NAME: _____ ( ) CLASS: 4 ( )

ANGLICAN HIGH SCHOOL
SECONDARY FOUR
PRELIMINARY EXAMINATIONS 2025

S4

MATHEMATICS
Paper 2

4052/02
25 August 2025
2 hours 15 minutes

Candidates answer on the Question Paper.

MARKING SCHEME

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
If working is needed for any question, it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 90.

For Examiners' Use

Questions	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Marks	**M**	**L/M/M**	**L**	**M**	**L**	**M/L**	**L/L/L**	**L/M/H/H**
Questions	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Marks	**M/H/L**	**M/M**	**M/H**	**L/L/M/M/M**	**L/L/M**	**L/M**	**L/L/M/M/ M/M**	**M/L/L/M/H**
Table of Penalties	**Units**							
	Clarity/Logic							
	Accuracy/Precision							**90**

Parent's Name and Signature:

Date:

This document consists of 24 printed pages.

This page is intentionally left blank

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

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

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

Arc length = $r\theta$, where θ is in radians

Sector area = $\frac{1}{2}r^2\theta$, where θ is in radians

Trigonometry

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

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

Statistics

Mean = $\frac{\Sigma fx}{\Sigma f}$

Standard deviation = $\sqrt{\frac{\Sigma fx^2}{\Sigma f}-\left(\frac{\Sigma fx}{\Sigma f}\right)^2}$

1 Rearrange the formula to make c the subject. $D=(a-c)^2-a^2$.

$D=(a-c)^2-a^2$ $(a-c)^2=D+a^2$ $a-c=\pm\sqrt{D+a^2}$ $c=a\pm\sqrt{D+a^2}$	**M1** **M1** **A1**

---

2 **(a)** A investor deposits \$18 000 with a finance company paying compound interest on a monthly basis at 6% per annum.

Calculate the interest received at the end of 5 years, correct to 2 decimal places.

$\text{Total Amount}=18000\left(1+\frac{6\div 12}{100}\right)^{5\times 12}$ $=24279.30$ $\text{Interest}=\text{Total Amount - Principal}$ $=24279.30-18000$ $=\$6279.30$	**M1** **A1**

(b) The price of a washing machine is \$900 before discount.
After selling the machine at a 20% discount, the seller still makes a profit of 25%.

Calculate the cost price of the washing machine.

Let x be the cost price of the washing machine $\text{Selling price of washing machine}=900\times 80\%$ $=720$ $\text{Percentage profit}=\frac{Selling\ price-x}{x}\times 100\%$ $25=\left(\frac{720-x}{x}\right)\times 100$ Divide both sides by 25 $1=4\left(\frac{720-x}{x}\right)$ $x=2880-4x$ $5x=2880$ $x=\$576$	**M1 for selling price of washing machine** **M1** **A1**

(c) The price of a gaming laptop is \$2 999. John buys this laptop on hire purchase after putting a down payment of \$600. For the remaining amount of the laptop, John has to pay the seller a monthly instalment of \$120 over 2 years.

Calculate the interest rate charged by the seller.

P, remaining amount owed to seller $= \$2999 - \$600$ $= \$2399$ Total amount paid to seller over 2 years $= 24 \times \$120$ $= \$2880$ Interest earned by seller $= \$2880 - \$2399$ $= \$481$	**M1 for finding interest**
Using $I = \frac{PRT}{100}$ $481 = \frac{2399 \times R \times 2}{100}$ $R = 10.025$ $= 10.0\%$	**M1 apply formula** **A1**

---

3 Write as a single fraction in its simplest form $\frac{2}{9x^2-1} + \frac{1}{1-3x}$.

$\frac{2}{9x^2-1} + \frac{1}{1-3x}$ $= \frac{2}{(3x-1)(3x+1)} - \frac{1}{3x-1}$ $= \frac{2-1(3x+1)}{(3x-1)(3x+1)}$ $= \frac{-(3x-1)}{(3x-1)(3x+1)}$ $= \frac{-1}{3x+1}$	**M2 for factorising $x^2 - 1$ and switching operation sign.** **A1**

---

4 **(a)** Express $-x^2+4x-3$ in the form $a(x+b)^2+c$.

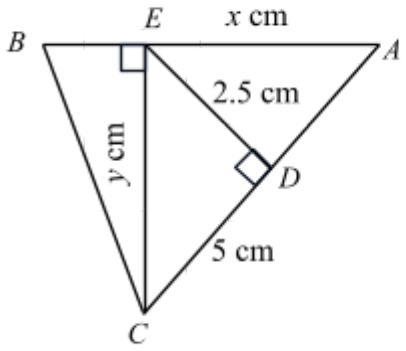
$-x^2+4x-3=-(x^2-4x+3)$ $=-((x-2)^2-4+3)$ $=-(x-2)^2+1$	**M1 for factorising** **A1**

(b) Hence, write down the coordinates of the turning point of the graph $-x^2+4x-3$.

Coordinates of turning point = (2,1)	**B1**

---

5 In triangle ABC, angle CDE and angle CEB are right angles.
$DE = 2.5$ cm, $CD = 5$ cm, $AE = x$ cm and $CE = y$ cm.



(a) **(i)** Show that ΔECD and ΔACE are similar.

