NAME:	CLASS:	INDEX NO:

QUEENSWAY SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2022

SECONDARY 1 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 1

4048/01

3 October 2022

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.

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 **11** printed pages.

Setter: Ms Goh Hui Min

[Turn over

Answer **all** the questions.

1 **(a)** Express 324 as a product of its prime factors.

Answer ..... [1]

(b) Hence, explain why 324 is a perfect square.

Answer .....

..... [1]

(c) Find the smallest value of k given that $\frac{324}{k}$ is a perfect cube.

Answer $k =$ ..... [1]

2 **(a)** Some numbers are listed below.

$$-\frac{\sqrt{3}}{2} \qquad 0.\dot{4} \qquad 2 \qquad \pi^2$$

List the rational number(s).

Answer ..... [1]

(b) **Without using a calculator**, evaluate

$$5\frac{6}{7} - 0.8 \times \left(-\frac{9}{2}\right)$$

Answer ..... [2]

3 **(a)** One of the top ten endangered species is the Asian elephant. It is estimated that there are 30 000 Asian elephants left in the wild, rounded off to 2 significant figures.

Write down the minimum and maximum number of Asian elephants that could be left in the wild.

Answer Minimum number = ... [1]

Maximum number = ... [1]

(b) The table shows the number of Asian elephants found in different countries of Southeast Asia. There is a total of 10655 Asian elephants.

Country	Number of Asian elephants	Percentage of Asian elephants (%)
Cambodia	250	2
Indonesia	2280	21
Laos	780	7
Malaysia	1250	12
Myanmar	3000	28
Thailand	3000	28
Vietnam	95	1

Explain why the percentage of Asian elephants sums to 99%, instead of 100%.

Answer .....

.....

.....[1]

4 **(a)** Expand and simplify $3c\,(2a - 2b) - 4bc\,(1 - c)$.

Answer ..... [2]

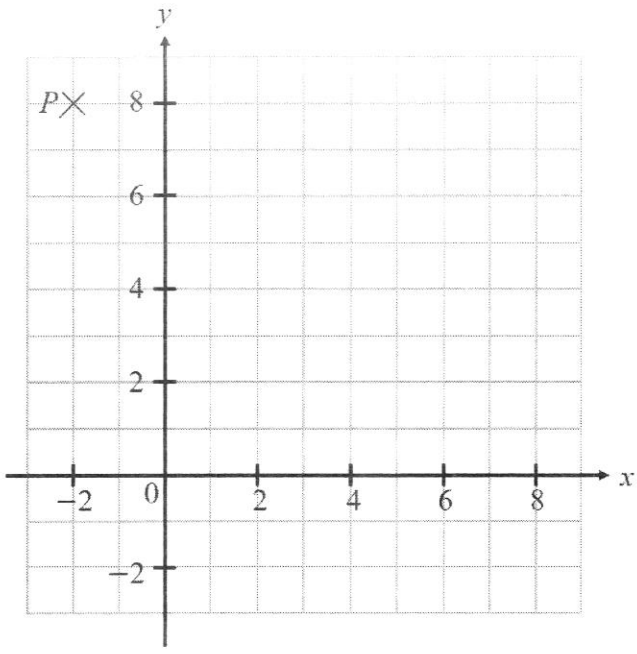
(b) Some sweets are being packed into boxes.

Packing x sweets into boxes of 6 requires three more boxes than packing $(x - 2)$ sweets into boxes of 8.

Form an equation in terms of x and find the value of x.

Answer $x =$ ..... [3]

5 The figure shows the point P plotted on a Cartesian plane.



(a) Plot the point Q (4, 2). [1]

(b) For the line that passes through points P and Q, find

(i) the y-intercept,

Answer y-intercept = ... [1]

(ii) the gradient.

Answer Gradient = ... [1]

6 A number sequence is shown below.

$$5, -3, -11, -19, \ldots$$

(a) Write down an expression, in terms of n, for the n^{th} term of this sequence.

Answer ..... [1]

(b) Hence, find the 20^{th} term of this sequence.

Answer ..... [1]

(c) Explain whether –36 is a term in this sequence.

Answer .....

.....[1]

7 The price of a game console, after 7% GST, is $577.80.

(a) Find the original price of the game console.

Answer $..... [1]

(b) "An increase in GST by 2 percentage points will lead to an increase in the price of the game console, after GST, by exactly 2%".

State whether you agree with the statement. Show workings to support your answer.

Answer .....

.....[2]

8 A caterpillar that is 7 cm long crawls at a speed of 45 cm/s.

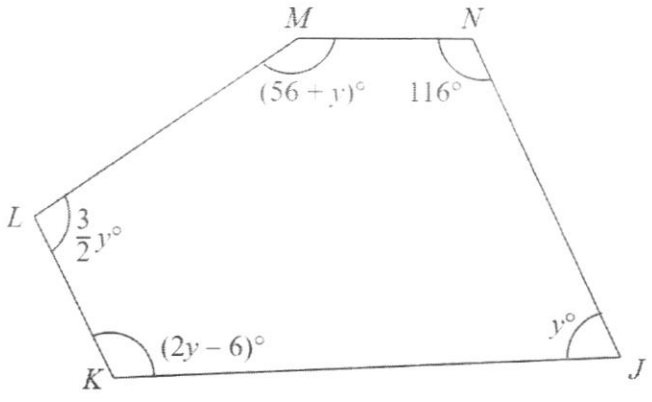
(a) Convert 45 cm/s to m/min.

Answer .....m/min [2]

(b) The caterpillar takes 0.8 s to crawl through a water pipe completely. Calculate the length of the water pipe.

Answer .....cm [2]

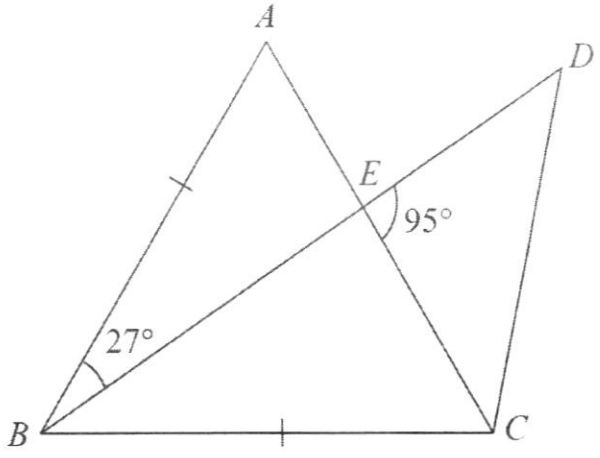
9 The diagram shows an irregular polygon, *MNJKL*.



Form an equation in terms of y and find the value of y.

