PRESBYTERIAN HIGH SCHOOL

2021 END-OF-YEAR EXAMINATION
SECONDARY ONE EXPRESS
MATHEMATICS (4052)

Name: _____ ( ) Class: 1 _____

Duration: 2 hours 30 minutes Date: 6 Oct 2021

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

INSTRUCTIONS TO CANDIDATES:

This paper consists of Section A and Section B.
Write your name, index number and class on the cover pages of **Section A** and **Section B**.
Write in dark blue or black ink pen. You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

Write your answers on the spaces provided below the questions.

Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.

INFORMATION FOR CANDIDATES:
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For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.
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 **Section A and Section B is 50 each**.

For Examiner's Use	
Section A	50

Setter: Mr Wong Shao Mun
Vetter: Mdm Chung Bee Chee

This paper consists of **12** printed pages (including this cover page) and **0** blank pages.

Section A (50 marks)
Answer ALL questions.

1 The table below gives information on the number of applications received for two primary schools.

Complete the table.

School	Number of applications	Number of vacancies	Ratio of applications to vacancies
Delta Primary	45	15	3 : 1
Echo Primary	28	7	

[1]

---

2 **(a)** Express 0.021 38 correct to 2 significant figures.

Answer ..... [1]

(b) The number of students in a school hall is given as 200, correct to the nearest hundred.

Write down the maximum number of students that could be in the school hall at that time.

Answer ..... [1]

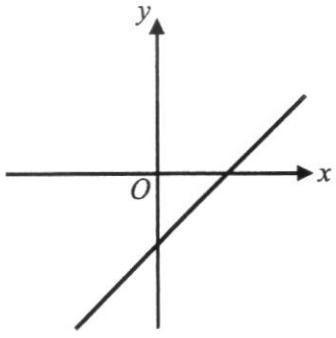
3

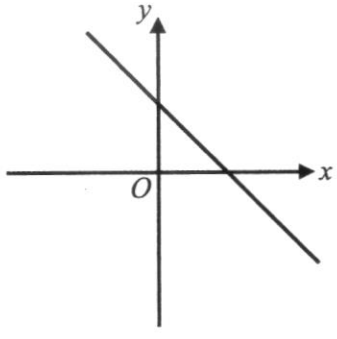
$y = 3x + 2$	$y = 3x - 2$	$y = -3x + 2$	$y = -3x - 2$

The diagrams below show sketches of two of these lines.

Write the correct equation below each diagram.

Answer





....

[2]

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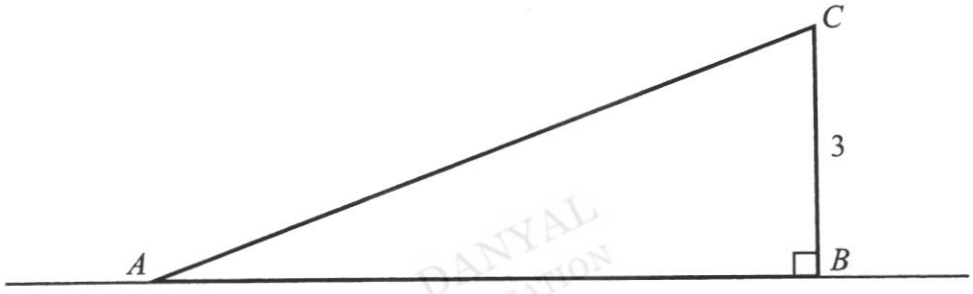
4 Find the square root of $3^2 \times 5^4$ without using a calculator. **Show your steps clearly.**

Answer ..... [2]

5



A slide in the shape of the triangle ABC lies on the ground.
$BC = 3$ m.
The area of triangle ABC is 7.8 m^2.

Find AB.

Answer ..... m [2]

[Turn over

6 It is given that $D = b^2 - 4ac$.

Find the value of

(a) D when $b = -3$, $a = 1$ and $c = -2$.

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

(b) c when $D = 3$, $b = 7$ and $a = 5$.

Answer $c =$ ..... [2]

---

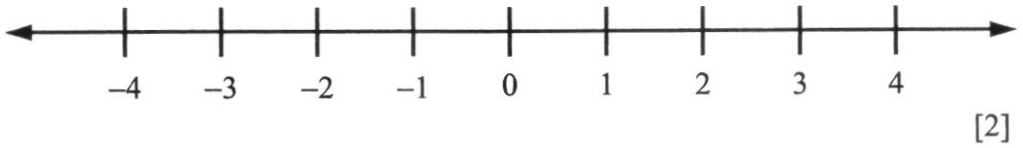
7 Consider these four numbers,

$$-0.\dot{3} \qquad \frac{\pi}{2} \qquad -2\sqrt{2} \qquad \frac{7}{2}$$

(a) write down the irrational number(s),

Answer ..... [1]

(b) represent the four numbers on the below number line.



[2]

---

8 **(a)** Factorise $3de + 9d^2$ completely.

Answer ..... [1]

(b) Simplify $2 \times m \times v + mv + 1$.

Answer ..... [2]

---

9 *ABCD* is a quadrilateral.
$BC = 7$ cm, $\angle ABC = 110°$, $AD = 9$ cm and $\angle BAD = 75°$.
AB is drawn below.

Answer (*a*)

(a) With the help of a pair of compasses, protractor and ruler, construct the quadrilateral *ABCD*. [2]

(b) Measure length *CD*.

Answer ..... cm [1]

[Turn over

10 **(a)** Express the following as a single fraction in its simplest form.

$$\frac{x+1}{4} - \frac{1-2x}{3}$$

Answer ..... [2]

(b) Solve $5y - 13 = 3y + 8$.

Answer $y =$ ..... [2]

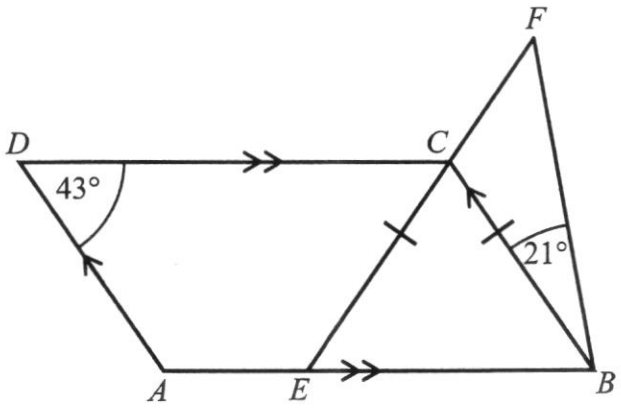
11 **(a)** A ceiling has an area of 120 000 cm^2.
Convert 120 000 cm^2 to m^2.

Answer ..... m^2 [2]

(b) 1 litre of paint covers 16 m^2.
Calculate the amount of paint needed to paint 11.2 m^2.

Answer ..... *l* [2]

12



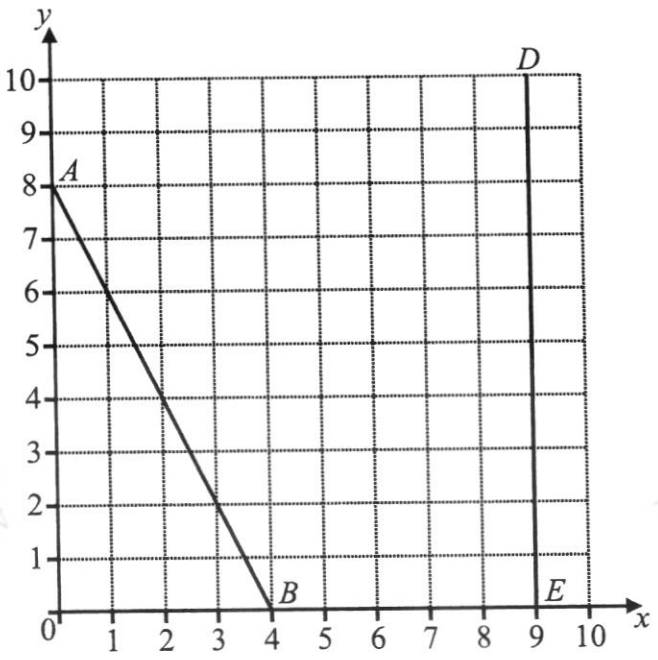
Not to scale

ABCD is a parallelogram.
ECF and *BF* are straight lines.
$CE = CB$, $\angle ADC = 43°$ and $\angle CBF = 21°$.
E is a point on *AB*.

Stating your reasons clearly, find $\angle EFB$.

Answer $\angle EFB =$ .....° [4]

13 Straight lines AB and DE are drawn on the grid.



(a) Find the gradient of the line AB.

Answer ..... [1]

(b) Write down the equation of the line AB.

Answer ..... [1]

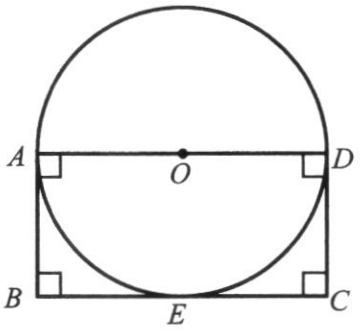
(c) Point C lies in the middle of line AB.
Write down the coordinates of point C.

Answer (..... , ...) [1]

(d) Write down the equation of the line DE.

Answer ..... [1]

14 The diagram shows a circle, centre O.
AD is the diameter of the circle.
The area of the circle is 9.9225π cm^2.
$ABCD$ is a rectangle.
E is a point on BC such that it touches the circle.



(a) Show that the radius of the circle is 3.15 cm.

[2]

(b) Calculate the perimeter of $ABCD$.

Answer ..... cm [2]

---

15 The following table of values is for a straight line $y = -5x + 4$.

x	-1	0	3
y	p	4	-11

(a) Find the value of p.