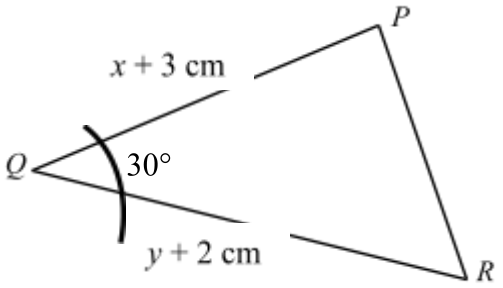
Angle ECD = Angle ACE (common angle) Angle EDC = Angle AEC = 90° (given) By AA test, the 2 triangles are similar.	**B1**

(ii) Express y in terms of x.

$\frac{ED}{AE}=\frac{CD}{CE}$ $\frac{2.5}{x}=\frac{5}{y}$ $y=2x$	**B1**

(b) **(i)** In triangle PQR, angle $PQR = 30°$, $PQ = x + 3$ cm and $QR = y + 2$ cm.

Express the area of triangle PQR in terms of x and y.



Area of $\Delta PQR = \frac{1}{2}(y+2)(x+3)\sin 30°$ $= \frac{1}{4}(y+2)(x+3)$ cm^2	**B1**

(ii) The area of triangle PQR is $17\frac{1}{2}$ cm^2.

Using your answer in **a(ii)** and **b(i)**, find the value of x and of y.

$\frac{1}{4}(x+3)(y+2) = 17\frac{1}{2}$ $\frac{1}{4}(x+3)(2x+2) = \frac{35}{2}$ $2x^2 + 8x + 6 = 70$ $2x^2 + 8x - 64 = 0$ $x^2 + 4x - 32 = 0$ $(x-4)(x+8) = 0$	**M1 for students to form the quadratic equation.**
$x - 4 = 0$ or $x + 8 = 0$ $x = 4$ or $x = -8$ (NA)	**M1 for solving the quadratic equation**

When $x = 4$, $y = 2(4)$ $= 8$	**A1**

---

6 In the Singapore F1 Grand Prix, the drivers must complete 62 laps around a circuit that is 4.940 km long.
One F1 driver completed 32 laps in 65 minutes.

What must be the minimum average speed for the remaining laps if he wants to complete the race in at most two hours?

Distance travelled in the first 32 laps $= 32 \times 4.940$ $= 158.08$ km Time taken $= \frac{65}{60}$ hours Distance to travel in the next 30 laps $= 30 \times 4.940$ $= 148.2$ km $\frac{\text{Distance}}{\text{Speed}} \leq \frac{55}{60}$ $\frac{148.2}{\text{Speed}} \leq \frac{55}{60}$ $148.2 \leq \text{Speed} \times \frac{55}{60}$ $\text{Speed} \geq 148.2 \div \frac{55}{60}$ $\text{Speed} \geq 161.67$ km per hour	**M1 for calculating the distance and times for the first 32 laps.** **M1 for setting up the inequality or equation to calculate the minimum speed in the next 30 laps.** **A1**

---

7 The position vector of point C is $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. The position vector of point D is $\begin{pmatrix} 4 \\ h \end{pmatrix}$. $|\overrightarrow{CD}| = \sqrt{20}$.

Find the two possible values of h.

$\overrightarrow{CD} = \overrightarrow{CO} + \overrightarrow{OD}$ $= \begin{pmatrix} -2 \\ 3 \end{pmatrix} + \begin{pmatrix} 4 \\ h \end{pmatrix}$ $= \begin{pmatrix} 2 \\ 3+h \end{pmatrix}$ $\sqrt{2^2 + (3+h)^2} = \lvert\overrightarrow{CD}\rvert$ $\sqrt{4+9+6h+h^2} = \sqrt{20}$ $h^2 + 6h + 13 = 20$ $h^2 + 6h - 7 = 0$ $(h+7)(h-1) = 0$ $h = -7 \text{ or } 1$	**M1 for** $\overrightarrow{CD}$ **M1 to form quadratic equation** **A1**

8 There are 180 oranges in a box.
The table shows the distribution of the masses of these oranges.

Mass (m g)	$90 < m \leq 100$	$100 < m \leq 110$	$110 < m \leq 120$	$120 < m \leq 130$	$130 < m \leq 140$
Frequency	10	28	51	45	48

(a) Calculate an estimate of the standard deviation of the masses.

11.9 g	**B1**

(b) The weighing machine was faulty and overestimated each of the oranges by 5g.

Explain, with a reason, what will happen to the standard deviation.

Standard deviation remains the same. Every value is an overestimate, hence, the spread will not change the standard deviation.	**B1** **B1 for reason**

(c) Explain why the range of the masses of oranges may not be 50g.

