3 is 3 marks)

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Solved by Mr. Pabitra

4 Joshua is going to cover a floor with tiles for a customer.
The area of the floor is 45 m^2

Joshua buys one box of tiles for each 1.5 m^2 of floor area.
Each box of tiles costs £64

Joshua also buys 5 bags of tile adhesive.
Each bag of tile adhesive costs £12

Joshua charges the customer £3000

Work out his percentage profit.
Give your answer correct to one decimal place.

No. of boxes $= \frac{45}{1.5} = 30$ boxes

Cost of 30 boxes $= 30 \times 64 = £1920$

Cost of tile adhesive $= 5 \times 12 = £60$

Total Cost $= 60 + 1920 = £1980$

Percentage Profit $= \frac{3000 - 1980}{1980} \times 100$

$= 51.5\%$

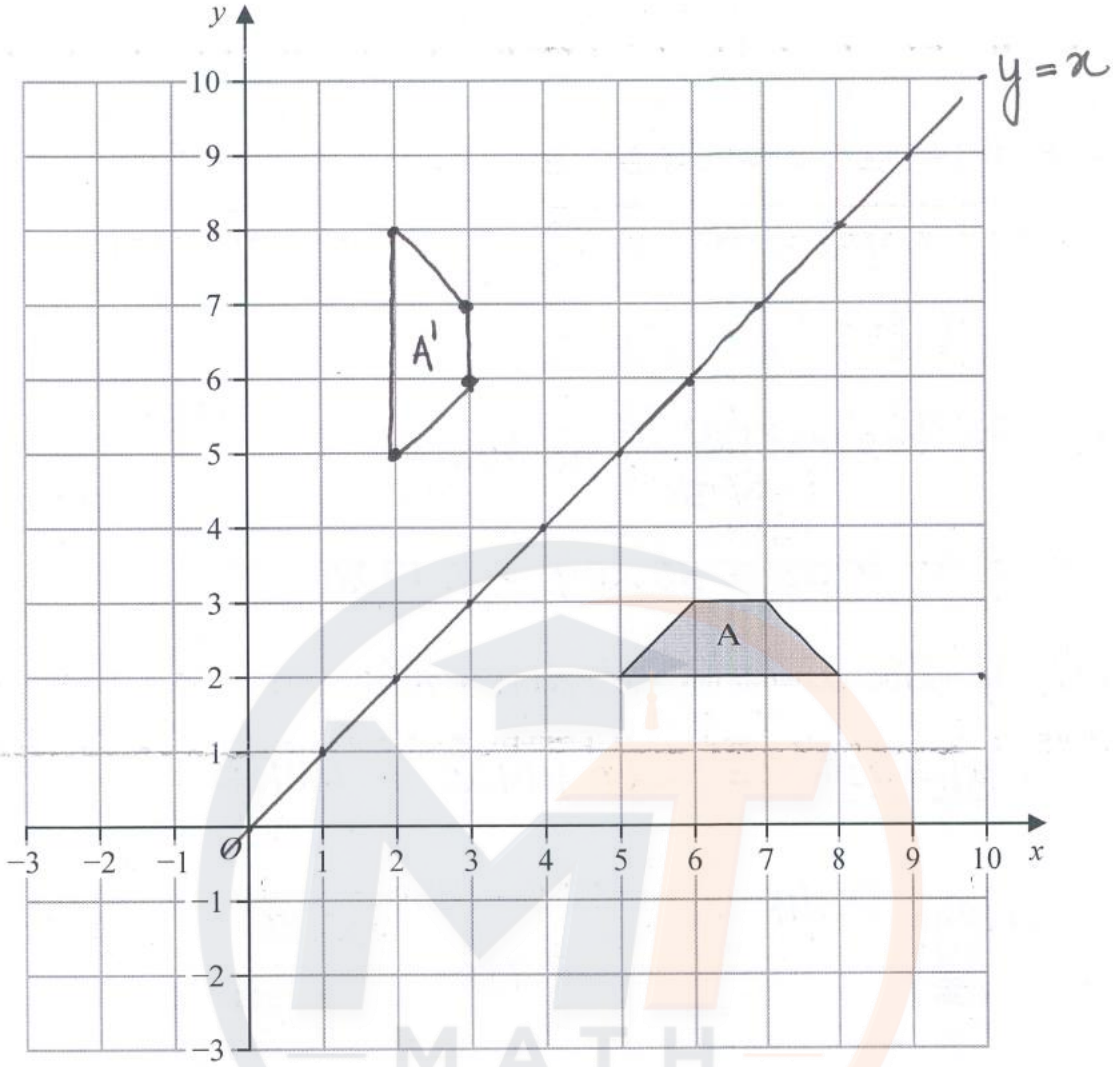
51.5 %

(Total for Question 4 is 5 marks)

