Mark Scheme

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

Name: _____ (   )   Class: 1 _____

Section B

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

Category	Accuracy	Symbols	Others
Question No.			

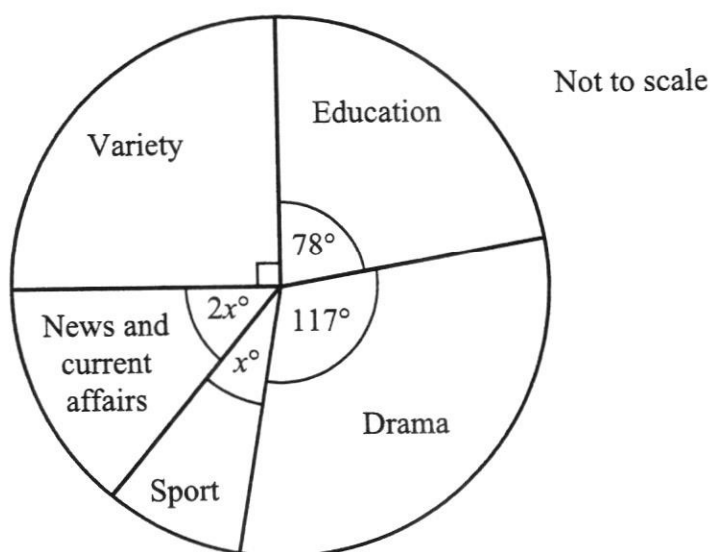| For Examiner's Use	
Section B	50

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.
AO2

$$90° + 2x° + x° + 117° + 78° = 360° \ (\angle s \text{ at a pt.}) \ \textbf{M1}$$
$$3x° + 285° = 360°$$
$$3x° = 360° - 225°$$
$$3x° = 135°$$
$$3x° = \frac{135°}{3}$$
$$x° = 25°$$
$$x = 25 \qquad Answer \ x = \underline{\hspace{2cm} 25 \ \textbf{A1} \hspace{2cm}} \ [2]$$

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

Percentage of people who watched drama
$$= \frac{117°}{360°} \times 100\%$$
$$= 32.5\% \qquad\qquad Answer \ \underline{\hspace{1.5cm} 32.5 \ \textbf{B1} \hspace{1.5cm}} \% \ [1]$$

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

$$117° - 78° \rightarrow 195 \ \textbf{M1}$$
$$39° \rightarrow 195$$
$$1° \rightarrow \frac{195}{39}$$
$$360° \rightarrow 360 \times \frac{195}{39} = 1800$$

$$Answer \ \underline{\hspace{1.5cm} 1800 \ \textbf{A1} \hspace{1.5cm}} \text{people} \ [2]$$

18
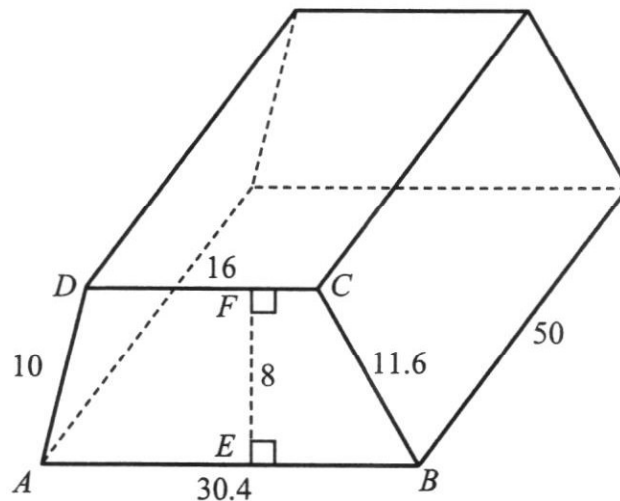
The diagram shows a prism whose cross-section is a trapezium, *ABCD*.
AB = 30.4 cm, *BC* = 11.6 cm, *CD* = 16 cm, *AD* = 10 cm and *EF* = 8 cm.
The length of the prism is 50 cm.

Calculate the

(a) volume of the prism,
AO1

Method 1:

Volume of the prism

$= \dfrac{1}{2}(16 + 30.4)(8) \times 50$ **M1: Seen** $\dfrac{1}{2}(16 + 30.4)(8)$.