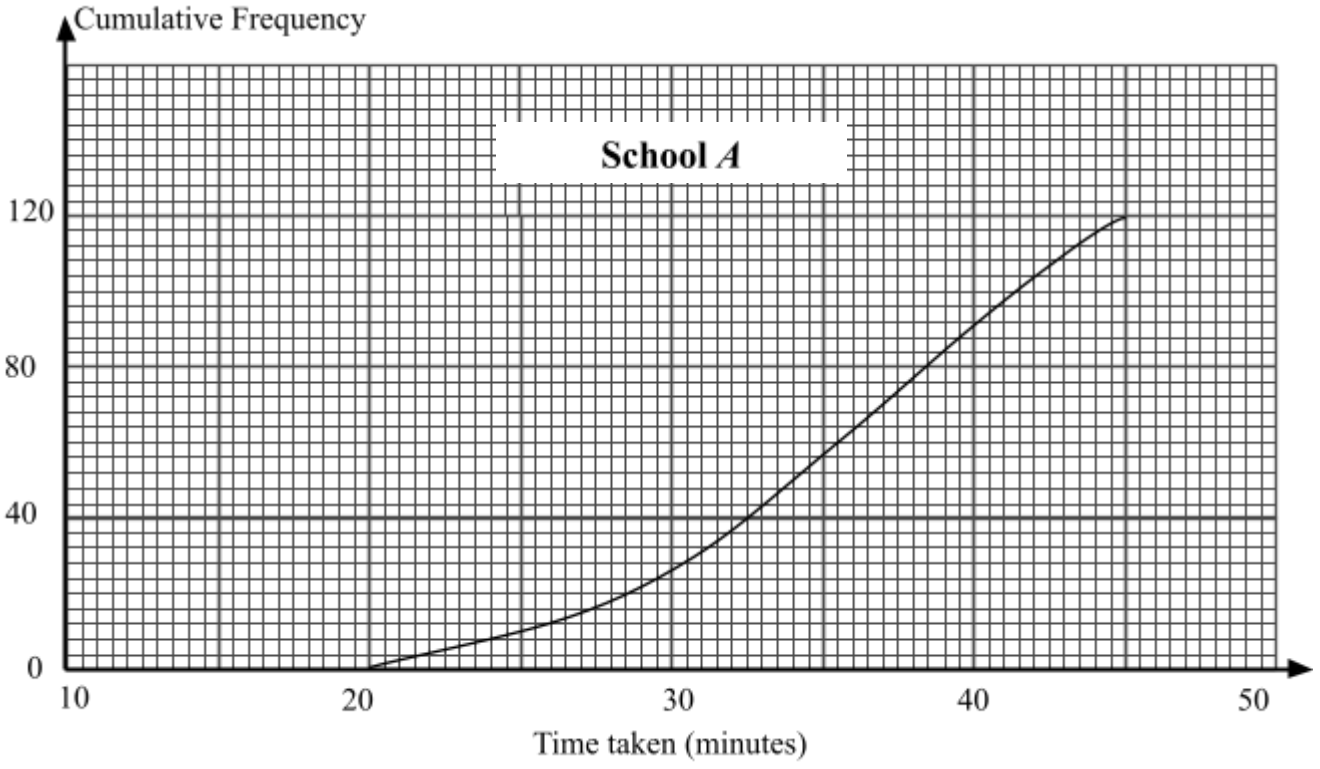
The data is **grouped**, the smallest data is greater than 90g and the largest data is at most 140g. therefore, the actual range could be less than 50g.	**B1**

(d) Roy says, "The modal class is the interval $110 < m \leq 120$ but the modal mass may not be in the interval $110 < m \leq 120$." Is he correct? Give a reason for your answer.

He is correct. Difference between modal mass and modal class. Or show evidence that the students know is it about. The mode mass refers to the mass with the highest frequency. However, the frequency of each mass is not known. The modal class may be in the interval $110 < m \leq 120$.	**B1** **B1**

---

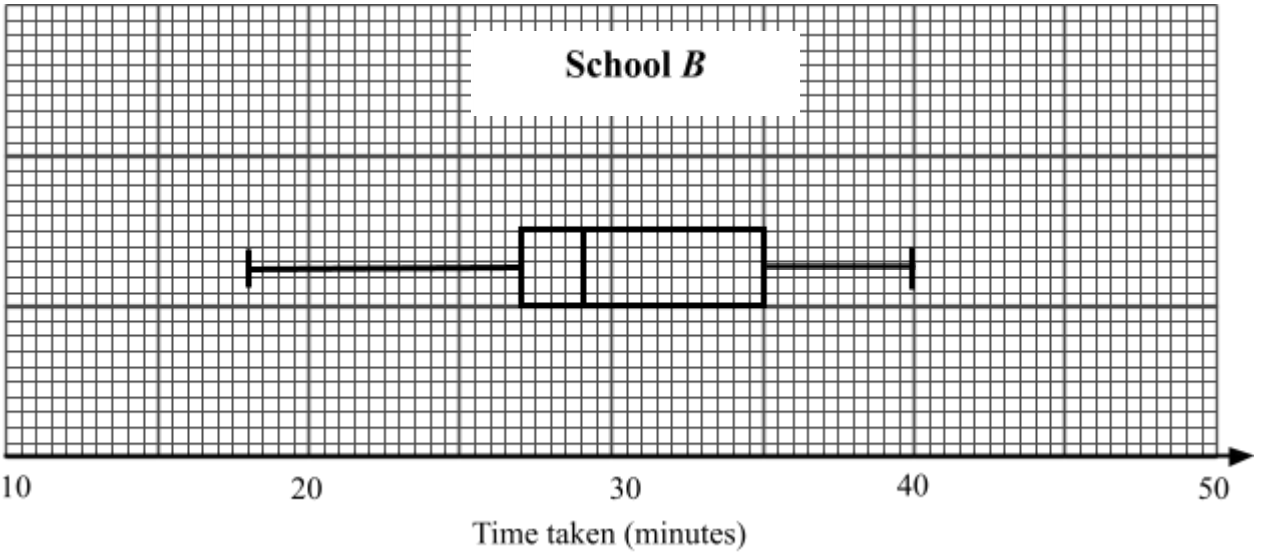
9 The time taken by 120 students to travel to school *A* was recorded.
The cumulative frequency curve below shows the distribution of their commute times.