Solved by Mr. Pabitra

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5

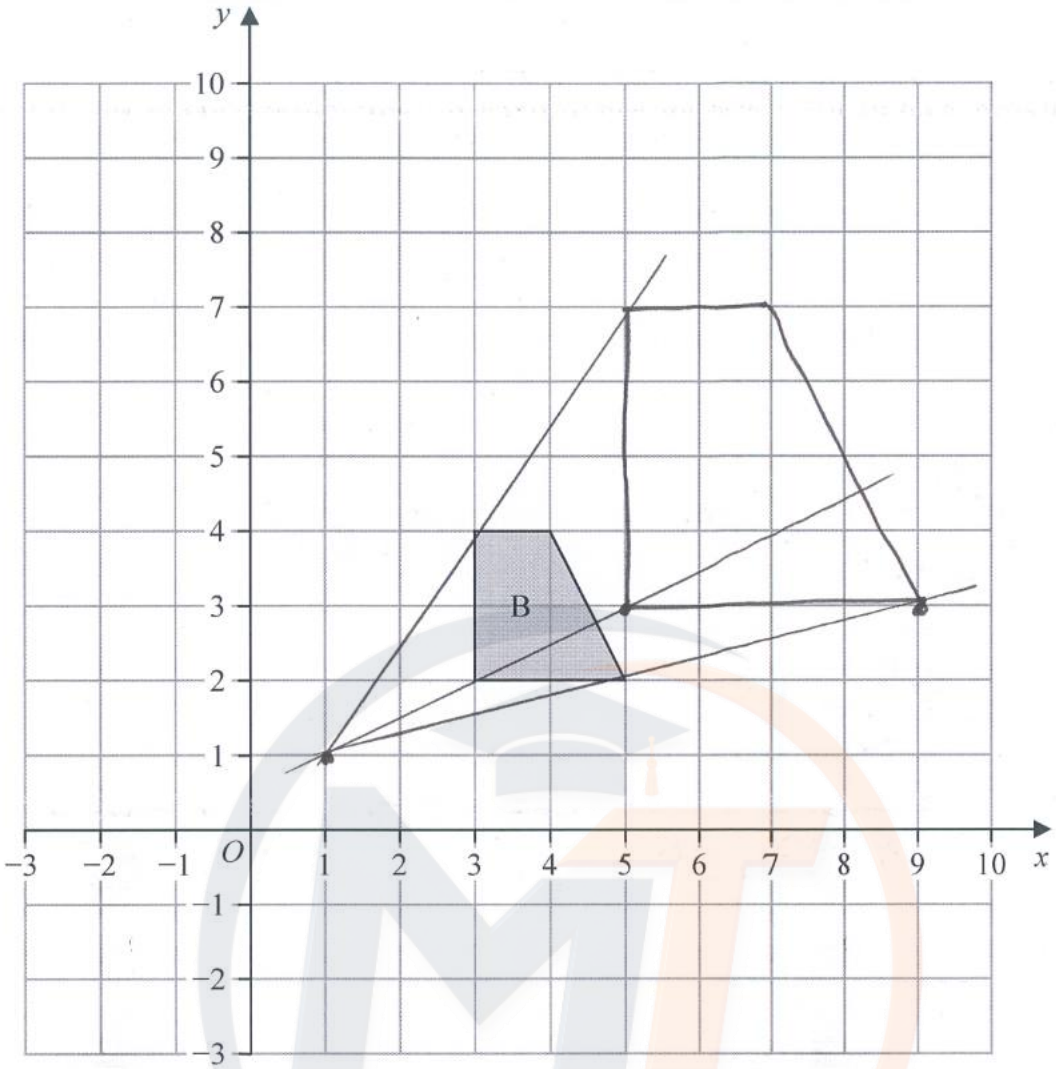


(a) On the grid above, reflect shape **A** in the line $y = x$

(2)

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Solved by Mr. Pabitra



(b) On the grid above, enlarge shape **B** by scale factor 2 with centre (1, 1)

(2)

(Total for Question 5 is 4 marks)

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Solved by Mr. Pabitra

6 (a) Write down the value of 5^0

1

(1)

$$\frac{5^9 \times 5^{-3}}{5^{-2}} = 5^k$$

(b) Find the value of k

$$\frac{5^{9+(-3)}}{5^{-2}} = 5^K \qquad 5^8 = 5^K$$

$$\frac{5^6}{5^{-2}} = 5^K$$

$$5^{6-(-2)} = 5^K$$

$k =$ 8

(2)

(c) Simplify fully $\left(2d^4e^5\right)^3$

$$2^3 \times (d^4)^3 \times (e^5)^3$$

$$8 \times d^{12} \times e^{15}$$

$8d^{12}e^{15}$

(2)

(Total for Question 6 is 5 marks)

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Solved by Mr. Pabitra

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7 The mass of a silver coin is 48.3 g
The density of silver is 10.5 g/cm^3

Work out the volume of the silver coin.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{volume} = \frac{\text{mass}}{\text{Density}}$$

$$\text{volume} = \frac{48.3\ \text{g}}{10.5\ \text{g/cm}^3}$$

$$= 4.6\ \text{cm}^3$$

4.6 cm^3

(Total for Question 7 is 2 marks)

8 The mean of 7 numbers is 60

The mean of 3 of the numbers is 46

Work out the mean of the other 4 numbers.

$$\frac{\text{Sum of 3 number}}{3} = 46$$

$$\text{Sum of 3 numbers} = 46 \times 3 = 138$$

$$\frac{\text{Sum of 7 numbers}}{7} = 60$$

$$\text{Sum of 7 numbers} = 60 \times 4 = 420$$

$$\text{Sum of 4 numbers} = 420 - 138 = 282$$

$$\text{mean of 4 numbers} = \frac{282}{4} = 70.5$$

(Total for Question 8 is 3 marks)

Solved by Mr. Pabitra

9 In a sale, normal prices are reduced by 15%

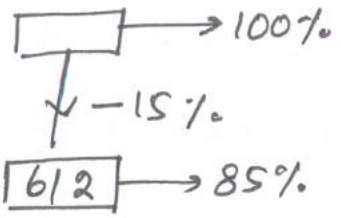
The sale price of a dishwasher is 612 Swiss francs.