Answer $p =$ ..... [1]

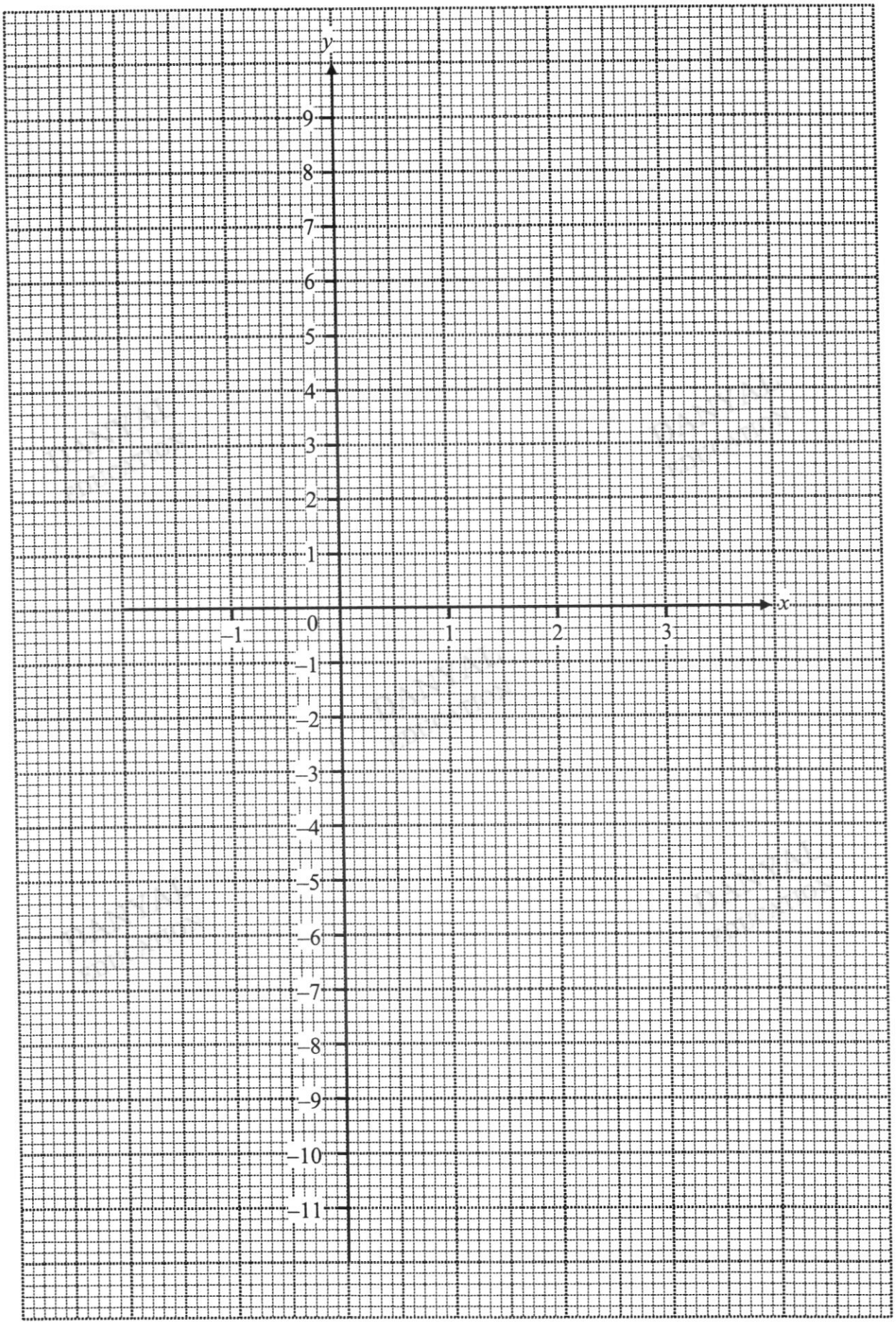
(b) On the grid on the next page, draw the graph of $y = -5x + 4$ for the range $-1 \leq x \leq 3$.

[2]

(c) Using your graph, find the value of x when $y = -4.5$.
Mark your working clearly on the grid.

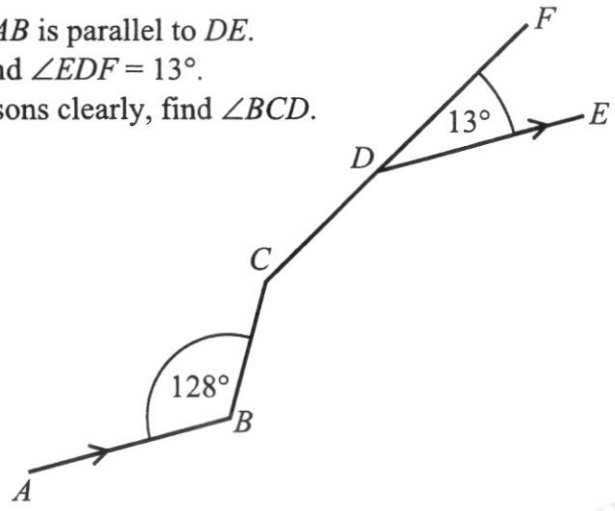
Answer $x =$ ..... [1]

11



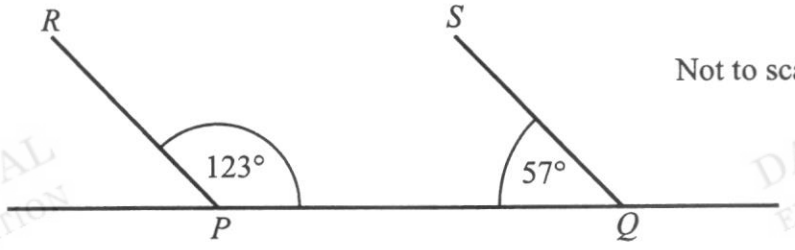
[Turn over

16 (a) In the diagram, AB is parallel to DE.
$\angle ABC = 128°$ and $\angle EDF = 13°$.
Stating your reasons clearly, find $\angle BCD$.



Answer $\angle BCD =$ .....° [3]

(b)



Drone P and drone Q are launched from the ground in the direction of R and S respectively.
Stating your reasons clearly, explain whether their flight paths will cross one another.

.....

..... [2]

END OF SECTION A

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MATHEMATICS (4052)

Name: _____ ( ) Class: 1 _____

Section B

For Examiner's Use													
Qn	17	18	19	20	21	22	23	24					*Marks Deducted*
Marks													

Category	Accuracy	Symbols	Others
Question No.			

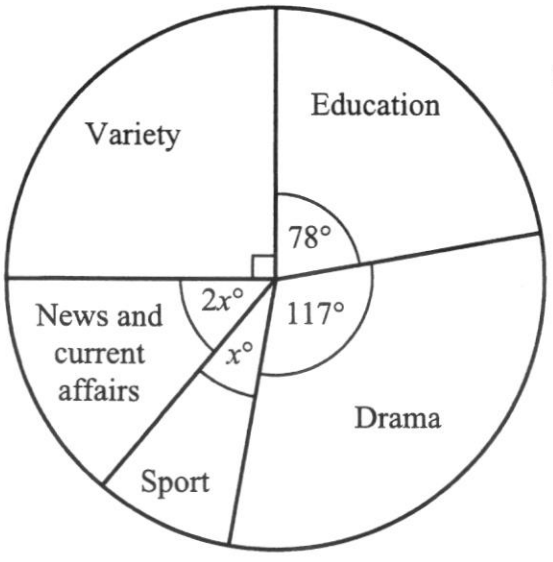
For Examiner's Use	
Section B	50

Setter: Mr Wong Shao Mun
Vetter: Mdm Chung Bee Chee

This paper consists of **12** printed pages (including this cover page) and **0** blank pages.

Section B (50 marks)
Answer ALL questions.

17 The pie chart shows the categories of online videos watched by a group of people.



Not to scale

(a) Calculate the value of x.

Answer $x =$ ..... [2]

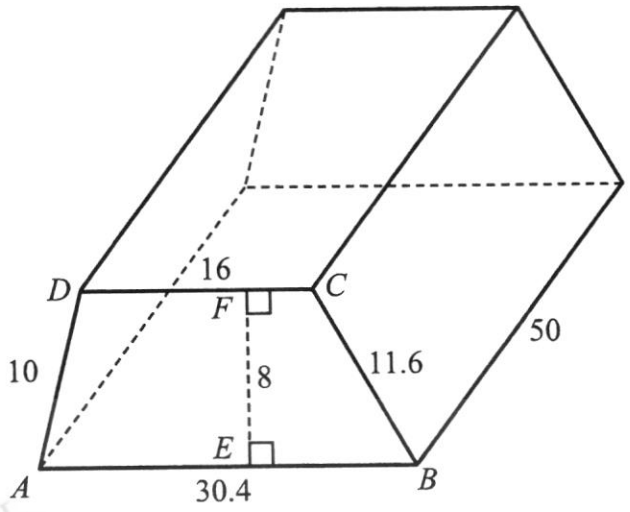
(b) Calculate the percentage of people that watched drama.

Answer .....% [1]

(c) If 195 more people watched drama than education, find the total number of people in the group.

Answer ..... people [2]

18



The diagram shows a prism whose cross-section is a trapezium, $ABCD$.
$AB = 30.4$ cm, $BC = 11.6$ cm, $CD = 16$ cm, $AD = 10$ cm and $EF = 8$ cm.
The length of the prism is 50 cm.

Calculate the

(a) volume of the prism,

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

(b) surface area of the prism.

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

19 **(a)** A shirt costs \$18 after a 20% discount. Find its original price.

Answer \$..... [2]

(b) Chris deposits \$6000 in a savings account at a simple interest rate of 1.2% per annum.

(i) Calculate the total interest earned in 3 years.

Answer \$..... [2]

(ii) If he wants to earn a total interest of \$360, how long should the \$6000 be deposited?

