Please check the examination details below before entering your candidate information

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

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Thursday 14 May 2026

Morning (Time: 2 hours)

Paper reference **4MA1/1H**

Mathematics A

PAPER 1H
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

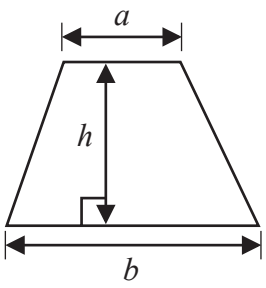
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

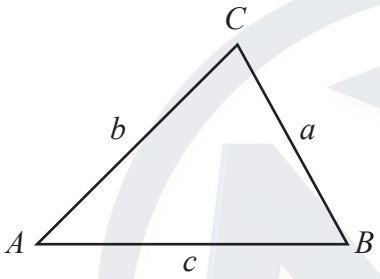
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

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



Trigonometry



In any triangle ABC

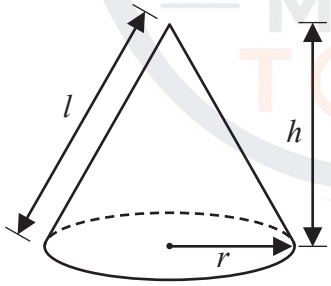
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

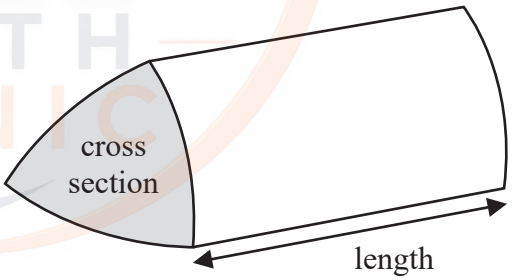
Area of triangle $= \frac{1}{2}ab\sin C$

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

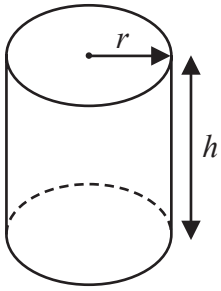
Curved surface area of cone $= \pi rl$



Volume of prism
= area of cross section × length

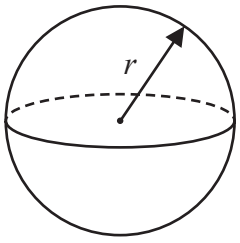


Volume of cylinder $= \pi r^2 h$
Curved surface area of cylinder $= 2\pi rh$



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

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



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Answer ALL TWENTY FIVE questions

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $4\frac{1}{7} - 2\frac{3}{5} = 1\frac{19}{35}$

$4\frac{1}{7} = \frac{4\times7+1}{7} = \frac{29}{7}$ $\quad 2\frac{3}{5} = \frac{2\times5+3}{5} = \frac{13}{5}$

$4\frac{1}{7} - 2\frac{3}{5} = \frac{29}{7} - \frac{13}{5}$ (common denominator = 7×5 = 35)

$= \frac{29\times5}{7\times5} - \frac{13\times7}{5\times7}$

$= \frac{145}{35} - \frac{91}{35} = \frac{145-91}{35} = \frac{54}{35}$

$= \frac{35}{35} + \frac{19}{35} = 1\frac{19}{35}$ as required

(Total for Question 1 is 3 marks)

2

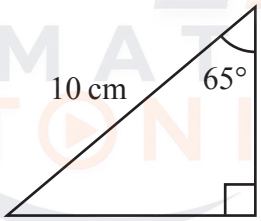


Diagram **NOT** accurately drawn

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

x is adjacent to 65°, 10 cm is the hypotenuse, so use cos (CAH)

$\cos 65° = \frac{adj}{hyp} = \frac{x}{10}$

$x = 10 \times \cos 65°$

$x = 4.226182...$

$x = 4.23$ (3 s.f.)

$x =$ 4.23

(Total for Question 2 is 3 marks)

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Solved by Mr. Pabitra

3 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$

$A = \{\text{factors of } 20\}$

$B = \{\text{multiples of } 5\}$

(a) List the members of the set

(i) $A \cup B$

$A = \{1, 2, 4, 5, 10\}$ (20 is not in the universal set)

$B = \{5, 10, 15\}$

1, 2, 4, 5, 10, 15

(1)

(ii) $A \cap B'$

B' = not multiples of 5, so remove 5 and 10 from A

1, 2, 4

(1)

$C = \{\text{prime numbers}\}$

Ana writes down the statement $A \cap C = \varnothing$
Ana's statement is wrong.