Work out the normal price of the dishwasher.

85% ⟶ 612 Swiss francs.

1% ⟶ $\frac{612}{85}$

100% ⟶ $\frac{612}{85} \times 100 = 720$



720 Swiss francs

(Total for Question 9 is 3 marks)

10 A straight line, **L**, is parallel to the line with equation $y = 2 - 5x$
The line **L** passes through the point (0, 6)

Find an equation of the line **L**

$y = -5x + 2$

Gradient (m) = −5

As L is parallel, so gradient line L is also −5

$y = -5x + c$ line is passing through (0,6)

$6 = -5 \times 0 + c$

$6 = 0 + c$

$c = 6$

$y = -5x + 6$

(Total for Question 10 is 2 marks)

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Solved by Mr. Pabitra

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11 The diagram shows two triangles, *ADE* and *CDB*

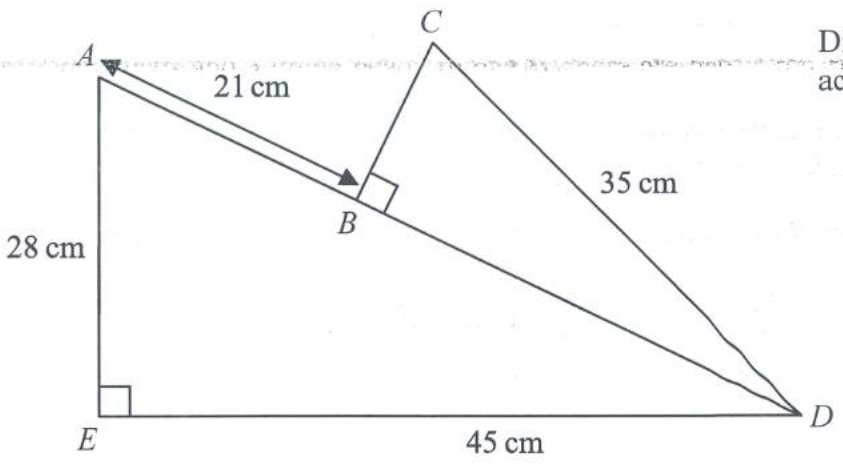


Diagram **NOT** accurately drawn

ABD is a straight line.

$AE = 28\,\text{cm}$ $ED = 45\,\text{cm}$ $AB = 21\,\text{cm}$ $CD = 35\,\text{cm}$

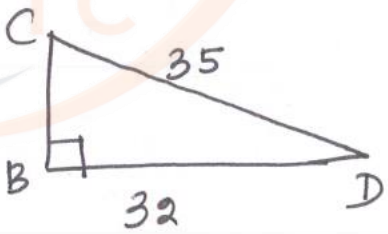
angle *AED* = angle *CBD* = 90°

Work out the area of triangle *CDB*
Give your answer correct to 3 significant figures.

$AD = \sqrt{28^2 + 45^2}$

$AD = 53$ cm

$BD = AD - AB = 53 - 21 = 32$ cm



$CB = \sqrt{35^2 - 32^2}$

$CB = 14.18$ cm

$\text{Area} = \frac{1}{2} \times 32 \times 14.18$

$\text{Area} = 226.8\ \text{cm}^2$

Area = 227 cm²

227 cm²

(Total for Question 11 is 5 marks)

Solved by Mr. Pabitra

12 Osman buys a car for \$16 000

The car depreciates at a rate of 12% each year for the first 2 years.
In the third year, the car depreciates at a rate of x%

At the end of 3 years, the value of the car is \$11 461.12

Work out the value of x

$$16000\left(1-\frac{12}{100}\right)^2 = \$12390.4$$

$$16000\left(1-\frac{12}{100}\right)^2\left(1-\frac{x}{100}\right) = 11461.12$$

$$12390.4\left(1-\frac{x}{100}\right) = 11461.12$$

$$1-\frac{x}{100} = \frac{11461.12}{12390.4}$$

7.5%

(Total for Question 12 is 3 marks)

$$1-\frac{x}{100} = 0.925$$

$$\frac{x}{100} = 1-0.925$$

$$\frac{x}{100} = 0.075$$

$$x = 0.075 \times 100$$

$$\boxed{x = 7.5\%}$$

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Solved by Mr. Pabitra

13 (a) Factorise $4x^2 - 25y^2$

$a^2 - b^2 = (a+b)(a-b)$

$4x^2 - 25y^2$

$(2x)^2 - (5y)^2$

$(2x+5y)(2x-5y)$

$(2x+5y)(2x-5y)$

(2)

(b) Show that $4x(x + 3)(2x - 5)$ can be written in the form $ax^3 + bx^2 + cx$ where a, b and c are integers to be found.