$= 185.6 \times 50$

$= 9280 \text{ cm}^3$

Method 2:

Volume of *ABCD*

$= 30.4 \times 8 - \dfrac{1}{2}(30.4 - 16)(8)$ **M1**

$= 185.6 \text{ cm}^2$

Volume of the prism

$= 185.6 \times 50$

$= 9280 \text{ cm}^3$

Answer ....9280 **A1**.......... cm³ [2]

(b) surface area of the prism.
AO1

Surface area of the prism

$= 2 \times \dfrac{1}{2}(16 + 30.4)(8) \textbf{ [M1]} + (30.4 + 11.6 + 16 + 10)(50) \textbf{ [M1]}$

$= 2 \times 185.6 + 68(50)$

$= 371.2 + 3400$

$= 3771.2 \text{ cm}^2$

Answer ....3771.2 **A1**.......... cm² [3]

[Turn over

19 (a) A shirt costs $18 after a 20% discount. Find its original price.
AO2

$100\% - 20\% \rightarrow \$18$ **M1**
$80\% \rightarrow \$18$
$1\% \rightarrow \dfrac{\$18}{80}$
$100\% \rightarrow 100 \times \dfrac{\$18}{80} = \$22.50$

∴ 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**
$= \$6000 \times \dfrac{1.2}{100}$
$= \$72$

Interest earned in 3 years = $72 × 3
$= \$216$

Method 2:
Interest earned in 3 years = $6000 × 1.2% × 3 **M1**
$= \$6000 \times \dfrac{1.2}{100} \times 3$
$= \$216$

Answer $ _____216 **A1**_____ [2]

(ii) If he wants to earn a total interest of $360, how long should the $6000
AO2 be deposited?

Duration of deposit
$= \dfrac{\$360}{\$72\,/\,\text{year}}$ **M1**
= 5 years

Answer _____5 **A1**_____ years [2]

20 The first three terms in a sequence of numbers, $T_1, T_2, T_3, \ldots$ 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.
AO1

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

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

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

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

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

Method 1:   *Answer*   Method 2:   Method 3:

$\quad 165 = 3 + 4n$ $\quad 165 = 3 + 4n$ $T_{40} = 3 + 4(40) = 163$

$165 - 3 = 4n$ $165 - 3 = 4n$ $T_{41} = 3 + 4(41) = 167$

$\quad 162 = 4n$ $\quad 162 = 4n$

$\quad 4n = 162$ $\quad 4n = 162$ **T_{40} is 163 and T_{41} is**
167, therefore 165 is
$\dfrac{4n}{4} = \dfrac{162}{4}$ **not a term of this**
sequence. B1
$\quad n = 40.5$ n represents the position
number. Since **162 is not**

n represents the position number.   **a multiple of 4 (162 is**
Since $n = \mathbf{40.5}$ is **not a positive**   **not divisible by 4),**
integer, therefore 165 is not a term therefore **165 is not a**
of this sequence. B1   term **of this sequence.**
                                    B1   [1]

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

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

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

$26x - 13 = 12x + 8$

$26x - 12x = 8 + 13$ **M1: Terms correctly collected on each side of equation.**
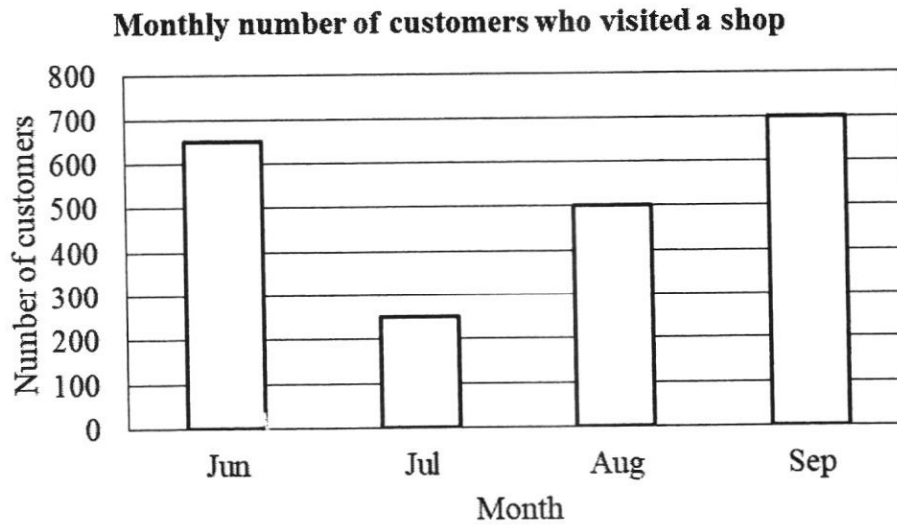
$14x = 21$

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

$x = 1.5$

1.5 A1

Accept $1\dfrac{1}{2}$.