Answer ..... years [2]

20 The first three terms in a sequence of numbers, T_1, T_2, T_3, ... are given below.

$T_1 = 3 + 4(1) = 7$

$T_2 = 3 + 4(2) = 11$

$T_3 = 3 + 4(3) = 15$

(a) **(i)** Find T_7.

Answer $T_7 =$ ..... [1]

(ii) Find an expression, in terms of n, for T_n.

Answer $T_n =$ ..... [1]

(iii) Explain why 165 is not a term of this sequence.

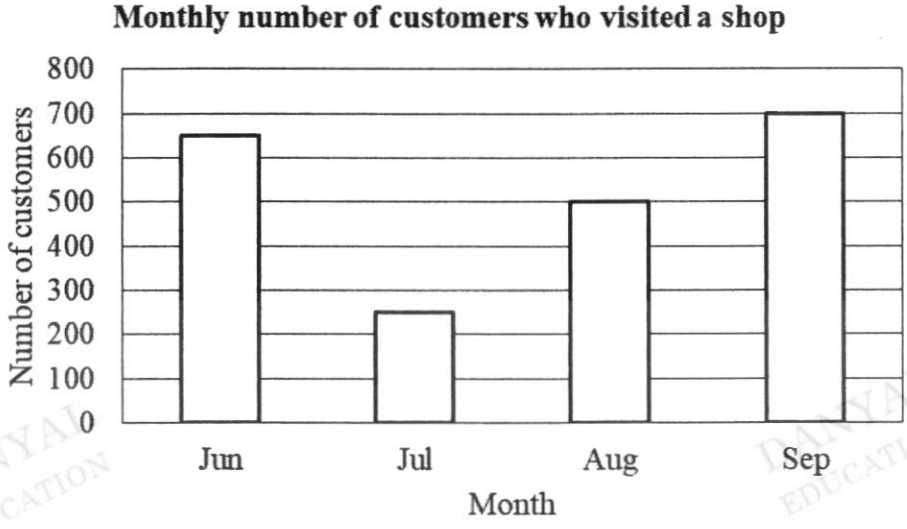
Answer

[1]

(b) Solve $\frac{2x-1}{3x+2} = \frac{4}{13}$.

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

21 The bar graph shows the monthly number of customers who visited a shop from June to September.



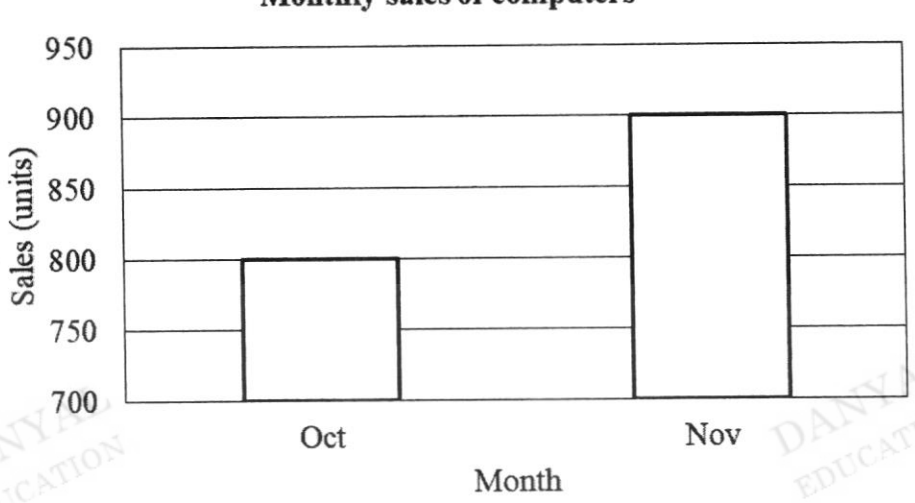
(a) Calculate the monthly average of customers who visited the shop.

Answer ..... [2]

(b) Calculate the percentage increase in the number of customers from August to September.

Answer .....% [2]

(c) Another bar graph shows the monthly sales of computers from October to November.



'The number of computers sold in November is twice the number of computers sold in October.'

Explain why this statement is wrong.

.....

.....

.....

..... [2]

22 **(a)** Convert 72 km/h to m/s.

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

(b) Daphne runs 6 km in 0.5 hour and rests for 0.25 hour.

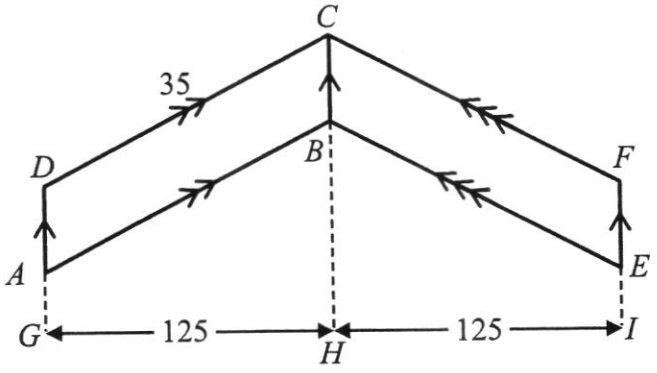
Calculate the average speed for the whole journey.

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

(c) Three buses leave a bus interchange at regular intervals. Bus *A* leaves every 5 minutes, Bus *B* leaves every 8 minutes and Bus *C* leaves every 34 minutes.
All three buses leave the interchange together at 6 am.
When will the three buses next leave together again?

Answer ..... [3]

23 (a)



ABEFCD is made up of two identical parallelograms, *ABCD* and *BEFC*.
CD = 35 cm and *GH* = *HI* = 125 cm.
The perimeter of one parallelogram is 110 cm.

Calculate

(i) *AD*,

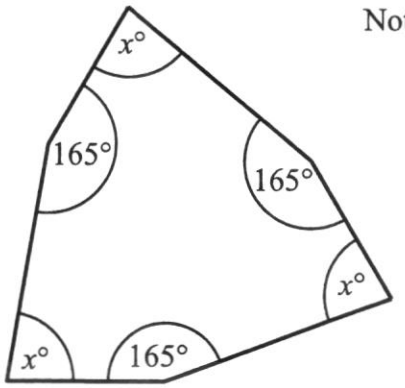
Answer ..... cm [2]

(ii) area of *ABEFCD*.

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

[Turn over

(b)



Not to scale

The diagram shows a hexagon.

Find the value of x.

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

(c) The angles of a quadrilateral are measured and recorded as below.

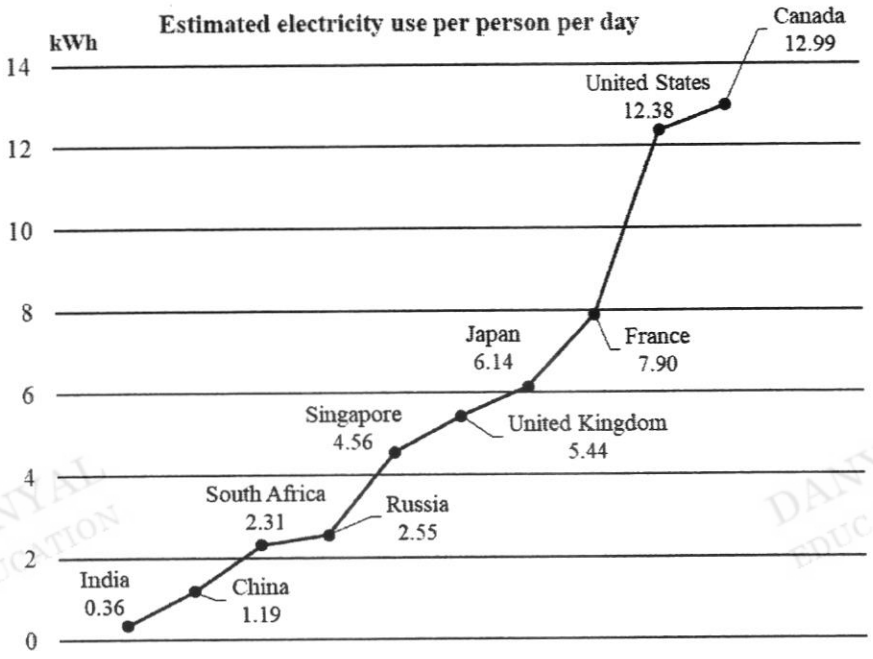
Measurement	W	X	Y	Z
Interior angle	91°	48°	114°	108°
Exterior angle	89°	132°	67°	72°

Identify which pair of measurement is wrong and explain why.

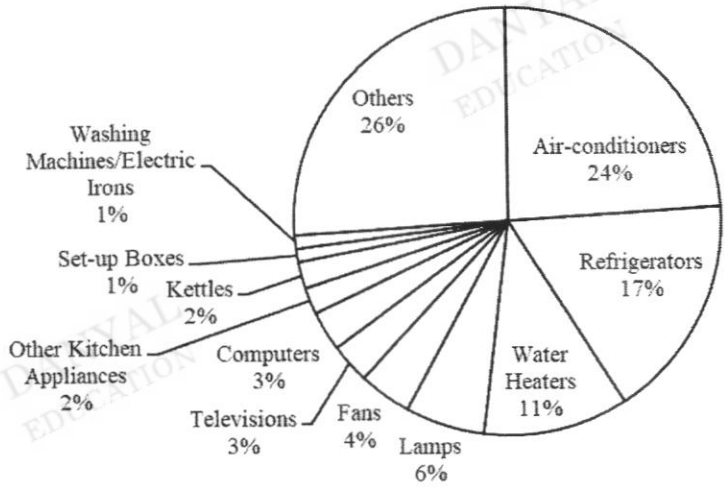
Measurement ..... is wrong because .....

..... [1]

24 Below is some information about electricity use.



Percentage breakdown of electricity use for appliances in a typical Singapore household



(a) In Singapore, what is the estimated electricity use per person per day for water heaters?

