

[C056/SQP105]

Intermediate 2
Mathematics

Time: 45 minutes

Specimen Question Paper 1 (Units 1, 2, 3)
Non-calculator Paper

NATIONAL
QUALIFICATIONS

- 1 Answer as many questions as you can.
- 2 Full credit will be given only where the solution contains appropriate working.
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- 4 Square-ruled paper is provided.

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

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

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

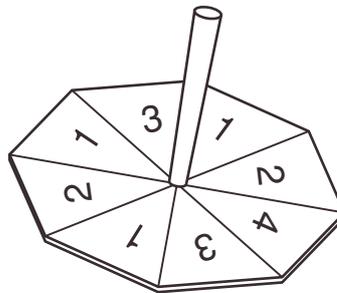
Volume of a sphere: $\text{Volume} = \frac{4}{3}\pi r^3$

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

Volume of a cylinder: $\text{Volume} = \pi r^2 h$

Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$

1. A spinner has eight edges numbered as shown in the diagram.
 When it is spun it comes to rest on one edge.
 What is the probability that it comes to rest on an even number?



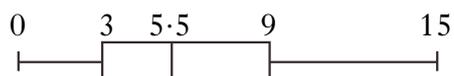
(2)

2. Factorise

$$x^2 - 7x - 8.$$

(2)

3. (a) The boxplot, drawn below, shows the daily rainfall (in millimetres) recorded over a number of days.

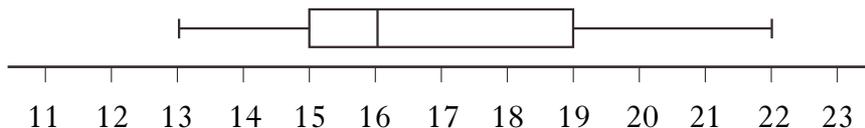


State the upper and lower quartiles.

(1)

- (b) The daily rainfall (in millimetres) for a town was recorded over **seven** days.

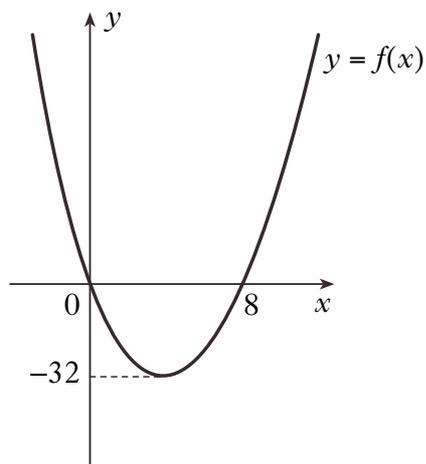
The boxplot, shown below, was drawn for this data set.



Write down a possible data set which fits this boxplot.

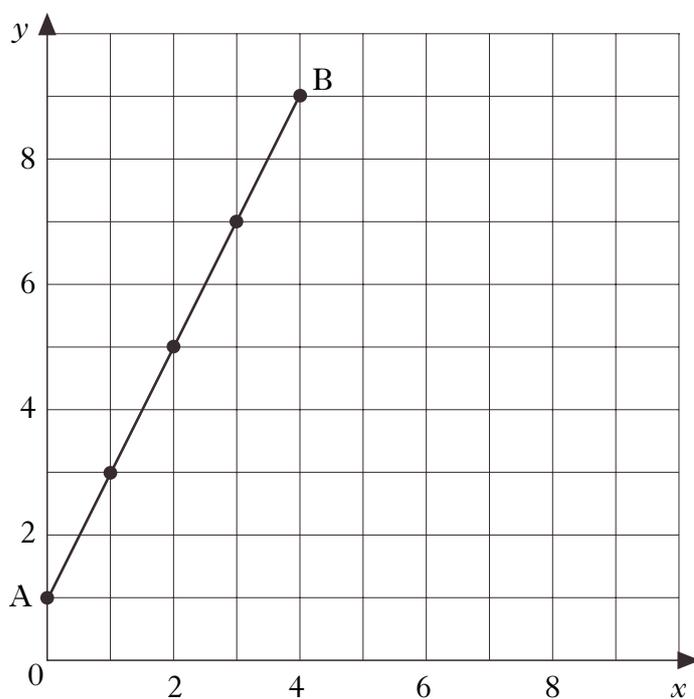
(3)

4. The diagram opposite shows the graph of $y = f(x)$.
Write down the equation of the graph in the form $y = (x + a)^2 + b$.



(2)

- 5.



Find the equation of the straight line AB.

(3)

6. A district council decided to plant maple and rowan trees on a piece of ground with area 0.25 hectares.

The trees were planted using a recommended spacing of 720 per hectare.

- (a) Let m be the number of maple trees and r the number of rowan trees planted.

Write down an equation in m and r which satisfies the above condition. (2)

- (b) The district council spent £1500 on the trees.

Each maple tree cost £9 and each rowan tree cost £7.50.

Write down an equation in m and r which satisfies this condition. (2)

- (c) How many trees of each kind did the council plant? (3)

7. (a) Express $\frac{3}{\sqrt{5}}$ as a fraction with a rational denominator. (2)

- (b) Express $\frac{b^{\frac{1}{2}} \times b^{\frac{3}{2}}}{b}$ in its simplest form. (2)

- (c) Express as a single fraction in its simplest form

$$\frac{5}{x} - \frac{3}{(x-2)}, x \neq 0 \text{ or } x \neq 2. \quad (3)$$

[END OF QUESTION PAPER]

[C056/SQP105]

Intermediate 2
Mathematics

Time: 45 minutes

NATIONAL
QUALIFICATIONS

Paper 1 (Non-calculator)
Units 1, 2 and Applications
of Mathematics
Specimen Question Paper

- 1 Answer as many questions as you can.
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FORMULAE LIST

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

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

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

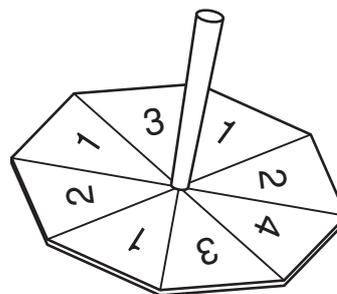
Volume of a cylinder: $\text{Volume} = \pi r^2 h$

Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n - 1}}$, where n is the sample size.

1. A spinner has eight edges numbered as shown in the diagram.

When it is spun it comes to rest on one edge.

What is the probability that it comes to rest on an even number?



(2)

2. Factorise

$$x^2 - 7x - 8.$$

(2)

3. (a) The boxplot, drawn below, shows the daily rainfall (in millimetres) recorded over a number of days.

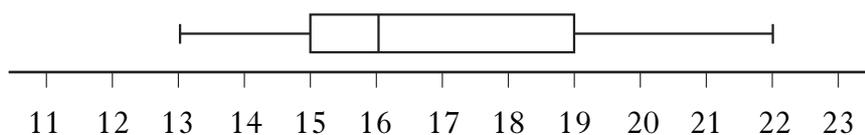


State the upper and lower quartiles.

(1)

- (b) The daily rainfall (in millimetres) for a town was recorded over **seven** days.

The boxplot, shown below, was drawn for this data set.