(b) Explain why.

2 and 5 are prime numbers and they are also factors of 20,

so 2 and 5 are in both A and C. $A \cap C = \{2, 5\}$, so it is not $\varnothing$

(1)

(Total for Question 3 is 3 marks)

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Solved by Mr. Pabitra

4 Henri competes in a race.

For the first part of the race Henri cycles 60 km at an average speed of 24 km/h
For the remaining part of the race Henri runs for 1 hour and 15 minutes at an average speed of 12 km/h

Work out Henri's average speed for the whole race.
Give your answer in km/h
Show your working clearly.

Cycling: time = $\frac{\text{distance}}{\text{speed}} = \frac{60}{24} = 2.5$ hours

Running: time = 1 h 15 min = 1.25 hours

distance = speed × time = 12 × 1.25 = 15 km

Total distance = 60 + 15 = 75 km

Total time = 2.5 + 1.25 = 3.75 hours

Average speed = $\frac{\text{total distance}}{\text{total time}} = \frac{75}{3.75} = 20$ km/h

20 km/h

(Total for Question 4 is 4 marks)

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Solved by Mr. Pabitra

5 (a) Expand $4e(2e-3)$

$4e \times 2e - 4e \times 3$

$8e^2 - 12e$

(1)

(b) Expand and simplify $(f+3)(f-6)$

$f \times f - 6 \times f + 3 \times f - 3 \times 6$

$= f^2 - 6f + 3f - 18$

$= f^2 - 3f - 18$

$f^2 - 3f - 18$

(2)

(c) Make x the subject of $t = ax - 2n$

$t = ax - 2n$

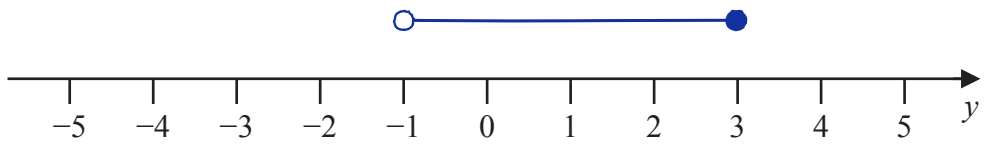
$t + 2n = ax$

$x = \frac{t + 2n}{a}$

$x = \frac{t + 2n}{a}$

(2)

(d) On the number line, represent the inequality $-1 < y \leqslant 3$



(2)

(Total for Question 5 is 7 marks)

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Solved by Mr. Pabitra

6 Simplify $\left(4x^5y^6\right)^3$

$(4x^5y^6)^3 = 4^3 \times x^{5\times3} \times y^{6\times3}$

$= 64\,x^{15}\,y^{18}$

$64x^{15}y^{18}$

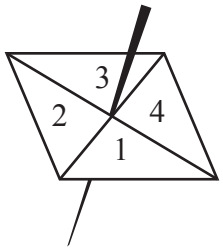
(Total for Question 6 is 2 marks)

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MATH TONIC

Solved by Mr. Pabitra

7 Here is a biased 4-sided spinner.



The table gives information about the probability that, when the spinner is spun once, it will land on each number.

Number	1	2	3	4
Probability	0.12	x	$2x$	0.16

Nevan spins the spinner 500 times.

Work out the expected number of times that the spinner lands on an even number.

Total probability = 1

$0.12 + x + 2x + 0.16 = 1$

$3x + 0.28 = 1$

$3x = 0.72$ so $x = 0.24$

$P(2) = x = 0.24$, $P(4) = 0.16$

$P(\text{even}) = P(2) + P(4) = 0.24 + 0.16 = 0.40$

Expected number $= 0.40 \times 500 = 200$

200

(Total for Question 7 is 4 marks)

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Solved by Mr. Pabitra

8 Change a speed of 70 metres per second to a speed in kilometres per hour.
Show your working clearly.

70 m/s means 70 metres in 1 second

In 1 hour (3600 s): 70 × 60 × 60 = 252 000 metres

252 000 m ÷ 1000 = 252 km

so 70 m/s = 252 km/h

252 km/h

(Total for Question 8 is 3 marks)

9 (a) Write 0.0651 in standard form.

