



CHIJ ST. THERESA'S CONVENT
PRELIMINARY EXAMINATION 2019
SECONDARY 4 EXPRESS / 5 NORMAL (ACADEMIC)

CANDIDATE
NAME

CLASS

INDEX
NUMBER

MATHEMATICS

4048/1

Paper 1

05 September 2019

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your index number, and name on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use paper clips, highlighters, glue or correction fluid.

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.

Calculators should be used 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 answers in terms of π .

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 80.

**ANSWERS TO QUESTIONS 1 TO 15 MUST BE HANDED IN SEPARATELY FROM
ANSWERS TO QUESTIONS 16 TO 24.**

This document consists of **17** printed pages.

Answer **all** the questions.

1 Solve $\frac{x}{4} + 13 = 6$.

Answer $x = \dots\dots\dots$ [1]

2 Peter boards a bus at bus stop A at 6.50 am. The bus travels to bus stop B at an average speed of 60 km/h to school. He reaches bus stop B at 7.15 am.

What is the distance between the 2 bus stops?

Answer $\dots\dots\dots$ km [2]

3 John wrote down five numbers.
The mean of these numbers is 8, the median is 6 and the mode is 5.
The largest number is three times the smallest number.

Find the five numbers.

Answer $\dots\dots\dots, \dots\dots\dots, \dots\dots\dots, \dots\dots\dots, \dots\dots\dots$ [2]

4 A field which has an area of 1800 m², is used to plant sunflowers.
It is known that an acre of land, which is about 4047 m², can grow an average of 20 000 sunflower plants.
Each sunflower plant has an average seeding rate of 1500 seeds.

Calculate an estimate of the total number of seeds that can be harvested from the field, leaving your answer in standard form, correct to 3 significant figures.

Answer $\dots\dots\dots$ seeds [2]

5 Simplify $\frac{3x}{5} - \frac{4(2-3x)}{7}$.

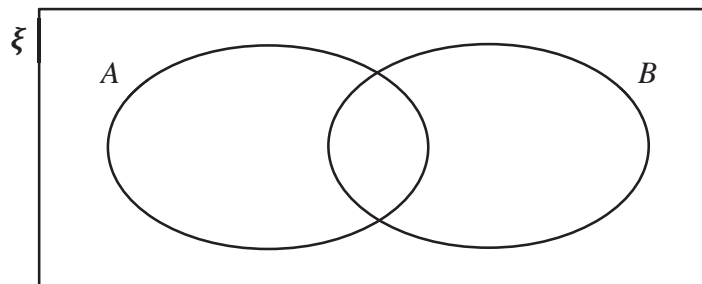
Answer [2]

- 6 $\xi = \{x : x \text{ is a positive integer and } x < 25\}$
 $A = \{x : x \text{ is a perfect square}\}$
 $B = \{x : x \text{ is an odd number}\}$

(a) Find $n(A \cap B)$.

Answer [1]

(b) On the Venn diagram, shade the region which represents $(A \cap B)'$.



[1]

7 Factorise fully $6ac + 9ad - 12bd - 8bc$.

Answer [2]

8 A is the point $(-2, 5)$ and $\vec{BA} = \begin{pmatrix} -4 \\ 8 \end{pmatrix}$.

(a) Find the coordinates of point B .

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

(b) Calculate $\left| \vec{BA} \right|$.

Answer [1]

9 Andrew weighed ten large watermelons from his farm.

The mean mass of the watermelons was 9070 grams.

The standard deviation of the masses of the watermelons was 362.8 grams.

The scales used by Andrew were found to be inaccurate.

The correct mass of each watermelon turns out to be 1650 grams more than Andrew recorded.

Write down the correct values for the mean and standard deviation (SD).

Answer Mean = g

SD = g [2]

- 10** A man purchased a painting in 2016.
The value of the painting increased by 8% in 2017.
In 2018, the value of the painting was \$73288.80, an increase of 20% as compared to 2017.
Express the cost of the painting in 2016 as a percentage of the cost of the painting in 2018.

Answer % [3]

- 11 (a)** David makes a mocktail drink for his kids.
He uses apple juice, lime juice and sparkling water in the ratio 3 : 2 : 7 respectively.
He uses 2.1 litres of sparkling water.

- (i)** How much apple juice does he use?

Answer litres [1]

- (ii)** How much mocktail drink does he make altogether?

Answer litres [1]

- (b)** Wen Ni makes a mocktail drink using lemon juice, syrup and coconut water.

The ratio lemon juice : syrup is $\frac{1}{2} : \frac{1}{3}$.

The ratio syrup : coconut water is 1 : 8.

Find the ratio lemon juice : syrup : coconut water.

Answer : : [2]

- 12** Jane draws a triangle.
 The first angle is 20° bigger than the second angle
 The third angle is three times the size of the first angle.

Form an equation and solve it to find the angles of the triangle.

