

CANDIDATE
NAME

CLASS

INDEX
NUMBER

METHODIST GIRLS' SCHOOL

Founded in 1887



PRELIMINARY EXAMINATION 2019 Secondary 4

Friday

MATHEMATICS

4048/02

16 August 2019

Paper 2

2 h 30 min

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name 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, glue or correction fluid.

Answer **all** questions in the spaces provided in the question paper.

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

The total of the marks for this paper is 100.

Mathematical Formulae*Compound Interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4 \pi r^2$$

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

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

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

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

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

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

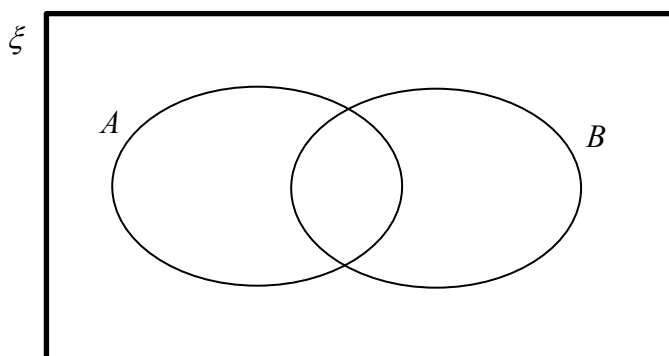
$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

1 (a) $\xi = \{x : x \text{ is an integer and } 2 \leq x \leq 12\}$, $N = \{x : x \text{ is a prime number}\}$ and $M = \{x : x \text{ is a multiple of } 4\}$.

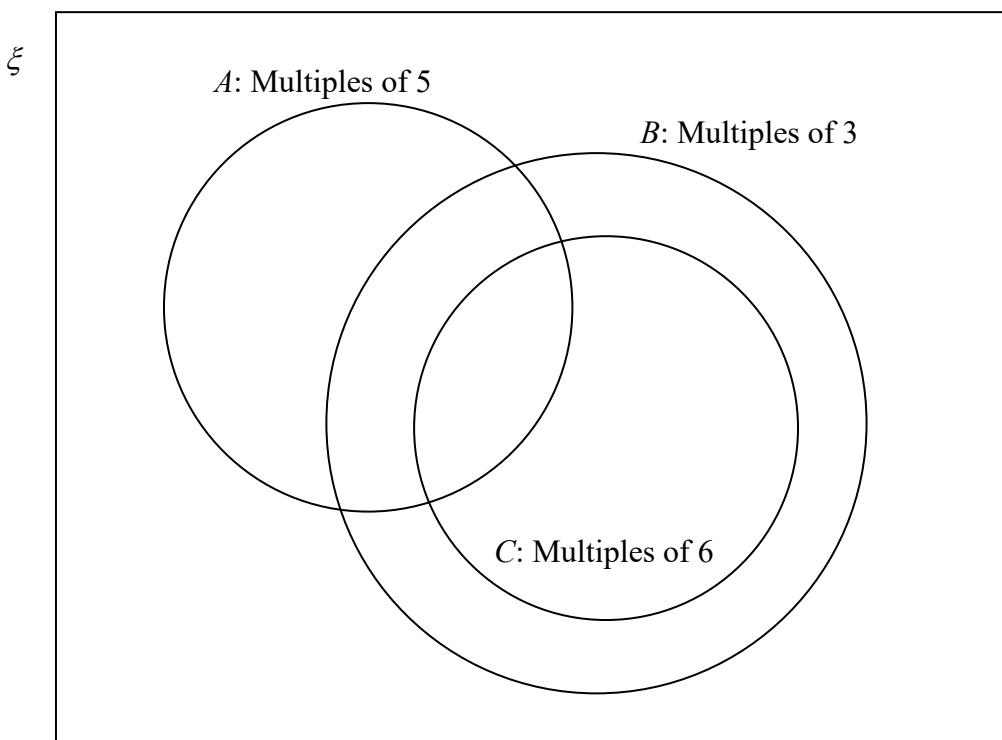
(i) List the elements of M' . [1]

(ii) Find the number of elements in $N \cap M'$. [1]

(b) On the Venn Diagram below, shade the region representing $A' \cap B$. [1]



(c) (i) Place the following five numbers in their correct positions in the diagram below.
15, 25, 33, 67 and 90 [2]



(ii) Use \emptyset , \subset , $\not\subset$, \in or \notin to complete the statement: $33 \dots\dots\dots A$. [1]

2 (a) Factorise $a^2 - 6ab - 1 + 9b^2$ completely. [2]

(b) Express $\frac{3}{(x-4)^2} + \frac{1}{4-x}$ as a single fraction. [3]

(c) Given that $\frac{1}{x} + \frac{2}{y} = \frac{3}{z}$, express y in terms of x and z . [3]

(d) (i) Solve the inequality $2(9 - 5x) < 4 - \frac{x}{2} \leq \frac{2x}{3} - \frac{4x}{7}$. [3]

(ii) Represent your solution on the number line below. [1]



(iii) Write down the smallest natural number that satisfies your answer in (d)(i). [1]

3 (a) Calculate the size of one interior angle of a regular hexagon.