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

$4x(2x^2 - 5x + 6x - 15)$

$4x(2x^2 + x - 15)$

$8x^3 + 4x^2 - 60x$

(3)

(Total for Question 13 is 5 marks)

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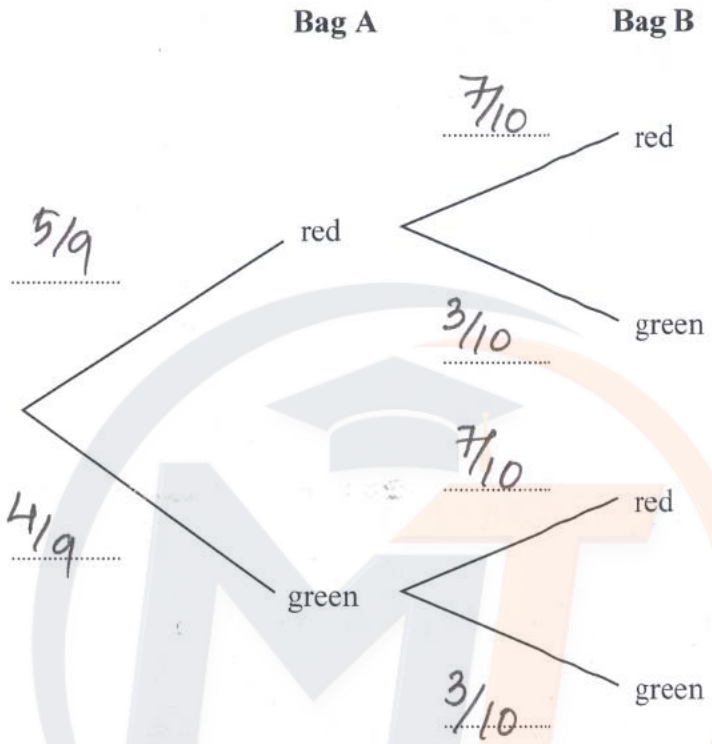
Solved by Mr. Pabitra

14 Sara has two bags, **A** and **B**

In bag **A**, there are only 5 red beads and 4 green beads.
In bag **B**, there are only 7 red beads and 3 green beads.

Sara takes at random a bead from bag **A**
She then takes at random a bead from bag **B**

(a) Use this information to complete the probability tree diagram.



(2)

(b) Work out the probability that Sara takes two red beads.

$$P(RR) = \frac{5}{9} \times \frac{7}{10}$$

$$= \frac{7}{18}$$

$\frac{7}{18}$

(2)

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Solved by Mr. Pabitra

Sara puts the beads back into their original bags.

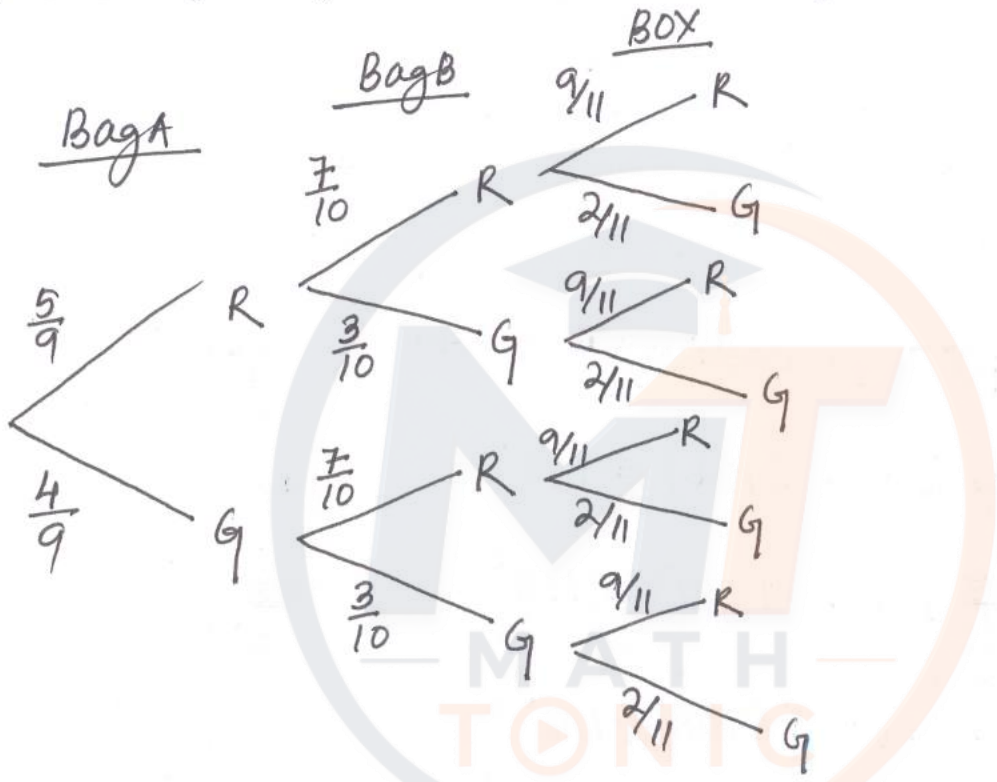
Sara also has a box of beads.
In the box, there are only red beads and green beads.