(a) Calculate the percentage of students who took at least 35 minutes to reach school.

$53\frac{1}{3}\%$ or 53.3%	**B1**

The commute times of another group of 120 students from school *B* were recorded.
The box-and -whisker plot below shows the distribution of their travel times.



(b) Mr Chan claims that in school B, there are twice as many students who take less than 27 minutes, than those who take more than 35 minutes.

Comment, with reasons on whether the data supports the claim.

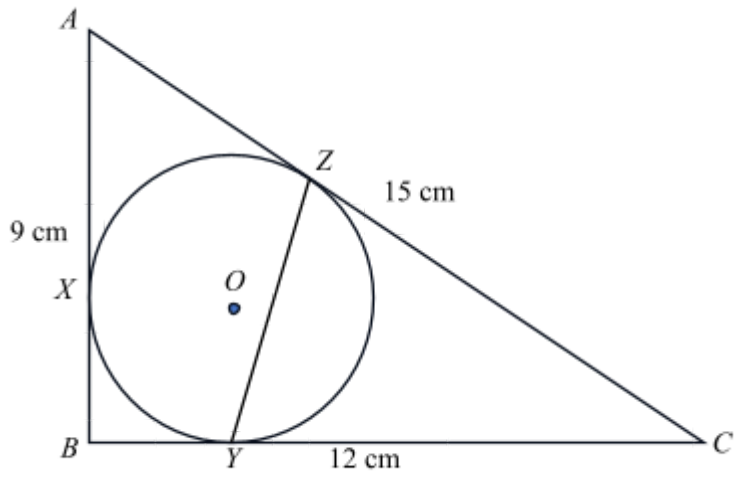
False. There are equal numbers of students who took less than 27 mins and students who took more than 35 mins.	**B1** **B1**

(c) Give two comments comparing the commute times of the two groups of students.

Median for 1st group = 35.5 minutes. Median for 2nd group = 29 minutes. The commute time for the 2nd group is shorter as it has a lower median.	**B1**
The interquartile range for the first group is 9minutes while the interquartile range for the second group is 8 minutes. The 2nd group has more consistent commute times as its interquartile range is smaller.	**B1**

---

10 In the diagram, triangle ABC is a right-angled triangle.
$AB = 9$ cm, $BC = 12$ cm and $AC = 15$ cm.
A circle with centre O and radius 3 cm is inscribed inside triangle ABC.
The circle touches the sides of the circle at X, Y and Z respectively.



(a) Show that the obtuse angle $YOZ = 2.50$ radians, correct to 3 significant figures.

$\tan \angle YOC = \frac{9}{3}$ $\angle YOC = \tan^{-1}(3)$ $= 1.2490$ rad $\therefore \quad \angle YOZ = 2 \times 1.2490$ rad $= 2.50$ rad(3s.f) (shown)	**M1 for finding angle *YOC* and angle *YOZ*.** **A1**

(b) Find the perimeter of the major segment *YXZ*.

Length of major arc $YXZ = 3(2\pi - 2.50)$ cm $= 11.34956$ cm Length of chord $YZ = \sqrt{3^2 + 3^2 - 2 \times 3 \times 3 \cos 2.50}$ cm $= 5.69391$ cm Perimeter of major segment $YXZ = 11.34956 + 5.69391$cm $= 17.04347$ cm $= 17.0$ cm (3s.f)	**M1 for finding length of major arc.** **M2 for find length of chord *YZ* using cosine rule.** **A1**

---

11 A group of N children are at school celebrating National Day.
The children come in either red or white T-shirts.
Three girls from the group wore white T-shirts.

(a) Two children are selected at random from the group.

The probability that both are girls wearing white T-shirts is $\frac{1}{70}$.

Find N.

$\frac{3}{N} \times \frac{2}{N-1} = \frac{1}{70}$ $420 = N(N-1)$ $N^2 - N - 420 = 0$ $(N-21)(N+20) = 0$	**M1 for forming the quadratic equation** **A1**

$N-21=0$ $\quad N+20=0$ $N=21$ $\quad N=-20$ (NA)	

(b) One child is selected at random.

The probability that it is a girl wearing a red T-shirt is $\frac{3}{7}$.
Three children are chosen at random.
The probability that one is a boy wearing a white T-shirt and two are girls wearing red T-shirts is $\frac{108}{665}$.