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

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

Monthly number of customers who visited a shop

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

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

Answer ....525 **A1**................. [2]

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

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.

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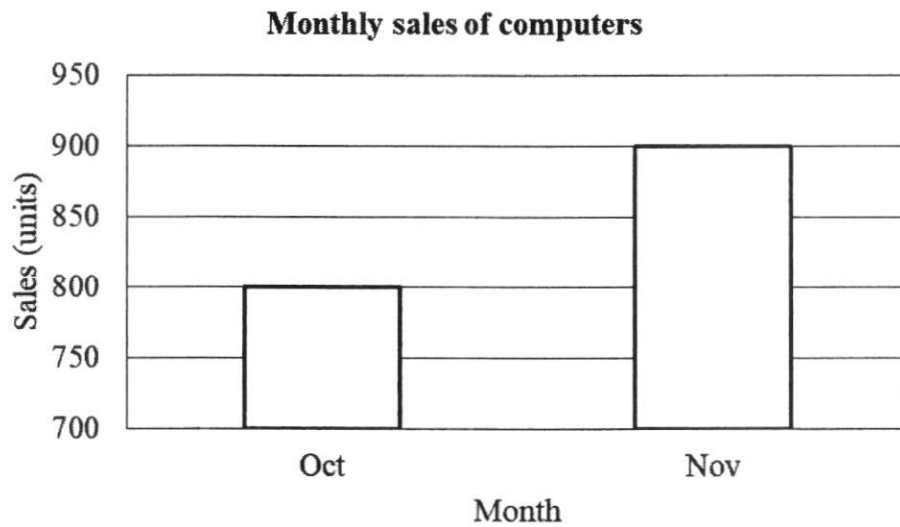
'The number of computers sold in November is twice the number of computers sold in October.'

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.

72 km/h

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

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

$= 20$ 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.

Average speed for whole journey

$= \dfrac{\text{Total distance travelled}}{\text{Total time taken}}$

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

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

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

$= 8$ 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**

6 h   5 h   20 min

6 am   12 noon   5 pm   5.20 pm
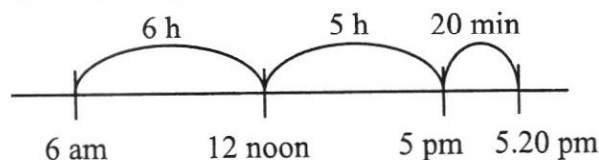
Answer ....5.20 pm **A1**................ [3]

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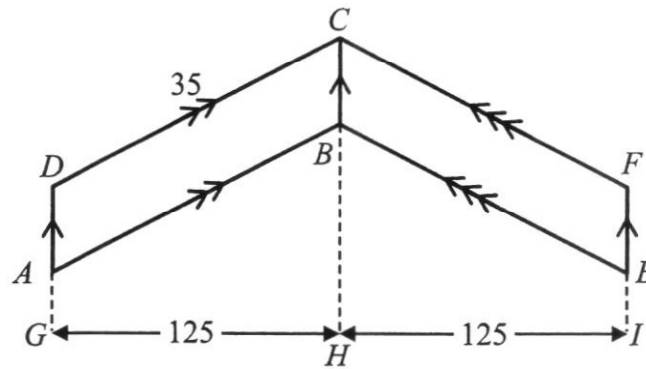
ABEFCD is made up of two identical parallelograms, *ABCD* and *BEFC*.
CD = 35 cm and *GH* = *HI* = 125 cm.
The perimeter of one parallelogram is 110 cm.

Calculate

(i) *AD*,

AO2

$AD + 35 + BC + 35 = 110$ **M1**
$AD + 35 + AD + 35 = 110$
$2AD = 110 - 35 - 35$
$2AD = 40$
$\dfrac{2AD}{2} = \dfrac{40}{2}$
$AD = 20$ 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
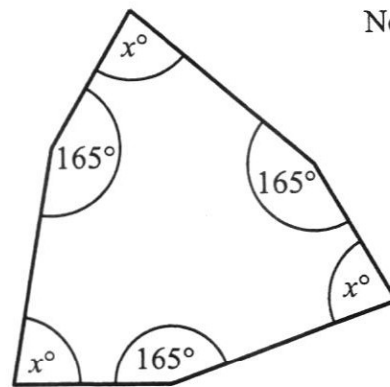
Not to scale

The diagram shows a hexagon.

Method 1: Find the value of x.