Answer y = ... [2]

10 In the diagram below, AEC and BED are straight lines. AB and BC are equal in length. Angle $ABE = 27°$ and angle $DEC = 95°$



Stating your reasons clearly, find

(a) angle ACB,

Answer .....° [3]

(b) reflex angle ABC.

Answer .....° [2]

11 **(a)** Construct a triangle XYZ where $XY = 7$ cm, angle $ZXY = 70°$ and angle $ZYX = 25°$.

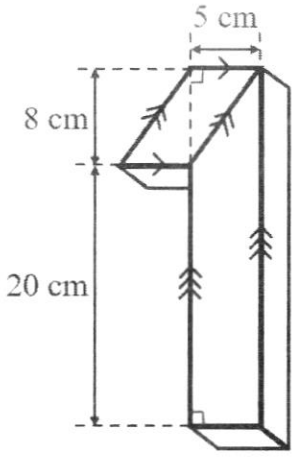
Answer

[2]

(b) Measure the length of YZ.

Answer YZ = ... cm [1]

12 The diagram shows a 3D model of the number "1".
It is a solid prism with a cross-section composed of a parallelogram and a trapezium.



(a) Find the cross-sectional area of the prism.

Answer .....cm^2 [2]

(b) Given that the prism has a depth of 3 cm, find its volume.

Answer ..... cm^3 [1]

End of Paper

NAME:	CLASS:	INDEX NO:

QUEENSWAY SECONDARY SCHOOL

END OF YEAR EXAMINATION 2022

SECONDARY 1 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 2

4048/02
6th OCT 2022
1 hour 30 minutes

Candidates answer on the Question Paper

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces provided at the top of this page.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction tape.

Answer **all** the questions.
Write your answers and working in the spaces provided.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The use of an approved scientific calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.
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 60.

This document consists of 18 printed pages.

Setter: Mr Tham YH

[Turn over

Section A (28 marks)

1. **(a)** By rounding each number to 2 significant figures, estimate the value of $\frac{21.1+\sqrt{15.98}}{0.499\times10.3}$.

Answer .....[2]

(b) When written as a product of their prime factors,

p is $2^5 \times 3^2$,
q is $2^2 \times 3^4 \times 5^2$,
r is $2^2 \times 3 \times 5^3 \times 11$

Find the greatest number that will divide p, q and r exactly.

Answer .....[1]

2. **(a)** One plate of chicken rice costs $\$x$ and a bowl of prawn noodle costs 50 cents more than the chicken rice. Ryan ordered 4 plates of chicken rice and 2 bowls of prawn noodle and the total cost is \$25.
Find the total cost of 3 plates of chicken rice and a bowl of prawn noodle.

Answer \$ ..... [3]

(b) There are three sirens, *A*, *B* and *C* on Happy Island. Siren *A* will sound off every 12 minutes, Siren *B* will sound off every 30 minutes and Siren *C* will sound off every 40 minutes. If they started sounding off at 8 am, what time will the three sirens sound off together at the same time again?

Answer ..... [2]

3. **(a)** \$680 is shared among three friends, Muthu, Ming and Yusof in the ratio $p : (2p - 1) : (2p + 1)$, where p is a positive integer.
Showing your working, find the value of p.

Answer $p =$ ..... [2]

(b) Hence, find the amount of the largest share.

Answer \$ ..... [1]

4. Bryan bought a skateboard at a price of $185 from Ali.
Ali made a loss of 5% from the sale of the skateboard.

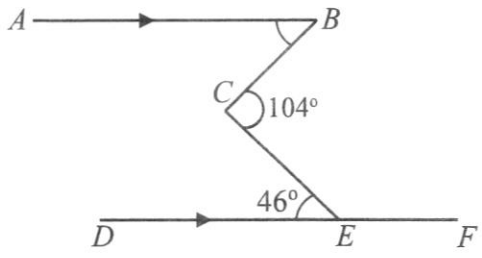
(a) Calculate the cost price of the skateboard.

Answer $ ..... [2]

(b) Bryan decided to sell the skateboard after 1 year. How much must he sell in order to make a profit of 8%?

Answer $ ..... [2]

5. In the figure, AB is parallel to DF.



Jenny claimed that angle $ABC = 180° - 46°$ due to interior angles.
By showing your working with reasons, state whether you agree or disagree with her.

Answer

[3]

6. **(a)** Solve the equation $\frac{y}{3} + \frac{2y-1}{4} = 1$.

Answer ..... [3]

(b) Given that $D = \sqrt{b^2 - 4ac}$, find the value of D when $b = -8$, $a = 3$ and $c = 2$.

Answer $D =$ ..... [1]

7. During a vacation, Mr Raj drove his car from Town A to Town B at an average speed of 75 km/h for 80 km. He continued his journey from Town B to Town C at an average speed of 55 km/h for 66 km.

(a) Calculate the time taken for the entire journey.
Give your answer in hours and minutes.

Answer ..... h .....min [2]

(b) Find the average speed for its entire journey, giving your answer correct to 1 decimal place.

Answer .....km/h [2]

(c) Convert your answer in part (b) to m/s.

Answer .....m/s [2]

Section B (32 marks)

8. Shi Kai bought a new unsharpened pencil in the shape of a cylinder. The pencil has a length of 20 cm and the diameter is 2 cm as shown in Figure 1. Shi Kai then sharpened the pencil. Figure 2 shows the sharpened pencil in the shape of a cylinder and a cone after use.

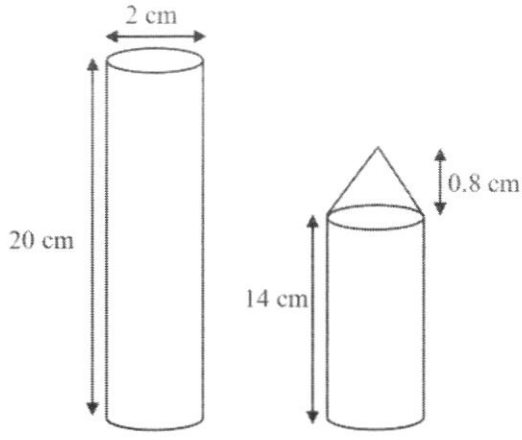


Figure 1 Figure 2

(a) Find the total surface area of the unsharpened pencil.

Answer ..... cm^2 [1]

(b) Given that the volume of the cone is 0.8378 cm^3, find the total volume of the sharpened pencil as shown in Figure 2.

Answer ..... cm^3 [2]

(c) Calculate the volume of the pencil he has used.