[1]

(b)



Source:
Malgorzata Pater
BA Interior & Spatial Design, Chelsea College of Arts & Design

DIAGRAM 1



DIAGRAM 2

DIAGRAM 1 shows a new packaging for 6 servings of spaghetti, in the form of a prism 30 cm in length, with a cross-section in the shape of a regular hexagon.

DIAGRAM 2 shows a cylindrical gift box of height 30 cm which comes with every purchase of one pack of spaghetti during the Christmas season.

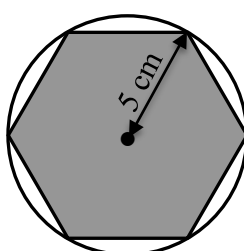


DIAGRAM 3

DIAGRAM 3 shows a regular hexagon inscribed in a circle of radius 5 cm which represents the top view of the pack of spaghetti fitted in the gift box.

- (i) Show that the area of the hexagonal cross-section is 65.0 cm^2 , correct to 3 significant figures. [2]

- (ii) Find the total external surface area of **one spaghetti pack** that contains 6 servings of spaghetti shown in **Diagram 1**. [2]

- (c) Calculate the volume of the **unoccupied** space in a gift box that contains one spaghetti pack. [3]

- 4 (a) The selling price of a *Dami T10+* mobile phone is \$1398. By selling the mobile phone at a 15% discount, the shop-owner still makes a profit of 39.8% on its cost price.
- (i) Find the discounted price of the mobile phone. [1]
- (ii) Find the cost price of the mobile phone. [2]
- (b) The selling price of a *Kaidin* air-conditioning System 4 is \$4500.
The hire purchase price is a deposit of \$200 plus 18 equal monthly payments of \$258 per month.
Calculate the simple interest rate per annum. [3]

- (c) In 2019, a bicycle shop priced a *PMW* mountain bike at \$1289, inclusive of Goods and Services Tax (GST) of 7%.
- (i) Calculate the amount of GST a customer pays for one bike, correct to the nearest cent. [2]

The GST rate is to be increased to 8% in July 2020.

- (ii) How much would a *PMW* mountain bike cost a customer after this increase? [2]

Come July 2023, the GST rate will be 10%. Barbara made the following comment:
“*The percentage increase of the GST rate will be 2% from July 2020 to July 2023.*”

- (iii) State whether you agree or disagree with her comment and give a reason for your answer. [1]

I with her comment.

Reason:

.....
.....

- 5** A Standard Men's Triathlon comprises of a 1500 – metre swimming leg, followed by a 40 – kilometre road cycling leg and then a 10 – kilometre running leg.

A participant of a Men's Triathlon took a total time of 2 hours 52 minutes and 30 seconds.

He completed the swimming leg of 1500 metres in a time of 22 minutes and 30 seconds.

- (a)** Calculate his average speed for the swimming leg in kilometres per hour. [2]

He completed the 40 km road cycling leg of the race at an average speed of x kilometres per hour.

- (b)** Write down an expression in terms of x , for his time taken for the cycling leg. [1]

He then completed the final 10 km road running leg of the Triathlon at an average speed of 25 kilometres per hour slower than the cycling leg.

- (c)** Write down an expression in terms of x , for his time taken for the running leg. [1]

(d) Form an equation in terms of x and show that it reduces to $x^2 - 45x + 400 = 0$. [3]

(e) Solve the equation $x^2 - 45x + 400 = 0$, correct your answers to 2 decimal places. [3]

(f) Hence, find his time taken for the running leg, in hours, minutes and seconds, correct to the nearest second. [2]

6 Answer parts (a), (c), (d), (e) and (f) in the spaces provided on this page.

A rock is launched by a mechanical catapult from the top of a cliff and lands in the sea below. The time t seconds after the rock is launched and the height h metres above the sea are connected by the equation

$$h = -16t^2 + 80t + 220.$$

t	0	1	2	3	4	5	6	7
h	220	284	316	316	284	220	124	k

(a) Calculate the value of k . [1]

(b) **Answer this part on page 13**

Using a scale of 2 cm to represent 1 unit, draw a horizontal axis for $0 \leq t \leq 7$.

Using a scale of 1 cm to represent 20 units, draw a vertical axis for $-20 \leq h \leq 340$.

Plot the points given in the table and join them with a smooth curve. [3]

(c) (i) Explain how you can use your graph to estimate the time taken, in seconds, for the rock to land in the sea. [1]

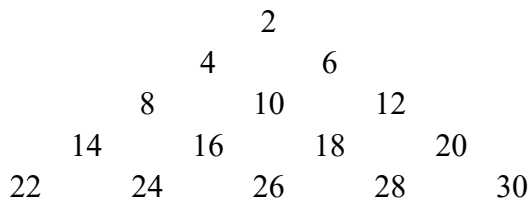
(ii) Write down the value of your estimate from (c)(i). [1]

(d) Using your graph, write down the value of h where the rock is at its highest point above the sea. [1]

(e) By drawing a tangent, estimate the value of t when the rock's height above the sea, is decreasing at 64 metres per second. [2]

(f) By drawing a suitable straight line on your graph, solve $4t^2 - 15t - 70 = 0$. [2]

- 7 (a) The even numbers are arranged in a triangular array as shown in the figure below. This pattern of arrangement is to be continued. In the first row, the number '2' is the first number and the last number for that row.



The following table is based on the arrangement of numbers above.

