

Calculator Model: _____

NAME:	CLASS:	INDEX NO:
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QUEENSWAY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2021
SECONDARY 2 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 1

4048/01**6th Oct 2021****1 hour**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction tape.

Answer **all** 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 .

At the end of the examination, fasten all your work securely together.

The number of marks is given in bracket [] at the end of each question or part question.

The total number of marks for this paper is 40.

This document consists of 10 printed pages.

Setter: Mr Tham YH

[Turn over

Answer **all** the questions

- 1(a) Use a calculator to evaluate $1.5^2 + \frac{\sqrt{64.27} - \sqrt[3]{-126.5}}{1.1\pi}$ and write down the first 5 digits.

Answer: _____ [1]

- (b) Write your answer to part (a) correct to 2 significant figures.

Answer: _____ [1]

- (c) Express $1\frac{4}{25}$ as a percentage.

Answer: _____ % [1]

2. It takes 12 men to dig a pond in 8 days.

- (a) How many men are required to dig the same pond in 6 days?

Answer: _____ [2]

- (b) State one assumption you made when doing your calculation in part (a). [1]

3(a) Simplify $\frac{x^2-y^2}{5h^3k} \div \frac{3x+3y}{10hk}$.

Answer: _____ [3]

(b) Solve $\frac{1-2p}{3} > \frac{-3p}{11}$.

Answer: _____ [2]

4. Solve the pair of simultaneous equations.

$$\frac{x}{3} + \frac{y}{2} = \frac{11}{6}$$

$$7x + 3y = 1$$

Answer: $x =$ _____

$y =$ _____ [3]

5. Expand and simplify each of the following expressions.

(a) $7x^2 - (2x - 1)(x + 1)$

Answer: _____ [2]

(b) $3(2p - 5)^2$

Answer: _____ [2]

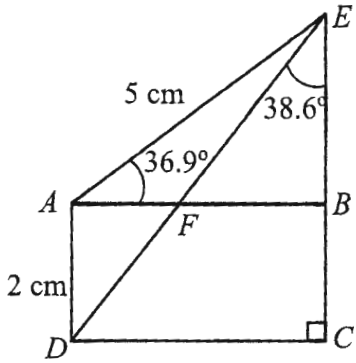
6. The time difference, t , in minutes, taken for an object to travel from point A to B and the return journey is given by the equation $(t + 6)(t - 8) = 72$.

By solving the equation $(t + 6)(t - 8) = 72$, find the time difference t , in minutes.

Answer: _____ minutes [3]

Tuition
with
Jason

7. In the diagram below, $AE = 5 \text{ cm}$, $AD = 2 \text{ cm}$, $\angle EAB = 36.9^\circ$ and $\angle DEB = 38.6^\circ$. DE is a straight line and F is a point on DE . Find,



(a) the length of AB ,

Answer: _____ cm [1]

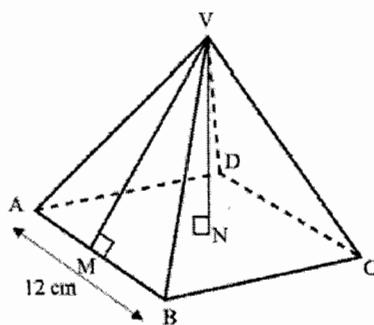
(b) the length of BE ,

Answer: _____ cm [1]

(c) the area of triangle AFE , correct to 2 significant figures.

Answer: _____ cm^2 [2]

8. ABCDV is a square pyramid with $AB = 12$ cm. M is the mid – point of AB.



- (a) Given that the volume of the pyramid is 720 cm^3 , find the vertical height of the pyramid, VN.

Answer: _____ cm [2]

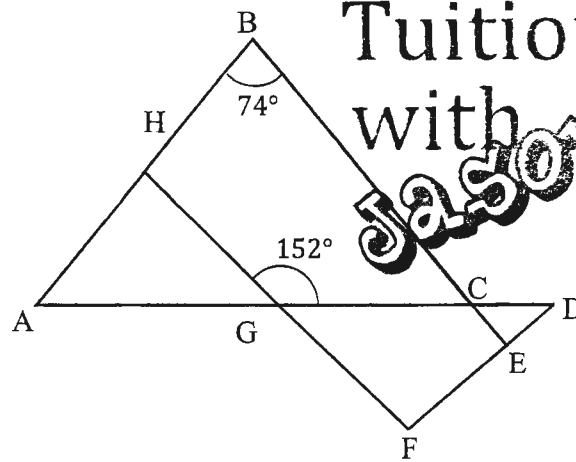
- (b) Calculate the length of VM.

Answer: _____ cm [1]

- (c) Find the total surface area of the pyramid.

Answer: _____ cm^2 [2]

9. In the diagram, ABC is an isosceles triangle with $\angle ABC = 74^\circ$ and $\angle HGC = 152^\circ$.
AC is produced to the point D. AGD, BCE and HGF are straight lines.



- (a) Find $\angle ACB$.

Answer: _____ $^\circ$ [1]

- (b) Given that triangle AHG and triangle DFG are congruent, find

- (i) $\angle GDF$,

Answer: _____ $^\circ$ [1]

- (ii) $\angle GFD$

Answer: _____ $^\circ$ [1]

- (c) Explain if triangle CDE is similar to triangle CAB.