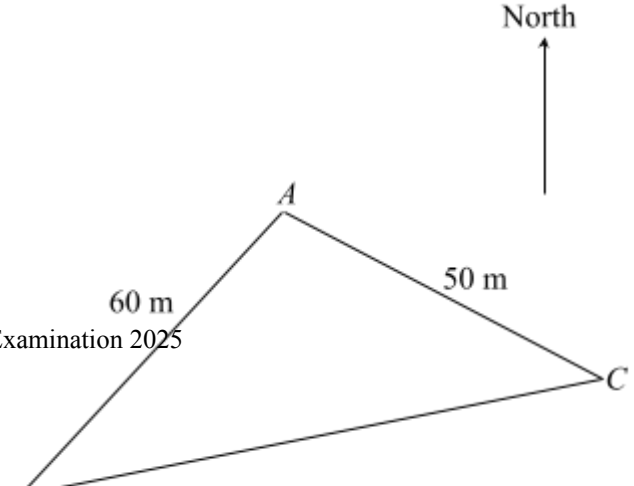
Find the value of a, of b and of c as shown in the table of information about the group of children.

	White T-shirts	Red T-shirts
Boys	a	b
Girls	3	c

$\frac{c}{21}=\frac{3}{7}$ $c=9$	**B1**
$\frac{a}{21}\times\frac{9}{20}\times\frac{8}{19}\times 3=\frac{108}{665}$ $a=\frac{108}{665}\div\left(\frac{9\times 8\times 3}{21\times 20\times 19}\right)$ $=6$	**B1**
$b=21-9-3-6$ $=3$	**B1**

---

12 The diagram shows three points A, B and C on horizontal ground.
A is at a bearing of 040° from B and C is at a bearing of 125° from A.
AB = 60 m and AC = 50 m.



(a) Find

(i) the bearing of B from A,

Bearing of B from A = 360° – 140° (sum of interior angles, //North lines) = 220°	**B1**

(ii) the area of triangle ABC,

Angle BAC = 220° – 125° = 95° Area of triangle $ABC = \frac{1}{2} \times 60 \times 50 \times \sin 95^\circ$ = 1494.29 m^2 = 1490 m^2 (3 s.f)	**M1 for angle *BAC*** **A1**

(iii) the distance BC,

$BC = \sqrt{60^2 + 50^2 - 2(60)(50)\cos 95^\circ}$ = 81.3814 m = 81.4 m (3 s.f)	**M1 for cosine rule** **A1**

(iv) angle ACB,

$\frac{60}{\sin \angle ACB} = \frac{81.3814}{\sin 95^\circ}$ $\sin \angle ACB = \frac{60 \sin 95^\circ}{81.3814}$ $\angle ACB = 47.262°$ $= 47.3°$ (1d.p)	**M1 for using sine rule** **A1**

(v) the shortest distance AX, where X is a point along BC.

AX is the perpendicular distance from A to BC. **Method 1:**	**M1 for equating area of triangle**

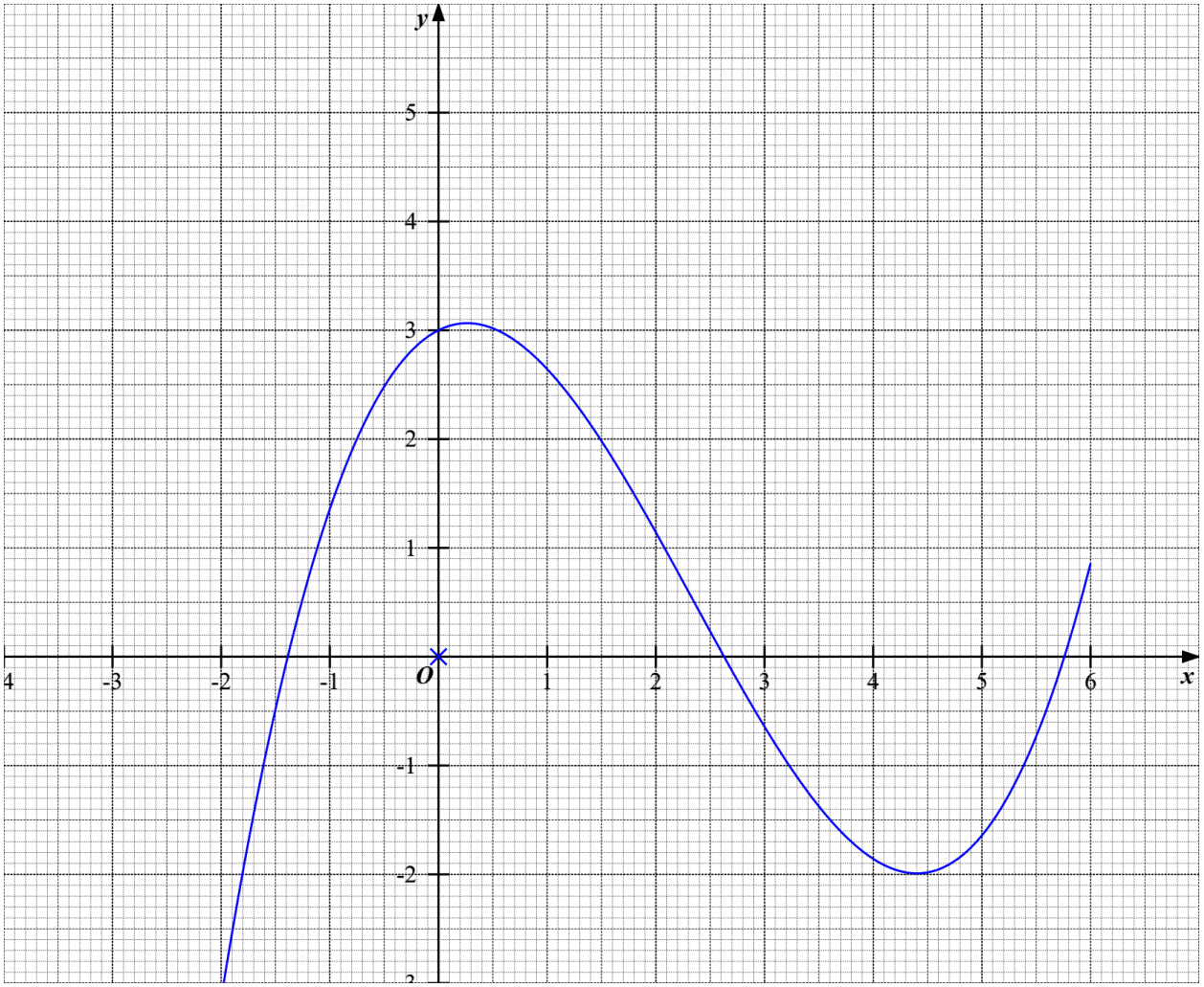
$\frac{1}{2} \times BC \times AX = \frac{1}{2} \times 60 \times 50 \times \sin 95^\circ$ $AX = \frac{60 \times 50 \times \sin 95°}{81.3814}$ $= 36.723$ m $= 36.7$ m (3 s.f) **Method 2:** $\sin 47.262° = \frac{AX}{50}$ $AX = 50 \sin 47.262°$ $= 36.723$ m $= 36.7$ m(3s.f)	**A1** **M1 for using sine rule** **A1**