Row No. n	Sum of the first and the last numbers T	Sum of all the numbers in the row S	Average of all the numbers in the row A
1	4	2	2
2	10	10	5
3	20	30	10
4	34	68	17
5	52	130	26
6	p	q	r

- (i) Find the values of p , q and r in the 6th row of the table. [3]

- (ii) Write down the formula, in terms of n , for finding A , the average of all the numbers in the n^{th} row. [1]

- (b) Ms Zuraida and Ms Tang are administrative assistants in a logistics company in Changi. They are paid according to normal and overtime pay rates. Based on company policy, all administrative assistants are required to work 8 normal hours on weekdays and 4 normal hours on Saturdays.

If Ms Zuraida works for 8 hours at normal rate and 2 hours at overtime rate on weekdays, she will be paid \$129.80 per weekday.

On Saturdays, if she works for 4 hours at normal rate and 3 hours at overtime rate, she will be paid \$100.30 per Saturday.

Let \$ n per hour be Ms Zuraida's normal pay rate and \$ x per hour be her overtime pay rate.

- (i) Form two equations in terms of n and x and solve them. [4]

Ms Tang is paid the same overtime rate as Miss Zuraida.

However, her normal pay rate is 10% less than Ms Zuraida's as she is junior to Ms Zuraida.

During a particular week, Ms Tang is required to work 2.5 hours overtime every day on weekdays and 2 hours overtime on that Saturday.

- (ii) Calculate Ms Tang's salary that week. [3]

- 8 (a) The masses (in kg) of six members of a Korean boy band are recorded in the stem-and-leaf diagram below.

stem	leaf	
6	2.5	8.7
7	2.3	7.8
8	2.9	6.4

Key 6 | 2.5 means 62.5 kg

- (i) Calculate the mean mass of the six members of the band. [1]

- (ii) Calculate the standard deviation of the masses of the band. [1]

The mean mass of eight members of a Korean girl group is 50.3 kg and the standard deviation is 3.47 kg.

- (iii) Make two comments comparing the masses of the boy band and the girl group. [2]

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- (b) The table below shows the survey results of a group of students and the estimated time they took to complete a Chemistry assignment.

The estimated time taken by each student is rounded off to the nearest 10 minutes.

Estimated time taken (minutes)	10	20	30	40	50	60	70	80	90
Number of students	2	7	10	6	x	3	0	0	2

- (i) Given that the median time is 30 minutes, find the largest possible value of x . [1]

- (ii) Would the mean or the median be a better measure of average for the above set of data? Explain your answer. [1]

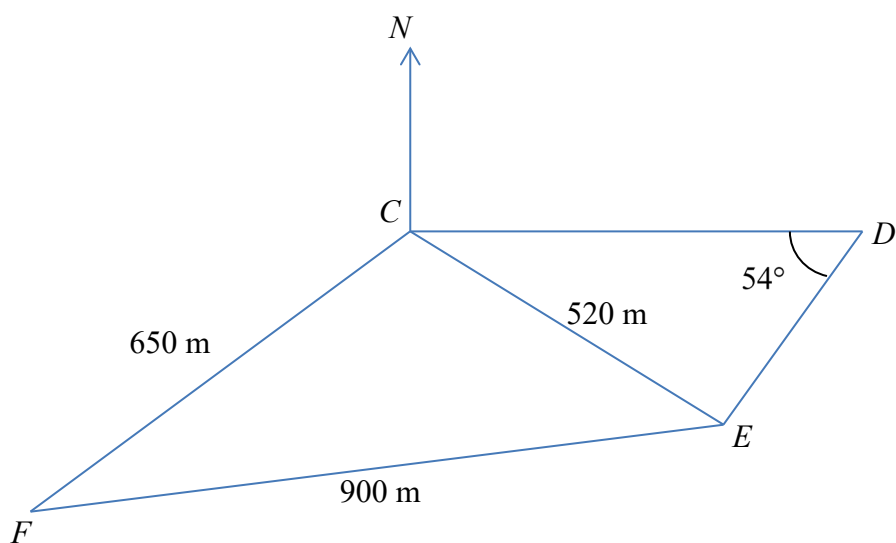
The would be a better measure because

.....

- (iii) It is given that $x = 8$. Javier claims that the mode is 10, since 10 is the highest frequency. Explain what is wrong with Javier’s statement and what the correct mode should be. [2]

.....

- 9 The diagram shows the positions of four ships at sea, the *Chelsea* (C), the *Dina* (D), the *Ellie* (E) and the *Francesca* (F). The *Dina* is due east of the *Chelsea*, the bearing of the *Francesca* from the *Chelsea* is 226° , $\angle CDE = 54^\circ$, $CE = 520$ m, $CF = 650$ m and $EF = 900$ m.



Calculate

- (a) (i) $\angle ECF$, [3]

- (ii) the bearing of the *Ellie* from the *Chelsea*, [1]

(iii) the distance between the *Dina* and the *Ellie*, [2]

(iv) the shortest distance from the *Chelsea* to the line *EF*. [2]

(b) A signal flare is shot 80 m **vertically** into the air from the *Chelsea*.