Answer ..... cm^3 [1]

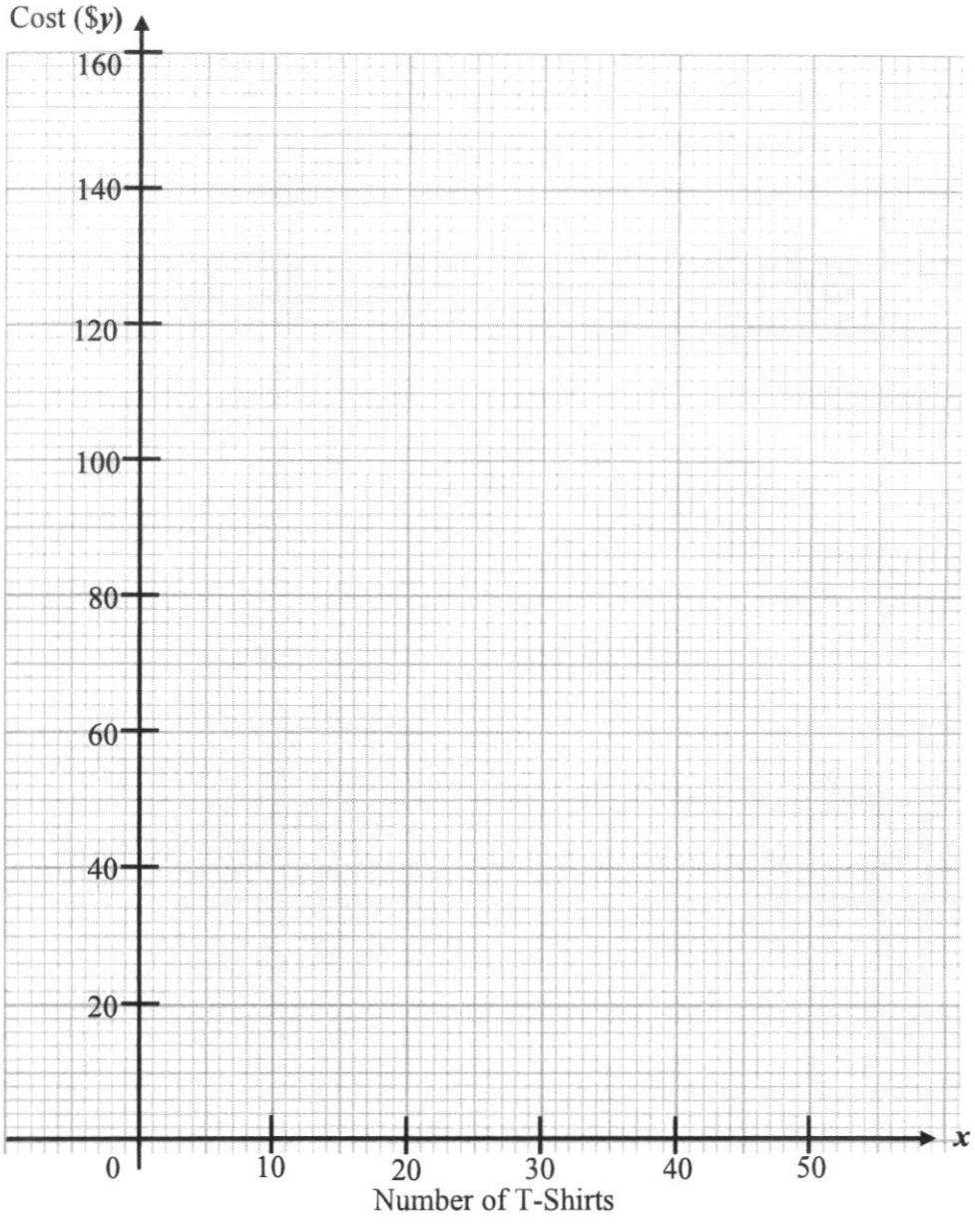
9. The cost, $\$y$, of printing x number of T-shirts, is given by the equation $y = 3x + 30$.
The table below shows some values of x and y.

x	10	20	30	40
y	60	90	a	150

(a) Calculate the value of a.

Answer $a =$ ..... [1]

(b) On the grid, draw the graph of $y = 3x + 30$ for $0 \leq x \leq 40$. [2]



(c) Use your graph to find the number of T-shirts that are printed when the cost is $66.

Answer .... [1]

(d) Explain what 30 in the equation represents.

Answer ....

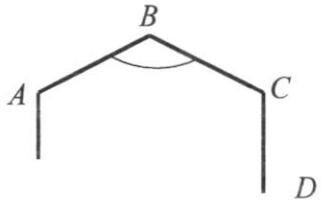
....

.... [1]

10. **(a)** Calculate the size of one interior angle of a regular pentagon.

Answer .....° [2]

(b) The diagram shows part of a regular n-sided polygon $ABCD\ldots$. The size of one interior angle to one exterior angle is in the ratio 2 : 1.



(i) Calculate the angle ABC.

Answer .....° [2]

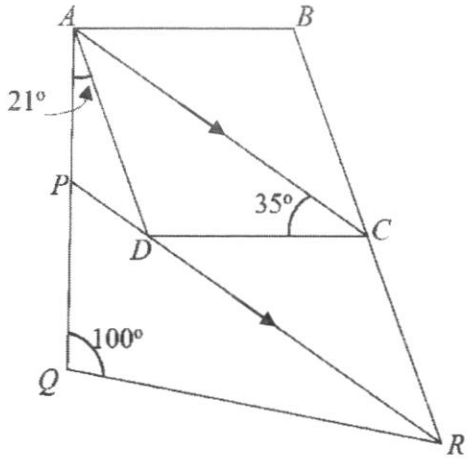
(ii) Calculate the angle ACD.

Answer .....° [2]

(iii) Find the value of n.

Answer n = ...[1]

11. In the diagram, $ABCD$ is a rhombus.
PDR, APQ and BCR are straight lines.
AC is parallel to PR.
Angle $PAD = 21°$, angle $ACD = 35°$ and angle $PQR = 100°$.



Calculate

(a) angle ADC,

Answer .....° [2]

(b) angle APD,

Answer .....° [2]

(c) angle PRQ.

Answer .....° [1]

(d) Given that the area of the rhombus $ABCD$ is 94 cm^2 and the perpendicular height of the rhombus is 9.4 cm, find the perimeter of the rhombus.

Answer ..... cm [2]

12. The information below shows the prices of the tickets to a museum.

The prices shown below are before discount.

- 1 Adult Ticket : $24
- 1 Child Ticket : $18
- 1 Senior Citizen (60 years old and above) Ticket : $20

Purchase Online

5% discount of total tickets purchased

Purchase of tickets On-Site

- *A-Card* Member
  Enjoy 10% off an adult ticket

- *C-Card* Member
  Enjoy 8% off a children ticket

- *S-Card* Member
  Enjoy 15% off 1 Senior Citizen ticket

Mr Lee and Mrs Lee, both 55 years old, his elderly father of 80 years old and their 2 children are planning to visit the museum.