Answer ..... kWh [2]

[Turn over

(b) **(i)** Find the total electricity use per day for a typical Singapore household of 4 people.

Answer ..... kWh [2]

(ii) There are 4 people in the Tan family.
The percentage of electricity they use for air-conditioners is the same as the percentage for a typical Singapore household.
The Tan family uses an average of 19 kWh of electricity per day.

Mr Tan claims that if each person in the family reduces their air-conditioning use time from 8 hours to 6 hours, the family can get their total electricity use to below that of a typical Singapore household of 4 people.

Is Mr Tan correct?
Explain your answer.

Answer

[3]

END OF SECTION B

Mark Scheme

PRESBYTERIAN HIGH SCHOOL

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SECONDARY ONE EXPRESS
MATHEMATICS (4052)

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For Examiner's Use	
Section A	50

Setter: Mr Wong Shao Mun
Vetter: Mdm Chung Bee Chee

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Section A (50 marks)
Answer ALL questions.

1 **AO2** The table below gives information on the number of applications received for two primary schools.

Complete the table.

School	Number of applications	Number of vacancies	Ratio of applications to vacancies
Delta Primary	45	15	3 : 1
Echo Primary	28	7	4 : 1 **B1**

[1]

---

2 **(a)** **AO1** Express 0.021 38 correct to 2 significant figures.

Answer 0.021 **B1** [1]

(b) **AO2** The number of students in a school hall is given as 200, correct to the nearest hundred.

Write down the maximum number of students that could be in the school hall at that time.

Answer 249 **B1** [1]

---

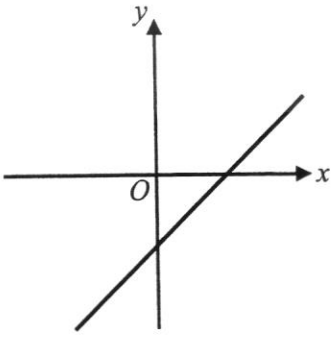
3 **AO2**

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

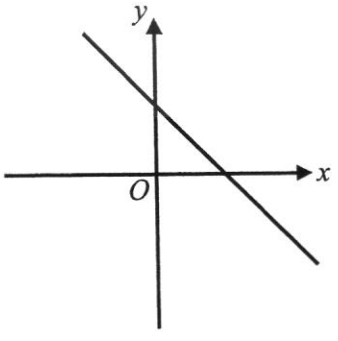
The diagrams below show sketches of two of these lines.

Write the correct equation below each diagram.

Answer



$y = 3x - 2$ **B1**



$y = -3x + 2$ **B1**

[2]

---

4 **AO1** Find the square root of $3^2 \times 5^4$ without using a calculator. **Show your steps clearly.**

Method 1:

$3^2 \times 5^4 = (3 \times 5^2) \times (3 \times 5^2)$ **M1:** Factors correctly grouped into 2 groups.

$\sqrt{\quad 5^4} = 3 \times 5^2$ If above not seen, award **M1** here if see this.

$\sqrt{3^2 \times 5^4} = 75$

Method 2:

$3^2 \times 5^4 = (3 \times 5^2)^2$ **M1:** Factors correctly grouped into 2 groups.

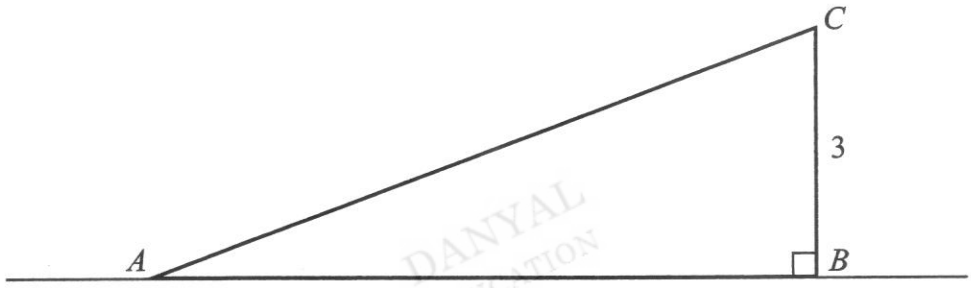
$\sqrt{\quad 5^4} = 3 \times 5^2$ If above not seen, award **M1** here if see this.

$\sqrt{3^2 \times 5^4} = 75$

Answer ..... 75 **A1** ..... [2]

---

5 **AO2**



A slide in the shape of the triangle ABC lies on the ground.
$BC = 3$ m.
The area of triangle ABC is 7.8 m^2.

Find AB.

$\frac{1}{2} \times AB \times 3 = 7.8$ **M1:** Form equation.

$1.5AB = 7.8$

$\frac{1.5AB}{1.5} = \frac{7.8}{1.5}$

$AB = 5.2$ m

Answer ..... 5.2 **A1** ..... m [2]

[Turn over

6 It is given that $D = b^2 - 4ac$.

Find the value of

(a) D when $b = -3$, $a = 1$ and $c = -2$.

AO1

$D = b^2 - 4ac$
$D = (-3)^2 - 4(1)(-2)$
$D = 17$

Answer $D =$ 17 **B1** [1]

(b) c when $D = 3$, $b = 7$ and $a = 5$.

AO1

$D = b^2 - 4ac$
$3 = (7)^2 - 4(5)c$ **M1:** Seen correct substitution.
$3 = 49 - 20c$
$3 - 49 = -20c$
$-46 = -20c$
$\frac{-46}{-20} = \frac{-20c}{-20}$
$2.3 = c$
$c = 2.3$

2.3 **A1**

Accept $2\frac{3}{10}$.

Answer $c =$ [2]

---

7 Consider these four numbers,

$-0.\dot{3}$ $\quad \frac{\pi}{2}$ $\quad -2\sqrt{2}$ $\quad \frac{7}{2}$

(a) write down the irrational number(s),

AO1

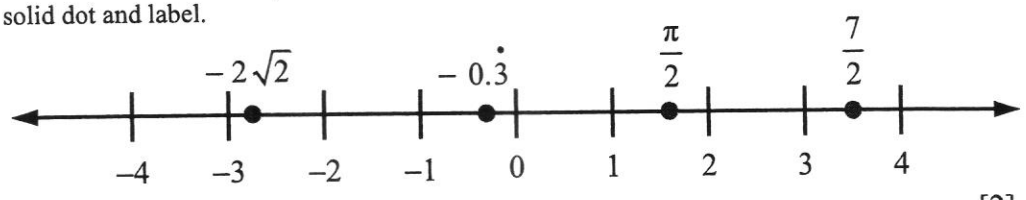
$\frac{\pi}{2}, -2\sqrt{2}$ **B1**

Answer [1]

(b) represent the four numbers on the below number line.

AO1 **B1** mark for every 2 correct answers. Each correct answer comprises of a solid dot and label.

B1 mark for all 4 correct dots but above number line.
B1 mark for all 4 correct dots but no label above dot.



[2]

---

8 **(a)** **AO1** Factorise $3de + 9d^2$ completely.

Answer $3d(e + 3d)$ **B1** [1]

(b) **AO1** Simplify $2 \times m \times v + mv + 1$.

$2 \times m \times v + mv + 1$
$= 2mv + mv + 1$ **M1:** Seen $2mv$.
$= 3mv + 1$

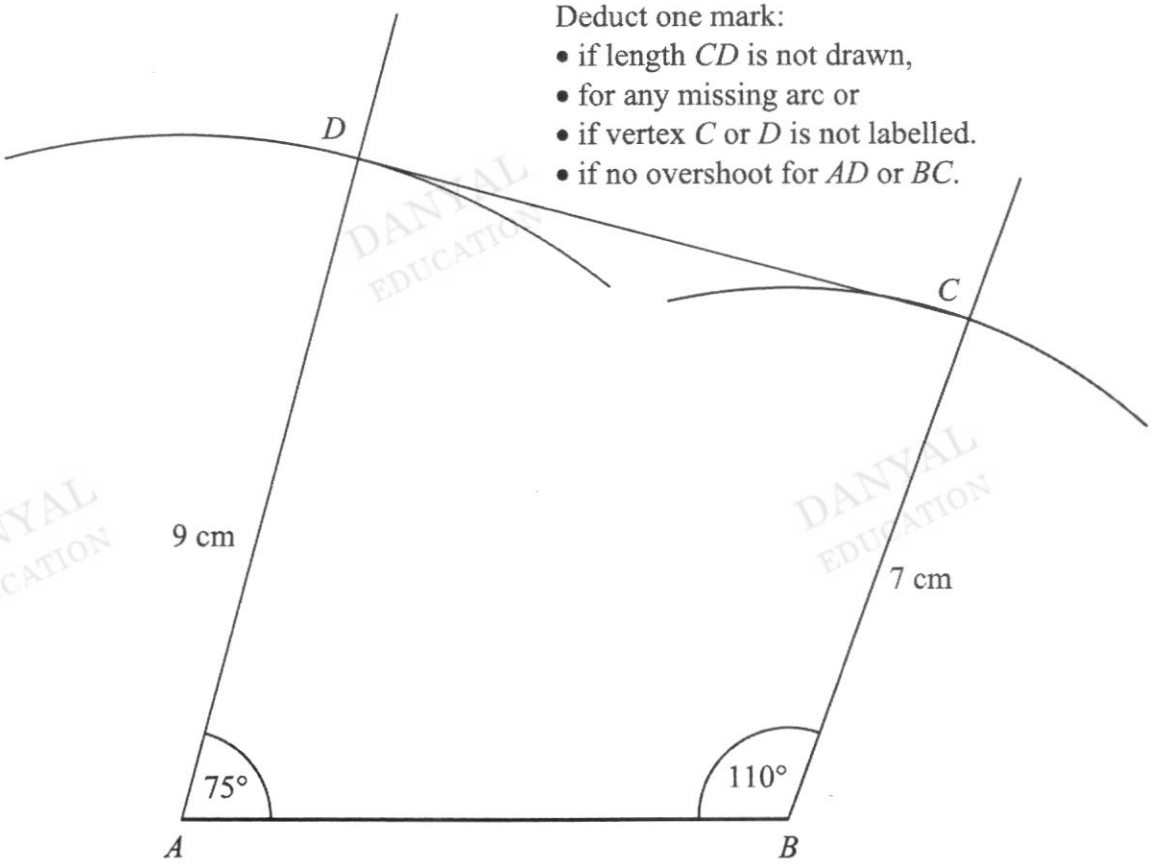
Answer $3mv + 1$ **A1** [2]

---

9 $ABCD$ is a quadrilateral.
$BC = 7$ cm, $\angle ABC = 110°$, $AD = 9$ cm and $\angle BAD = 75°$.
AB is drawn below.