$0.0651 = 6.51 \div 100 = 6.51 \times 10^{-2}$

6.51×10^{-2}

(1)

(b) Work out $\left(4 \times 10^{56}\right) \times \left(8 \times 10^{74}\right)$

Give your answer in standard form.

$(4 \times 8) \times (10^{56} \times 10^{74})$

$= 32 \times 10^{56+74} = 32 \times 10^{130}$

$= 3.2 \times 10 \times 10^{130}$

$= 3.2 \times 10^{131}$

3.2×10^{131}

(2)

(Total for Question 9 is 3 marks)

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Solved by Mr. Pabitra

10 Solve the simultaneous equations

$$4x + 3y = 9$$
$$2x - 2y = -13$$

Show clear algebraic working.

$4x + 3y = 9$ (1)

$2x - 2y = -13$ (2)

(2) × 2: $4x - 4y = -26$ (3)

(1) − (3): $3y - (-4y) = 9 - (-26)$

$7y = 35$

$y = 5$

Substitute $y = 5$ into (1):

$4x + 3 \times 5 = 9$

$4x + 15 = 9$

$4x = -6$

$x = -1.5$

Check in (2): $2(-1.5) - 2(5) = -3 - 10 = -13$ correct

$x =$ -1.5

$y =$ 5

(Total for Question 10 is 3 marks)

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Solved by Mr. Pabitra

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TURN OVER FOR QUESTION 11

MATH TONIC

Solved by Mr. Pabitra

11 The diagram shows a shaded shape *ABCDEO* made from a semicircle *BCD* and two identical right-angled triangles *ABO* and *EDO*

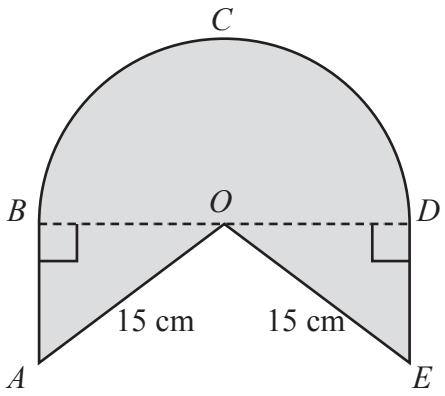


Diagram **NOT** accurately drawn

BD is the diameter of the semicircle.
O is the midpoint of *BD*

angle *ABO* = angle *EDO* = 90° *AO* = *EO* = 15 cm

The area of semicircle *BCD* is 227 cm^2

Work out the perimeter of the shaded shape.
Show your working clearly.
Give your answer correct to one decimal place.

Area of semicircle = $\frac{1}{2}\pi r^2$

$\frac{1}{2} \times \pi \times r^2 = 227$

$r^2 = \frac{227 \times 2}{\pi} = 144.51...$

$r = \sqrt{144.51...} = 12.021...$ cm

Arc length BCD = half of the circumference

$= \frac{2 \times \pi \times r}{2} = \pi \times 12.021... = 37.766...$ cm

Triangle ABO: right angle at B, AO = 15 cm (hypotenuse), BO = r

$AB^2 = AO^2 - BO^2 = 15^2 - 12.021...^2$

$AB^2 = 225 - 144.51... = 80.487...$

$AB = \sqrt{80.487...} = 8.971...$ cm (DE = AB = 8.971... cm)

Perimeter = arc BCD + DE + EO + OA + AB

= 37.766... + 8.971... + 15 + 15 + 8.971...

= 85.709... = 85.7 cm (1 d.p.)

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85.7 ..... cm

(Total for Question 11 is 5 marks)

MATH TONIC

Solved by Mr. Pabitra

12 $\dfrac{2^{\frac{x}{3}}}{8^x} = 64$

(a) Find the value of x
Show clear algebraic working.