When a bead is taken at random from the box, the probability that it is

a green bead is $\frac{2}{11}$

Sara takes at random a bead from bag **A**
She then takes at random a bead from bag **B**
She then takes at random a bead from the box.

(c) Work out the probability that Sara takes more red beads than green beads.



$P(RRR) + P(RRG) + P(RGR) + P(GRR)$

$\left(\frac{5}{9} \times \frac{7}{10} \times \frac{9}{11}\right) + \left(\frac{5}{9} \times \frac{7}{10} \times \frac{2}{11}\right) + \left(\frac{5}{9} \times \frac{3}{10} \times \frac{9}{11}\right) + \left(\frac{4}{9} \times \frac{7}{10} \times \frac{2}{11}\right)$

$\frac{7}{22} + \frac{7}{99} + \frac{3}{22} + \frac{14}{55} = \frac{386}{495}$

$\frac{386}{495}$

(3)

(Total for Question 14 is 7 marks)

Solved by Mr. Pabitra

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

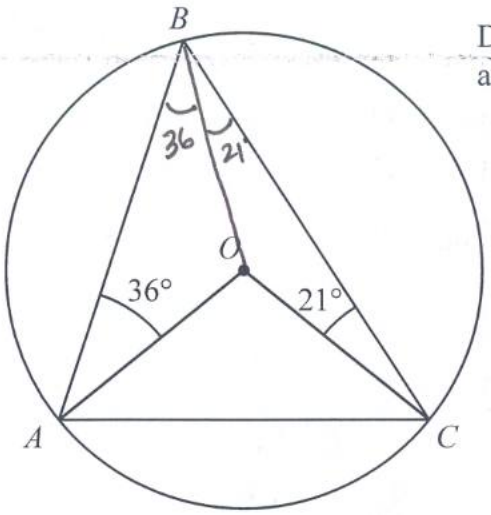


Diagram **NOT** accurately drawn

Angle $BAO = 36°$
Angle $BCO = 21°$

Work out the size of angle ACO

$OB = OA = OC =$ radius

$A\hat{O}B = 180 - (36+36) = 108°$

$B\hat{O}C = 180 - (21+21) = 138°$

$A\hat{O}C = 360 - (108° + 138°)$

$A\hat{O}C = 114°$

$A\hat{C}O = \dfrac{180 - 114}{2}$

$\boxed{A\hat{C}O = 33°}$

°

(Total for Question 15 is 3 marks)

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Solved by Mr. Pabitra

16 Show that $\frac{4}{3\sqrt{5}+7}$ can be written in the form $a-\sqrt{b}$ where a and b are integers.

Show each stage of your working.

$$\frac{4(3\sqrt{5}-7)}{(3\sqrt{5}+7)(3\sqrt{5}-7)} = \frac{4(3\sqrt{5}-7)}{(3\sqrt{5})^2-7^2}$$

$(a+b)(a-b)=a^2-b^2$

$$= \frac{4(3\sqrt{5}-7)}{45-49}$$

$$= \frac{4(3\sqrt{5}-7)}{-4}$$

$3\sqrt{5}$

$\sqrt{9}\times\sqrt{5}$

$\sqrt{9\times5}$

$\sqrt{45}$

$$= \frac{3\sqrt{5}-7}{-1}$$

$$= \boxed{7-3\sqrt{5}} = \boxed{7-\sqrt{45}}$$

(Total for Question 16 is 3 marks)

17 Make k the subject of $p=\frac{8k^2+5}{7-3k^2}$

$$p(7-3k^2) = 8k^2+5$$

$$7p-3pk^2 = 8k^2+5$$

$$7p-5 = 8k^2+3pk^2$$

$$7p-5 = k^2(8+3p)$$

$$\frac{7p-5}{8+3p} = k^2$$

$$k = \pm\sqrt{\frac{7p-5}{8+3p}}$$

$$k = \pm\sqrt{\frac{7p-5}{8+3p}}$$

(Total for Question 17 is 4 marks)

Solved by Mr. Pabitra

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18 OAB is a triangle.

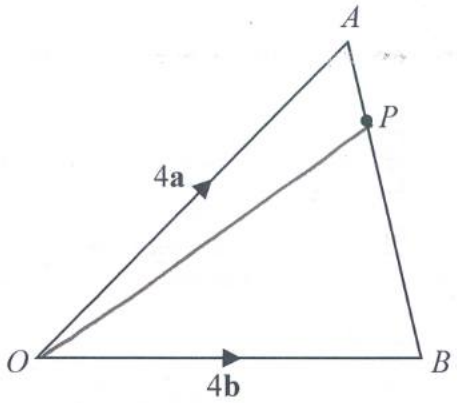


Diagram **NOT** accurately drawn

$\overrightarrow{OA} = 4\mathbf{a}$

$\overrightarrow{OB} = 4\mathbf{b}$

P is the point on AB such that $AP : PB = 1 : 3$

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

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

$= -4a + 4b$

$-4a+4b$

(1)

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

$AP : PB = 1 : 3$

$\overrightarrow{AP} = \frac{1}{4} \times \overrightarrow{AB}$

$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$

$= 4a + \frac{1}{4} \times \overrightarrow{AB}$

$= 4a + \frac{1}{4}(-4a+4b)$

$= 4a - a + b$

$\overrightarrow{OP} = 3a+b$

$3a+b$

(2)