_____ [2]

10. The time taken by 30 students to complete a task is tabulated in the table shown below.

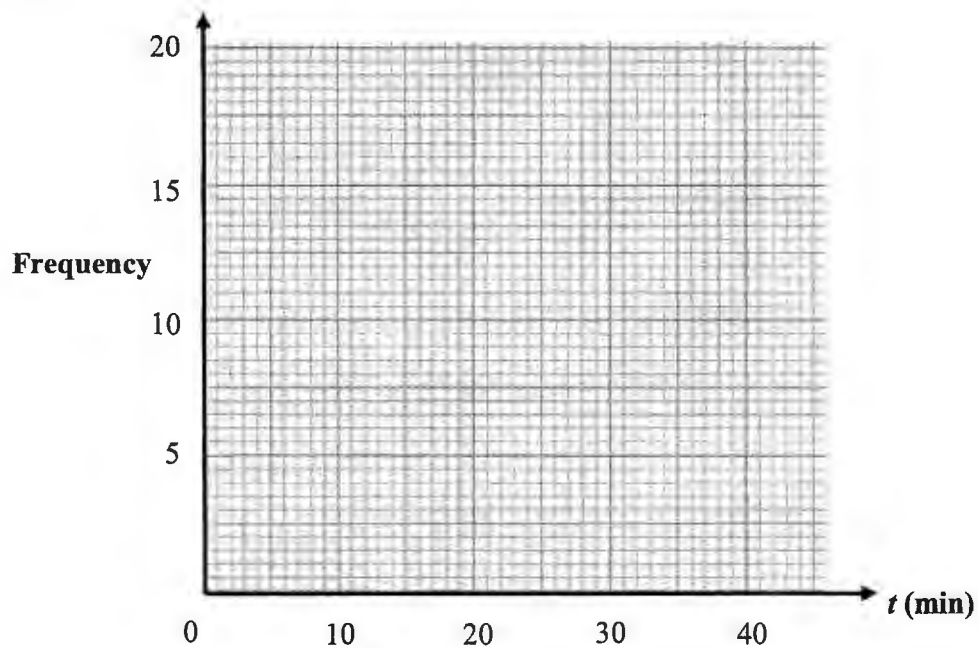
Time (in minutes)	Frequency
$0 < t \leq 10$	2
$10 < t \leq 20$	18
$20 < t \leq 30$	x
$30 < t \leq 40$	3

- (a) Find the value of x .

Answer: _____ [1]

- (b) On the grid, draw a histogram to represent the above information.

[2]



(c) Calculate the percentage of students who took between 10 minutes to 30 minutes to complete a task.

Answer: _____ % [1]

(d) Jialing says that the most common timing taken to complete the task is between 20 to 30 minutes. Explain if you agree with her.

[1]

End of Paper

Calculator Model: _____

NAME:	CLASS:	INDEX NO:
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QUEENSWAY SECONDARY SCHOOL
END OF YEAR EXAMINATION 2021
SECONDARY 2 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 2

4048/02**8th Oct 2021****1 hour 30 minutes**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction tape.

Answer **all** 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.

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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 bracket [] at the end of each question or part question.

The total number of marks for this paper is 60.

This document consists of 17 printed pages.

Setter: Ms Philynn Tan

[Turn over

Section A (28 marks)

1. (a) Make b the subject of $a\sqrt{b-c} = 2c$.

Answer: [1]

- (b) Simplify $\frac{8x^2-18}{2x^2-17x+21}$.

Answer: [3]

- (c) Express as a single fraction in its simplest form $\frac{3}{(x-4)^2} + \frac{2}{(4-x)}$.

Answer: [3]

2. A map is drawn to a scale of 1 cm to 0.3 km.
(a) The length of a road on the map is 10.5 cm.
Find the actual distance, in km, of the road.

Answer:km [1]

(b) A lake has an actual area of 6 km^2 .
Find the area, in cm^2 , of the lake on the map.



Answer: cm^2 [2]

(c) Find the scale of another map in the form $1:n$, if the actual area of the lake in part (b) is represented by an area of 24 cm^2 on this second map.

Answer: [2]

3. (a) Simplify $(4n + 3)^2 - 9$.

Answer: [2]

- (b) Given that n is an integer, determine if $(4n + 3)^2 - 9$ is a multiple of 8.
Show your working clearly. [1]

4. Lisa can wrap 120 gifts in 5 hours.

Alex can wrap 96 gifts in 4 hours.

Lisa and Alex are to work together to wrap 300 gifts.

If they continue to work at the same rate, how long will it take for them to wrap the 300 gifts? Give your answer in hours and minutes.

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Jason**

Answer:hours.....mins [3]

5. The stem-and-leaf diagram shows the distances travelled by taxi drivers from two companies.

Leaves for Company A	Stem	Leaves for Company B
2	4	0 2 3 7
4 4 4 4 1	5	0 8 9
7 0 0 0	6	0 0 4 8 9
	7	0 2 2

Key: 4|0 mean 40 km

- (a) Which class interval has the highest frequency for Company B?

Answer: [1]

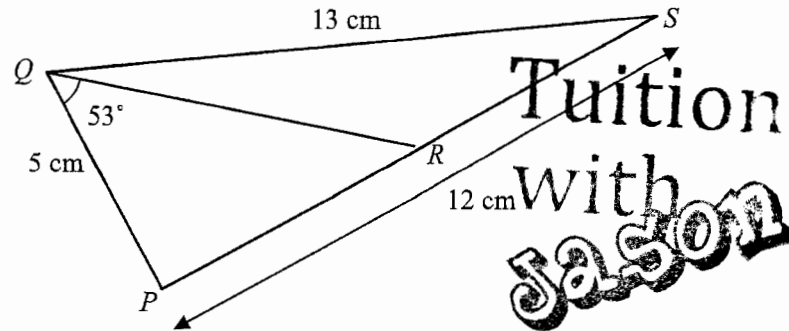
- (b) Find the fraction of taxi drivers who travelled more than 64 km.

Answer: [1]

- (c) Among the bottom 20% of drivers, what is the longest distance travelled?