(a) Calculate the amount Mr Lee needs to pay if he buys the tickets online.

Answer $ ..... [2]

(b) If Mr Lee intends to bring only his children to the museum and buys on-site using *C-Card*, calculate the amount he needs to pay.

Answer $ ………………………………… [2]

(c) Mrs Lee claims that using the *S-Card* membership to buy the 5 tickets will be the cheapest alternative. Do you agree?
Show your working clearly.

Answer ……………………………… ………………………………………

……………………………… ……………………………………… ……….

……………………………… ……………………………………… ……. [4]

(d) State one assumption for your choice.

Answer ……………………………… ………………………………………

……………………………… ……………………………………………. [1]

--------End of Paper -------

NAME:	CLASS:	INDEX NO:

QUEENSWAY SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2022

SECONDARY 1 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 1

4048/01

3 October 2022

1 hour

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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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 40.

Note:
Deduct 1 mark overall for any issues with
- clear presentation (e.g. no indication of what each step is calculating).
- rounding off to 3sf / 1dp (only relevant to 8b).

1 **(a)** Express 324 as a product of its prime factors.

$324 = 2^2 \times 3^4$ **B1**

(b) Hence, explain why 324 is a perfect square.

All the powers of its prime factors are even
OR
$324 = (2 \times 3^2)^2$ **B1**

(c) Find the smallest value of k given that $\frac{324}{k}$ is a perfect cube.

$k = 2^2 \times 3$
$= 12$ **B1**

2 **(a)** Some numbers are listed below.

$$-\frac{\sqrt{3}}{2} \qquad 0.\dot{4} \qquad 2 \qquad \pi^2$$

List the rational number(s).

$0.\dot{4}$, 2 **B1**

(b) **Without using a calculator**, evaluate

$$5\frac{6}{7} - 0.8 \times \left(-\frac{9}{2}\right)$$

$5\frac{6}{7} - 0.8 : \quad 5\frac{6}{7} - \frac{4}{5} \times \left(-\frac{9}{2}\right)$
$= 5\frac{6}{7} + \frac{18}{5}$ **M1**
$= 5\frac{30}{35} + 3\frac{21}{35}$
$= 9\frac{16}{35}$ **A1** *Answer must be in mixed number*

3 **(a)** One of the top ten endangered species is the Asian elephant. It is estimated that there are 30 000 Asian elephants left in the wild, rounded off to 2 significant figures.

Write down the minimum and maximum number of Asian elephants that could be left in the wild.

Minimum number = 29500 B1

Maximum number = 30499 B1

(b) The table shows the number of Asian elephants found in different countries of Southeast Asia. There is a total of 10655 Asian elephants.

Country	Number of Asian elephants	Percentage of Asian elephants (%)
Cambodia	250	2
Indonesia	2280	21
Laos	780	7
Malaysia	1250	12
Myanmar	3000	28
Thailand	3000	28
Vietnam	95	1

Explain why the percentage of Asian elephants sums to 99%, instead of 100%.

100 % has three significant figures, but the percentage of asian elephants in each country is expressed in one or two/ fewer significant figure, resulting in rounding

B1

4 **(a)** Expand and simplify $3c\,(2a - 2b) - 4bc\,(1 - c)$.

$3c\,(2a - 2b) - 4bc\,(1 - c) = 6ac - 6bc - 4bc + 4bc^2$ **M1**

$= 6ac - 10bc + 4bc^2$ **A1**

(b) Some sweets are being packed into boxes.

Packing x sweets into boxes of 6 requires three more boxes than packing $(x - 2)$ sweets into boxes of 8.

Form an equation in terms of x and find the value of x.

$\frac{x}{6} - \frac{x-2}{8} = 3$ *M1 Accept any equivalent form of thr equation*

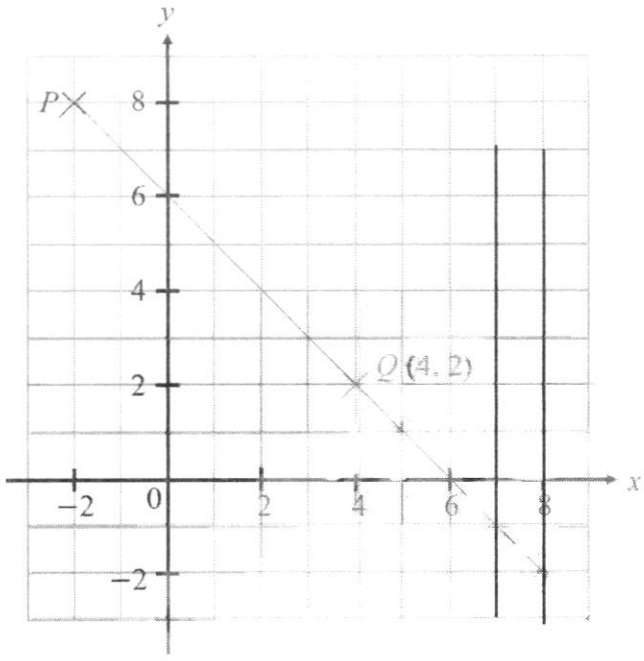
$\frac{4x-3(x-2)}{24} = 3$

$\frac{4x-3x+6}{24} = 3$

$4x - 3x + 6 = 72$ M1 *correctly combine into single fraction and remove denominator*

$x = 66$ **A1**

5 The figure shows the point P (–2, 8) plotted on a Cartesian plane.



(a) Plot the point Q (4, 2). **B1** *Refer to figure*

(b) For the line that passes through points P and Q, find

(i) the y-intercept.

y-intercept = 6 **B1**

(ii) its gradient.

$$\text{Gradient} = \frac{-6}{6}$$
$$= -1$$ **B1**

6 A number sequence is shown below.

$$5, -3, -11, -19, \ldots$$

(a) Write down an expression, in terms of n, for the n^{th} term of this sequence.

$T_n = 13 - 8n$ **B1**

(b) Hence, find the 20^{th} term of this sequence.

$T_{20} = 13 - 8(20)$
$= -147$ **B1**

(c) Explain whether –36 is a term in this sequence.

Suppose –36 is a term in this sequence
$T_n = -36$
$13 - 8n = -36$
$-8n = -49$
$n = 6.125$ **B1**
Since n is not a positive integer / whole number, –36 is not a term in this sequence.

7 The price of a game console, after 7% GST, is \$577.80.

(a) Find the original price of the game console.

$$\text{Original price} = \frac{100}{107} \times 577.80$$
$$= \$540$$ **B1**

(b) "An increase in GST by 2 percentage points will lead to an increase in the price of the game console, after GST, by exactly 2%".