Calculate the largest angle of elevation of the highest point reached by the flare from *EF*. [2]

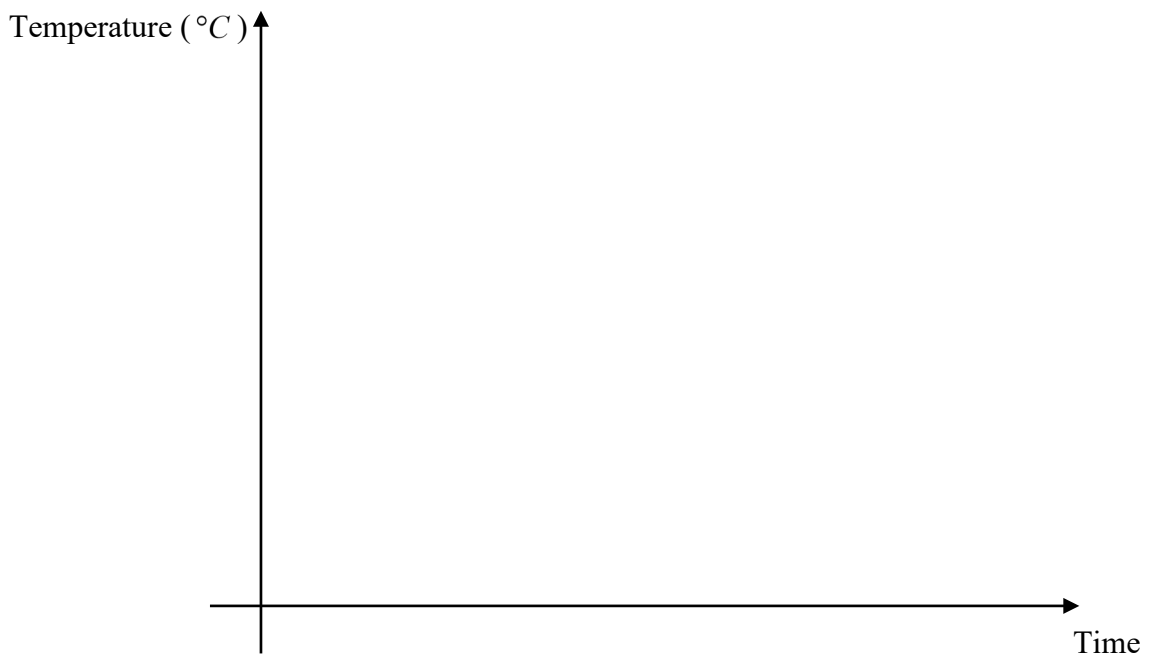
- 10 (a)** The following table shows the temperatures in degrees celsius ($^{\circ}\text{C}$) recorded in Singapore on 18 October 2018 between 8 a.m. and 6 p.m. The highest temperature recorded was 34.6°C at 2 p.m.

Time	8 a.m.	10 a.m.	12 p.m.	2 p.m.	4 p.m.	6 p.m.
Temperature in $^{\circ}\text{C}$	27.3	29.0	32.2	34.6	30.1	31.7

Shaun and Teresa are working on a Geography presentation on rising temperatures in Singapore. They need to decide on a statistical diagram to represent the above information clearly. Shaun said, “I think we should use a bar graph for these temperatures.” Teresa replied, “I feel we need to use a line graph to represent these temperatures.”

- (i)** Decide who you agree with and hence, sketch and label clearly the relevant diagram to represent the above information. [3]

I agree with



- (ii)** Give a reason for your decision. [1]

.....

- (b) NASA Scientists: “A 2.7 degree Fahrenheit rise in global temperatures has serious consequences like rising sea levels, impact on crops, reduction in freshwater.”

The President of Country X, who does not like to read reports and tables but prefers diagrams and graphs instead, disagrees: “Climate change is not a problem. This is clearly seen from **Diagram 1**. Global temperatures have remained consistent the last 100 years.”

“**Diagram 2** also shows that our country is only responsible for a small portion of the total carbon dioxide emissions and only about half of China’s!”

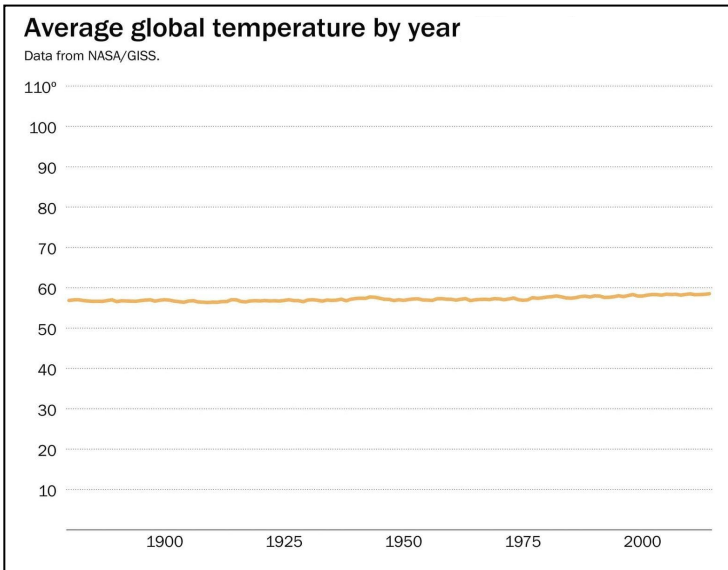


Diagram 1 (Temperature in Fahrenheit)