Answer (a)

Q9(a) B1 for length BC.
B1 for length AD.
Deduct one mark:
- if length CD is not drawn,
- for any missing arc or
- if vertex C or D is not labelled.
- if no overshoot for AD or BC.



(a) **AO1** With the help of a pair of compasses, protractor and ruler, construct the quadrilateral $ABCD$. [2]

(b) **AO1** Measure length CD.

Note: General Office's printing machine in 2021 enlarged AB from 8 cm to 8.1 cm, thus CD is (8.4 ± 0.1) cm. If not, CD should have been (8.3 ± 0.1) cm.

Answer $8.4 \pm 0.1 = 8.3$ to 8.5 **B1** cm [1]

[Turn over

10 (a) AO1 Express the following as a single fraction in its simplest form.

$$\frac{x+1}{4} - \frac{1-2x}{3}$$

$$\frac{x+1}{4} - \frac{1-2x}{3}$$

$$= \frac{x+1}{4} \times \frac{3}{3} - \frac{1-2x}{3} \times \frac{4}{4}$$ **M1:** Find common denominator.

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

$$= \frac{3x+3-4+8x}{12}$$

$$= \frac{11x-1}{12}$$

Answer $\frac{11x-1}{12}$ **A1** [2]

(b) AO1 Solve $5y - 13 = 3y + 8$.

$5y - 13 = 3y + 8$

$5y - 3y = 8 + 13$ **M1:** Terms correctly collected on each side of equation.

$2y = 21$

$\frac{2y}{2} = \frac{21}{2}$

$y = 10.5$

10.5 **A1**

Accept $10\frac{1}{2}$.

Answer $y =$ ..... [2]

11 (a) A ceiling has an area of 120 000 cm^2.
AO1 Convert 120 000 cm^2 to m^2.

Method 1:

$100 \text{ cm} \times 100 \text{ cm} = 1 \text{ m} \times 1 \text{ m}$

$10\,000 \text{ cm}^2 = 1 \text{ m}^2$ **M1**

$$\frac{10\,000 \text{ cm}^2}{10\,000} = \frac{1 \text{ m}^2}{10\,000}$$

$$1 \text{ cm}^2 = \frac{1}{10\,000} \text{ m}^2$$

$$120\,000 \times 1 \text{ cm}^2 = 120\,000 \times \frac{1}{10\,000} \text{ m}^2$$

$120\,000 \text{ cm}^2 = 12 \text{ m}^2$

Method 2:

$120\,000 \text{ cm}^2 = 120\,000 \times 1 \text{ cm} \times 1 \text{ cm}$

$$120\,000 \text{ cm}^2 = 120\,000 \times \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m}$$ **M1**

$120\,000 \text{ cm}^2 = 12 \text{ m}^2$

Method 3:

$$1 \text{ cm} \times 1 \text{ cm} = \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m}$$

$$1 \text{ cm}^2 = \frac{1}{10\,000} \text{ m}^2$$ **M1**

$$120\,000 \times 1 \text{ cm}^2 = 120\,000 \times \frac{1}{10\,000} \text{ m}^2$$

$120\,000 \text{ cm}^2 = 12 \text{ m}^2$

Answer ..... 12 **A1** ..... m^2 [2]

(b) 1 litre of paint covers 16 m^2.
AO2 Calculate the amount of paint needed to paint 11.2 m^2.

Amount of paint needed

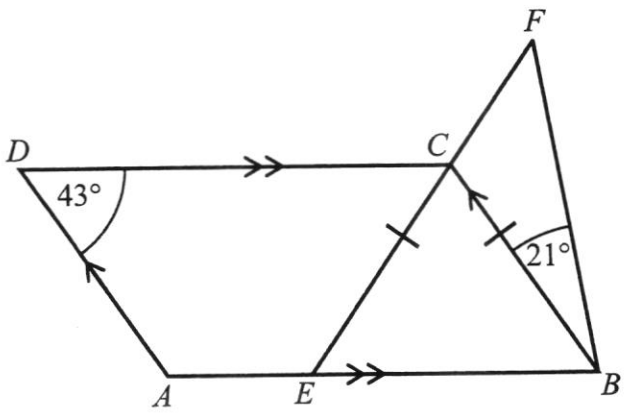
$$= \frac{11.2}{16}$$ **M1**

$= 0.7\ l$

Answer ..... 0.7 **A1** ..... l [2]

[Turn over

12
AO2



Not to scale

ABCD is a parallelogram.
ECF and *BF* are straight lines.
$CE = CB$, $\angle ADC = 43°$ and $\angle CBF = 21°$.
E is a point on *AB*.

Stating your reasons clearly, find $\angle EFB$.

$\angle EBC = 43°$ (opp. $\angle$s of //gram) **M1:** Seen geometrical reason.

$\angle CEB = 43°$ (base $\angle$s of isos. Δ) **M1:** Seen geometrical reason.

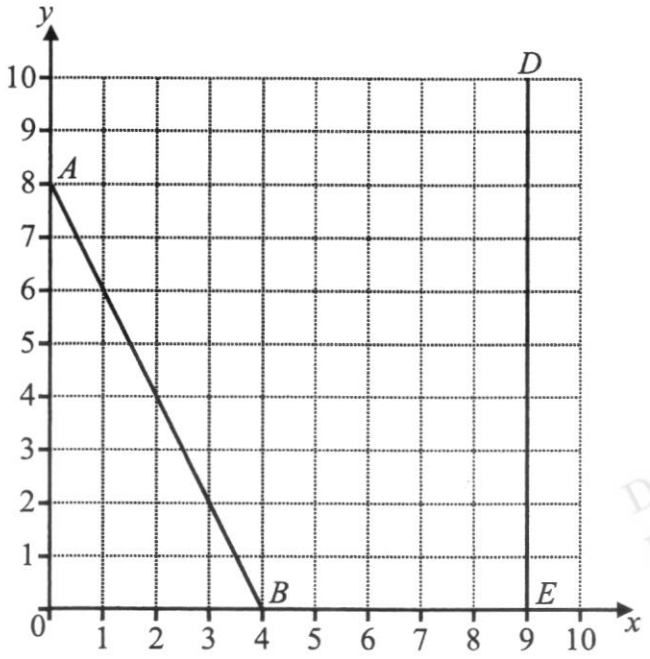
$\angle EFB = 180° - 43° - 43° - 21°$ ($\angle$ sum of Δ) **M1:** Seen geometrical reason.
$\angle EFB = 73°$

Deduct 1 mark for any missing/wrong geometrical reason from above three.

Deduct 1 mark for two or more non-standard geometrical reason from above three.

Answer $\angle EFB =$ 73 **A1** ° [4]

13 Straight lines AB and DE are drawn on the grid.



(a) **AO2** Find the gradient of the line AB.

$$\text{Gradient} = \frac{\text{Vertical change}}{\text{Horizontal change}}$$

$$= \frac{-8}{4}$$

$$= -2$$

Answer -2 **B1** [1]

(b) **AO2** Write down the equation of the line AB.

Answer $y = -2x + 8$ **B1** [1]

(c) **AO2** Point C lies in the middle of line AB.
Write down the coordinates of point C.

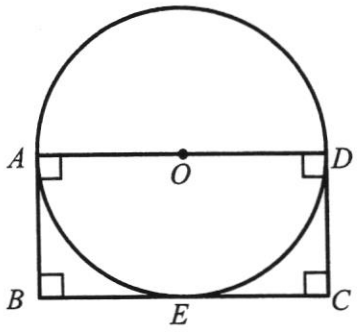
Answer (2 , 4 **B1**) [1]

(d) **AO1** Write down the equation of the line DE.

Answer $x = 9$ **B1** [1]

---

14 The diagram shows a circle, centre O.
AD is the diameter of the circle.
The area of the circle is 9.9225π cm^2.
$ABCD$ is a rectangle.
E is a point on BC such that it touches the circle.



(a) **AO1** Show that the radius of the circle is 3.15 cm.

$\pi r^2 = 9.9225\pi$ **M1**

$\frac{\pi r^2}{\pi} = \frac{9.9225\pi}{\pi}$

$r^2 = 9.9225$

$r = \sqrt{}$

$r = 3.15$ cm (shown) **A1**

[2]

(b) **AO2** Calculate the perimeter of $ABCD$.

Length of $ABCD$
$= 6(3.15)$ **M1**
$= 18.9$ cm

Answer 18.9 **A1** cm [2]

---

15 The following table of values is for a straight line $y = -5x + 4$.

x	-1	0	3
y	p	4	-11

(a) **AO1** Find the value of p.