Answer: [1]

6. In the diagram, $PQ = 5 \text{ cm}$, $PS = 12 \text{ cm}$, $QS = 13 \text{ cm}$ and $\angle PQR = 53^\circ$.



- (a) Show that triangle PQS is a right-angled triangle. [2]
- (b) Calculate the area of $\triangle QRS$.

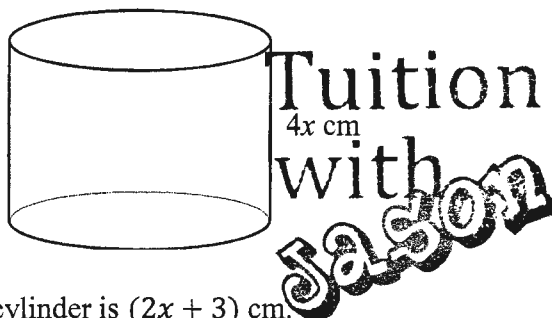
Answer:cm² [3]

- (c) Hence calculate the shortest distance from R to QS .

Answer:cm [2]

Section B (32 marks)

7. The height and the volume of a solid cylinder are $4x$ cm and $\pi(16x^3 + 48x^2 + 36x)$ cm³ respectively.



- (a) Show that the radius of the cylinder is $(2x + 3)$ cm. [3]

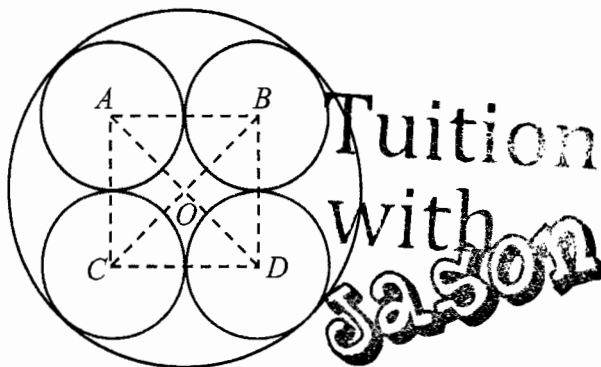
- (b) The total surface area of the solid cylinder is 90π cm². Write down an equation in x and show that it simplifies to $x^2 + 2x - 3 = 0$. [3]

- (c) Solve the equation $x^2 + 2x - 3 = 0$.

Answer: [2]

- (d) Explain why one of the values of x cannot be accepted. [1]

8. The diagram below shows the top view of a cylindrical box containing four spherical candles. O is the centre of the box. A , B , C and D are the centres of the candles. The radius of each candle is 3 cm.



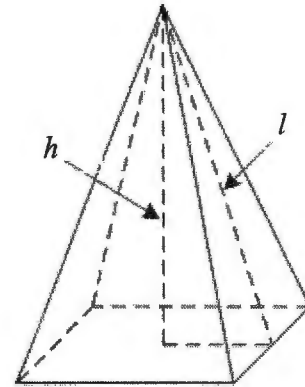
- (a) Calculate the volume of one spherical candle.

Answer: [2]

- (b) Show that the radius of the box is 7.243 cm, corrected to three decimal places. [2]

- (c) The four spherical candles are melted and recast into one large candle as shown below. The candle is of the shape of a square pyramid. The height of the pyramid is 1.5 times the length of the square base.

Find the height, h , of the pyramid.

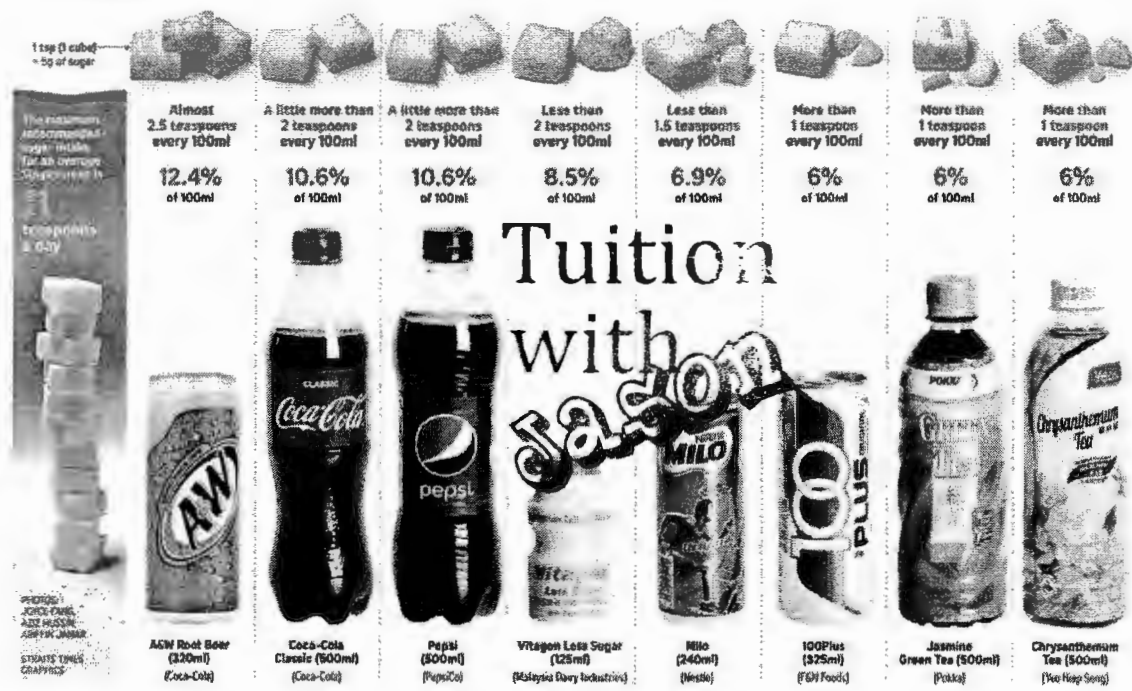


Answer: [3]

- (d) Find the slanted height, l , of the candle.