2015 Total Carbon Dioxide Emissions from Fuel Consumption (million metric tons)
World Bank

Diagram 2

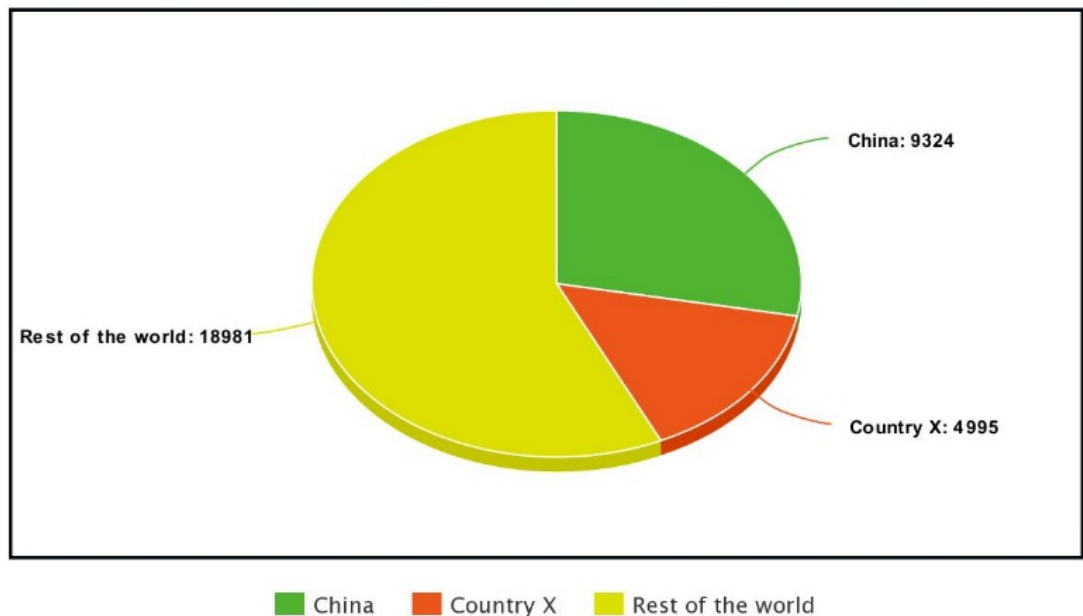


Table 1 (Carbon Dioxide Emissions from Fuel Consumption in million metric tons)

	2015	2016	2017	2018
China	9324	9420	9255	9177
Country X	4995	5198	5376	5485
Rest of the World	18981	18532	18199	18400

Convince the President that climate change is a serious issue. Do this by:

- 1) Explaining why the graph in Diagram 1 is misleading and what modification to the graph can be made to show the change in average global temperature better.
- 2) Using Table 1 and showing your calculations clearly, comment on the President's claim on carbon dioxide emissions.
- 3) State one assumption you made in your argument.

[6]

End of paper

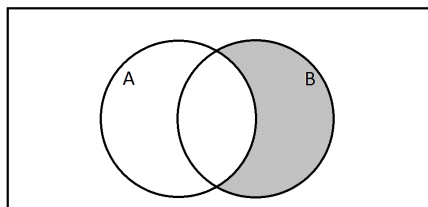
2019 Sec 4 Mathematics Prelim P2 Marking Scheme