$8 = 2^3$ so $8^x = (2^3)^x = 2^{3x}$ $\quad 64 = 2^6$

$\dfrac{2^{x/3}}{2^{3x}} = 2^6$

$2^{x/3 - 3x} = 2^6$ (same base, so equate the powers)

$\dfrac{x}{3} - 3x = 6$

$x - 9x = 18$ (multiply by 3)

$-8x = 18$

$x = \dfrac{18}{-8} = -2.25$

$x =$ −2.25

(3)

(b) Expand and simplify $4t(t + 5)(2t - 3)$

$(t + 5)(2t - 3) = 2t^2 - 3t + 10t - 15$

$= 2t^2 + 7t - 15$

$4t(t + 5)(2t - 3) = 4t(2t^2 + 7t - 15)$

$= 4t \times 2t^2 + 4t \times 7t - 4t \times 15$

$= 8t^3 + 28t^2 - 60t$

$8t^3 + 28t^2 - 60t$

(3)

(Total for Question 12 is 6 marks)

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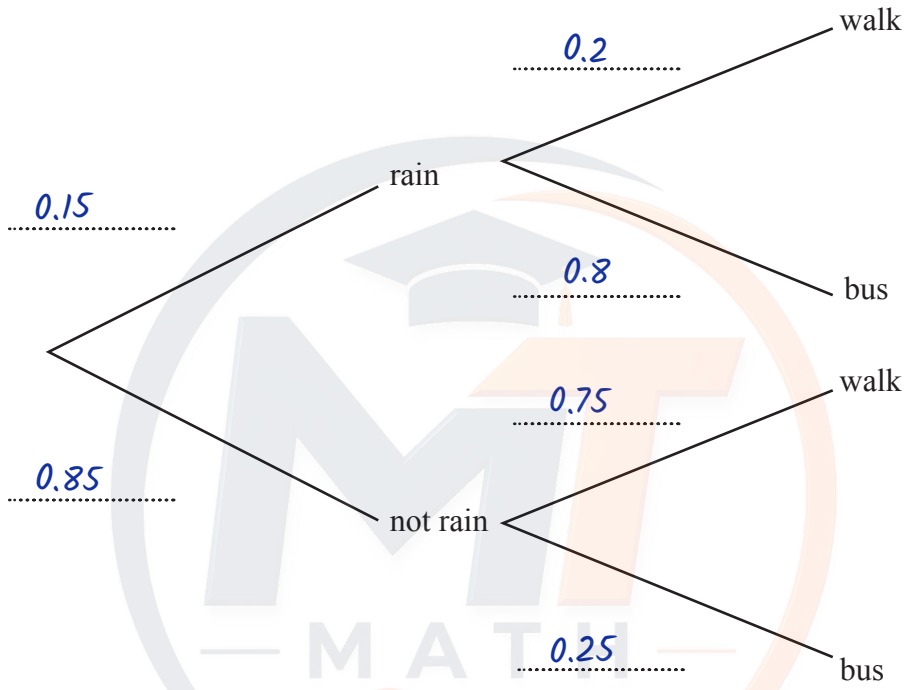
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13 On any school day, Paulo either walks to school or travels by bus to school.

The probability that it rains on any school day is 0.15

If it rains on a school day, the probability that Paulo walks to school is 0.2
If it does not rain on a school day, the probability that Paulo walks to school is 0.75

(a) Complete the probability tree diagram for this information.



(2)

(b) Work out the probability that on a school day, it rains and Paulo walks to school.

$P(\text{rain and walk}) = P(\text{rain}) \times P(\text{walk given rain})$

$= 0.15 \times 0.2$

$= 0.03$

0.03

(2)

(Total for Question 13 is 4 marks)

Solved by Mr. Pabitra

14 In September, the sales in a shop increased by 20%
In October, the sales in the same shop decreased by x%

Over these two months, the sales in the shop decreased by 10%

Work out the value of x

Let the original sales = 100

After September (+20%): $100 \times 1.2 = 120$

After both months (−10% overall): $100 \times 0.9 = 90$

Decrease in October = $120 - 90 = 30$

$x = \frac{30}{120} \times 100 = 25$ %

Check: $\frac{0.9}{1.2} = 0.75$, so October is a 25% decrease

$x =$ 25

(Total for Question 14 is 3 marks)