Answer: [2]

9. The infographic below shows the amount of sugar in some of the popular drinks sold in Singapore.



(a) How many bottles of Vitagen Less Sugar would have the same amount of sugar as 1 bottle of Pepsi? Round off your answer to the nearest whole number.

Answer: [2]

- (b) Find the sugar content of 1 can of Milo as a percentage of 1 bottle of Jasmine Green Tea.

Answer: [2]

- (c) Josh drinks 2 bottles of Pepsi daily. Due to risk of getting diabetes, his doctor has advised him to reduce his sugar intake to a maximum of 25 g per day. Josh still want to satisfy his cravings for sugar. He decided to switch to drinking 2 cans of 100Plus in a day.

Do you think his decision to switch to drinking 2 cans of 100Plus in a day satisfies his doctor's advice?

Justify your answer with clear working and reasoning. [2]

10. The following shows a table of values for the graph of $y = 5 + 3x - 2x^2$.

x	-2	-1	0	0.5	1	2	3
y	k	0	5	6	6	3	-4

(a) Calculate the value of k .

Answer: [1]

(b) Using a scale of 2 cm to represent 1 unit on the x -axis and 1 cm to represent 1 unit on the y -axis, plot the graph of $y = 5 + 3x - 2x^2$ for $-2 \leq x \leq 3$ on the next page. [3]

(c) From your graph,
(i) find y when $x = -0.5$,

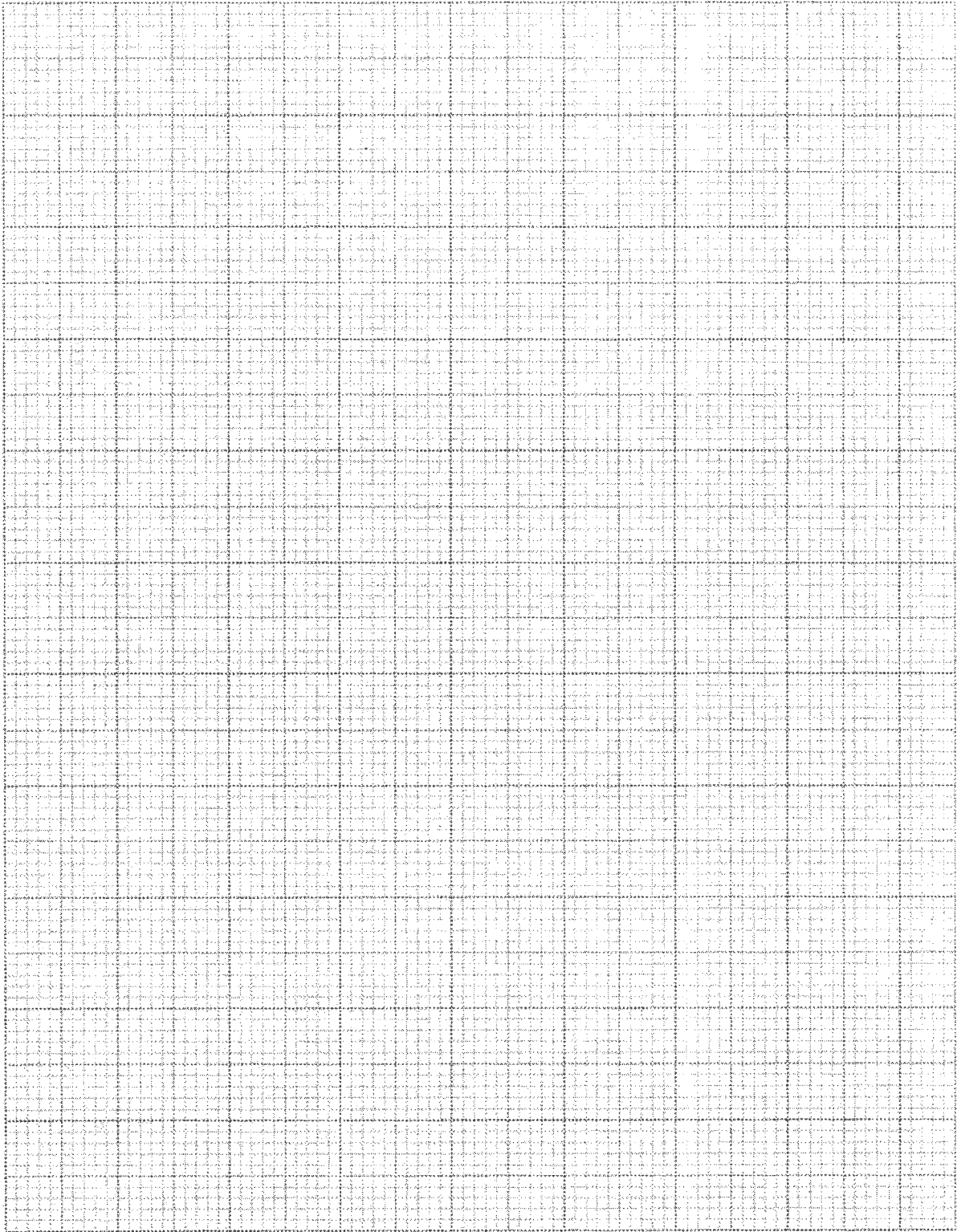
Answer: [1]

(ii) state the equation of the line of symmetry.

Answer: [1]

(d) By drawing an appropriate line, solve $5 + 3x - 2x^2 = -5$.