1. (a) (i) $M' = \{2, 3, 5, 6, 7, 9, 10, 11\}$ B1

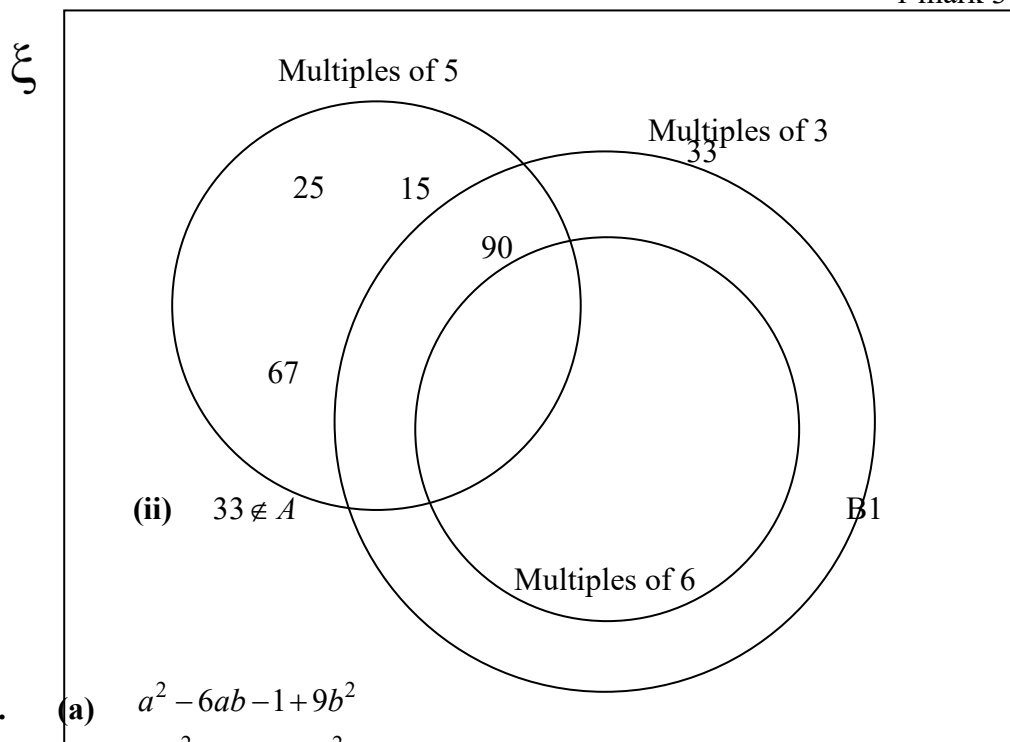
(ii) $N \cap M' = \{2, 3, 5, 7, 11\}$

No. of elements = 5 B1

(b) B1



(c) (i) B2 2 marks 5 correct
1 mark 3 – 4 correct



2. (a) $a^2 - 6ab - 1 + 9b^2$
 $= a^2 - 6ab + 9b^2 - 1$
 $= (a - 3b)^2 - 1$ M1 perfect square
 $= (a - 3b + 1)(a - 3b - 1)$ A1

(b) $\frac{3}{(x-4)^2} + \frac{1}{4-x}$
 $= \frac{3}{(x-4)^2} - \frac{1}{x-4}$ M1 change sign

$$\begin{aligned}
 &= \frac{3}{(x-4)^2} - \frac{x-4}{(x-4)^2} \\
 &= \frac{3-x+4}{(x-4)^2} \\
 &= \frac{7-x}{(x-4)^2}
 \end{aligned}$$

} M1 common denominator/simplify
} A1

(c) $\frac{2}{y} = \frac{3}{z} - \frac{1}{x}$

$\frac{2}{y} = \frac{3}{z} - \frac{1}{x}$ $yz + 2xz = 3xy$ M1 multiply by LCM

$\frac{2}{y} = \frac{3x-z}{xz}$ M1 single fraction $3xy - yz = 2xz$

$\frac{y}{2} = \frac{xz}{3x-z}$ M1 flip $y(3x-z) = 2xz$ M1 factorise

$\therefore y = \frac{2xz}{3x-z}$ A1 $-\frac{2xz}{z-3x}$ max 2 marks

(d) $2(9-5x) < 4 - \frac{x}{2} \leq \frac{2x}{3} - \frac{4x}{7}$

$2(9-5x) < 4 - \frac{x}{2}$ $4 - \frac{x}{2} \leq \frac{2x}{3} - \frac{4x}{7}$ } M1 any solving

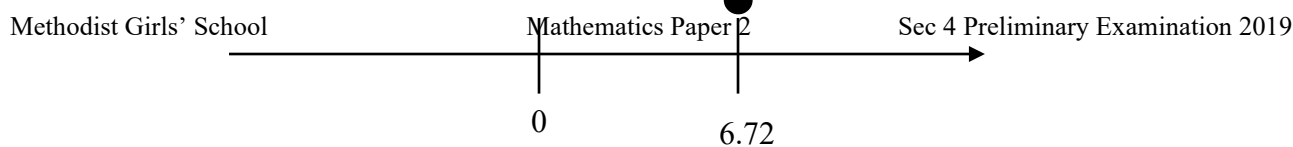
$18-10x < 4 - \frac{x}{2}$ $4 \leq \frac{2x}{21} + \frac{x}{2}$

$14 < \frac{19x}{2}$ $4 \leq \frac{25x}{42}$

$1\frac{9}{19} < x$ A1 $6\frac{18}{25} \leq x$ accept $\frac{28}{19}$

$\therefore x \geq 6\frac{18}{25}$ A1 accept 6.72 or $\frac{168}{25}$

B1



Smallest natural number = 7.

B1

3. (a) One interior angle of regular hexagon = $\frac{(6-2)180^\circ}{6}$
 $= 120^\circ$

B1

(b) (i) Area of cross-section = $6 \left[\frac{1}{2} (5)(5) \sin 60^\circ \right]$
 $= 64.9519$
 $= 65.0 \text{ cm}^2$ (3 s.f.) [shown]

M1 1 mark for 60° or

use of equilateral triangle

A1 show unrounded

Or

$$\tan 60^\circ = \frac{x}{2.5}$$

$$\tan 30^\circ = \frac{2.5}{x}$$

$$x = 2.5 \tan 60^\circ$$

$$x = \frac{2.5}{\tan 30^\circ}$$

$$\text{Area of cross-section} = 6 \left[\frac{1}{2} (5)(2.5 \tan 60^\circ) \right]$$

$$\text{or } 6 \left[\frac{1}{2} (5) \left(\frac{2.5}{\tan 30^\circ} \right) \right]$$

$$= 64.9519$$

$$= 65.0 \text{ cm}^2$$
 (3 s.f.) [shown]

M1 height of triangle

M1

A1 show unrounded

(ii) Total external surface area of hexagonal prism
 $= 6(30)(5) + 2(64.9519)$
 $= 1030 \text{ cm}^2$ (3 s.f.)