15 Point A has coordinates $(-3, 4)$
Point B has coordinates $(2, -6)$

Work out the gradient of the line AB

Gradient = $\frac{\text{change in } y}{\text{change in } x}$

$= \frac{-6 - 4}{2 - (-3)} = \frac{-10}{5} = -2$

−2

(Total for Question 15 is 2 marks)

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MATH TONIC

Solved by Mr. Pabitra

16 The diagram shows triangle ABC

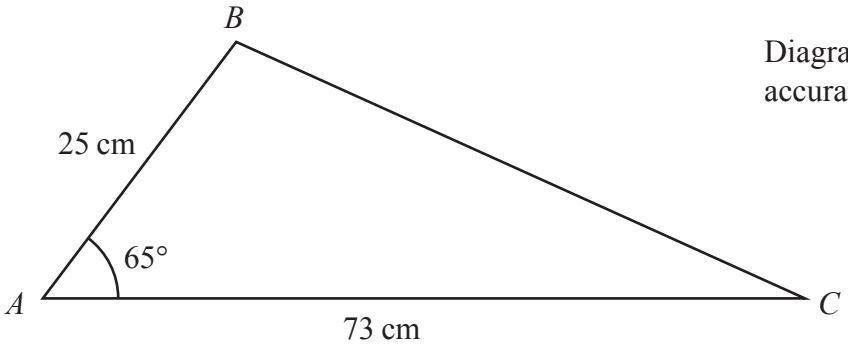


Diagram **NOT** accurately drawn

$AB = 25$ cm $\quad AC = 73$ cm $\quad$ angle $BAC = 65°$

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

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

$BC^2 = 25^2 + 73^2 - 2 \times 25 \times 73 \times \cos 65°$

$BC^2 = 625 + 5329 - 1542.556...$

$BC^2 = 4411.443...$

$BC = \sqrt{4411.443...} = 66.418...$

$BC = 66.4$ cm (3 s.f.)

66.4 cm

(3)

(b) Work out the area of the triangle.
Give your answer correct to 3 significant figures.

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

$= \frac{1}{2} \times 25 \times 73 \times \sin 65°$

$= 827.005... = 827$ cm^2 (3 s.f.)

827 cm^2

(2)

(Total for Question 16 is 5 marks)

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Solved by Mr. Pabitra

17 Show that $\left(4-\sqrt{20}\right)\left(5-2\sqrt{5}\right)$ can be written in the form $a-\sqrt{b}$

where a and b are integers.

$\sqrt{20} = \sqrt{4 \times 5} = 2\sqrt{5}$

$(4-\sqrt{20})(5-2\sqrt{5}) = (4-2\sqrt{5})(5-2\sqrt{5})$

$= 4 \times 5 - 4 \times 2\sqrt{5} - 2\sqrt{5} \times 5 + 2\sqrt{5} \times 2\sqrt{5}$

$= 20 - 8\sqrt{5} - 10\sqrt{5} + 4 \times 5$

$= 20 - 18\sqrt{5} + 20$

$= 40 - 18\sqrt{5}$

$18\sqrt{5} = \sqrt{18^2 \times 5} = \sqrt{324 \times 5} = \sqrt{1620}$

So it equals $40 - \sqrt{1620}$ $\quad a = 40, \; b = 1620$

(Total for Question 17 is 3 marks)

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18 Simplify fully $\dfrac{4x^2-9}{2x^2-5x-12}$

Show clear algebraic working.

Numerator: $4x^2 - 9 = (2x)^2 - 3^2 = (2x-3)(2x+3)$

Denominator: $2x^2 - 5x - 12 = 2x^2 - 8x + 3x - 12$

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

$\dfrac{4x^2-9}{2x^2-5x-12} = \dfrac{(2x-3)(2x+3)}{(2x+3)(x-4)} = \dfrac{2x-3}{x-4}$

$\dfrac{2x-3}{x-4}$

(Total for Question 18 is 3 marks)