Answer: [2]



END OF PAPER

Calculator Model: _____

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QUEENSWAY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2021
SECONDARY 2 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 1

4048/01**6th Oct 2021****1 hour**

Candidates answer on the Question Paper.

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The total number of marks for this paper is 40.

This document consists of 10 printed pages.

Setter: Mr Tham YH

[Turn over

Answer **all** the questions

- 1(a) Use a calculator to evaluate $1.5^2 + \frac{\sqrt{64.27} - \sqrt[3]{-126.5}}{1.1\pi}$ and write down the first 5 digits.
 $= 6.0224$

A1

Answer: _____ [1]

- (b) Write your answer to part (a) correct to 2 significant figures.
 6.0 **A1**

Answer: _____ [1]

- (c) Express $1\frac{4}{25}$ as a percentage.
 $1\frac{4}{25} \times 100\%$
 $= 116\%$ **A1**

Answer: _____ % [1]

2. It takes 12 men to dig a pond in 8 days.

- (a) How many men are required to dig the same pond in 6 days?

12 men ----- 8 days
 12 × 8 men ----- 1 day
 96 men ----- 1 day
 $\frac{96}{6}$ men ----- 6 days
 16 men ----- 6 days
 16 men are required.

**Tuition
with
Jason**

A1

Answer: _____ [2]

- (b) State one assumption you made when doing your calculation in part (a). [1]

The men dig the pond at the same rate. **A1**

3(a). Simplify $\frac{x^2-y^2}{5h^3k} \div \frac{3x+3y}{10hk}$.

$$\begin{aligned} & \frac{x^2-y^2}{5h^3k} \div \frac{3x+3y}{10hk} \\ &= \frac{x^2-y^2}{5h^3k} \times \frac{10hk}{3x+3y} \\ &= \frac{(x-y)(x+y)}{5h^3k} \times \frac{10hk}{3(x+y)} && \text{M1} \\ &= \frac{x-y}{h^2} \times \frac{2}{3} && \text{M1} \\ &= \frac{2(x-y)}{3h^2} && \text{A1} \end{aligned}$$

Answer: _____ [3]

(b) Solve $\frac{1-2p}{3} > \frac{-3p}{11}$.

$$\begin{aligned} & \frac{1-2p}{3} > \frac{-3p}{11} \\ & 11(1-2p) > 3(-3p) && \text{M1} \\ & 11-22p > -9p \\ & 11 > 22p-9p \\ & 11 > 13p \\ & p < \frac{11}{13} && \text{A1} \end{aligned}$$

Answer: _____ [2]

4. Solve the pair of simultaneous equations.

$$\frac{x}{3} + \frac{y}{2} = \frac{11}{6}$$

$$7x + 3y = 1$$

$$\frac{x}{3} + \frac{y}{2} = \frac{11}{6} \text{ --- (1)}$$

$$7x + 3y = 1 \text{ --- (2)}$$

(1) $\times 6$:

$$2x + 3y = 11 \text{ --- (3)}$$

(2) - (3):

$$7x + 3y - (2x + 3y) = 1 - 11 \quad \text{M1}$$

$$7x + 3y - 2x - 3y = -10$$

$$5x = -10$$

$$x = -2$$

$$\text{Sub } x = -2 \text{ into (2)} \quad \text{A1}$$

$$7(-2) + 3y = 1$$

$$3y = 15$$

$$y = 5$$

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A1

Answer: $x =$ _____

$y =$ _____ [3]

5. Expand and simplify each of the following expressions.

$$\begin{aligned}
 \text{(a)} \quad & 7x^2 - (2x - 1)(x + 1) \\
 &= 7x^2 - (2x^2 + 2x - x - 1) \\
 &= 7x^2 - 2x^2 - 2x + x + 1 && \text{M1} \\
 &= 5x^2 - x + 1 && \text{A1}
 \end{aligned}$$

Answer: _____ [2]

$$\begin{aligned}
 \text{(b)} \quad & 3(2p - 5)^2 \\
 &= 3[(2p)^2 - 2(2p)(5) + (5)^2] \\
 &= 3(4p^2 - 20p + 25) \\
 &= 12p^2 - 60p + 75
 \end{aligned}$$

Answer: _____ [2]

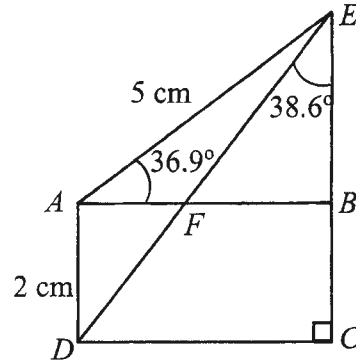
6. The time difference, t , in minutes, taken for an object to travel from point A to B and the return journey is given by the equation $(t + 6)(t - 8) = 72$.

By solving the equation $(t + 6)(t - 8) = 72$, find the time difference t , in minutes.

$$\begin{aligned}
 & (t + 6)(t - 8) = 72 \\
 & t^2 - 8t + 6t - 48 = 72 \\
 & t^2 - 2t - 120 = 0 && \text{M1} \\
 & (t - 12)(t + 10) = 0 && \text{M1} \\
 & t - 12 = 0 \quad \text{or} \quad t + 10 = 0 \\
 & t = 12 \quad \text{or} \quad t = -10 \text{ (rej)} && \text{A1}
 \end{aligned}$$

Answer: _____ minutes [3]

7. In the diagram below, $AE = 5 \text{ cm}$, $AD = 2 \text{ cm}$, $\angle EAB = 36.9^\circ$ and $\angle DEB = 38.6^\circ$. DE is a straight line and F is a point on DE . Find,



- (a) the length of AB ,

$$\begin{aligned}\cos 36.9^\circ &= \frac{AB}{5} \\ AB &= 5 \cos 36.9^\circ \\ AB &= 4.00 \text{ cm (to 3 s.f.)} \quad \mathbf{A1}\end{aligned}$$

Answer: _____ cm [1]

- (b) the length of BE ,

$$\begin{aligned}\sin 36.9^\circ &= \frac{BE}{5} \\ BE &= 5 \sin 36.9^\circ \\ BE &= 3.00 \text{ cm (to 3 s.f.)} \quad \mathbf{A1}\end{aligned}$$

Answer: _____ cm [1]

- (c) the area of triangle AFE , correct to 2 significant figures.