M1 allow 65.0

A1 or exact if used 65.0

- (c) Volume of unused space = $\pi(5)^2(30) - 64.9519(30)$ M2 one each
 $= 408 \text{ cm}^3$ (3 s.f.) A1 or 406 if used 65.0

4. (a) (i) Discounted price = $\frac{85}{100}(1398)$
 $= \$1188.30$ B1 overall rounding penalty if 1188.3

(ii) 139.8% to \$1188.30
 100% to $\frac{1188.3}{139.8}(100)$ M1
 $= \$850$ A1 no penalty for \$850.00

(b) Total hire purchase price = $200 + 18(258)$
 $= \$4844$ M1 either

Interest paid = $4844 - 4500$
 $= \$344$

Let interest rate be r .
 $\frac{4300(r)(1.5)}{100} = 344$ M1 equation

Rate = 5.33% (3 s.f.) A1 accept $5\frac{1}{3}$

(c) (i) 107% to \$1289
 7% to $\frac{1289}{107}(7)$ M1
 $= \$84.33$ (nearest cent) A1
 Amount of interest paid is \$84.33.

(ii) 100% to 1204.67 M1 for \$1204.67 or $\frac{1289}{107}(100)$
 108% to $\frac{1204.67}{100}(108)$
 $= \$1301.05$ (2 d.p.) A1

A customer pays \$1301.05.

- (iii) Disagree. Increase mentioned is not percentage increase but increase in percentage points. B1 accept other plausible
Or
 Disagree. Percentage increase of GST is actually 25% from 2020 to 2023.
 B1 no mark once “Agree”

5. (a) Average speed = $1.5 \div \left[22\frac{1}{2} \div 60 \right]$ M1
 $= 4 \text{ km/h}$ A1
- (b) Time taken (cycling) = $\left(\frac{40}{x} \right) \text{ h}$ B1
- (c) Time taken (running) = $\left(\frac{10}{x-25} \right) \text{ h}$ B1
- (d) $\frac{3}{8} + \frac{40}{x} + \frac{10}{x-25} = \frac{23}{8}$ M1 equation formed
 $\frac{40(x-25) + 10x}{x^2 - 25x} = \frac{5}{2}$ M1 simplifying
 $5x^2 - 125x = 100x - 2000$
 $5x^2 - 225x + 2000 = 0$ A1
 $\therefore x^2 - 45x + 400 = 0$ (shown)
- (e) $x = \frac{45 \pm \sqrt{(-45)^2 - 4(1)(400)}}{2}$ M1 formula correctly substituted
 $= 32.8078 \text{ or } 12.1922$
 $= 32.81 \text{ or } 12.19$ (2 d.p.) A2 penalise overall for rounding 3 s.f.
- (f) Time taken (running) = $\frac{10}{32.8078 - 25}$ M1
 $= 1 \text{ hour } 16 \text{ min } 51 \text{ s}$ A1
6. (a) $k = -4$ B1
- (b) Plotting all points correctly G1
 Using correct scales & labelling G1
 Smooth curve G1
- (c) (i) Read the point where the graph intersects/cuts the horizontal axis.
 B1 or equivalent
 (ii) $6.9 \leq t < 7$ B1 ≥ 7 strictly not acceptable

- (d) $318 \leq h \leq 322$ B1
- (e) Tangent drawn with correct gradient M1
 $4.4 \leq t \leq 4.6$ A1
- (f) $4t^2 - 15t - 70 = 0$
 $-16t^2 + 60t + 280 = 0$
 $-16t^2 + 80t + 220 = 20t - 60$
 Draw $h = 20t - 60$ M1 -1 mark if $y = 20x - 60$
 $6.3 \leq t \leq 6.6$ A1

7. (a) (i) $p = 74$ B1
 $q = 222$ B1
 $r = 37$ B1
- (ii) Formula = $n^2 + 1$ B1 accept $\frac{n^3 + n}{n}$
- (b) (i) $8n + 2x = 129.80$ }
 $4n + 3x = 100.30$ } M1 both
- $8n + 6x = 200.60$ M1 solving
 $4x = 70.8$
 $x = 17.70, y = 11.80$ A2
- (ii) Ms Tang's normal pay rate = $\frac{90}{100}(11.80) = \10.62 M1

$$\begin{aligned}
 &\text{Her salary that week} \\
 &= 8(5)(10.62) + 2.5(5)(17.70) + 4(10.62) + 2(17.70) && \text{M1} \\
 &= \$723.93 && \text{A1}
 \end{aligned}$$

8. (a) (i) Mean = 75.1 kg (3 s.f.) B1
- (ii) Standard deviation = 8.20 kg (3 s.f.) B1
- (iii) The boys were generally heavier than the girls with a mean of 65.1 kg > 45.0 kg. B1
 The girls' masses were more consistent with a standard deviation of 3.47 kg as compared to the standard deviation of 8.20 kg for the boys. B1
- (b) (i) $x = 7$ B1
- (ii) Median. There are (two) extremely large values/outliers of 90 minutes which will inflate the mean, so the median is a better measure. B1 no mark once 'mean' accept other plausible
- (iii) Mode should be the data being measured, in this case, the estimated time taken, and not the frequency which is the number of students. Mode is 30 minutes. B2

9. (a) (i) $900^2 = 650^2 + 520^2 - 2(650)(520)\cos \angle ECF$

$810000 = 422500 + 270400 - 676000 \cos \angle ECF$

$\cos \angle ECF = \frac{422500 + 270400 - 810000}{676000}$

$\cos \angle ECF = -\frac{1171}{6760}$

$\angle ECF = \cos^{-1}\left(-\frac{1171}{6760}\right)$

$= 100.0^\circ$ (1 d.p.)