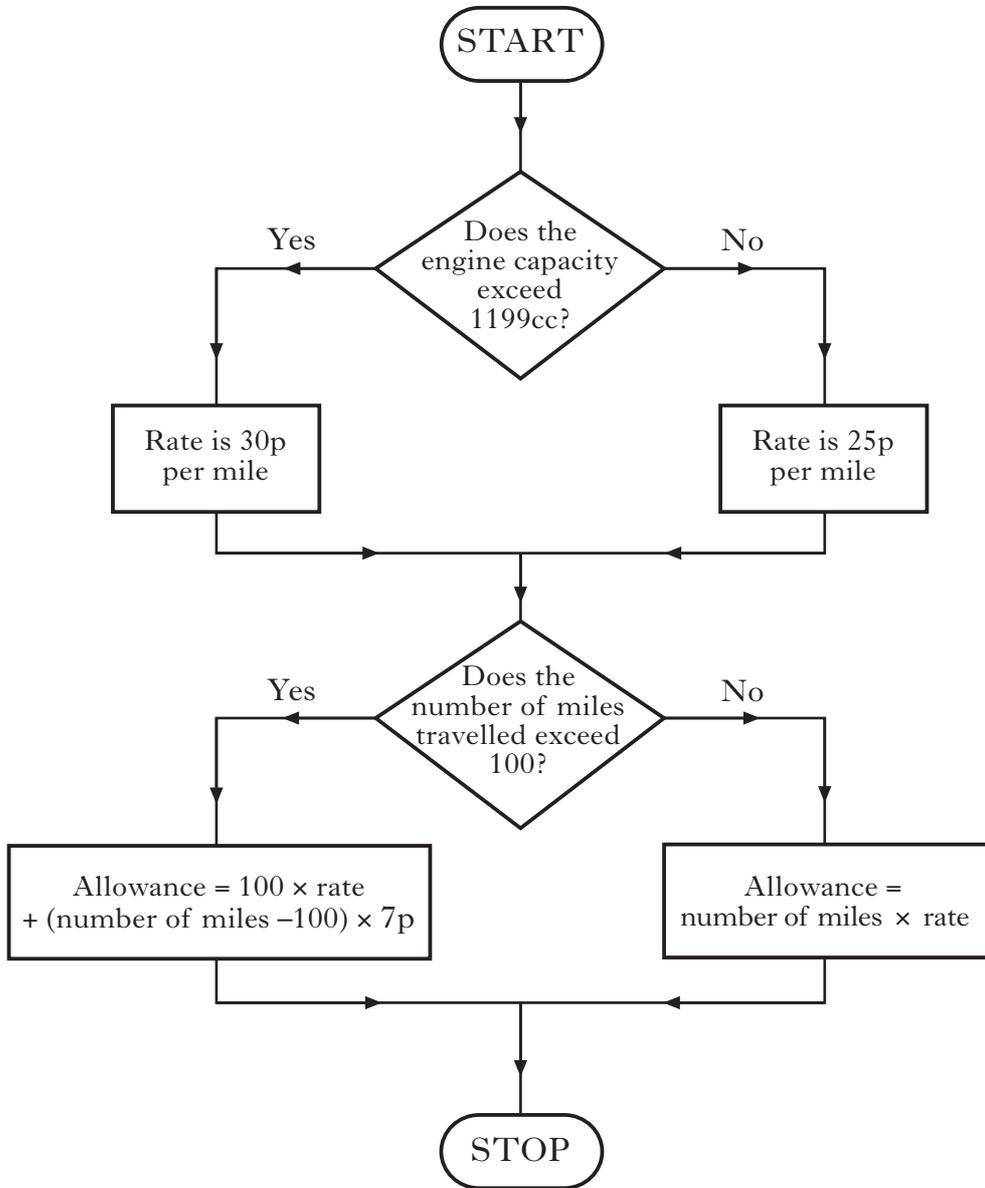


Write down a possible data set which fits this boxplot.

(3)

4. The flowchart shown below gives instructions on how to calculate travelling expenses.

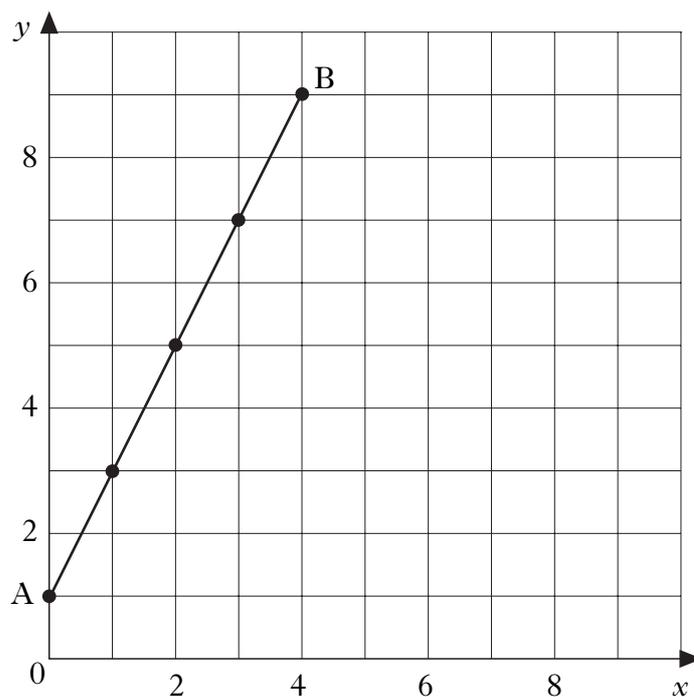
The total expenses claimed depends on the engine capacity of the car being used and the number of miles travelled.



Use the flowchart to calculate the expenses which can be claimed for travelling 129 miles in a car with an engine capacity of 998 cc.

(4)

5.



Find the equation of the straight line AB.

(3)

6. A district council decided to plant maple and rowan trees on a piece of ground with area 0.25 hectares.

The trees were planted using a recommended spacing of 720 per hectare.

(a) Let m be the number of maple trees and r the number of rowan trees planted.

Write down an equation in m and r which satisfies the above condition.

(2)

(b) The district council spent £1500 on the trees.

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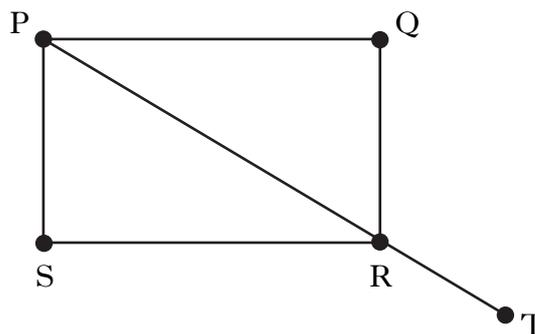
(c) How many trees of each kind did the council plant?

(3)

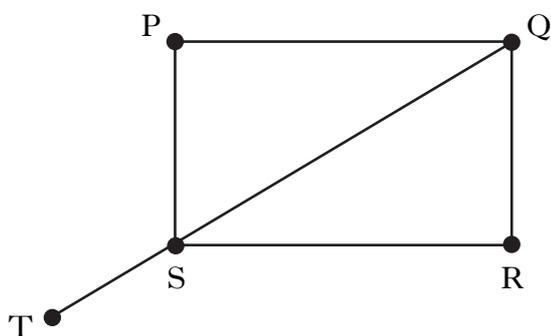
7. (a) A network is **traversable** if it can be drawn by going over every line once and only once without lifting your pencil.