When $x = -1$,
$p = -5x + 3$
$p = -5(-1) + 4$
$p = 9$

Answer $p =$ 9 **B1** [1]

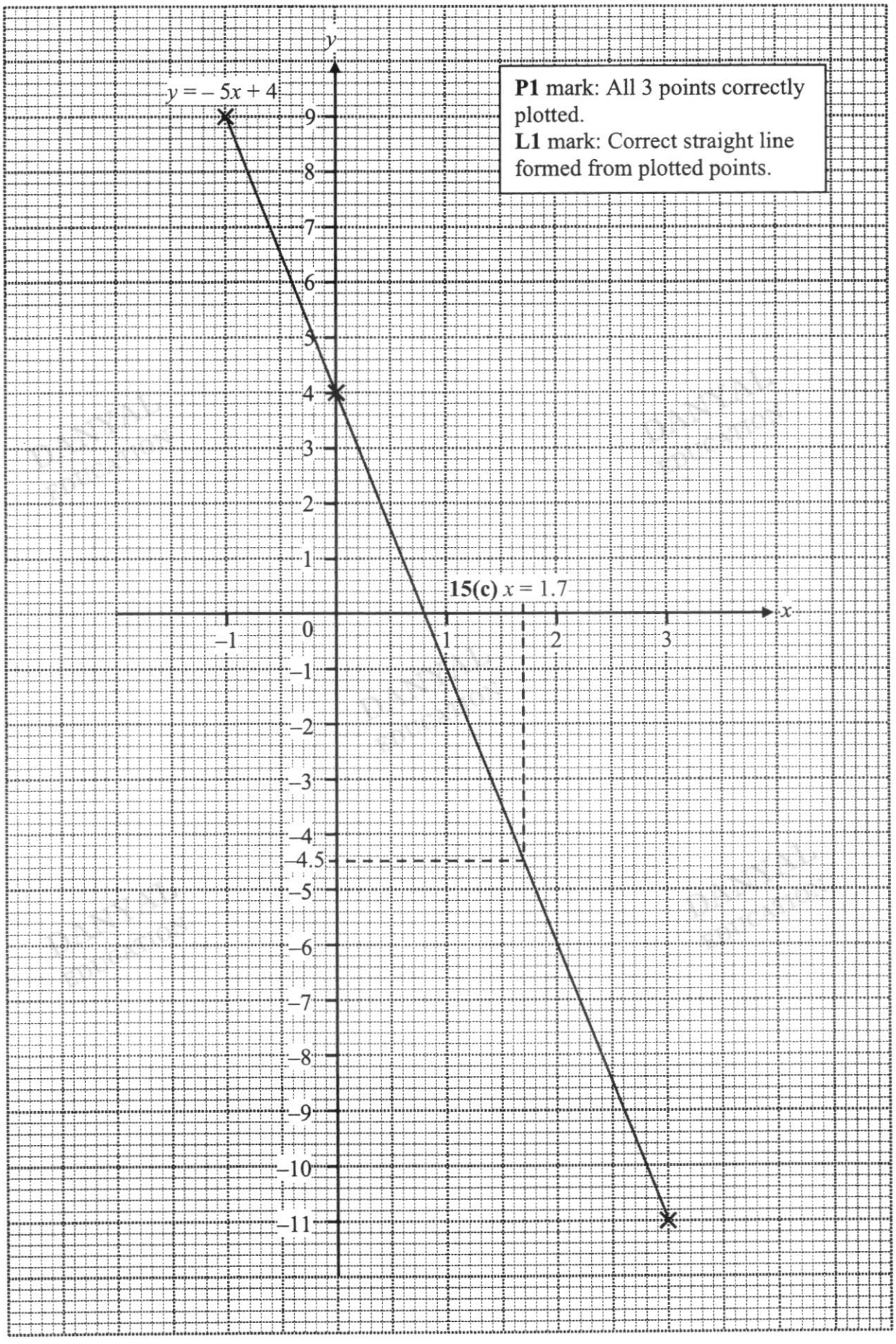
(b) **AO1** On the grid on the next page, draw the graph of $y = -5x + 4$ for the range $-1 \leq x \leq 3$.

[2]

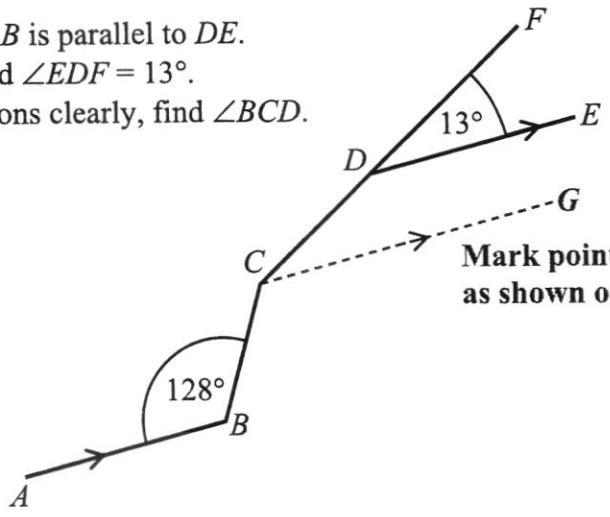
(c) **AO1** Using your graph, find the value of x when $y = -4.5$.
Mark your working clearly on the grid.

B1: Seen dotted line working and answer labelled on grid.

Answer $x =$ $1.7 \pm 0.05 = 1.65$ to 1.75 [1]


y
x
y = – 5x + 4
P1 mark: All 3 points correctly plotted.
L1 mark: Correct straight line formed from plotted points.
15(c) x = 1.7
9
8
7
6
5
4
3
2
1
0
–1
–2
–3
–4
–4.5
–5
–6
–7
–8
–9
–10
–11
–1
1
2
3

16 (a) AO2 In the diagram, AB is parallel to DE.
$\angle ABC = 128°$ and $\angle EDF = 13°$.
Stating your reasons clearly, find $\angle BCD$.



$\angle BCG = 128°$ (alt. $\angle$s, AB // CG) **M1:** Seen geometrical reason.

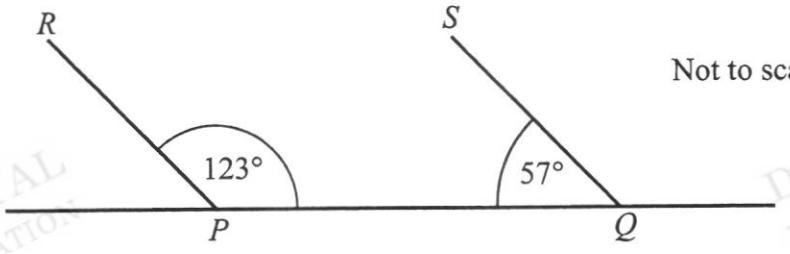
$\angle FCG = 13°$ (corr. $\angle$s, DE // CG) **M1:** Seen geometrical reason.

$\angle BCD = 128° + 13°$
$\angle BCD = 141°$

Deduct 1 mark for any missing/wrong geometrical reason.

Answer $\angle BCD =$ ..... 141 **A1** ..... ° [3]

(b) AO3



Drone P and drone Q are launched from the ground in the direction of R and S respectively.
Stating your reasons clearly, explain whether their flight paths will cross one another.

Their **flight paths will not cross** one another because they are **parallel [B1]** as
.....
$\angle QPR + \angle PQS = 123° + 57° = 180°$ **(int. $\angle$s, PR // QS).** **[B1:** Seen geometrical reason.]
..... [2]

END OF SECTION A

Mark Scheme

PRESBYTERIAN HIGH SCHOOL

2021 END-OF-YEAR EXAMINATION
SECONDARY ONE EXPRESS
MATHEMATICS (4052)

Name: _____ ( ) Class: 1 _____

Section B

For Examiner's Use													
Qn	17	18	19	20	21	22	23	24					*Marks Deducted*
Marks													

Category	Accuracy	Symbols	Others
Question No.			

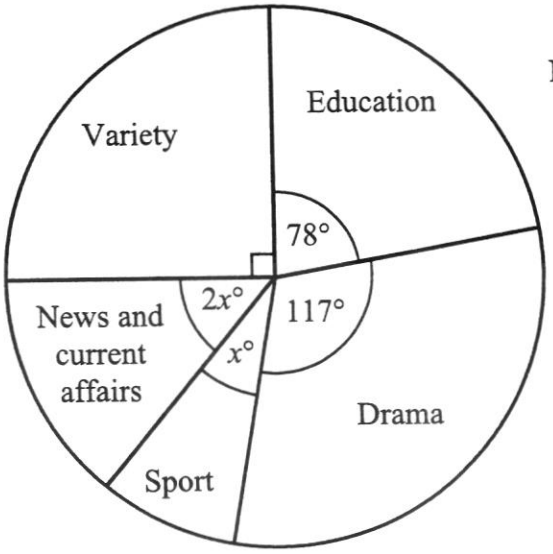
For Examiner's Use	
Section B	50

Setter: Mr Wong Shao Mun
Vetter: Mdm Chung Bee Chee

This paper consists of **12** printed pages (including this cover page) and **0** blank pages.

Section B (50 marks)
Answer ALL questions.

17 The pie chart shows the categories of online videos watched by a group of people.



Not to scale

(a) **AO2** Calculate the value of x.

$90° + 2x° + x° + 117° + 78° = 360°$ ($\angle$s at a pt.) **M1**

$3x° + 285° = 360°$

$3x° = 360° - 225°$

$3x° = 135°$

$3x° = \frac{135°}{3}$

$x° = 25°$

$x = 25$ **A1**

Answer $x =$ ..... [2]

(b) **AO1** Calculate the percentage of people that watched drama.

Percentage of people who watched drama

$= \frac{117°}{360°} \times 100\%$

$= 32.5\%$

Answer ..... % [1]

(c) **AO2** If 195 more people watched drama than education, find the total number of people in the group.