Alternative

$$\begin{aligned}\tan 38.6^\circ &= \frac{BF}{3} \\ BF &= 3 \tan 38.6^\circ \\ &= 2.39486 \\ AF &= 3.9984 - 2.39486 \\ &= 1.6035\end{aligned}$$

M1

$$\begin{aligned}\tan 38.6^\circ &= \frac{AF}{2} \\ AF &= 2 \tan 38.6^\circ \\ &= 1.59657\end{aligned}$$

M1

$$\begin{aligned}\text{Area} &= \frac{1}{2}(3)(1.6035) \\ &= 2.4 \text{ cm}^2\end{aligned}$$

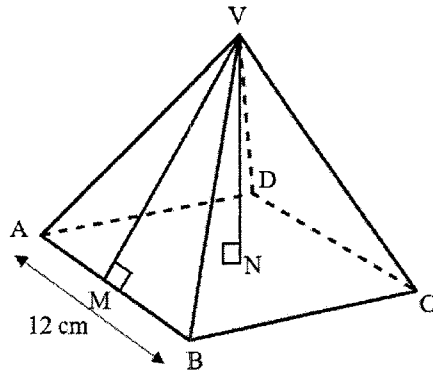
A1

$$\begin{aligned}\text{Area} &= \frac{1}{2}(1.59657)(3) \\ &= 2.4 \text{ cm}^2\end{aligned}$$

Tuition with Jason

Answer: _____ cm² [2]

8. ABCDV is a square pyramid with $AB = 12$ cm. M is the mid – point of AB.



- (a) Given that the volume of the pyramid is 720 cm^3 , find the length of the vertical height of the pyramid, VN.

volume of the pyramid = 720

$$\frac{1}{3}(12 \times 12) \times VN = 720 \quad \text{M1}$$

$$48VN = 720$$

$$VN = 15 \text{ cm}$$

A1

Answer: _____ cm [2]

- (b) Calculate the length of VM.

In $\triangle VMN$,
 $MN = 6 \text{ cm}$

$$VM^2 = VN^2 + NM^2$$

$$VM^2 = 15^2 + 6^2$$

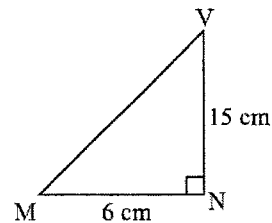
$$VM^2 = 261$$

$$VM = \sqrt{261}$$

$$VM = 16.155 \text{ cm (to 4 s.f.)}$$

$$VM = 16.2 \text{ cm (to 3 s.f.)}$$

A1



Answer: _____ cm [1]

- (c) Find the total surface area of the pyramid.

Total surface area of pyramid

= $4 \times$ Area of one lateral surface + Area of square base

$$= 4 \times \left(\frac{1}{2} \times 12 \times 16.155 \right) + 144 \quad \text{M1}$$

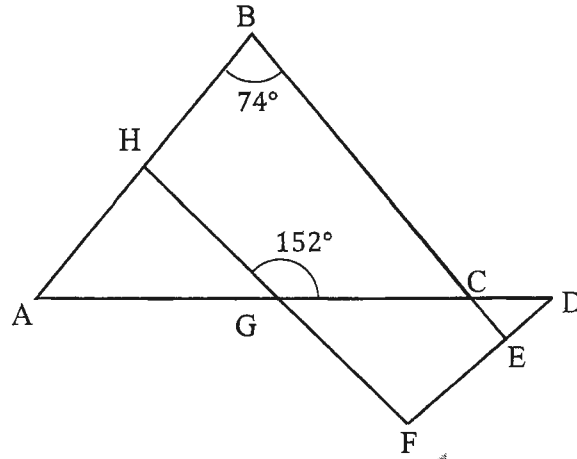
$$= 531.7296$$

$$= 532 \text{ cm}^2 \text{ (to 3 s.f.)}$$

A1

Answer: _____ cm^2 [2]

9. In the diagram, ABC is an isosceles triangle with $\angle ABC = 74^\circ$ and $\angle HGC = 152^\circ$.
AC is produced to the point D. AGD, BCE and HGF are straight lines.



- (a) Find $\angle ACB$.

$$\begin{aligned}\angle ACB &= \frac{180^\circ - 74^\circ}{2} \text{ (base } \angle \text{ of isos. } \Delta \text{)} \\ &= 53^\circ\end{aligned}$$

A1

Answer: _____ $^\circ$ [1]

- (b) Given that triangle AHG and triangle DFG are congruent, find

- (i) $\angle GDF$,

$$\begin{aligned}\angle HAG &= \frac{180^\circ - 74^\circ}{2} \text{ (base } \angle \text{ of isos. } \Delta \text{)} \\ &= 53^\circ\end{aligned}$$

$$\begin{aligned}\angle GDF &= \angle HAG \text{ (congruent } \Delta \text{)} \\ &= 53^\circ\end{aligned}$$

Tuition
with
Jason

Answer: _____ $^\circ$ [1]

- (ii) $\angle GFD$

$$\begin{aligned}\angle GFD &= 152^\circ - 53^\circ \text{ (ext. } \angle \text{ of } \Delta \text{)} \\ &= 99^\circ\end{aligned}$$

A1

Answer: _____ $^\circ$ [1]

- (c) Explain if triangle CDE is similar to triangle CAB. [2]

Yes as all the corresponding angles are equal.