The network shown opposite can be traversed by the route:

$P \rightarrow R \rightarrow S \rightarrow P \rightarrow Q \rightarrow R \rightarrow T$



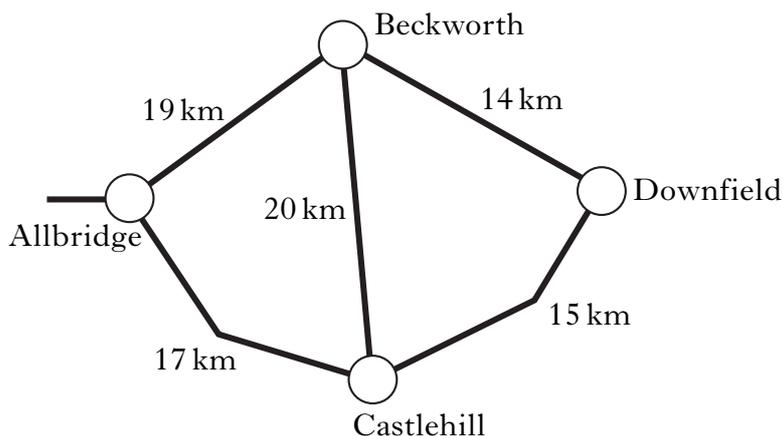
Write down a route by which the network below can be traversed.



(1)

- (b) A delivery van leaves its depot in Allbridge to make deliveries to Beckworth, Castlehill and Downfield.

The diagram shown below gives the distances between the depots.



- (i) Draw a tree diagram to show the possible delivery routes. (2)

- (ii) Which is the shortest route? (2)

[END OF QUESTIONS]

[C056/SQP105]

Intermediate 2 Time: 1 hour 30 minutes
Mathematics
Specimen Question Paper 2 (Units 1, 2, 3)

NATIONAL
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FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$

1. A golfer recorded the following scores for six games of golf.

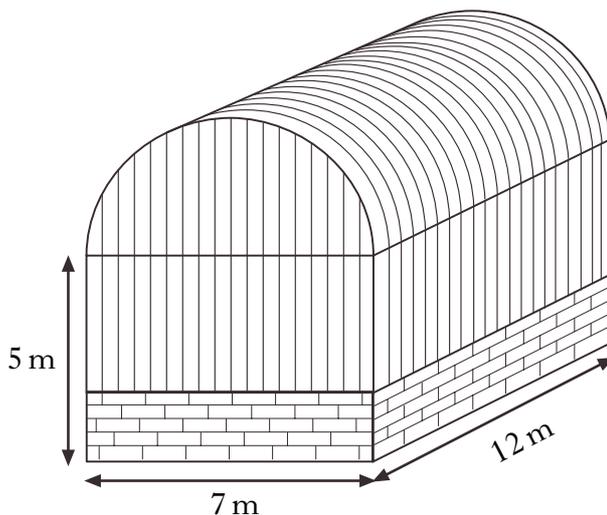
69, 75, 74, 78, 70, 72

Use the formula to calculate the standard deviation.

Show clearly all your working.

(4)

2. A storage barn is prism shaped, as shown below.



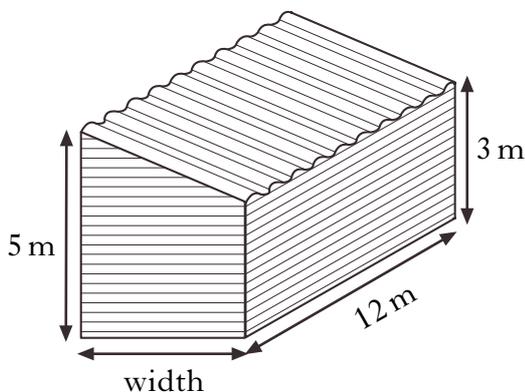
The cross-section of the storage barn consists of a rectangle measuring 7 metres by 5 metres and a semi-circle of radius 3.5 metres.

- (a) Find the volume of the storage barn.

Give your answer in cubic metres, **correct to 2 significant figures.**

(4)

- (b) An extension to the barn is planned to increase the volume by 200 cubic metres.



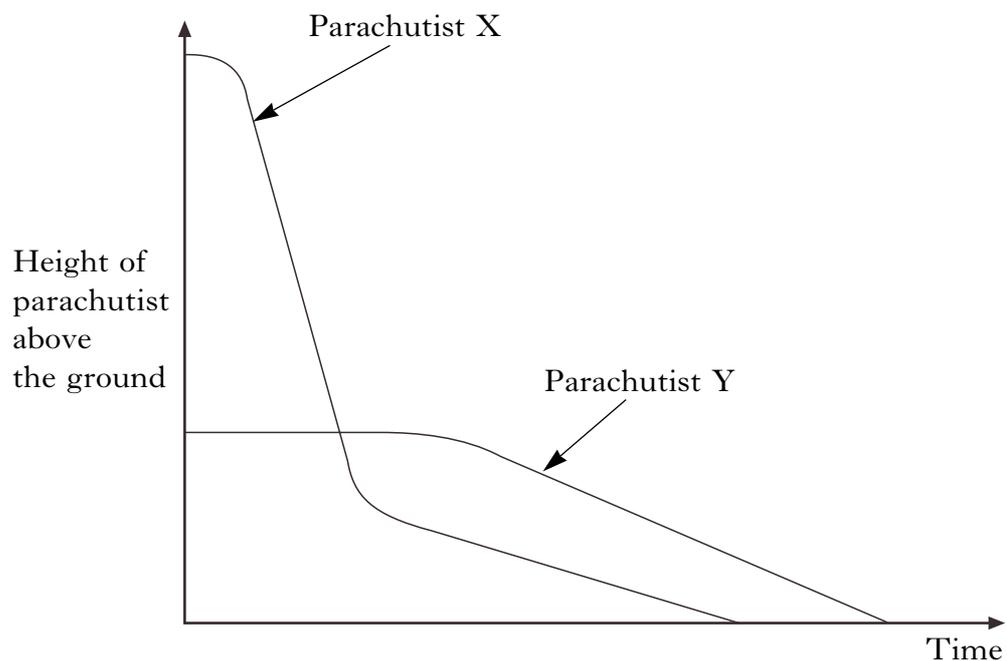
The uniform cross-section of the extension consists of a rectangle and a right-angled triangle.

Find the width of the extension.

(3)

3. Two parachutists, X and Y, jump from two separate aircrafts at different times.

The graph shows how their height above the ground changes over a period of time.



- (a) Which parachutist jumped first?
- (b) Which parachutist did not open his parachute immediately after jumping?

Explain your answer clearly.

(3)

4. Figure 1 shows the circular cross-section of a tunnel with a horizontal floor.

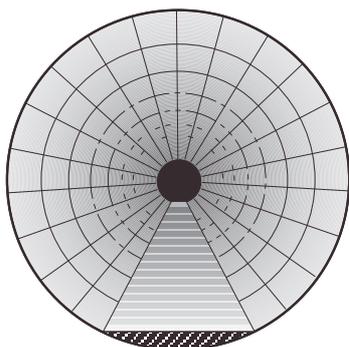


figure 1

In figure 2, AB represents the floor. AB is 2.4 metres.
 The radius, OA, of the cross-section is 2.5 metres.
 Find the height of the tunnel.