$117° - 78° \rightarrow 195$ **M1**

$39° \rightarrow 195$

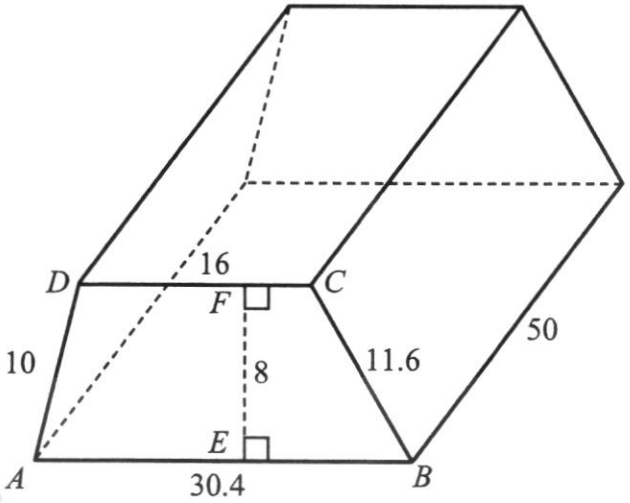
$1° \rightarrow \frac{195}{39}$

$360° \rightarrow 360 \times \frac{195}{39} = 1800$

A1

Answer ..... people [2]

18



The diagram shows a prism whose cross-section is a trapezium, $ABCD$.
$AB = 30.4$ cm, $BC = 11.6$ cm, $CD = 16$ cm, $AD = 10$ cm and $EF = 8$ cm.
The length of the prism is 50 cm.

Calculate the

(a) volume of the prism,
AO1

Method 1:
Volume of the prism
$= \frac{1}{2}(16 + 30.4)(8) \times 50$ **M1:** Seen $\frac{1}{2}(16 + 30.4)(8)$.
$= 185.6 \times 50$
$= 9280 \text{ cm}^3$

Method 2:
Volume of $ABCD$
$= 30.4 \times 8 - \frac{1}{2}(30.4 - 16)(8)$ **M1**
$= 185.6 \text{ cm}^2$

Volume of the prism
$= 185.6 \times 50$
$= 9280 \text{ cm}^3$

Answer 9280 **A1** cm^3 [2]

(b) surface area of the prism.
AO1

Surface area of the prism
$= 2 \times \frac{1}{2}(16 + 30.4)(8)$ **[M1]** $+ (30.4 + 11.6 + 16 + 10)(50)$ **[M1]**
$= 2 \times 185.6 + 68(50)$
$= 371.2 + 3400$
$= 3771.2 \text{ cm}^2$

Answer 3771.2 **A1** cm^2 [3]

19 (a) A shirt costs \$18 after a 20% discount. Find its original price.

AO2

100% - 20% → \$18 **M1**

80% → \$18

1% → $\frac{\$18}{80}$

100% → $100 \times \frac{\$18}{80} = \$22.50$

∴ Original price of shirt is \$22.50.

Answer \$ 22.50 **A1** [2]

(b) Chris deposits \$6000 in a savings account at a simple interest rate of 1.2% per annum.

(i) Calculate the total interest earned in 3 years.

AO2

Method 1:

Interest earned in 1 year = \$6000 × 1.2% **M1**

$= \$6000 \times \frac{1.2}{100}$

= \$72

Interest earned in 3 years = \$72 × 3

= \$216

Method 2:

Interest earned in 3 years = \$6000 × 1.2% × 3 **M1**

$= \$6000 \times \frac{1.2}{100} \times 3$

= \$216

Answer \$ 216 **A1** [2]

(ii) If he wants to earn a total interest of \$360, how long should the \$6000 be deposited?

AO2

$= \frac{\text{Duration of deposit}}{\$360 \,/\, \$72 / \text{year}}$ **M1**

= 5 years

Answer 5 **A1** years [2]

20 The first three terms in a sequence of numbers, T_1, T_2, T_3, ... are given below.

$T_1 = 3 + 4(1) = 7$

$T_2 = 3 + 4(2) = 11$

$T_3 = 3 + 4(3) = 15$

(a) (i) AO1 Find T_7.

$T_7 = 3 + 4(7) = 31$

Answer $T_7 =$ 31 **B1** [1]

(ii) AO2 Find an expression, in terms of n, for T_n.

Answer $T_n =$ $3 + 4n$ **B1** [1]

(iii) AO3 Explain why 165 is not a term of this sequence.

Answer

Method 1:

$165 = 3 + 4n$

$165 - 3 = 4n$

$162 = 4n$

$4n = 162$

$\frac{4n}{4} = \frac{162}{4}$

$n = 40.5$

n represents the position number. Since $n = 40.5$ is **not a positive integer**, therefore **165 is not a term of this sequence. B1**

Method 2:

$165 = 3 + 4n$

$165 - 3 = 4n$

$162 = 4n$

$4n = 162$

n represents the position number. Since **162 is not a multiple of 4 (162 is not divisible by 4)**, therefore **165 is not a term of this sequence. B1**

Method 3:

$T_{40} = 3 + 4(40) = 163$

$T_{41} = 3 + 4(41) = 167$

T_{40} is 163 and **T_{41} is 167**, therefore **165 is not a term of this sequence. B1**

[1]

(b) AO1 Solve $\frac{2x-1}{3x+2} = \frac{4}{13}$.

$\frac{2x-1}{3x+2} = \frac{4}{13}$

$13(2x - 1) = 4(3x + 2)$ **M1:** Cross-multiply.

$26x - 13 = 12x + 8$

$26x - 12x = 8 + 13$ **M1:** Terms correctly collected on each side of equation.

$14x = 21$

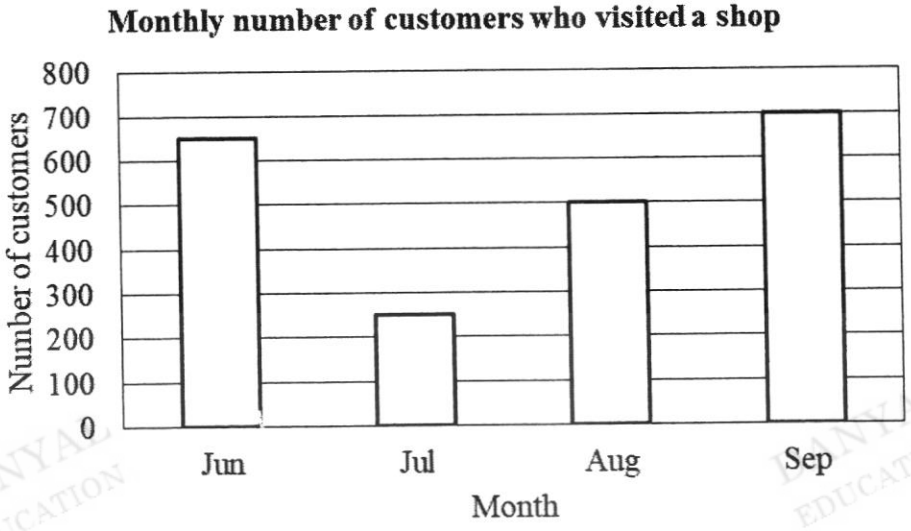
$\frac{14x}{14} = \frac{21}{14}$

$x = 1.5$

Answer $x =$ 1.5 **A1**

Accept $1\frac{1}{2}$. [3]

21 The bar graph shows the monthly number of customers who visited a shop from June to September.



(a) AO2 Calculate the monthly average of customers who visited the shop.

$$\text{Monthly average} = \frac{650+250+500+700}{4} \quad \textbf{M1}$$
$$= 525$$

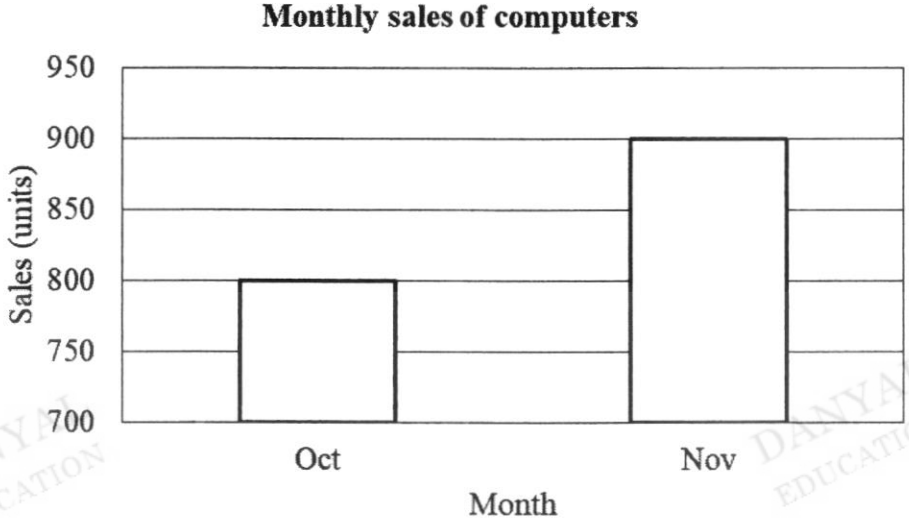
Answer 525 **A1** [2]

(b) AO1 Calculate the percentage increase in the number of customers from August to September.

$$\text{Percentage increase} = \frac{700-500}{500} \times 100\% \quad \textbf{M1}$$
$$= 40\%$$

Answer 40 **A1** % [2]

(c) AO3 Another bar graph shows the monthly sales of computers from October to November.



'The number of computers sold in November is twice the number of computers sold in October.'

Explain why this statement is wrong.

800 computers and 900 computers were sold in October and November

respectively **[B1]** and 900 computers is not the twice of 800. **[B1]**

..... [2]

22 (a) AO1 Convert 72 km/h to m/s.

$$= \frac{72 \times 1000 \text{ m}}{60 \times 60 \text{ s}}$$ **M1:** Correct conversion to m and s.

$$= \frac{72\,000 \text{ m}}{3600 \text{ s}}$$

$= 20$ m/s

Answer ..... 20 **A1** ..... m/s [2]

(b) AO1 Daphne runs 6 km in 0.5 hour and rests for 0.25 hour.