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Solved by Mr. Pabitra

19 M is directly proportional to p^2

$M = 2$ when $p = 5$

(a) Find a formula for M in terms of p

M is directly proportional to p^2, so $M = kp^2$

When $p = 5$, $M = 2$: $2 = k \times 5^2$

$2 = 25k$

$k = \frac{2}{25} = 0.08$

$M = \frac{2p^2}{25}$

$M = \frac{2p^2}{25}$

(3)

(b) Work out the value of M when $p = 15$

$M = \frac{2 \times 15^2}{25} = \frac{2 \times 225}{25} = \frac{450}{25} = 18$

$M = 18$

(1)

(Total for Question 19 is 4 marks)

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Solved by Mr. Pabitra

20 The final velocity, v m/s, of an object is given by

$$v = 2\left(\frac{s}{t}\right) - u$$

where

$s = 100$ correct to the nearest integer
$t = 1.68$ correct to 2 decimal places
$u = 0.5$ correct to 1 decimal place

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

Bounds: $99.5 \leq s < 100.5$

$1.675 \leq t < 1.685$

$0.45 \leq u < 0.55$

Upper bound of v: use largest s, smallest t, smallest u

$UB = 2 \times \frac{100.5}{1.675} - 0.45 = 120 - 0.45 = 119.55$

Lower bound of v: use smallest s, largest t, largest u

$LB = 2 \times \frac{99.5}{1.685} - 0.55 = 118.100... - 0.55 = 117.55...$

UB = 119.55 = 120 to 2 s.f.

LB = 117.55... = 120 to 2 s.f.

Both bounds round to 120 to 2 s.f. (but not to 3 s.f.)

so v = 120 m/s

120

(Total for Question 20 is 5 marks)

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Solved by Mr. Pabitra

21 The diagram shows a solid cuboid.

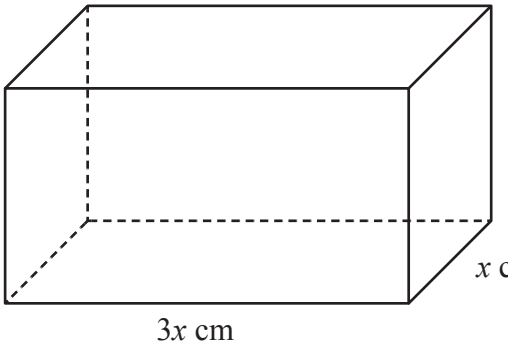


Diagram **NOT** accurately drawn

The volume of the cuboid is V cm^3

Find the maximum value of V
Show clear algebraic working.