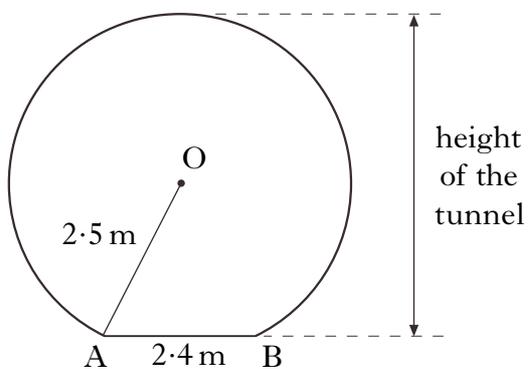
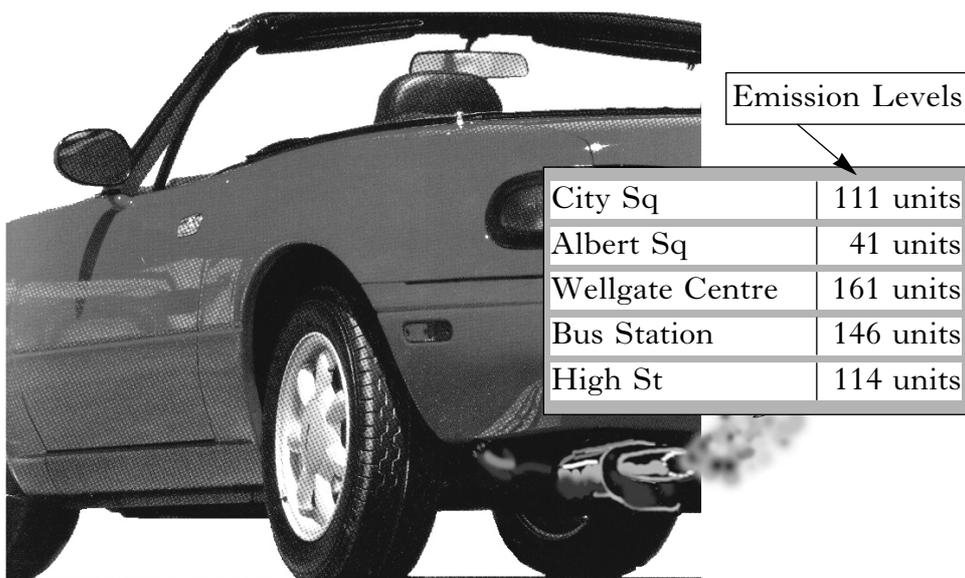


figure 2

(4)

5. The table shows the emission levels of harmful gases at different places in a city.



Health regulations state that the emission levels of harmful gases should be **less** than 135 units.

The city council plan to reduce the levels in such a way that for each of the next 3 years the emission levels will be 5% less than the level in the previous year.

Will all the places listed in the table meet the health regulations in 3 years time?

Show clearly all your working.

(4)

6. Solve the equation

$$x^2 + 2x - 6 = 0$$

giving your answers correct to 1 decimal place.

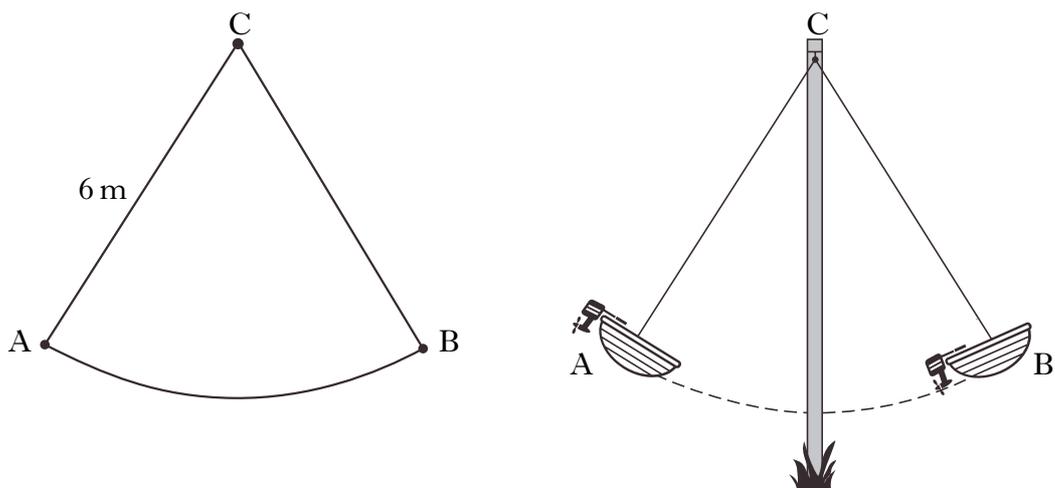
(4)

7. The table shows the distribution of absentees per class on a particular day in a secondary school.

Number of absentees	Frequency
0	2
1	5
2	7
3	4
4	4
5	2
6	1

- (a) Make a cumulative frequency table from the above data. (1)
- (b) Find the median and the lower and upper quartiles for this distribution. (3)

8. The boat on a carnival ride travels along an arc of a circle, centre C.



The boat is attached to C by a rod 6 metres long.

The rod swings from position CA to position CB.

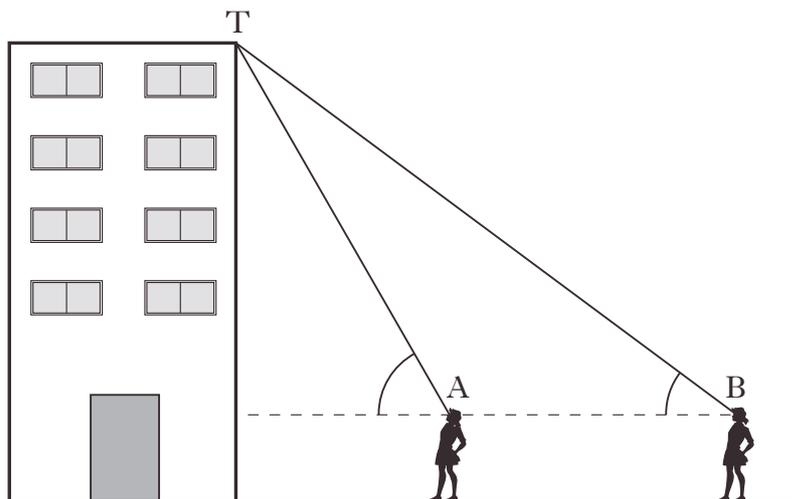
The length of the arc AB is 7 metres.

Find the angle through which the rod swings from position A to position B. (4)

9. Change the subject of the formula to k

$$d = \frac{k - m}{t}. \quad (2)$$

10. The diagram shows two positions of a student as she views the top of a tower.



From position B, the angle of elevation to T at the top of the tower is 64° .
 From position A, the angle of elevation to T at the top of the tower is 69° .
 The distance AB is 4.8 metres and the height of the student to eye level is 1.5 metres.

Find the height of the tower.

(6)

11. (a) Solve the equation

$$7\cos x^\circ - 2 = 0, \quad \text{for } 0 \leq x < 360. \quad (3)$$

- (b) Show that $\frac{\sin^2 x}{1 - \sin^2 x} = \tan^2 x.$ (2)

12. A rectangular sheet of plastic 18 cm by 100 cm is used to make a gutter for draining rain water.

The gutter is made by bending the sheet of plastic as shown below in diagram 1.