Calculate the average speed for the whole journey.

$$\text{Average speed for whole journey} = \frac{\text{Total distance travelled}}{\text{Total time taken}}$$

$$= \frac{6 \text{ km}}{0.5 \text{ h} + 0.25 \text{ h}}$$ **M1**

Accept $\frac{6 \text{ km}}{30 \text{ min} + 15 \text{ min}}$.

$$= \frac{6 \text{ km}}{0.75 \text{ h}}$$

$= 8$ km/h

Answer ..... 8 **A1** ..... km/h [2]

(c) AO2 Three buses leave a bus interchange at regular intervals. Bus *A* leaves every 5 minutes, Bus *B* leaves every 8 minutes and Bus *C* leaves every 34 minutes. All three buses leave the interchange together at 6 am.
When will the three buses next leave together again?

Method 1:

$5 = \quad \times 5$

$8 = 2^3$

$34 = 2 \quad \times 17$

LCM $= 2^3 \times 5 \times 17$ **M1**

LCM = 680 min

Method 2:

2	5	8	34
2	5	4	17
2	5	2	17
5	5	1	17
17	1	1	17
	1	1	1

LCM $= 2^3 \times 5 \times 17$ **M1**

LCM = 680 min

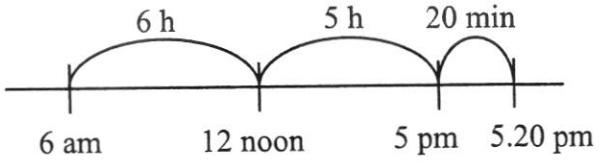
Method 1:

680 min = 11 h 20 min **M1**

Time buses next leave together
= 6 am + 11 h 20 min
= 5.20 pm

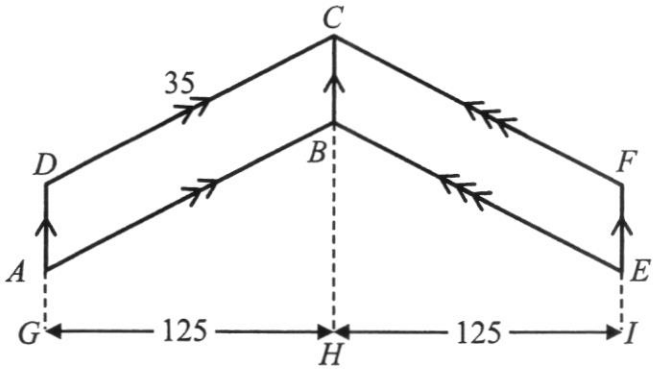
Method 2:

680 min = 11 h 20 min **M1**



Answer ..... 5.20 pm **A1** ..... [3]

23 (a)



ABEFCD is made up of two identical parallelograms, *ABCD* and *BEFC*.
CD = 35 cm and *GH* = *HI* = 125 cm.
The perimeter of one parallelogram is 110 cm.

Calculate

(i) *AD*,
AO2

$AD + 35 + BC + 35 = 110$ **M1**
$AD + 35 + AD + 35 = 110$
$2AD = 110 - 35 - 35$
$2AD = 40$
$\frac{2AD}{2} = \frac{40}{2}$
$AD = 20$ cm

Answer 20 **A1** cm [2]

(ii) area of *ABEFCD*.
AO2

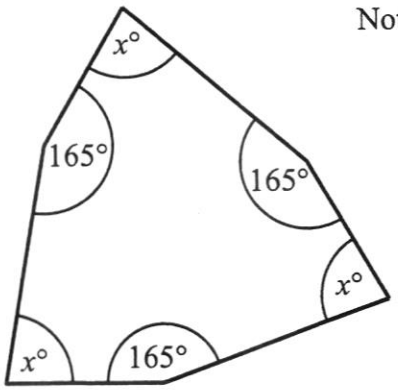
Method 1:
Area of *ABEFCD* = $20 \times (125 + 125)$ **M1**
= 5000 cm^2

Method 2:
Area of *ABEFCD* = $2 \times 20 \times 125$ **M1**
= 5000 cm^2

Answer 5000 **A1** cm^2 [2]

[Turn over

(b)
AO2



Not to scale

The diagram shows a hexagon.

Find the value of x.

Method 1:

$3 \times x° + 3 \times 165°$ **[M1 for LHS]** $= (6 - 2) \times 180°$ **[M1 for RHS]**

$$3x° + 495° = 4 \times 180°$$
$$3x = 720 - 495$$
$$3x = 225$$
$$\frac{3x}{3} = \frac{225}{3}$$
$$x = 75$$

Method 2:

Each exterior angle next to $x° = \frac{360° - 3 \times 15°}{3}$ **M1**

$$= \frac{315°}{3}$$
$$= 105°$$

$x° = 180° - 105°$ (adj. $\angle$s on a str. line) **M1**

$x° = 75°$

$x = 75$

Answer $x =$ 75 **A1** [3]

(c)
AO3

The angles of a quadrilateral are measured and recorded as below.

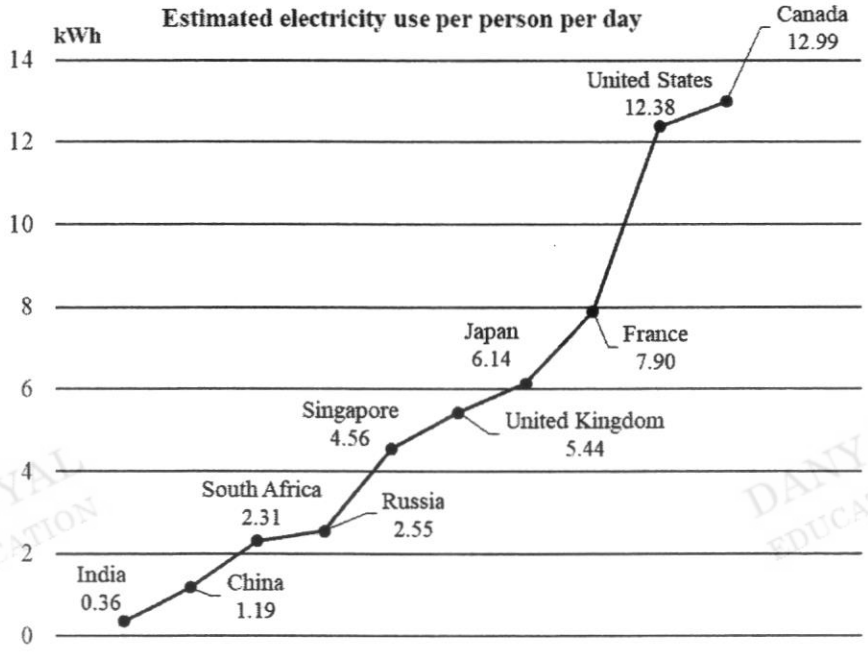
Measurement	W	X	Y	Z
Interior angle	91°	48°	114°	108°
Exterior angle	89°	132°	67°	72°

Identify which pair of measurement is wrong and explain why.

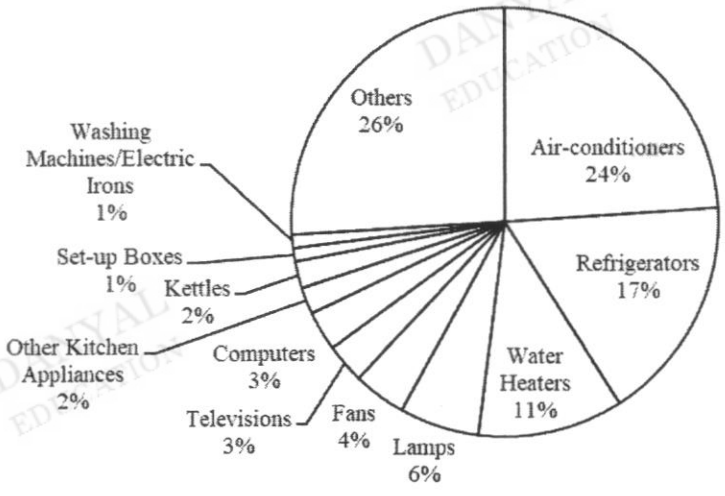
Measurement *Y* is wrong because

interior angle + exterior angle = 114° + 67° **≠ 180°. B1** [1]

24 Below is some information about electricity use.



Percentage breakdown of electricity use for appliances in a typical Singapore household



(a) AO2 In Singapore, what is the estimated electricity use per person per day for water heaters?

Estimated usage per person per year for water heaters

$= 11\% \times 4.56$ **M1**

$= \frac{11}{100} \times 4.56$

$= 0.5016$ kWh

0.5016 **A1**

Reject $\frac{627}{1250}$.

Answer ..... kWh [2]

[Turn over

(b) **(i)** **AO1** Find the total electricity use per day for a typical Singapore household of 4 people.

Total electricity use per day
$= 4 \times 4.56$ **M1**
$= 18.24$ kWh

Answer 18.24 **A1** kWh [2]

(ii) **AO3** There are 4 people in the Tan family.
The percentage of electricity they use for air-conditioners is the same as the percentage for a typical Singapore household.
The Tan family uses an average of 19 kWh of electricity per day.

Mr Tan claims that if each person in the family reduces their air-conditioning use time from 8 hours to 6 hours, the family can get their total electricity use to below that of a typical Singapore household of 4 people.

Is Mr Tan correct?
Explain your answer.

Answer

Usage for Tan family per day for air-conditioners
$= 24\% \times 19$ **M1**
$= \frac{24}{100} \times 19$
$= 4.56$ kWh

Total electricity use for Tan family per day at reduced air-conditioner time
$= 19 - \frac{2}{8} \times 4.56$ **M1**
$= 19 - 1.14$
$= 17.86$ kWh

Since 17.86 kWh is less than a typical Singapore household's use of 18.24 kWh, Mr Tan is correct. **A1**

[3]

END OF SECTION B