State whether you agree with the statement. Show workings to support your answer.

$$\text{Price with 9\% GST} = \frac{109}{100} \times 540$$
$$= \$588.60$$ **M1**

$$\text{Percentage increase in price} = \frac{588.60 - 577.80}{577.80} \times 100\%$$
$$\approx 1.87\% \text{ (3 s.f.) which is not 2\%}$$ **A1**

Thus, I <u>disagree</u>.

8 A caterpillar that is 7 cm long crawls at a speed of 45 cm/s.

(a) Convert 45 cm/s to m/min.

$$45 \text{ cm/s} = \frac{0.45 \text{ m}}{\frac{1}{60} \text{ min}}$$ **M1**

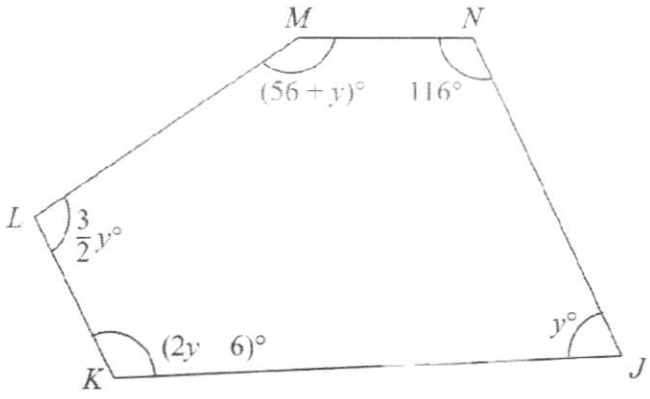
$$= 27 \text{ m/min}$$ **A1**

(b) The caterpillar takes 0.8 s to crawl through a water pipe completely. Calculate the length of the water pipe.

$$\text{Length of pipe} = 45 \times 0.8 - 7$$ **M1**
$$= 29 \text{ cm}$$ **A1**

Answer .....cm [2]

9 The diagram shows an irregular polygon, $MNJKL$.



Form an equation in terms of y and find the value of y.

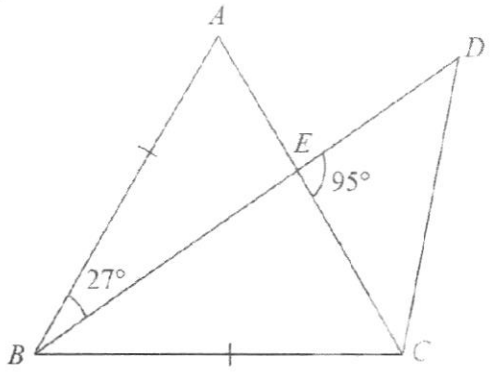
$y° + (2y - 6)° + \frac{3}{2}y° + (56 + y)° + 116° = (5 - 2)(180°)$ **M1**

$\frac{11}{2}y° + 166° = 540°$

$\frac{11}{2}y° = 374°$

$y = 68$ **A1**

10 In the diagram below, AEC and BED are straight lines. AB and BC are equal in length. Angle $ABE = 27°$ and angle $DEC = 95°$



Stating your reasons clearly, find

(a) angle ACB,

$\angle AEB = 95°$ (vert. opp. $\angle$s) **M1**

$\angle ACB = \angle CAB$ (base $\angle$s in isos. Δ)
$= 180° - 27° - 95°$ (sum of $\angle$s in Δ) **M1**
$= 58°$ **A1**

Note: Deduct 1 mark for part (a) if angle properties are not clearly stated.

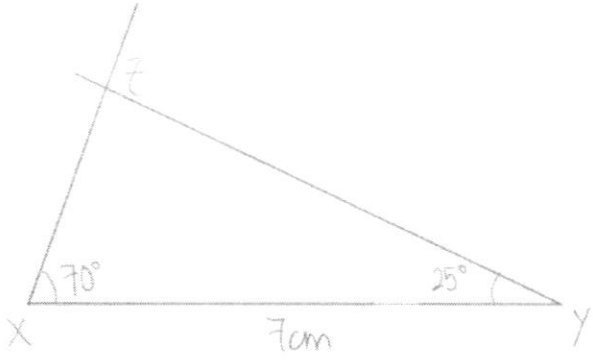
(b) reflex angle ABC.

acute $\angle ABC = 180° - 58° - 58°$ (sum of $\angle$s in Δ) **M1**
$= 64°$

reflex acute $\angle ABC = 360° - 64°$ ($\angle$s at a pt.)
$= 296°$ **A1**

Note: Deduct 1 mark for part (b) if angle properties are not clearly stated.

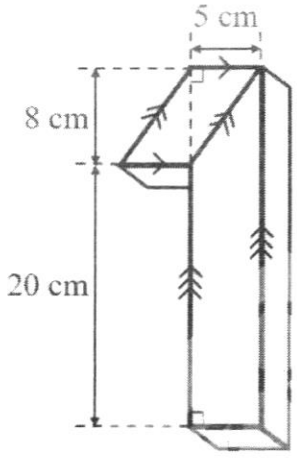
11 **(a)** Construct a triangle XYZ where $XY = 7$ cm, angle $ZXY = 70°$ and angle $ZYX = 25°$.



$XY = 7$ cm **B1**
Two lines drawn at angle of 70° and 25°, intersecting at Z **B1**

(b) Measure the length of YZ.
$YZ = 6.6 \pm 0.1$ cm **B1**

12 The diagram shows a 3D model of the number "1".
It is a solid prism with a cross-section composed of a parallelogram and a trapezium.



(a) Find the cross-sectional area of the prism.

Cross-sectional area $= 5 \times 8 + \frac{1}{2}(20 + 28)(5)$ **M1**

$= 160 \text{ cm}^2$ **A1**

(b) Given that the prism has a depth of 3 cm, find its volume

Volume $= 160 \times 3$

$= 480 \text{ cm}^3$ **B1**

End of Paper

Calculator Model: _____

NAME:	CLASS:	INDEX NO:

QUEENSWAY SECONDARY SCHOOL

END OF YEAR EXAMINATION 2022

SECONDARY 1 EXPRESS

Parent's Signature:

MATHEMATICS

Paper 2

4048/02

6th OCT 2022

1 hour 30 minutes

Candidates answer on the Question Paper

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces provided at the top of this page.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction tape.

Answer **all** the questions.
Write your answers and working in the spaces provided.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The use of an approved scientific calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.
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 60.

This document consists of 18 printed pages.