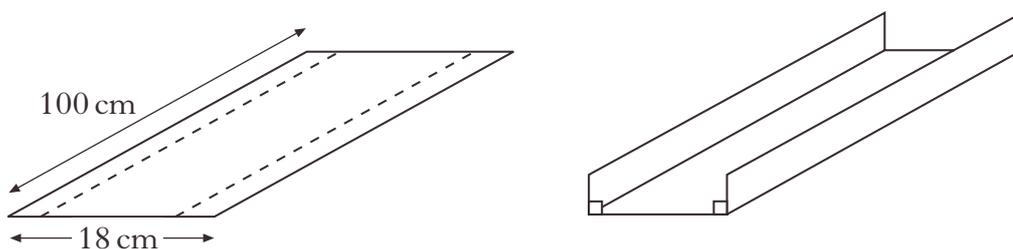


diagram 1

- (a) The depth of the gutter is x centimetres as shown in diagram 2 below. Write down an expression in x for the width of the gutter. (1)

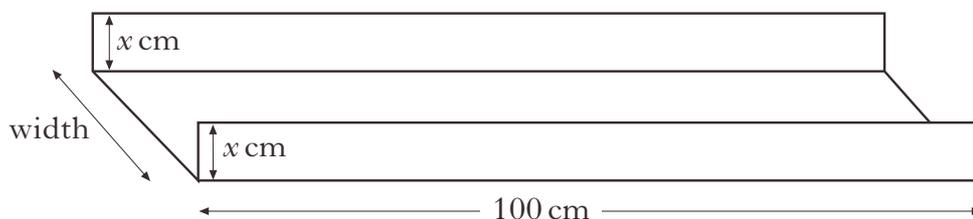


diagram 2

- (b) Show that the volume, V cubic centimetres, of this gutter is given by

$$V = 1800x - 200x^2. \quad (2)$$

- (c) Find the dimensions of the gutter which has the largest volume. Show clearly all your working. (4)

[END OF QUESTION PAPER]

[C056/SQP105]

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Mathematics
Paper 2
Units 1, 2 and Applications
of Mathematics
Specimen Question Paper

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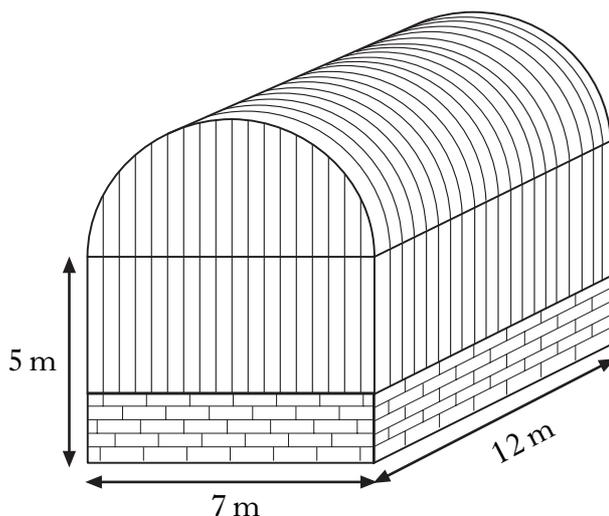
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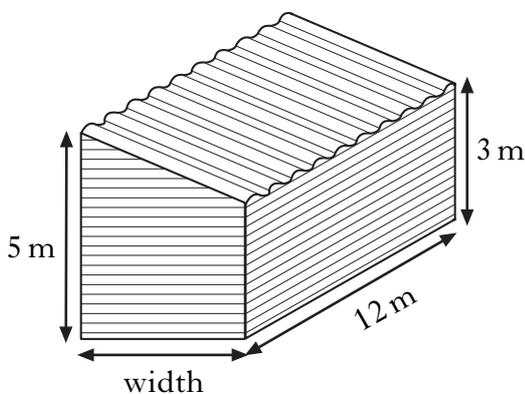
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(4)

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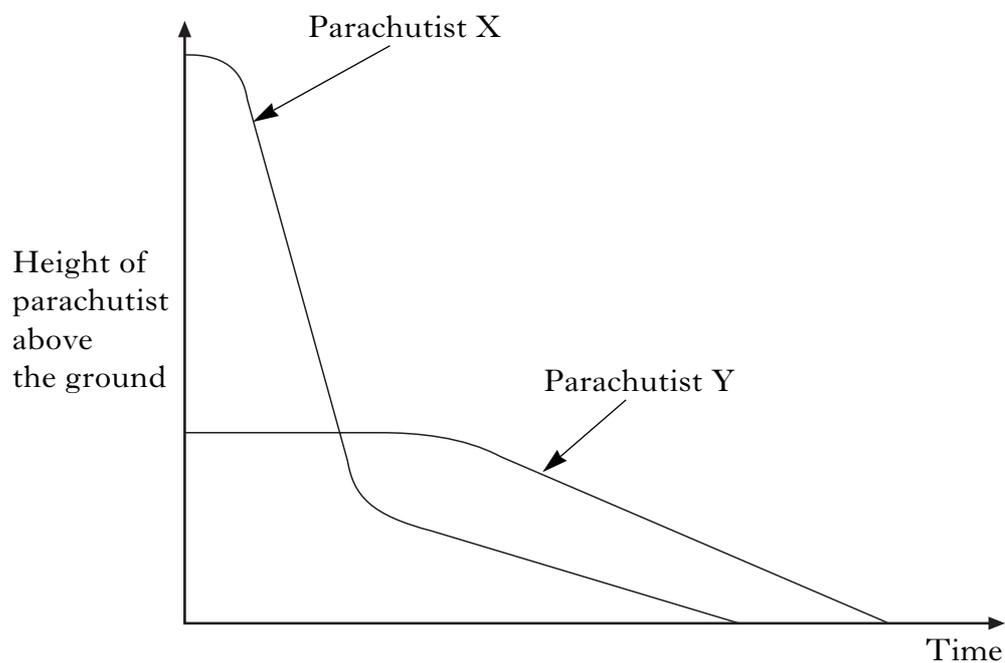
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(3)

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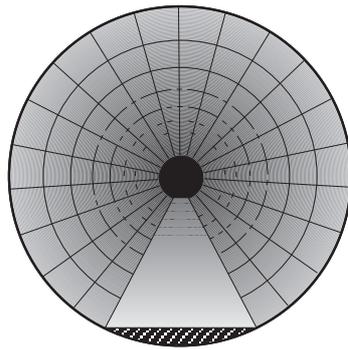


figure 1

In figure 2, AB represents the floor. AB is 2.4 metres.
 The radius, OA, of the cross-section is 2.5 metres.
 Find the height of the tunnel.