A1

A1

10. The time taken by 30 students to complete a task is tabulated in the table shown below.

Time (in minutes)	Frequency
$0 < t \leq 10$	2
$10 < t \leq 20$	18
$20 < t \leq 30$	x
$30 < t \leq 40$	3

- (a) Find the value of x .

$$x = 30 - 2 - 18 - 3$$

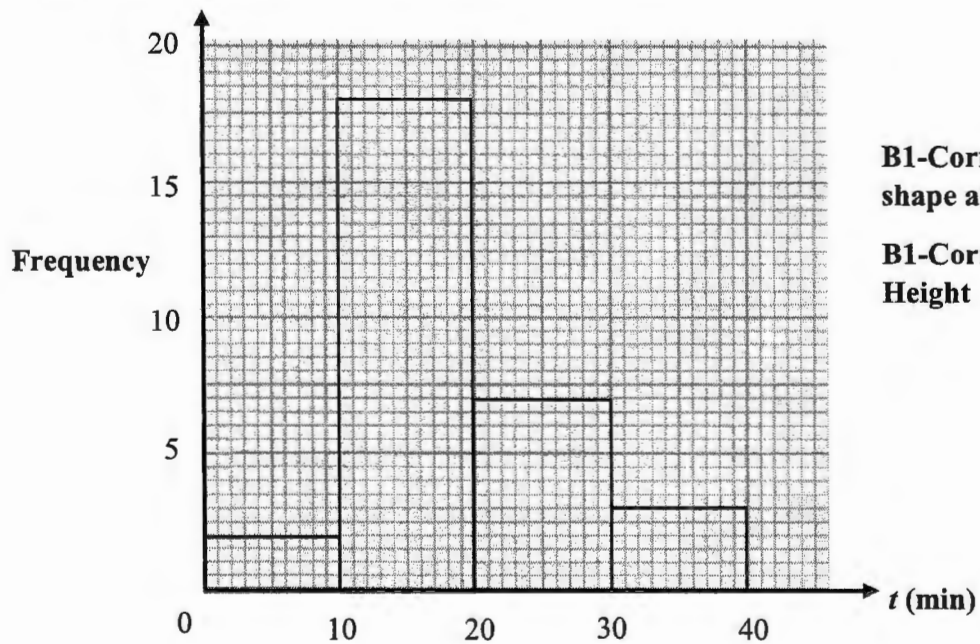
$$x = 7$$

Tuition
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Jason

Answer: _____ [1]

On the grid, draw a histogram to represent the above information.

[2]



- (c) Calculate the percentage of students who took between 10 minutes to 30 minutes to complete a task.

$$\begin{aligned}\text{Number of students who took between 10 minutes to 30 minutes} &= 18 + 7 \\ &= 25\end{aligned}$$

Required percentage

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

$$= 83\frac{1}{3}\% \quad \text{or} \quad 83.3\% \text{ (to 3 s.f.)}$$

**Tuition
with
Jason**

Answer: _____ % [1]

- (d) Jialing says that the most common timing taken to complete the task is between 20 to 30 minutes. Explain if you agree with her. [1]

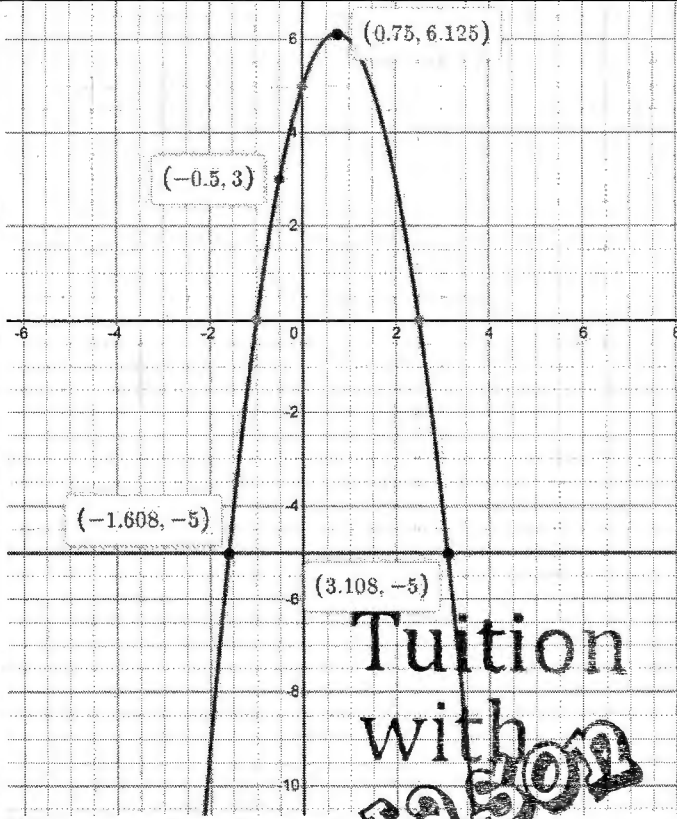
No I disagree. The timing from 10 to 20 minutes taken by students to complete the task is the highest therefore that should be the most common timing. **A1**