(Total for Question 18 is 3 marks)

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Solved by Mr. Pabitra

19 The functions f and g are such that

$$f(x) = 3x - 4 \text{ where } x > 2$$

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

(a) State the value of x that cannot be included in any domain of g

$2x+1 \neq 0$

$2x \neq -1$

$x \neq -1/2$

$-1/2$

(1)

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

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

$$gf(x) = \frac{f(x)}{2f(x)+1} = \frac{3x-4}{2(3x-4)+1}$$

$$= \frac{3x-4}{6x-8+1}$$

$$= \frac{3x-4}{6x-7}$$

$gf(x) = \dfrac{3x-4}{6x-7}$

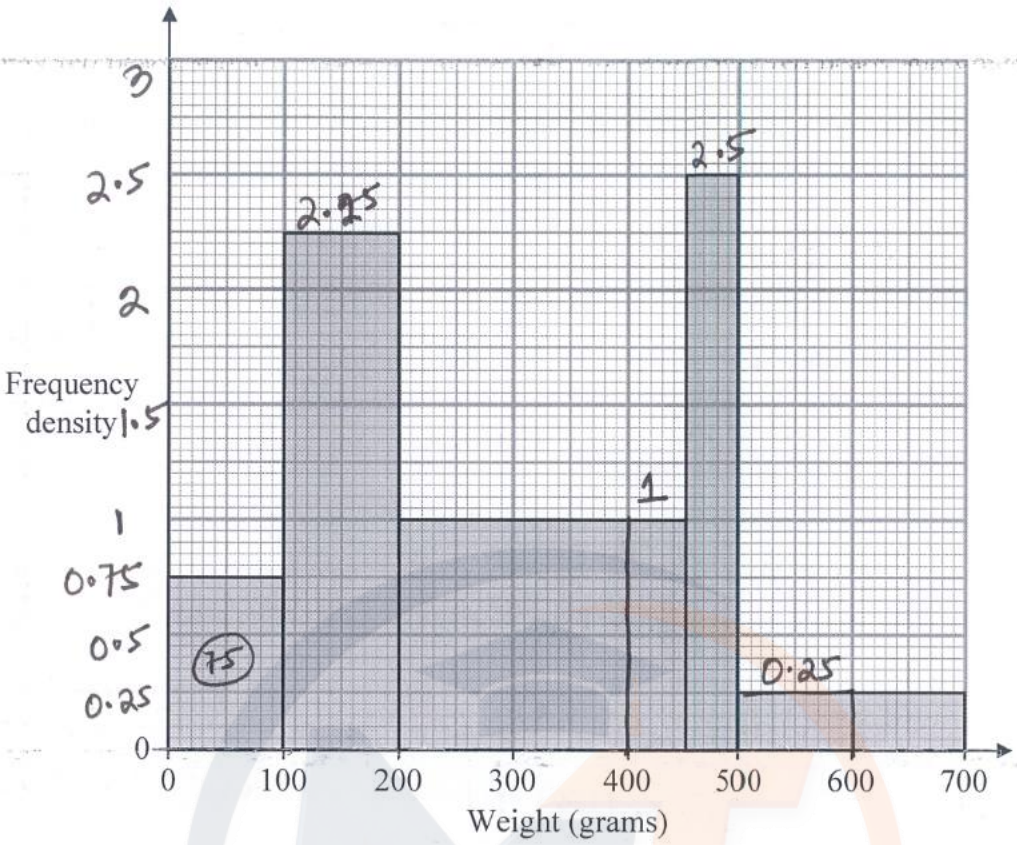
(2)

(Total for Question 19 is 3 marks)

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Solved by Mr. Pabitra

20 The histogram gives some information about the weights, in grams, of some books.



75 books weigh less than 100 grams.

A book is chosen at random.

Find an estimate for the probability that this book weighs between 400 grams and 600 grams.

Frequency Density $= \frac{75}{100} = 0.75$

$400 \leq g \leq 600$

$400-450 \Rightarrow 50 \times 1 = 50$

$450-500 \Rightarrow 50 \times 2.5 = 125$

$500-600 \Rightarrow 100 \times 0.25 = 25$

200

Total

$100 \times 0.75 = 75$

$0-100 =$

$100-200 = 100 \times 2.25 = 225$

$200-450 = 250 \times 1 = 250$

$450-500 = 50 \times 2.5 = 125$

$500-700 = 200 \times 0.25 = 50$

775

Probability $= \frac{200}{775} = \frac{8}{31}$

$\frac{8}{31}$

(Total for Question 20 is 4 marks)

Solved by Mr. Pabitra

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21 Solve the inequality $2x^2 - 7x - 15 > 0$

Show clear algebraic working.

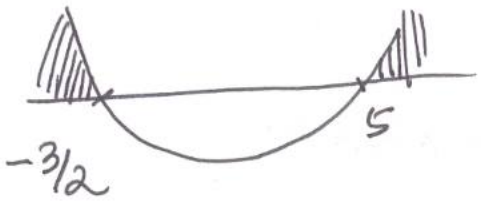
$2x^2 - 7x - 15 = 0$

$(x-5)(2x+3) = 0$

$x-5=0 \quad | \quad 2x+3=0$

$x=5 \quad | \quad x=-3/2$

$2x^2 - 7x - 15 > 0$



$x > 5$ and $x < -3/2$

(Total for Question 21 is 3 marks)

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22 The diagram shows a solid cuboid.