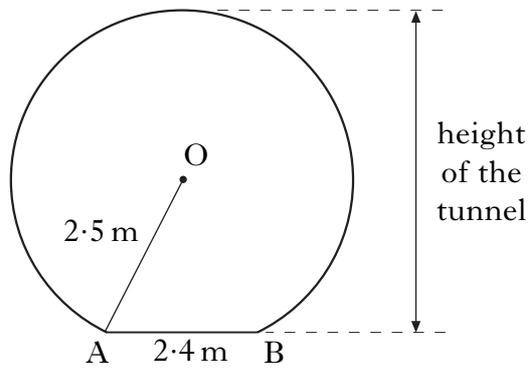
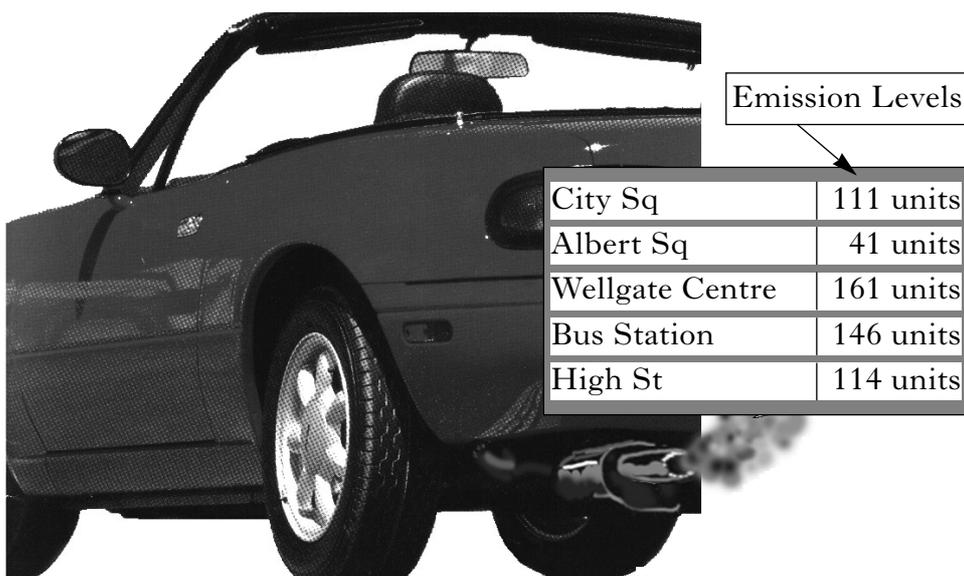


figure 2

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The city council plan to reduce the levels in such a way that for each of the next 3 years the emission levels will be 5% less than the level in the previous year.

Will all the places listed in the table meet the health regulations in 3 years time?

Show clearly all your working.

(4)

6. The income tax rates are shown in the table below.

10% on the first £1500 of taxable income
 23% on the next £26 500 of taxable income
 40% on taxable income over £28 000

Jenny White earns £16 620 per year.

Her annual tax allowances total £5220.

Calculate Jenny's annual salary after tax has been deducted.

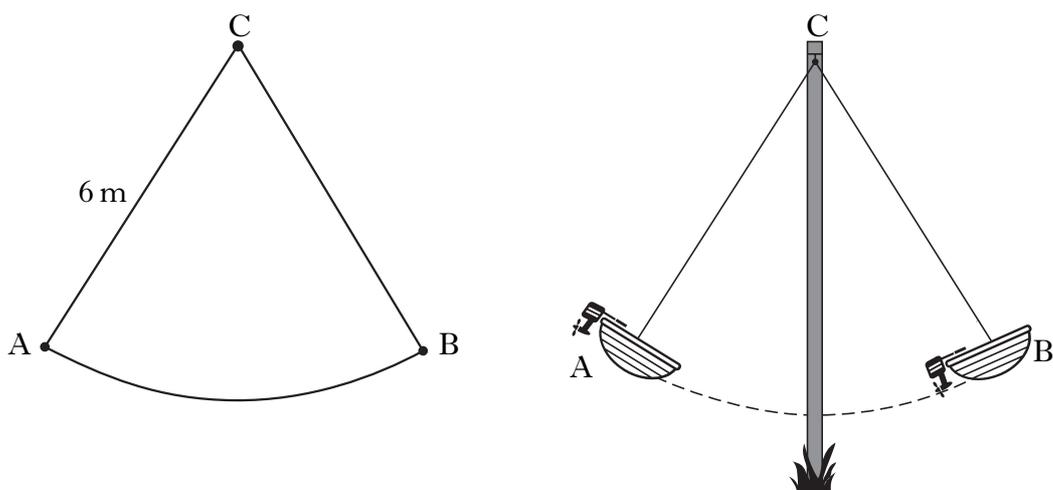
(5)

7. The table shows the distribution of absentees per class on a particular day in a secondary school.

Number of absentees	Frequency
0	2
1	5
2	7
3	4
4	4
5	2
6	1

- (a) Make a cumulative frequency table from the above data. **(1)**
- (b) Find the median and the lower and upper quartiles for this distribution. **(3)**

8. The boat on a carnival ride travels along an arc of a circle, centre C.



The boat is attached to C by a rod 6 metres long.

The rod swings from position CA to position CB.

The length of the arc AB is 7 metres.

Find the angle through which the rod swings from position A to position B. **(4)**

9. A metal bar expands when it is heated.

The new length, L centimetres, of the metal bar is given by the formula

$$L = B(1 + kt)$$

where B centimetres is the length of the bar before heating

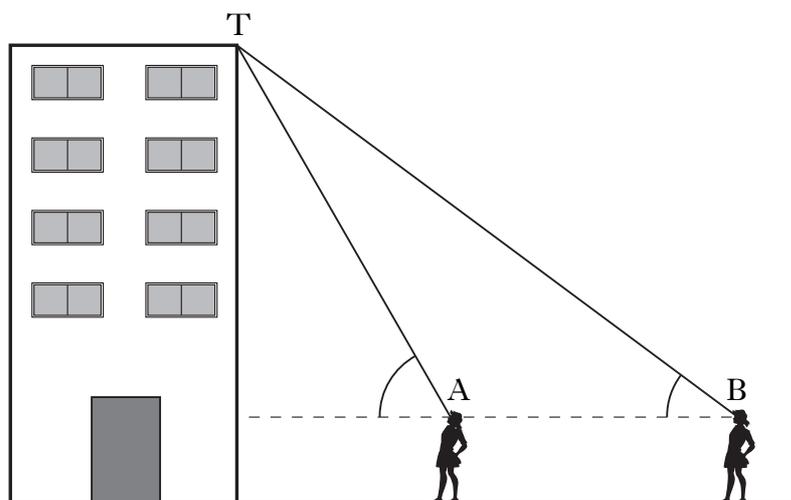
t °C is the rise in temperature

k depends on the type of metal.

- (a) Calculate L when $B = 20$, $t = 15$ and $k = 0.002$. (3)

- (b) Find B when $L = 53$, $t = 20$ and $k = 0.003$. (2)

10. The diagram shows two positions of a student as she views the top of a tower.



From position B, the angle of elevation to T at the top of the tower is 64° .
 From position A, the angle of elevation to T at the top of the tower is 69° .
 The distance AB is 4.8 metres and the height of the student to eye level is 1.5 metres.

- Find the height of the tower. (6)

11. A record was kept of the number of packets of crisps sold each day in a school shop. The results are shown below.

Number of packets	Number of days
20 – 44	2
45 – 69	3
70 – 94	4
95 – 119	7
120 – 144	10
145 – 169	3
170 – 194	1

Calculate the mean number of packets sold.

(4)

12. Jim Grant borrows £3000 over 24 months with personal loan protection.

MONTHLY REPAYMENT TABLE				
	36 months		24 months	
Amount	W	W/o	W	W/o
£2000	£80.63	£71.40	£109.62	£98.98
£3000	£115.06	£102.46	£158.93	£143.97
£5000	£187.73	£167.56	£261.09	£236.83
£10 000	£375.48	£335.13	£522.16	£473.65

W = With personal loan protection

W/o = Without personal loan protection

Use the loan repayment table shown above to calculate how much his loan will cost.