V = length × width × height = $3x \times x \times (13.5 - 2x)$

$V = 3x^2(13.5 - 2x) = 40.5x^2 - 6x^3$

For the maximum value of V, $\frac{dV}{dx} = 0$

$\frac{dV}{dx} = 81x - 18x^2$

$81x - 18x^2 = 0$

$9x(9 - 2x) = 0$

$x = 0$ (not possible) or $x = 4.5$

$\frac{d^2V}{dx^2} = 81 - 36x = 81 - 36 \times 4.5 = -81 < 0$, so maximum

$V = 3 \times 4.5^2 \times (13.5 - 2 \times 4.5)$

$V = 3 \times 20.25 \times 4.5$

$V = 273.375$

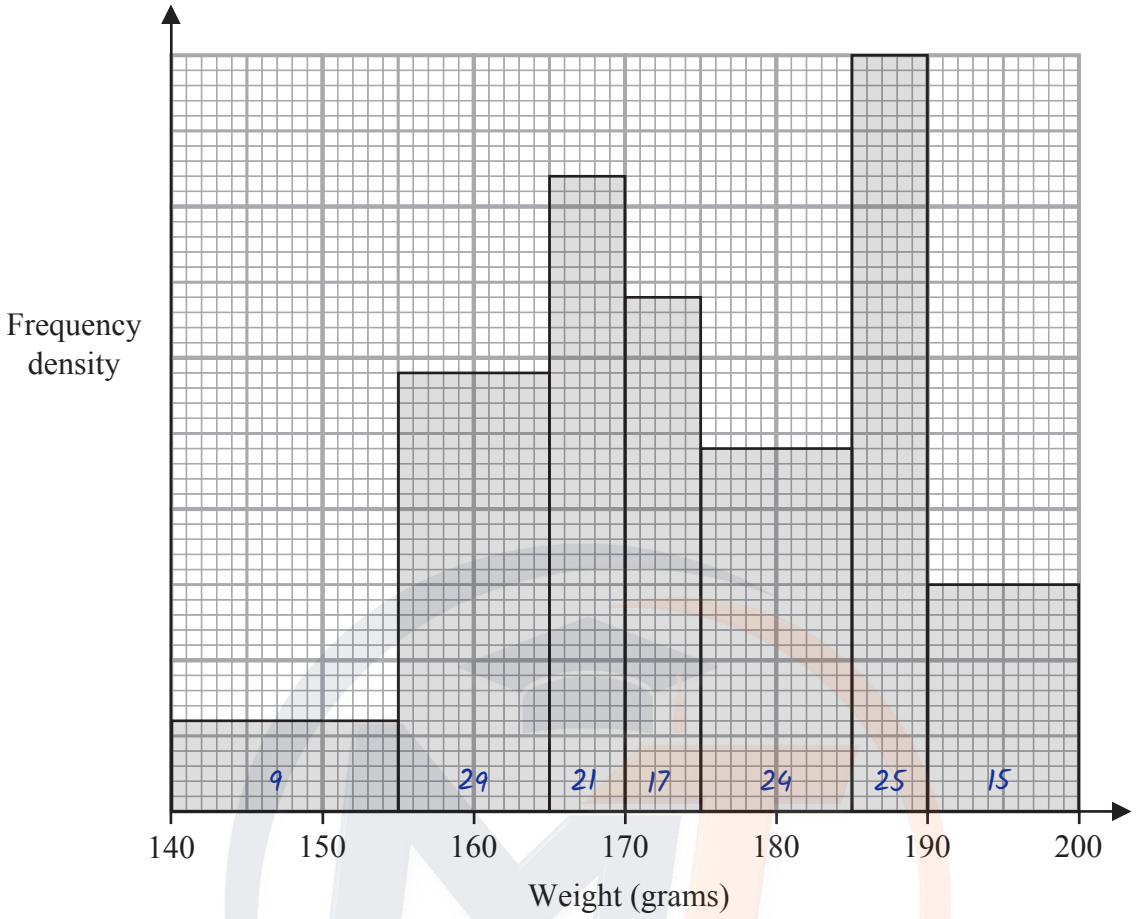
$V =$ 273.375

(Total for Question 21 is 5 marks)

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Solved by Mr. Pabitra

22 The histogram gives information about the weights, in grams, of all the apples in a shop.



There are 9 apples with a weight between 140 grams and 155 grams.

(a) Work out the number of apples with a weight less than 175 grams.

Bar 140-155 is 6 small squares high and fd = 9 ÷ 15 = 0.6

so 1 small square (up) = 0.1 frequency density

Frequency = frequency density × class width

155-165: 2.9 × 10 = 29 165-170: 4.2 × 5 = 21

170-175: 3.4 × 5 = 17

Less than 175 g: 9 + 29 + 21 + 17 = 76

76

(3)

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Solved by Mr. Pabitra

An apple is classified as a large apple if it has a weight of more than 180 grams.
One of the large apples is chosen at random.

(b) Work out the probability that it has a weight of more than 190 grams.

More than 180 g:

180-185: half of the 175-185 bar = 2.4 × 5 = 12

185-190: 5.0 × 5 = 25 190-200: 1.5 × 10 = 15

Large apples = 12 + 25 + 15 = 52 ; more than 190 g = 15

P(more than 190 g) = $\frac{15}{52}$

$\frac{15}{52}$

(2)

(Total for Question 22 is 5 marks)

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MATH TONIC

Solved by Mr. Pabitra

23 A bag contains x marbles.
12 of the marbles are pink and the rest are yellow.

Greta takes at random 2 marbles from the bag.

The probability that Greta takes a pink marble and a yellow marble is $\frac{18}{47}$

Work out the value of x
Show clear algebraic working.