Setter: Mr Tham YH

[Turn over

Section A (28 marks)

1. **(a)** By rounding each number to 2 significant figures, estimate the value of $\frac{21.1+\sqrt{15.98}}{0.499\times10.3}$.

$$\frac{21.1+\sqrt{15.98}}{0.499\times10.3}$$
$$= \frac{21+\sqrt{16}}{0.50\times10} \quad \textbf{M1}$$
$$= \frac{21+4}{5}$$
$$= 5 \quad \textbf{A1}$$

Answer .....[2]

(b) When written as a product of their prime factors,

p is $2^5 \times 3^2$,
q is $2^2 \times 3^4 \times 5^2$,
r is $2^2 \times 3 \times 5^3 \times 11$

Find the greatest number that will divide p, q and r exactly.

Highest Common Factor
$= 2^2 \times 3$
$= 12$ **A1**

Answer .....[1]

2. **(a)** One plate of chicken rice costs $\$x$ and a bowl of prawn noodle costs 50 cents more than the chicken rice. Ryan ordered 4 plates of chicken rice and 2 bowls of prawn noodle and the total cost is \$25.
Find the total cost of 3 plates of chicken rice and a bowl of prawn noodle.

One bowl of prawn noodle costs $\$(x + 0.5)$

Total cost = 25
$4x + 2(x + 0.5) = 25$ **M1**
$4x + 2x + 1 = 25$
$6x = 24$
$x = 4$ **M1**

Total cost of 3 plates of chicken rice and a bowl of prawn noodle
$= \$[(3 \times 4) + 4.5]$
$= \$16.50$ **A1**

Answer \$ ..... [3]

(b) There are three sirens, *A*, *B* and *C* on Happy Island. Siren *A* will sound off every 12 minutes, Siren *B* will sound off every 30 minutes and Siren *C* will sound off every 40 minutes. If they started sounding off at 8 am, what time will the three sirens sound off together at the same time again?

From part (a), LCM = 120 minutes
= 2 hours **M1**

They will sound off together again at 10 am. **A1**

Answer ..... [2]

3. **(a)** \$680 is shared among three friends, Muthu, Ming and Yusof in the ratio $p : (2p - 1) : (2p + 1)$, where p is a positive integer.
Showing your working, find the value of p.

Total units $= p + 2p - 1 + 2p + 1$
$= 5p$

$5p = 680$ **M1**
$p = 136$ **A1**

Answer $p =$ ..... [2]

(b) Hence, find the amount of the largest share.

Largest share $= 2p + 1$
$= 2(136) + 1$
$= 273$ **A1**

Answer \$ ..... [1]

4. Bryan bought a skateboard at a price of $185 from Ali.
Ali made a loss of 5% from the sale of the skateboard.

(a) Calculate the cost price of the skateboard.

95% ---------- $185
1% ---------- $\$\frac{185}{95}$
100% ---------- $\$\frac{185}{95} \times 100$ **M1**
$= \$194.74$ (to 2 d.p) **A1**

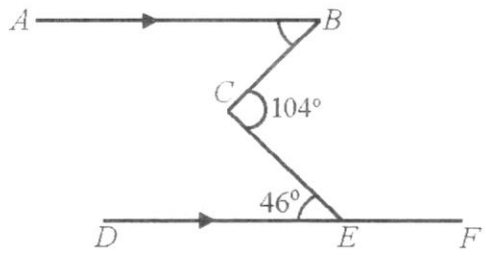
Answer $ ..... [2]

(b) Bryan decided to sell the skateboard after 1 year. How much must he sell in order to make a profit of 8%?

100% ---------- $185
1% ---------- $1.85
108% ---------- 1.85×108 **M1**
$= \$199.80$ **A1**

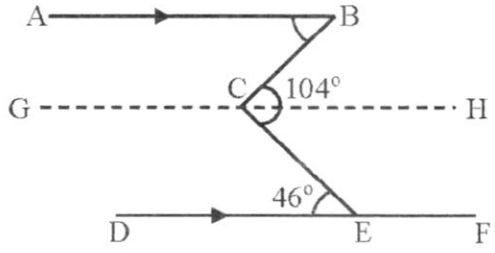
Answer $ ..... [2]

5. In the figure, AB is parallel to DF.



Jenny claimed that angle $ABC = 180° - 46°$ due to interior angles.
By showing your working with reasons, state whether you agree or disagree with her.

Answer



Draw a line GH parallel to lines AB and DF.

$\measuredangle GCE = 180° - 46°$ (int. $\measuredangle s$, $DF // GH$) **M1**
$= 134°$

$\measuredangle GCB = 360° - 134° - 104°$ ($\measuredangle s$ at a point) **M1**
$= 122°$

$\measuredangle ABC = 180° - 122°$ (int. $\measuredangle s$, $AB // GH$)
$= 58°$
$\neq 180° - 46°$

No. I disagree with Jenny. **A1**

Alternative:

$\measuredangle HCE = 46°$ (alt. $\measuredangle s$, $DF // GH$) **M1**

$\measuredangle BCE = 104° - 46°$
$= 58°$ **M1**

$\measuredangle ABC = 58°$ (alt. $\measuredangle s$, AB // GH)
$\neq 180° - 46°$

No. I disagree with Jenny. **A1**

[3]

6. **(a)** Solve the equation $\frac{y}{3}+\frac{2y-1}{4}=1$.

$\frac{y}{3}+\frac{2y-1}{4}=1$

$\frac{y}{3}\times 12+\frac{2y-1}{4}\times 12=1\times 12$ **M1**

$4y+3(2y-1)=12$

$4y+6y-3=12$ **M1**

$10y=15$

$y=1.5$ or $1\frac{1}{2}$ **A1**

OR

$\frac{y}{3}+\frac{2y-1}{4}=1$

$\frac{4y}{12}+\frac{3(2y-1)}{12}=1$

$\frac{4y+3(2y-1)}{12}=1$ **M1**

$4y+3(2y-1)=12$

$4y+6y-3=12$ **M1**

$10y=15$

$y=1.5$ or $1\frac{1}{2}$ **A1**

Answer ..... [3]

(b) Given that $D=\sqrt{b^2-4ac}$, find the value of D when $b=-8$, $a=3$ and $c=2$.

$D=\sqrt{(-8)^2-4(3)(2)}$

$=6.32$ (to 3 s.f) **A1**

Answer $D=$ ..... [1]

7. During a vacation, Mr Raj drove his car from Town A to Town B at an average speed of 75 km/h for 80 km. He continued his journey from Town B to Town C at an average speed of 55 km/h for 66 km.

(a) Calculate the time taken for the entire journey.
Give your answer in hours and minutes.

Total time
$= \frac{80}{75} + \frac{66}{55}$ **M1**
$= 2\frac{4}{15}\text{h}$
$= 2\,h\ 16\ min$ **A1**

Answer ..... h .....min [2]

(b) Find the average speed for its entire journey, giving your answer correct to 1 decimal place.