(b) Point A is the base of a vertical mast AT. The angle of depression of C from the T is 33°. Find the greatest angle of elevation of T from a point along BC.

Let height of vertical mast be p m. $\tan 33° = \frac{p}{50}$ $p = 50 \tan 33°$ $= 32.470$ m Greatest angle of depression is at perpendicular distance of A from BC, which is AX. $\tan \angle AXT = \frac{AT}{AX}$ $\angle AXT = \tan^{-1}\left(\frac{32.470}{36.723}\right)$ $= 41.483°$ $= 41.5°$(1d.p)	**M1 for finding height of mast** **M1 for TOA** **A1**

---

13 The graph of $y = \frac{1}{7}x^3 - x^2 + \frac{1}{2}x + 3$ is drawn on the grid.



Using your graph,

(a) write down the range of values of x such that $y \geq 2$.

$-0.75 \leq x \leq 1.50$ Accept answers ± 0.1 from the limits.	**B1**

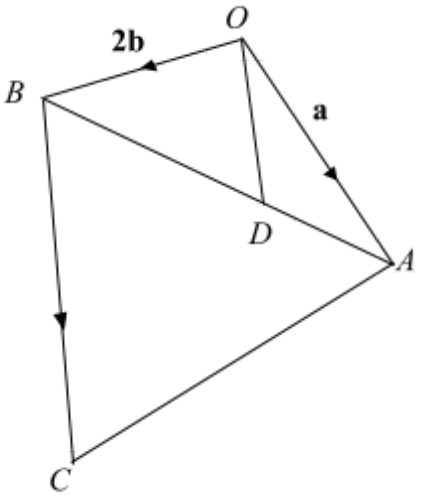
(b) find the gradient of the tangent to the curve where $x = -0.5$.

Gradient $= 1.6$ Accept ± 0.2	**M1 – the tangent is drawn.** **A1**

(c) by drawing a suitable straight line on the grid, solve the equation $6x^3 - 42x^2 + 126 = 21x$.

$6x^3 - 42x^2 + 126 = 21x$ $x^3 - 7x^2 + 21 = \frac{7}{2}x$ $\frac{1}{7}x^3 - x^2 + 3 = \frac{1}{2}x$ $\frac{1}{7}x^3 - x^2 + \frac{1}{2}x + 3 = \frac{1}{2}x + \frac{1}{2}x$ $= x$ Consider the intersection of $y = \frac{1}{7}x^3 - x^2 + \frac{1}{2}x + 3$ and the line $y = x$ $x = 1.7$ or $x = -1.7$ Accept ± 0.1	**M1 for obtain the straight line** **M1 for drawing the straight line** **A1**

14



OACB is a quadrilateral.

$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = 2\mathbf{b}$ and $\overrightarrow{BC} = 2\mathbf{a} + 2\mathbf{b}$. $BD : DA = 2 : 1$.

(a) Write each of the following in terms of **a** and **b**,

(i) $\overrightarrow{AB}$,

(i) $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $= -\mathbf{a} + 2\mathbf{b}$	**B1**

(ii) $\overrightarrow{CA}$,

(ii) $\overrightarrow{CA} = \overrightarrow{CB} + \overrightarrow{BO} + \overrightarrow{OA}$ $= \mathbf{-2a - 2b - 2b + a}$ $= \mathbf{-a - 4b}$	**B1**

(iii) $\overrightarrow{DO}$.

(iii) $\overrightarrow{DO} = \overrightarrow{DB} + \overrightarrow{BO}$ *o.e.* $= \frac{2}{3}\overrightarrow{AB} - 2\mathbf{b}$ $= \frac{2}{3}(\mathbf{-a + 2b}) - 2\mathbf{b}$ $= -\frac{2}{3}\mathbf{a} - \frac{2}{3}\mathbf{b}$ $= -\frac{2}{3}(\mathbf{a + b})$	**B1**

(b) Explain why $\overrightarrow{DO}$ is parallel to $\overrightarrow{BC}$.