(3)

[END OF QUESTIONS]

[C056/SQP105]

Intermediate 2

Mathematics

Specimen Marking Instructions 1 (Units 1, 2, 3)

Non-calculator Paper

NATIONAL
QUALIFICATIONS

Mathematics Intermediate 2 (Paper 1)

Qu

Marking Scheme
Give 1 mark for each •

Illustrations of evidence
for awarding a mark at each •

<p>1.</p>	<p>ans : 3/8</p> <ul style="list-style-type: none"> •¹ strategy: know to write probability as $x/\text{total number of outcomes}$ •² process: find probability <p>2 marks</p>	<ul style="list-style-type: none"> •¹ $\frac{\quad}{8}$ •² $\frac{3}{8}$
<p>2.</p>	<p>ans : $(x - 8)(x + 1)$</p> <ul style="list-style-type: none"> •¹ process: factorise binomial expression •² process: complete factorisation <p>2 marks</p>	<ul style="list-style-type: none"> •¹ one correct factor •² 2nd correct factor
<p>3a.</p>	<p>ans : 9 and 3</p> <ul style="list-style-type: none"> •¹ communicate: state upper and lower quartiles <p>1 mark</p>	<ul style="list-style-type: none"> •¹ 9 and 3
<p>3b.</p>	<p>ans : (possible) 13, 15, 15, 16, 17, 19, 22</p> <ul style="list-style-type: none"> •¹ strategy: identify upper, lower quartiles and median •² strategy: identify end points of the range •³ communicate: complete process correctly <p>3 marks</p>	<ul style="list-style-type: none"> •¹ 15, 16, 19 •² 13, 22 •³ any two valid measurements

Qu

Marking Scheme
Give 1 mark for each •

Illustrations of evidence
for awarding a mark at each •

<p>4.</p>	<p>ans : $(x - 4)^2 - 32$</p> <ul style="list-style-type: none">•¹ interpret: identify “<i>a</i>”•² interpret: identify “<i>b</i>” <p>2 marks</p>	<ul style="list-style-type: none">•¹ $a = -4$•² $b = -32$
<p>5.</p>	<p>ans : $y = 2x + 1$</p> <ul style="list-style-type: none">•¹ process: identify y intercept or evaluate “<i>c</i>” in $y = mx + c$•² process: find gradient•³ communicate: state equation of straight line <p>3 marks</p>	<ul style="list-style-type: none">•¹ 1•² 2•³ $y = 2x + 1$
<p>6a.</p>	<p>ans : $m + r = 180$</p> <ul style="list-style-type: none">•¹ interpret: start to interpret text•² interpret: complete interpretation <p>2 marks</p>	<ul style="list-style-type: none">•¹ $m + r$•² $m + r = 180$

Qu

Marking Scheme
Give 1 mark for each •

Illustrations of evidence
for awarding a mark at each •

<p>6b.</p>	<p>ans : $9m + 7.5r = 1500$</p> <p>•¹ interpret: start to interpret text</p> <p>•² interpret: complete interpretation</p> <p>2 marks</p>	<p>•¹ $9m + 7.5r$</p> <p>•² $9m + 7.5r = 1500$</p>
<p>6c.</p>	<p>ans : 100 maple trees; 80 rowan trees</p> <p>•¹ strategy: know to solve system of equations</p> <p>•² process: solve system of equations</p> <p>•³ communicate: state result</p> <p>3 marks</p>	<p>•¹ $m + r = 180$ $9m + 7.5r = 1500$</p> <p>•² $m = 100$ $r = 80$</p> <p>•³ 100 maple 80 rowan</p>

Qu

Marking Scheme
Give 1 mark for each •

Illustrations of evidence
for awarding a mark at each •

<p>7a.</p>	<p>ans $\frac{3\sqrt{5}}{5}$</p> <ul style="list-style-type: none"> •¹ strategy: know how to rationalise denominator •² process: simplify fraction <p>2 marks</p>	<ul style="list-style-type: none"> •¹ $\frac{3 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}}$ •² $\frac{3\sqrt{5}}{5}$
<p>7b.</p>	<p>ans : b</p> <ul style="list-style-type: none"> •¹ process: add indices in numerator •² process: subtract indices <p>2 marks</p>	<ul style="list-style-type: none"> •¹ b^2 •² b
<p>7c.</p>	<p>ans : $\frac{2x-10}{x(x-2)}$</p> <ul style="list-style-type: none"> •¹ process: state valid denominator •² process: find numerators of equivalent fractions •³ process: state answer in simplest form <p>3 marks</p>	<ul style="list-style-type: none"> •¹ $x(x-2)$ •² $5(x-2), 3x$ •³ $\frac{2x-10}{x(x-2)}$

[END OF MARKING INSTRUCTIONS]

[C056/SQP105]

Intermediate 2
Mathematics

Specimen Marking Instructions Paper 1
(Applications of Mathematics questions)
Non-calculator Paper

NATIONAL
QUALIFICATIONS

Mathematics Intermediate 2 (Paper 1) Applications of Mathematics questions

Qu	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4	<ul style="list-style-type: none"> •¹ interpret: identify rate per mile •² interpret: identify relevant formula •³ process: start to evaluate formula •⁴ process: calculate expenses 	<ul style="list-style-type: none"> •¹ 25p •² use of relevant formula •³ 100×25 $+ 29 \times 7p$ •⁴ £27.03
7 (a)	<ul style="list-style-type: none"> • interpret/communicate: state route 	<ul style="list-style-type: none"> • $Q \rightarrow S \rightarrow R \rightarrow Q \rightarrow P \rightarrow S \rightarrow T$
(b) (i)	<ul style="list-style-type: none"> •¹ strategy: start to draw tree diagram •² strategy: complete diagram correctly <div style="text-align: center; margin: 10px 0;"> <pre> graph LR A --- B A --- C B --- C B --- D C --- B C --- D C --- D D --- C D --- B </pre> </div>	<ul style="list-style-type: none"> •¹ 4 branches of tree •² completed tree diagram
(ii)	<ul style="list-style-type: none"> • strategy: calculate distance for each route • communicate: identify shortest route 	<ul style="list-style-type: none"> • evidence of calculations • $A \rightarrow C \rightarrow D \rightarrow B$

[END OF MARKING INSTRUCTIONS]

[C056/SQP105]

Intermediate 2

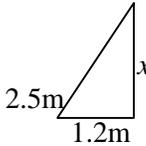
Mathematics

Specimen Marking Instructions 2 (Units 1, 2, 3)

NATIONAL
QUALIFICATIONS

Mathematics Intermediate 2 (Paper 2)

<p>1.</p>	<p>ans : $s = 3.35$</p> <ul style="list-style-type: none"> •¹ process: calculate $\frac{-}{x}$ •² process: calculate $(x - \frac{-}{x})^2$ •³ process: substitute in formula •⁴ process: calculate standard deviation <p>4 marks</p>	<ul style="list-style-type: none"> •¹ 73 •² 16, 4, 1, 25, 9, 1 •³ $\sqrt{\frac{56}{5}}$ •⁴ $s = 3.35$ (disregard rounding)
<p>2a.</p>	<p>ans : 650 m^3</p> <ul style="list-style-type: none"> •¹ strategy: know how to calculate volume of barn •² process: substitute into formulae for cuboid and half cylinder •³ process: calculate total volume •⁴ process: round answer to 2 significant figures <p>4 marks</p>	<ul style="list-style-type: none"> •¹ volume of cuboid + volume of $\frac{1}{2}$ cylinder •² $7 \times 12 \times 5$ $+ \frac{1}{2} \times \pi \times 3.5^2 \times 12$ •³ 650.9 m^3 •⁴ 650 m^3