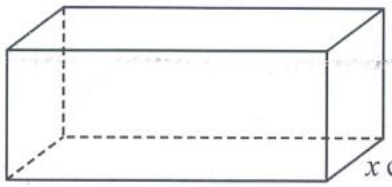


Diagram **NOT** accurately drawn

The volume of the cuboid is V cm^3

Find the maximum value of V

$$\text{volume} = (15-4x) \times x \times x$$

$$= x^2(15-4x)$$

$$\text{volume} = 15x^2 - 4x^3$$

$$V = 15x^2 - 4x^3$$

$$\frac{dV}{dx} = 30x - 12x^2$$

For maximum $\frac{dV}{dx} = 0$

$$30x - 12x^2 = 0$$

$$6x(5-2x) = 0$$

$6x = 0$ $\quad$ $5-2x = 0$

$x = 0$ $\quad$ $5 = 2x$

(Reject) $\quad$ $x = 5/2$

$\boxed{x = 2.5}$

volume is maximum at $x = 2.5$

$$V = 15x^2 - 4x^3$$

$$V_{max} = 15 \times 2.5^2 - 4(2.5)^3$$

$$\boxed{V_{max} = 31.25 \text{ cm}^3}$$

31.25 cm^3

(Total for Question 22 is 5 marks)

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23 The diagram shows a triangular prism, $ABCDEF$, with a horizontal rectangular base $ABCD$

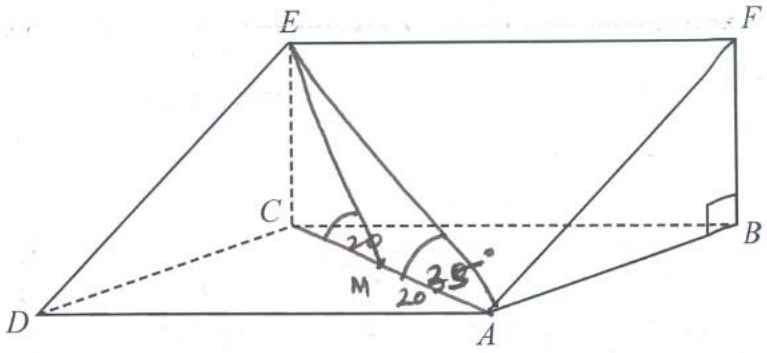


Diagram **NOT** accurately drawn

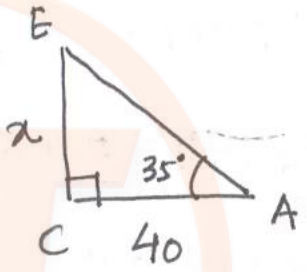
M is the midpoint of the line AC

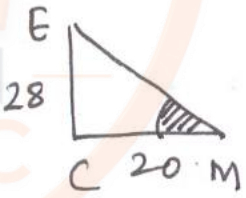
$AC = 40\,\text{cm}$ angle $CAE = 35°$ angle $ABF = 90°$

Work out the size of angle CME
Give your answer correct to 3 significant figures.

$EC = 40 \times \tan 35$

$EC = 28\ \text{cm}$





$\tan m = \frac{28}{20}$

$m = \tan^{-1}\left(\frac{28}{20}\right)$

$\boxed{m = 54.5°}$

54.5 °

(Total for Question 23 is 3 marks)

Solved by Mr. Pabitra

24 PQ is a straight line drawn on a square grid, with a scale of 1 cm for 1 unit on each axis.

P has coordinates $(-5, a)$ and Q has coordinates $(7, 3a)$ where $a > 0$

The length of PQ is $4\sqrt{10}$ cm

Find an equation of the perpendicular bisector of PQ
Give your answer in the form $y = mx + c$ where m and c are integers.