Total distance
$= 80 + 66$
$= 146\text{ km}$

Average speed
$= \frac{146}{2\frac{4}{15}}$ **M1**
$= 64.4\text{ km / h (to 1 d.p)}$ **A1**

Answer .....km/h [2]

(c) Convert your answer in part (b) to m/s.

64.4 km/h
$= \frac{64.4\text{ km}}{1\text{ h}}$
$= \frac{64400\text{ m}}{60\times60\text{ s}}$ **M1**
$= 17.9\text{ m / s (to 3 s.f)}$ **A1**

Answer .....m/s [2]

Section B (32 marks)

8. Shi Kai bought a new unsharpened pencil in the shape of a cylinder. The pencil has a length of 20 cm and the diameter is 2 cm as shown in Figure 1. Shi Kai then sharpened the pencil. Figure 2 shows the sharpened pencil in the shape of a cylinder and a cone after use.

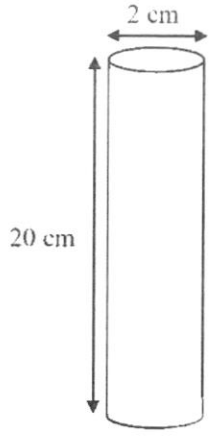


Figure 1

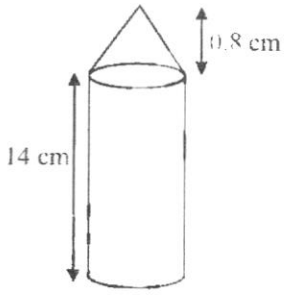


Figure 2

(a) Find the total surface area of the unsharpened pencil.

Total surface area of unsharpened pencl
$= 2\pi(1)^2 + 2\pi(1)(20)$ **M1**
$= 131.947$ (to 6 s. f)
$= 132$ cm^2 (to 3 s. f) **A1**

Answer ..... cm^2 [1]

(b) Given that the volume of the cone is 0.8378 cm^3, find the total volume of the sharpened pencil as shown in Figure 2.

Volume of sharpened pencil
$= \pi(1)^2(14) + 0.8378$ **M1**
$= 44.82$ (to 4 s.f)
$= 44.8$ cm^3 (to 3 s.f) **A1**

Answer ..... cm^3 [2]

(c) Calculate the volume of the pencil he has used.

Volume of pencil before use
$= \pi(1)^2(20)$
$= 20\pi$
$= 62.8319\,cm^3$ (to 6 s. f)

Volume of pencil used
$= 62.8319 - 44.820$
$= 18.0119$
$= 18.0\,cm^3$ (to 3 s.f) **A1**

Answer ..... cm^3 [1]

9. The cost, $\$y$, of printing x number of T-shirts, is given by the equation $y = 3x + 30$.
The table below shows some values of x and y.

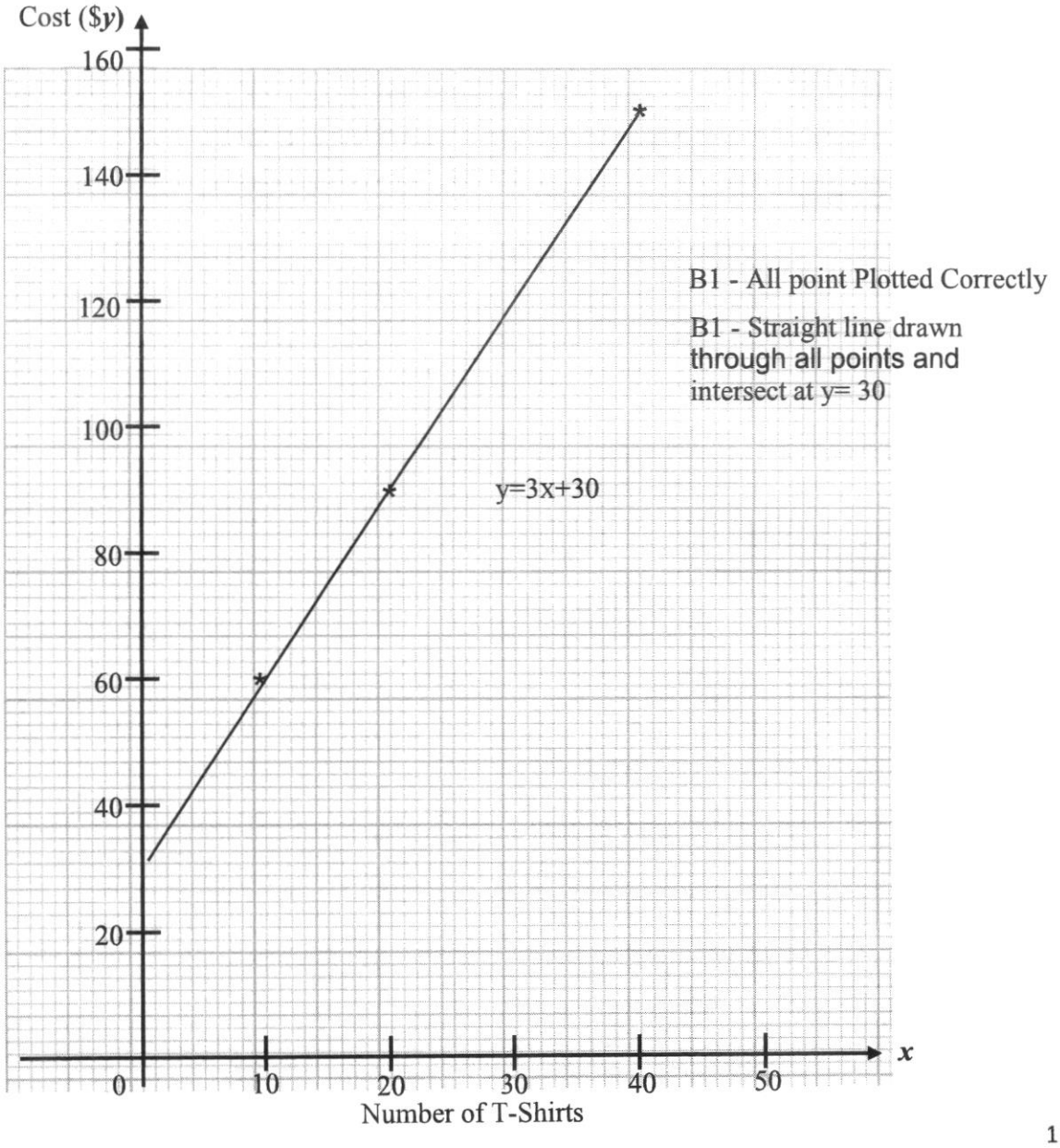
x	10	20	30	40
y	60	90	a	150

(a) Calculate the value of a.