$\overrightarrow{BC} = 2\mathbf{a} + 2\mathbf{b}$ $= 2\mathbf{(a + b)}$ $\overrightarrow{DO} = -\frac{2}{3}(\mathbf{a + b})$ Therefore BC is parallel to DO.	**B1** $\overrightarrow{BC}$ and $\overrightarrow{DO}$ are shown in $(\mathbf{a + b})$ form. Accept $\overrightarrow{DO} = -\frac{1}{3}\overrightarrow{BC}$ Accept $\overrightarrow{BC} = -3\overrightarrow{DO}$

(c) Show that the area of $\dfrac{\text{Area of triangle } OBD}{\text{Area of triangle } BCD} = \dfrac{1}{3}$.

Method 1: using $Area = \frac{1}{2}ab\sin C$ to prove. $\angle OBD = \angle DBC$ (alterante angle $CB//DO$) $\dfrac{\text{Area of triangle } OBD}{\text{Area of triangle } BCD}$ $= \dfrac{\frac{1}{2}AB \times OD \sin \angle OBD}{\frac{1}{2}AB \times BC \sin \angle DBC}$ $= \dfrac{OD}{BC}$ $= \dfrac{1}{3}$ because $BC:OD = 3:1$ Method 2: Using same height (ht) between $CB//DO$ to prove. $\dfrac{\text{Area of triangle } OBD}{\text{Area of triangle } BCD}$ $= \dfrac{\frac{1}{2}OD_{base} \times ht}{\frac{1}{2}BC_{base} \times ht}$ $= \dfrac{OD}{BC}$ $= \dfrac{1}{3}$ because $BC:OD = 3:1$	**B1**

(d) Find

(i) $\dfrac{\text{Area of triangle } BCD}{\text{Area of triangle } CAD}$,

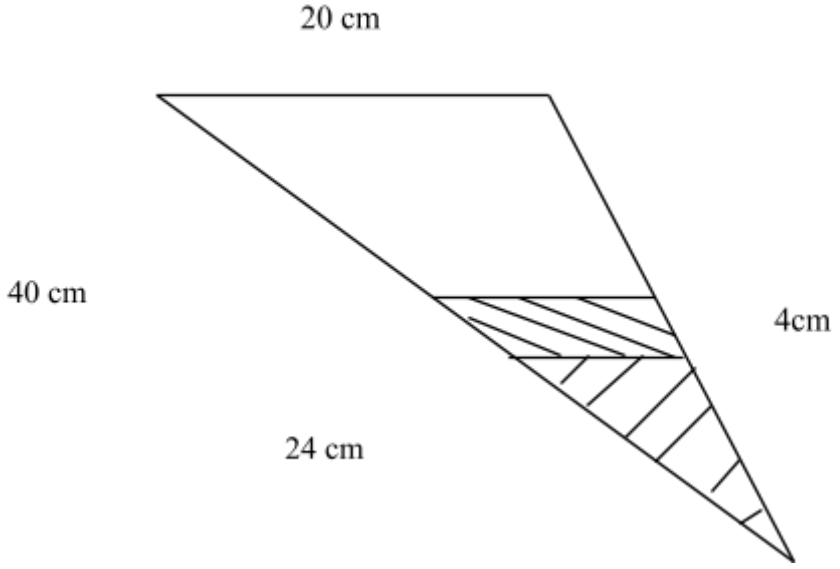
$\frac{\text{Area of triangle } BCD}{\text{Area of triangle } CAD}$ $= \frac{\frac{1}{2} BD_{base} \times ht}{\frac{1}{2} AD_{base} \times ht}$ $= \frac{2}{1}$	**B1**

(ii) $\frac{\text{Area of triangle } OBD}{\text{Area of triangle } CAD}$.

$\frac{\text{Area of triangle } OBD}{\text{Area of triangle } CAD}$ $= \frac{\text{Area of triangle } OBD}{\text{Area of triangle } BCD} \times \frac{\text{Area of triangle } BCD}{\text{Area of triangle } CAD}$ $= \frac{1}{3} \times \frac{2}{1}$ $= \frac{2}{3}$	**B1**

---

15 The diagram shows a container with diameter 20 cm and height 40 cm.
It contains water to a height of 24 cm from the vertex of the container.
A layer of oil of height 4 cm floats on the water surface.



(a) Calculate the diameter of the water in the container.