<p>4.</p>	<p>ans : 4.69 m</p> <ul style="list-style-type: none"> •¹ strategy: marshal facts and know to use Pythagoras •² process: rearrange equation •³ process: calculate x •⁴ communicate: state the height <p>4 marks</p>	<ul style="list-style-type: none"> •¹  •² $x^2 = 2.5^2 - 1.2^2$ •³ $x = 2.19$ •⁴ 4.69 m
<p>5.</p>	<p>ans : NO + reason</p> <ul style="list-style-type: none"> •¹ strategy: identify crucial aspect •² strategy: know how to calculate level in 3 years •³ process: calculate within valid strategy •⁴ communicate: give response based on previous evidence <p>4 marks</p>	<ul style="list-style-type: none"> •¹ 161 •² $0.95^3 \times 161$ •³ 138 •⁴ NO, with reason

<p>6.</p>	<p>ans : $x = -3.6$ and 1.6</p> <ul style="list-style-type: none"> •¹ strategy: know to use the quadratic formula •² process: substitute correctly into quadratic formula •³ process: calculate $b^2 - 4ac$ •⁴ communicate: state 2 values of x correct to 1 decimal place <p>4 marks</p>	<ul style="list-style-type: none"> •¹ quadratic formula •² $x = \frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -6}}{2}$ •³ 28 •⁴ -3.6 and 1.6
<p>7a.</p>	<p>ans : 2, 7, 14, 18, 22, 24, 25</p> <ul style="list-style-type: none"> •¹ communicate: table with cumulative frequencies 	<ul style="list-style-type: none"> •¹ 2, 7, 14, 18, 22, 24, 25
<p>7b.</p>	<p>ans: median = 2, lower quartile = 1, upper quartile = 4</p> <ul style="list-style-type: none"> •¹ communicate: median •² communicate: lower quartile •³ communicate: upper quartile 	<ul style="list-style-type: none"> •¹ 2 •² 1 •³ 4

<p>8.</p>	<p>ans : 66.9°</p> <ul style="list-style-type: none"> •¹ strategy: marshal facts •² strategy: express arc as ratio of circumference •³ strategy: know how to find angle •⁴ process: carry out all calculations <p>4 marks</p>	<ul style="list-style-type: none"> •¹ evidence of link with circumference •² $\frac{7}{\pi \times 12}$ •³ $\frac{7 \times 360^\circ}{\pi \times 12}$ •⁴ 66.9°
<p>9.</p>	<p>ans : $k = dt + m$</p> <ul style="list-style-type: none"> •¹ process: "remove" denominator •² process: make k the subject <p>2 marks</p>	<ul style="list-style-type: none"> •¹ $dt = k - m$ •² $k = dt + m$

<p>10.</p>	<p>ans : 47.7 m</p> <ul style="list-style-type: none"> •¹ interpret: find size of angle ATB •² strategy: know to apply sine rule to find AT •³ process: substitute into sine rule •⁴ process: calculate TA •⁵ strategy: know to apply trigonometry to find TC (C on building horizontally aligned with A) •⁶ process: calculate TC and height of building 	<ul style="list-style-type: none"> •¹ $ATB = 5^\circ$ •² sine rule •³ $\frac{TA}{\sin 64^\circ} = \frac{4.8}{\sin 5^\circ}$ •⁴ $TA = 49.5 \text{ m}$ •⁵ $\frac{TC}{TA} = \sin 69^\circ$ •⁶ $TC = 46.2 \text{ m}$ $TA = 47.7 \text{ m}$
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<p>11a.</p>	<p>ans : $x = 73.4$ and 286.6</p> <ul style="list-style-type: none"> •¹ process: solve equation for $\cos x^\circ$ •² process: find one value for x •³ process: final 2nd value for x <p>3 marks</p>	<ul style="list-style-type: none"> •¹ $\cos x^\circ = \frac{2}{7}$ •² $x = 73.4$ •³ $x = 286.6$
<p>11b.</p>	<p>Proof</p> <ul style="list-style-type: none"> •¹ strategy: substitute $\cos^2 x$ for $1 - \sin^2 x$ •² communicate: state valid explanation <p>2 marks</p>	<ul style="list-style-type: none"> •¹ $\frac{\sin^2 x}{\cos^2 x}$ •² $\tan^2 x$

<p>12a.</p>	<p>ans : 18-2x</p> <ul style="list-style-type: none"> •¹ communicate: find formula <p>1 mark</p>	<ul style="list-style-type: none"> •¹ $18 - 2x$
<p>12b.</p>	<p>ans: Proof</p> <ul style="list-style-type: none"> •¹ communicate: state expression for volume in terms of x •² process: demonstrate clearly the result <p>2 marks</p>	<ul style="list-style-type: none"> •¹ $100 \times \pi \times (18 - 2x) \text{ cm}^3$ •² $1800x - 200x^2$
<p>12c.</p>	<p>ans: 100 cm by 9 cm by 4.5 cm</p> <ul style="list-style-type: none"> •¹ strategy: equate $1800x - 200x^2$ to zero •² process: solve equation for x •³ process: find x value for maximum volume •⁴ communicate: state the dimensions <p>4 marks</p>	<ul style="list-style-type: none"> •¹ $1800x - 200x^2 = 0$ •² $x = 0, x = 9$ •³ $x = 4.5$ •⁴ 100 cm by 9 cm by 4.5 cm

[END OF MARKING INSTRUCTIONS]

[C056/SQP105]

Intermediate 2
Mathematics

Specimen Marking Instructions Paper 2
(Applications of Mathematics questions)

NATIONAL
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Mathematics Intermediate 2 (Paper 2) Applications of Mathematics questions

Qu	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6	<ul style="list-style-type: none"> •¹ process: calculate taxable income •² strategy: know how to calculate lower rate of tax •³ strategy: know how to calculate middle rate of tax •⁴ process: calculate tax at lower and middle rate •⁵ process: calculate total amount of tax due 	<ul style="list-style-type: none"> •¹ £11 400 •² $0.1 \times \text{£}1500$ •³ $0.23 \times \text{£}(11\,400 - 1500)$ •⁴ £150 and £2277 •⁵ £2427
9 (a)	<ul style="list-style-type: none"> •¹ process: substitute into formula •² process: start evaluation •³ process: complete evaluation 	<ul style="list-style-type: none"> •¹ $20(1 + 0.002 \times 15)$ •² 1.03 •³ 20.6
(b)	<ul style="list-style-type: none"> •¹ process: substitute into formula •² process: calculate B 	<ul style="list-style-type: none"> •¹ $53 = B(1 + 20 \times 0.003)$ •² 50

Qu	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
11	<ul style="list-style-type: none"> •¹ process: calculate midpoints of intervals •² process: multiply midpoints by frequency •³ process: find totals •⁴ process: calculate mean 	<ul style="list-style-type: none"> •¹ 32, 57, 82, 107, 132, 157, 182 •² 64, 171, 328, 749, 1320, 471, 182 •³ 3285 and 30 •⁴ 109.5
12	<ul style="list-style-type: none"> •¹ interpret: identify monthly repayment •² process: calculate total repayment •³ process: calculate cost of loan 	<ul style="list-style-type: none"> •¹ £158.93 •² £3814.32 •³ £814.32

[END OF MARKING INSTRUCTIONS]