$a = 3(30) + 30$
$= 120$ **A1**

Answer $a =$ ..... [1]

(b) On the grid, draw the graph of $y = 3x + 30$ for $0 \leq x \leq 40$. [2]



B1 - All point Plotted Correctly

B1 - Straight line drawn through all points and intersect at y= 30

11

(c) Use your graph to find the number of T-shirts that are printed when the cost is \$66.

12 **A1**

Answer ..... [1]

(d) Explain what 30 in the equation represents.

Answer It represents a fixed overhead cost. .....

Accept other reasonable answers such as the cost .....

/rents/utilities needed to operate the business. **A1** ..... [1]

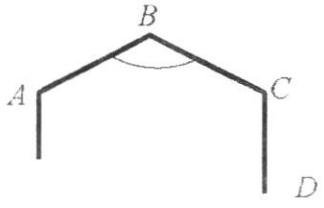
10. **(a)** Calculate the size of one interior angle of a regular pentagon.

Sum of interior angles
$= (5 - 2) \times 180°$
$= 540°$

Size of 1 interior angle
$= \frac{540°}{5}$ **M1**
$= 108°$ **A1**

Answer .....° [2]

(b) The diagram shows part of a regular n-sided polygon $ABCD\ldots$. The size of one interior angle to one exterior angle is in the ratio 2 : 1.



(i) Calculate the angle ABC.

Interior angle : Exterior angle	Total units
2 : 1	= 3

3 units ---------- 180° **M1**
2 units ---------- 120°

Therefore angle $ABC = 120°$ **A1**

Answer .....° [2]

(ii) Calculate the angle ACD.

$\measuredangle BCA = \frac{180° - 120°}{2}$ (base $\measuredangle$s of isos. Δ) **M1**
$= 30°$

$\measuredangle ACD = 120° - 30°$
$= 90°$ **A1**

Answer .....° [2]

(iii) Find the value of n.

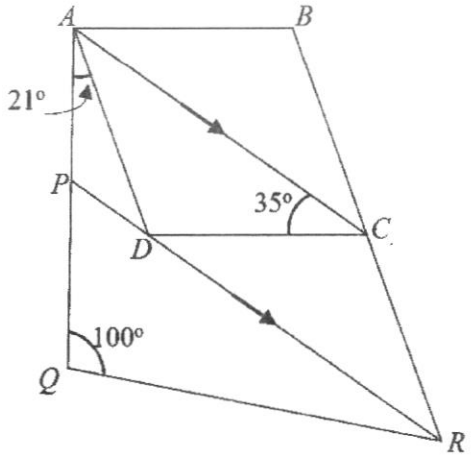
1 ext. angle $= 60°$

$n = \frac{360°}{60°}$

$= 6$ **A1**

Answer $n =$ .....[1]

11. In the diagram, $ABCD$ is a rhombus.
PDR, APQ and BCR are straight lines.
AC is parallel to PR.
Angle $PAD = 21°$, angle $ACD = 35°$ and angle $PQR = 100°$.



Calculate

(a) angle ADC,

$\measuredangle DAC = 35°$ (base $\measuredangle s$ of isos. Δ) **M1**

$\measuredangle ADC = 180° - 35° - 35°$ ($\measuredangle$ sum of Δ)
$= 110°$ **A1**

Answer ..... ° [2]

(b) angle APD,

$\measuredangle CDR = 35°$ (alt. $\measuredangle$, AC // RD)

$\measuredangle APD = (110° + 35°) - 21°$ (ext. $\measuredangle$ of Δ) **M1**
$= 124°$ **A1**

Answer ..... ° [2]

(c) angle PRQ.

$\measuredangle PRQ = 124° - 100°$ (ext. $\measuredangle$ of Δ)
$= 24°$ **A1**

Alternative

$\measuredangle RPQ = 180° - 124°$ (adj. $\measuredangle$s on a str line)
$= 56°$

$\measuredangle PRQ = 180° - 56° - 100°$ ($\measuredangle$ sum of Δ)
$= 24°$ **A1**

Answer .....° [1]

(d) Given that the area of the rhombus $ABCD$ is 94 cm^2 and the perpendicular height of the rhombus is 9.4 cm, find the perimeter of the rhombus.

Area of rhombus $= 94$
$CD \times 9.4 = 94$
$CD = 10$ cm **M1**

Perimeter of rhombus
$= 4 \times 10$
$= 40$ cm **A1**

Answer ..... cm [2]

12. The information below shows the prices of the tickets to a museum.

The prices shown below are before discount.

- 1 Adult Ticket : $24
- 1 Child Ticket : $18
- 1 Senior Citizen (60 years old and above) Ticket : $20

Purchase Online

5% discount of total tickets purchased

Purchase of tickets On-Site

- *A-Card* Member
  Enjoy 10% off an adult ticket
- *C-Card* Member
  Enjoy 8% off a children ticket
- *S-Card* Member
  Enjoy 15% off 1 Senior Citizen ticket

Mr Lee and Mrs Lee, both 55 years old, his elderly father of 80 years old and their 2 children are planning to visit the museum.

(a) Calculate the amount Mr Lee needs to pay if he buys the tickets online.

Cost of 2 adults, 2 children and 1 senior citizen
$= \$[(2 \times 24) + (2 \times 18) + 20]$ **M1**
$= \$104$

Price after 5% discount
$= 95\% \times 104$
$= \$98.80$ **A1**

Answer $ ..... [2]

(b) If Mr Lee intends to bring only his children to the museum and buys on-site using *C-Card*, calculate the amount he needs to pay.

Cost of tickets using *C-Card*
$= \$[24 + (0.92 \times 18 \times 2)]$ **M1**
$= \$57.12$ **A1**

Answer $ ..... [2]

(c) Mrs Lee claims that using the *S-Card* membership to buy the 5 tickets will be the cheapest alternative. Do you agree?
Show your working clearly.

A-Card Member :
$= \$[(0.9 \times 24 \times 2) + (2 \times 18) + 20]$ **M1**
$= \$99.20$

C-Card Member :
$= \$[(24 \times 2) + (0.92 \times 18 \times 2) + 20]$ **M1**
$= \$101.12$

S-Card Member :
$= \$[(24 \times 2) + (18 \times 2) + (0.85 \times 20)]$ **M1**
$= \$101$

Answer Since buying online cost $98.80 which is the cheapest of all options,
I disagree with Mrs Lee. **A1**
..... [4]

(d) State one assumption for your choice.

Answer Mrs Lee has all the three membership cards. **A1**
..... [1]

-----End of Paper-----