$(-5,a)$ — M — $(7,3a)$

P — $4\sqrt{10}$ — Q

$\sqrt{(3a-a)^2 + [7-(-5)]^2} = 4\sqrt{10}$

$\sqrt{(2a)^2 + 12^2} = 4\sqrt{10}$

$\left(\sqrt{4a^2+144}\right)^2 = (4\sqrt{10})^2$

$4a^2 + 144 = 16 \times 10$

$4a^2 + 144 = 160$

$4a^2 = 160 - 144$

$4a^2 = 16$

$a^2 = 4$

$a = \pm 2$

$a > 0$, $\boxed{a = 2}$

$(-5,2)$ — M — $(7,6)$

midpoint

$\left(\frac{-5+7}{2}, \frac{2+6}{2}\right) = (1, 4)$

$m_{PQ} = \frac{6-2}{7-(-5)} = \frac{4}{12} = \frac{1}{3}$

$m_1 \times m_2 = -1$

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

$\boxed{m_2 = -3}$

Equation of Perpendicular Bisects

$y = -3x + C$

at $(1,4)$ $\quad 4 = -3 \times 1 + C$

$4 = -3 + C$

$C = 4 + 3 = 7$

$y = -3x + 7$

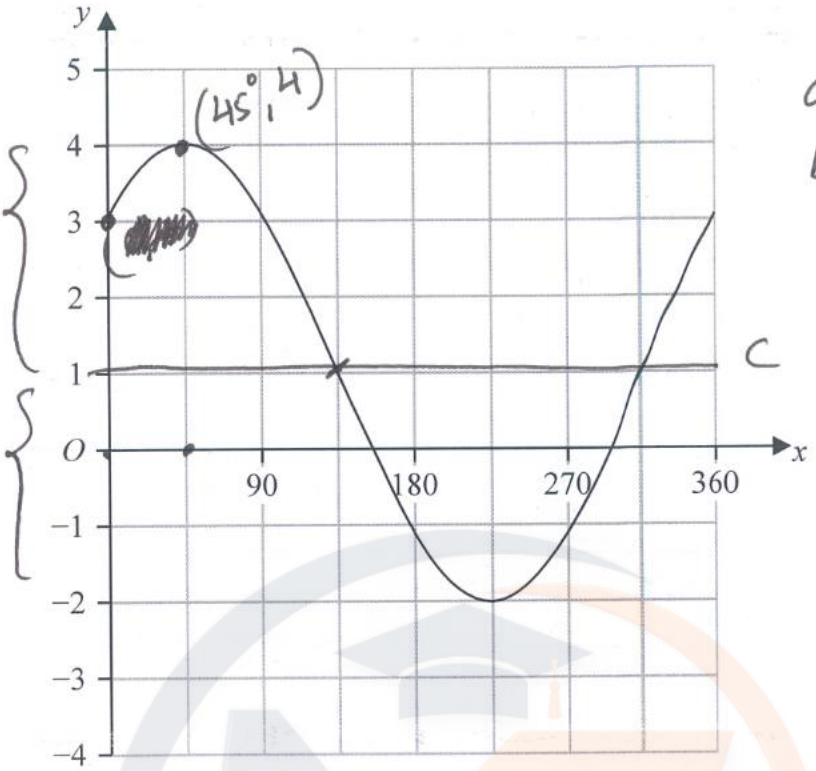
$\boxed{y = -3x + 7}$

(Total for Question 24 is 6 marks)

Solved by Mr. Pabitra

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25 The graph of $y = a\sin(x + b)^\circ + c$ for $0 \leqslant x \leqslant 360$ is drawn on the grid below.



a = amplitude
b = phase shift
c = vertical shift → base (from where amplitude is measured)

a = 3

3

Find a suitable value for a, for b and for c

(45°, 4) at

$y = 3\sin(x+b) + 1$

$4 = 3\sin(45+b) + 1$

$4 - 1 = 3\sin(45^\circ+b)$

$\frac{3}{3} = \sin(45^\circ+b)$

$1 = \sin(45^\circ+b)$

$a = 3$

$b = 45^\circ$

$c = 1$

(Total for Question 25 is 3 marks)

$45^\circ + b = \sin^{-1}(1)$

$45^\circ + b = 90^\circ$

$b = 90 - 45$

$b = 45^\circ$

Turn over for Question 26

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26 The diagram shows a solid hemisphere, H

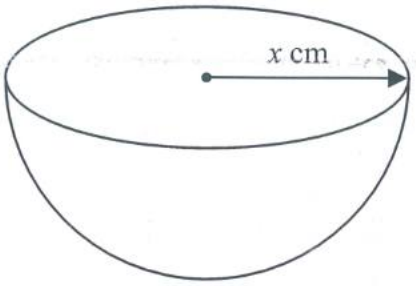


Diagram **NOT** accurately drawn

The radius of H is x cm
The volume of H is 6174π cm^3

A bowl is made by removing a solid hemisphere from H such that the uniform thickness of the bowl is 2 cm

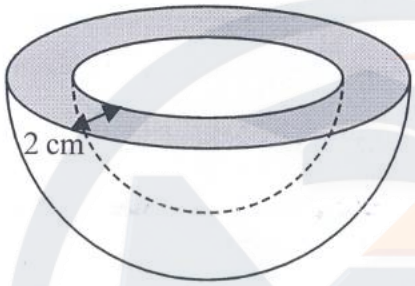


Diagram **NOT** accurately drawn

Work out the **total** surface area of the bowl.
Give your answer in terms of π

Volume of hemisphere $= \frac{2}{3}\pi r^3$

$\frac{2}{3}\pi \times x^3 = 6174\pi$

$x^3 = \frac{6174 \times 3}{2}$

$x^3 = 9261$

$x = \sqrt[3]{9261}$

$\boxed{x = 21 \text{ cm}}$

Area of Original Top $= \pi \times 21^2 = 441\pi$

Area of Removed Top $= \pi \times 19^2 = 361\pi$

Area of width (Top) $= 441\pi - 361\pi = 80\pi$

Solved by Mr. Pabitra

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Surface Area of inner bowl = $2\pi r^2 = 2\pi \times 19^2 = 722\pi$

Surface Area of Outer bowl = $2\pi r^2 = 2\pi \times 21^2 = 882\pi$

Total Surface Area = $882\pi + 722\pi + 80\pi$

$= 1684\pi$

1684π cm^2

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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