M1 any cosine rule

M1 cos ratio/inverse

A1

(ii) The bearing of the *Ellie* from the *Chelsea*

$= 226^\circ - 99.975^\circ = 126.0^\circ$ (1 d.p.)

B1

(iii) $\angle DCE = 126.024^\circ - 90^\circ = 36.024^\circ$

$\frac{DE}{\sin \angle DCE} = \frac{CE}{\sin \angle CDE}$

$\frac{DE}{\sin 36.024^\circ} = \frac{520}{\sin 54^\circ}$

M1

$DE = \frac{520}{\sin 54^\circ} (\sin 36.024^\circ) = 378.026 = 378$ m

A1

$$(iv) \frac{1}{2}x(900) = \frac{1}{2}(520)(650) \sin 99.975^\circ \quad M1$$

$$\therefore x = 369.87 = 370 \text{ m} \quad A1$$

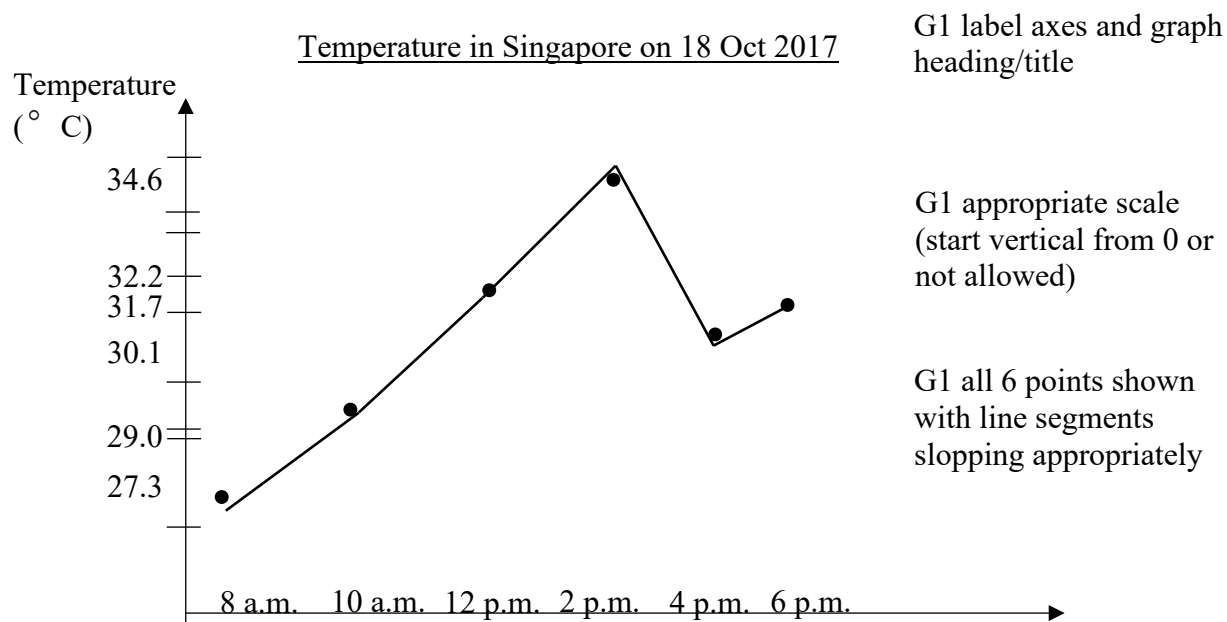
$$(b) \tan \theta = \frac{80}{369.87} \quad M1$$

$$\theta = \tan^{-1}\left(\frac{80}{369.87}\right) = 12.2^\circ \text{ (1 d.p.)} \quad A1$$

10. (a) Agree with Teresa.

Time	8 a.m.	10 a.m.	12 p.m.	2 p.m.	4 p.m.	6 p.m.
Temperature in $^\circ\text{C}$	27.3	29.0	32.2	34.6	30.1	31.7

(i)



(ii)

Temperature is a **continuous** variable. Hence, a line graph is more appropriate to

show the **trend** of temperature changes over time.

B1 Accept other plausible

- (b) The scale chosen in the graph results in an almost horizontal line that hides the change in global temperatures. B1
 Use a different scale which excludes the 0 – 40 & 70 – 110 ranges so that the increase in temperature looks more pronounced. B1
 Or
 Starting the vertical axis from zero results in an almost horizontal line that hides the change in global temperatures. B1
 Start the vertical axis from a number closer to 50 or 55 allows the increase in temperature to look more pronounced/obvious. B1

<u>Percentage of total</u>	<u>M2 Math calculations</u>			
	2015	2016	2017	2018
China	28	28.4	28.2	27.8
Country X	15	15.7	16.4	16.6

Country X's percentage of total carbon emissions trend is increasing while that of China's is decreasing. It is a cause for concern, cannot look at only one year (2015), trend needed. B1 accept other plausible
 Assumption:
 High levels of carbon emission contribute to global warming/rises in global temperatures/adverse climate change. B1 accept other plausible