Pink = 12, Yellow = $x - 12$

$P(P,Y) + P(Y,P) = \frac{12}{x} \times \frac{x-12}{x-1} + \frac{x-12}{x} \times \frac{12}{x-1} = \frac{18}{47}$

$\frac{24(x-12)}{x(x-1)} = \frac{18}{47}$

$47 \times 24(x-12) = 18x(x-1)$

$1128x - 13536 = 18x^2 - 18x$

$18x^2 - 1146x + 13536 = 0$

$\div 6: \quad 3x^2 - 191x + 2256 = 0$

$(3x - 47)(x - 48) = 0$

$x = \frac{47}{3}$ or $x = 48$

$\frac{47}{3}$ is not a whole number of marbles, so $x = 48$

$x =$ 48

(Total for Question 23 is 5 marks)

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Solved by Mr. Pabitra

24 (a) Express $10 - 24x - 3x^2$ in the form $a - b(x + c)^2$ where a, b and c are integers.

$10 - 24x - 3x^2 = 10 - 3(x^2 + 8x)$

$= 10 - 3[(x + 4)^2 - 16]$

$= 10 - 3(x + 4)^2 + 48$

$= 58 - 3(x + 4)^2$

$a = 58, \quad b = 3, \quad c = 4$

$58 - 3(x + 4)^2$

(3)

T is the curve with equation $y = 10 - 24(x - 1) - 3(x - 1)^2$
The point P is the maximum point on **T**

(b) Use your answer to part (a) to find the coordinates of P

$y = 58 - 3((x - 1) + 4)^2 = 58 - 3(x + 3)^2$

Maximum when $x + 3 = 0$, so $x = -3$ and $y = 58$

$(-3, 58)$

(1)

(c) Write down the equation for the line of symmetry of **T**

The line of symmetry goes through the maximum point P

$x = -3$

(1)

(Total for Question 24 is 5 marks)

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Solved by Mr. Pabitra

25 The diagram shows a triangular prism $ABCDEF$ with horizontal rectangular base $ABCD$
F is vertically above A

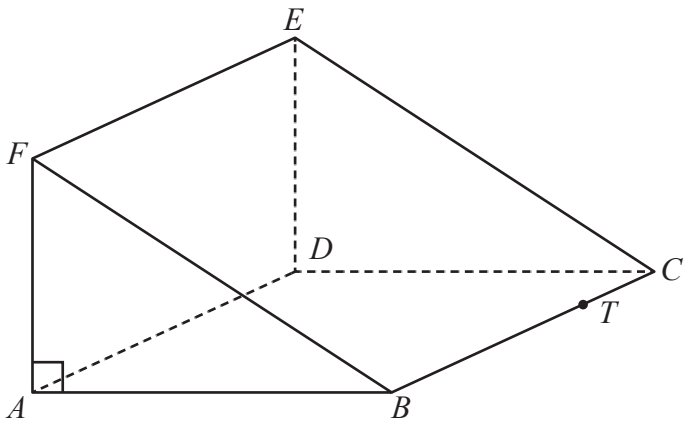


Diagram **NOT** accurately drawn

$AF = 12\,\text{cm}$ angle $ABF = 30°$ angle $BAF = 90°$

T is the point on the line BC such that $BF : BT = 3 : 2$

Work out the size of the angle between the line FT and the plane $ABCD$
Give your answer correct to one decimal place.
Show your working clearly.

Triangle ABF (right angle at A):

$\sin 30° = \frac{AF}{BF}$ so $BF = \frac{12}{\sin 30°} = 24$ cm

$BF : BT = 3 : 2$

$BT = \frac{2}{3} \times 24 = 16$ cm

Triangle FBT: angle FBT = 90° (BC is perpendicular to plane ABF)

$FT^2 = BF^2 + BT^2 = 24^2 + 16^2 = 576 + 256 = 832$

$FT = \sqrt{832} = 28.844...$ cm

The angle between FT and plane ABCD is angle ATF

(F is vertically above A, so A is directly below F)

$\sin ATF = \frac{AF}{FT} = \frac{12}{28.844...} = 0.41602...$

angle $ATF = \sin^{-1}(0.41602...) = 24.58...°$

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Solved by Mr. Pabitra

Angle = 24.6° (1 d.p.)

24.6 °

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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MATH TONIC

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MATH TONIC

Solved by Mr. Pabitra