$3 \times x° + 3 \times 165°$ **[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 $x° = \dfrac{360° - 3 \times 15°}{3}$ **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 $= 114° + 67° \neq 180°$. **B1**
.... [1]

24 Below is some information about electricity use.

Estimated electricity use per person per day

Canada 12.99
United States 12.38
France 7.90
Japan 6.14
United Kingdom 5.44
Singapore 4.56
Russia 2.55
South Africa 2.31
China 1.19
India 0.36
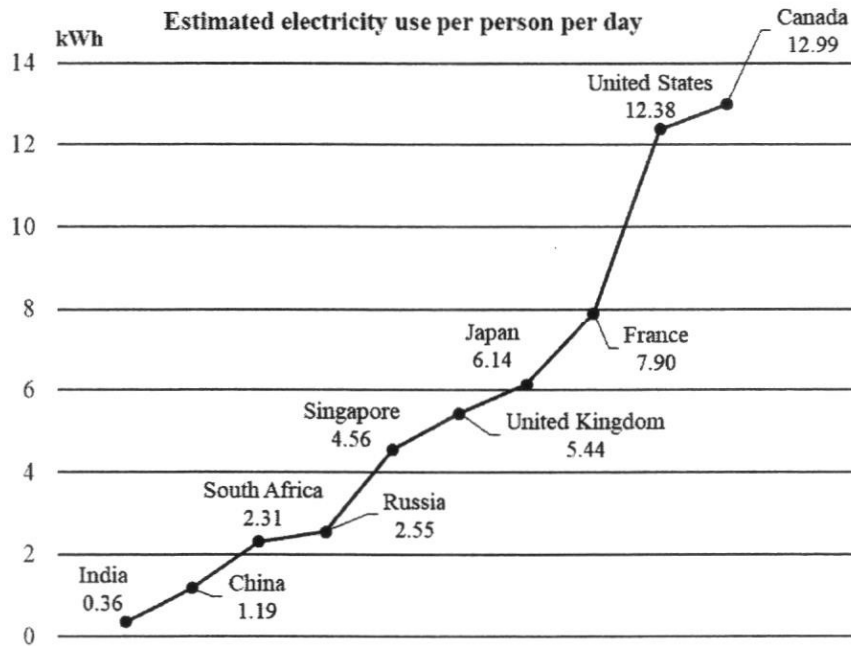
Percentage breakdown of electricity use for appliances in a typical Singapore household

Others 26%
Air-conditioners 24%
Washing Machines/Electric Irons 1%
Set-up Boxes 1%
Kettles 2%
Other Kitchen Appliances 2%
Computers 3%
Televisions 3%
Fans 4%
Lamps 6%
Water Heaters 11%
Refrigerators 17%
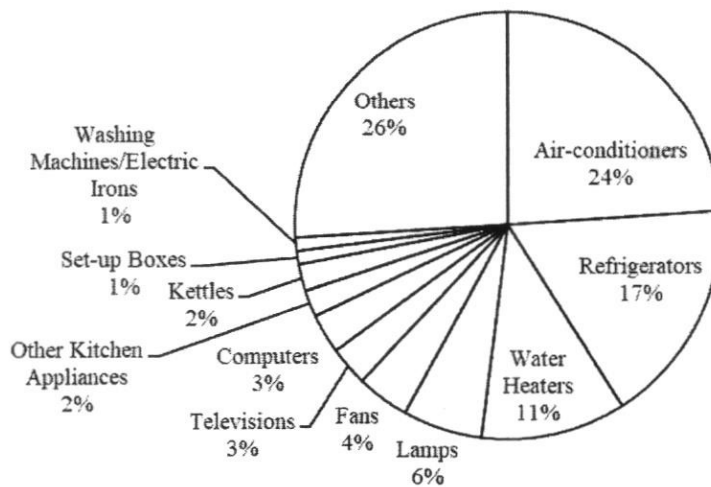
(a)
AO2 In Singapore, what is the estimated electricity use per person per day for water heaters?

Estimated usage per person per year for water heaters
$= 11\% \times 4.56$ **M1**
$= \dfrac{11}{100} \times 4.56$
$= 0.5016 \text{ kWh}$

0.5016 **A1**
Reject $\dfrac{627}{1250}$.

Answer .... kWh [2]

[Turn over

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

Total electricity use per day
= 4 × 4.56 **M1**
= 18.24 kWh

Answer ....18.24 **A1**.................... kWh [2]

(ii) There are 4 people in the Tan family.
AO3 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% × 19 **M1**
= $\dfrac{24}{100}$ × 19
= 4.56 kWh

Total electricity use for Tan family per day at reduced air-conditioner time
= 19 − $\dfrac{2}{8}$ × 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