End of Paper

1.	(a)	$a\sqrt{b-c} = 2c$ $\sqrt{b-c} = \frac{2c}{a}$ $b-c = \frac{4c^2}{a^2}$ $b = \frac{4c^2}{a^2} + c$	A1
	(b)	$\frac{8x^2 - 18}{\frac{2x^2 - 17x + 21}{2(4x^2 - 9)}}$ $= \frac{(2x-3)(x-7)}{2(2x-3)(2x+3)}$ $= \frac{(x-7)}{2(2x+3)}$	M1 M1 A1
	(c)	$\frac{3}{(x-4)^2} + \frac{2}{(4-x)}$ $= \frac{3}{(x-4)^2} - \frac{2}{x-4}$ $= \frac{3-2x+8}{(x-4)^2}$ $= \frac{11-2x}{(x-4)^2}$	M1 M1 A1
2.	(a)	Map : Actual 1 cm : 0.3 km 10.5 cm : 0.3×10.5 $= 3.15 \text{ km}$	A1
	(b)	Map : Actual 1 cm ² : 0.09 km ² Area on map = $\frac{6}{0.09}$ $= 66\frac{2}{3} \text{ cm}^2$ or 66.7 cm^2	M1 A1
	(c)	Map : Actual 24 cm ² : 6 km ² 1 cm ² : 2.5 km ² Map scale: 1 cm : 0.5 km 1 cm : 50000 cm 1 : 50000	M1 A1
3.	(a)	$(4n+3)^2 - 9 = 16n^2 + 24n + 9 - 9$ $= 16n^2 + 24n$	M1 A1
	(b)	$(4n+3)^2 - 9 = 16n^2 + 24n$ $= 8(2n^2 + 3n)$	A1

4.		In 1 hr, Lisa wraps $\frac{120}{5}$ gifts, Alex wraps $\frac{96}{4}$ gifts In 1 hr, both can wrap $\frac{120}{5} + \frac{96}{4} = 48$ gifts Time taken = $\frac{300}{48}$ $= 6\frac{1}{4}$ hr $= 6$ hr 15 mins	M1 M1 A1
5.	(a)	60 – 69	B1
	(b)	$\frac{6}{25}$	B1
	(c)	$25 \times 20\% = 5$ $\therefore$ Longest distance travelled among the bottom 20% = 47	B1
6.	(a)	$QS^2 = 13^2$ $= 169$ $PS^2 + QP^2 = 12^2 + 5^2$ $= 169$ Since $QS^2 = QP^2 + PS^2$, by converse of Pythagoras' theorem, ΔPQS is a right-angled triangle.	M1 A1
	(b)	$\tan 53^\circ = \frac{PR}{5}$ $PR = 5 \times \tan 53^\circ$ $PR = 6.635$ Area of $\Delta QRS = \frac{1}{2} \times (12 - 6.635) \times 5$ $= 13.41$ $\approx 13.4 \text{ cm}^2$	M1 M1 A1
	(c)	$\frac{1}{2} \times 13 \times d = 13.41$ $d = 2.06 \text{ cm}$	M1 A1
7.	(a)	$\pi r^2(4x) = \pi(16x^3 + 48x^2 + 36x)$ $r^2(4x) = 16x^3 + 48x^2 + 36x$ $r^2 = 4x^2 + 12x + 9$ $r^2 = (2x + 3)^2$ $r = 2x + 3$ (shown)	M1 M1 A1
	(b)	$2\pi r^2 + 2\pi rh = 90\pi$ $2\pi(2x + 3)^2 + 2\pi(2x + 3)(4x) = 90\pi$ $(2x + 3)^2 + (2x + 3)(4x) = 45$ $12x^2 + 24x - 36 = 0$ $x^2 + 2x - 3 = 0$ (shown)	M1 M1 A1
	(c)	$x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x = -3$ or $x = 1$	M1 A1
	(d)	Length cannot be negative	B1

8.	(a)	Volume of 1 candle = $\frac{4}{3} \times \pi \times 3^3$ = 113.09 = 113 cm ³ (3sf)	M1 A1
	(b)	$BC = \sqrt{6^2 + 6^2}$ = 8.4852 Radius = $\frac{8.4852+2(3)}{2}$ = 7.2426 = 7.243 cm (shown)	M1 A1
	(c)	Let x be the length of the square base $\frac{1}{3}(x)^2(1.5x) = 4 \times 113.09$ $1.5x^3 = 1356.96$ $x^3 = 904.64$ $x = 9.6717$ Height = 1.5×9.671 = 14.5065 = 14.5 cm (3sf)	M1 M1 A1
	(d)	Slanted height = $\sqrt{14.5065^2 + \left(\frac{9.6717}{2}\right)^2}$ = 15.2908 = 15.3 cm (3sf)	M1 A1
9.	(a)	1 bottle of Vitagen has $125 \times 8.5\% = 10.625g$ of sugar 1 bottle of Pepsi has $500 \times 10.6\% = 53g$ of sugar $\therefore \frac{53}{10.625} = 4.988$ ≈ 5	M1 A1
	(b)	1 can of Milo has $240 \times 6.9\% = 16.56g$ of sugar 1 bottle of Jasmine Green Tea has $500 \times 6\% = 30g$ of sugar $\therefore \frac{16.56}{30} \times 100\% = 55.2\%$	M1 A1
	(c)	1 can of 100Plus has $325 \times 6\% = 19.5g$ of sugar 2 cans of 100Plus has $19.5 \times 2 = 39g$ of sugar No, his suggestion does not satisfy the doctor's advice as the amount of sugar in 2 cans of 100Plus is higher than the advised sugar intake.	M1 B1

10.	(a)	$k = -9$	B1
	(b)	 B1 – points plotted correctly B1 – smooth curve B1 – correct scale and label of graph and axes.	
	(c)	(i) $y = 3$	A1
		(ii) $x = 0.75$	A1
	(d)	Draw $y = -5$ on graph $x = -1.6$ or 3.1	M1 A1