$\frac{\text{Diameter of water}}{\text{Diameter of container}} = \frac{\text{Height of water}}{\text{Height of container}}$ $\therefore \text{Diameter of water} = \frac{20 \times 24}{40}$ $= 12 \text{ cm}$	**B1**

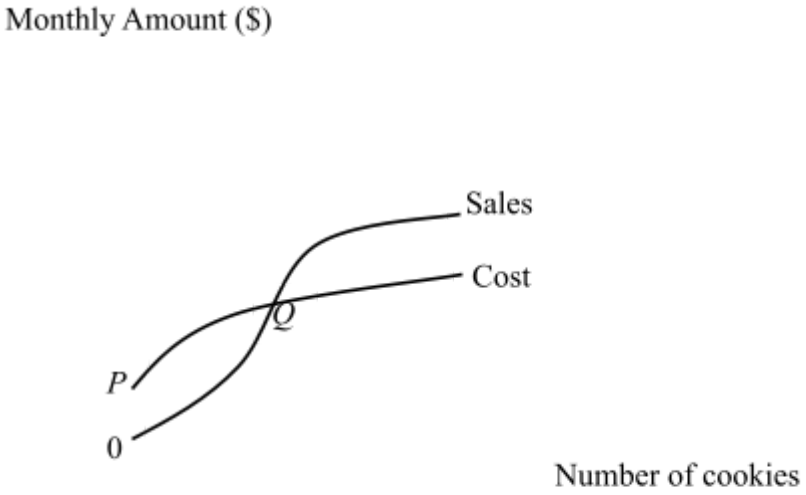
(b) The curved surface area of the container is 150 cm^2.

Calculate the curved surface of the container in contact with the oil.

$\frac{\text{Curved surface area of container}}{\text{Curved surface area of water}} = \left(\frac{10}{6}\right)^2$ $\text{Curved surface area of water} = \frac{150 \times 36}{100}$ $= 54 \text{ cm}^2$	**M1 for finding the curved surface areas of water**
$\frac{\text{Curved surface area of container}}{\text{Curved surface area of water and oil}} = \left(\frac{10}{7}\right)^2$ $\text{Curved surface area of water and oil} = \frac{150 \times 49}{100}$ $= 73.5 \text{ cm}^2$	**M1 for finding curved surface area of water and oil**
Hence, curved surface area of the container in contact with the oil = 73.5 cm^2 – 54 cm^2 = 19.5 cm^2	**A1**

---

16 The graph below shows the monthly cost and total sales of cookies by Mrs Tan.



(a) Explain what does point *P* represent.

P represents the depreciation cost of the oven or *P* is the cost incurred without making any cookies	**B1**

(b) Explain what does point *Q* represent.

Q represents the break even cost. Alternatively, when cost is equal to sales received o.e.	**B1**

Mrs Tan bought 3 ovens costing $10 950 that will be fully depreciated (means reduced to $0) in 2 years.

Each oven is to be used to bake large, medium and small cookies respectively.
Each large, medium and small circular cookie has a thickness of 0.4 cm and measures 6 cm, 4 cm and 3 cm in diameter respectively.

Selling price for each large cookie is $1, medium cookie is $0.80 and small cookie is $0.50.
Order for each type of cookies must be in multiples of 20.

On a particular day, she receives orders from 18 locations amounting to a total of 160 large, 100 medium and 140 small pieces of cookies. The cost of delivery fee to each location is $3.50.

The table below shows the cost of producing and packing the cookies on a particular day.

- Electricity and water usage : $6.
- Depreciation of oven : $15.
- Cost of delivery.
- Cost of materials.

- Cost of packaging.

The cost of materials are shown in the table below.

Each piece of	Cost of material
Large cookie	20 cents
Medium cookie	15 cents
Small cookie	11 cents

Mrs Tan wants to pack exactly 20 cookies in each container. The table below shows the dimensions and cost of the different types of containers from a supplier for her to select.

Dimensions of circular containers available		Cost of each circular container
Diameter (cm)	Height (cm)	
7	10	\$0.60
6	7	\$0.50
5	10	\$0.40
4	7	\$0.30

(c) By taking 1 year to be 365 days, show that the depreciation cost of the 3 ovens per day is \$15.

Depreciation per day $= \frac{10950}{2 \times 365}$ $= \$15$	**B1**

(d) Calculate Mrs Tan's profit from the sales of cookies on this particular day.

From the orders of 160 large, 100 medium and 140 small, 140 cookies Total sales $= 160\times\$1+100\times\$0.80+140\times\$0.50$ $=\$310$	**B1**
Cost of raw materials $= 0.2\times160+0.15\times100+0.11\times140$ $=\$62.4.$	**B1**
Based on 6,4,3 and thickness of 0.4, \$0.60 and \$0.20 packaging should be chosen. Cost of packaging $=0.60\times\left(\frac{160}{20}\right)+0.4\times\left(\frac{100}{20}\right)+0.4\left(\frac{140}{20}\right)$	**M1**
$or = 0.60\left[\left(\frac{160}{20}\right)+\left(\frac{100}{20}\right)+\left(\frac{140}{20}\right)\right]$ $=\$9.60$ *or* $=\$12$	**B1**
Cost of delivery to 18 locations $= 18\times3.5$ $=\$63$	**B1**
Cost of electricity $=\$6$ Depreciation cost $=\$15$	
Total cost $= 62.40+\$9.60+63+6+15$ *or* $= 62.40+\$12+63+6+15$ $=\$156$ *or* $=\$158.40$	
Profit $=\$310-\$156$ *or* $=\$310-158.4$ $=\$154$ *or* $=\$151.60$	**B1**

(e) Without raising the price of the large, medium and small cookies, suggest a way to help Mrs Tan increase the profit margin.

Possible suggestions a) Reduce cost such as cost of material, packaging or delivery.[accept either one of the three] b) Sell only the large cookies. It is the most profitable cookies.	**B1**

End of Paper