Answer $^\circ$, $^\circ$, $^\circ$ [3]

- 13** It is given that x and y are in direct proportion.
 The difference in the value of y , when x is 5 and when x is 17, is 54.

(a) Find an equation connecting x and y .

Answer [3]

(b) Find the value of x when $y = 84$.

Answer [1]

- 14 When written as the product of their prime factors,

$$m \text{ is } 2^2 \times 5^2 \times 11$$

$$n \text{ is } 2^3 \times 3 \times 5 \times 7$$

Find

- (a) the largest integer which is a factor of m and n ,

Answer [1]

- (c) the smallest integer p such that mp is a perfect cube,

Answer [1]

- (d) the smallest positive integer value of q such that $\sqrt[3]{\frac{mn}{q}}$ is an integer.

Answer [1]

- 15 (a) Solve the inequalities $-15 \leq 8 - 3x < 2$.

Answer [2]

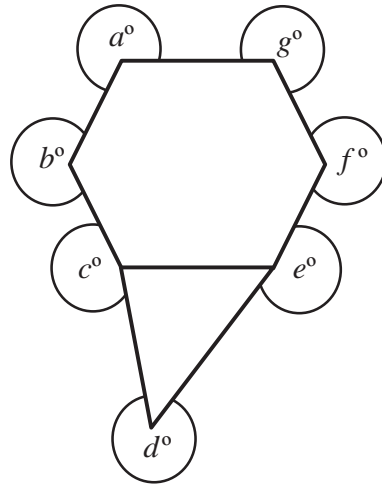
- (b) Write down all the integers that satisfy $-15 \leq 8 - 3x < 2$.

Answer [1]

Name: _____ ()

Class: _____

16 The diagram shows a regular hexagon and a triangle.



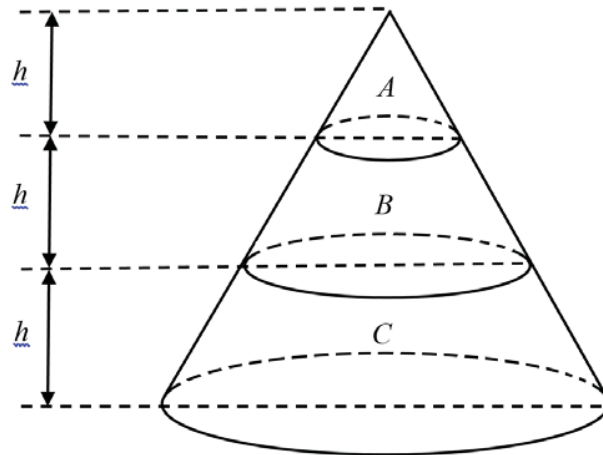
(a) Calculate the sum of the interior angles of the regular hexagon.

Answer° [1]

(b) Calculate the sum of the angles a , b , c , d , e , f and g .

Answer° [2]

- 17 The diagram shows a right circular cone which is divided into 3 parts A , B and C by planes parallel to the base as shown. B and C are frustums of a cone. The height of each part is h cm.



The curved surface area of A is 200 cm^2

- (a) Show that $A_A : A_{A+B}$ is $1 : 4$, where A_A is the curved surface area of A and A_{A+B} is the combined curved surface areas of A and B .

[1]

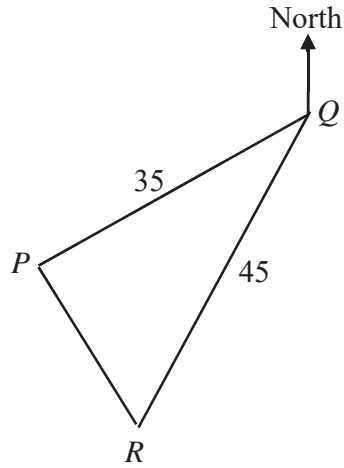
- (b) Find A_B , the curved surface area of B .

Answer cm^2 [1]

- (c) Find the ratio of the volume of B to the volume of C .

Answer [3]

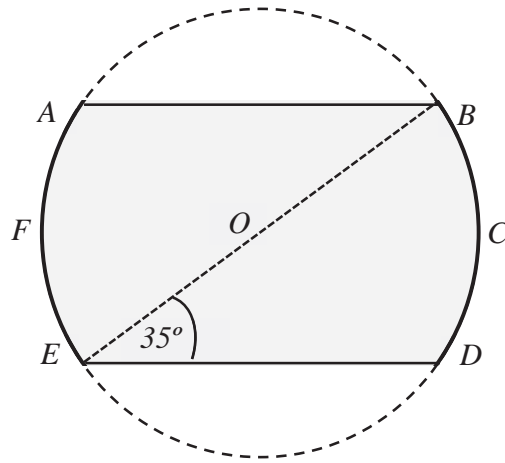
- 18 The diagram shows the positions of three towns P , Q and R .
 $PQ = 35$ km and $QR = 45$ km.
 The bearing of P from Q is 235° and the bearing of R from Q is 205° .



Calculate the distance between towns P and R .

Answer km [3]

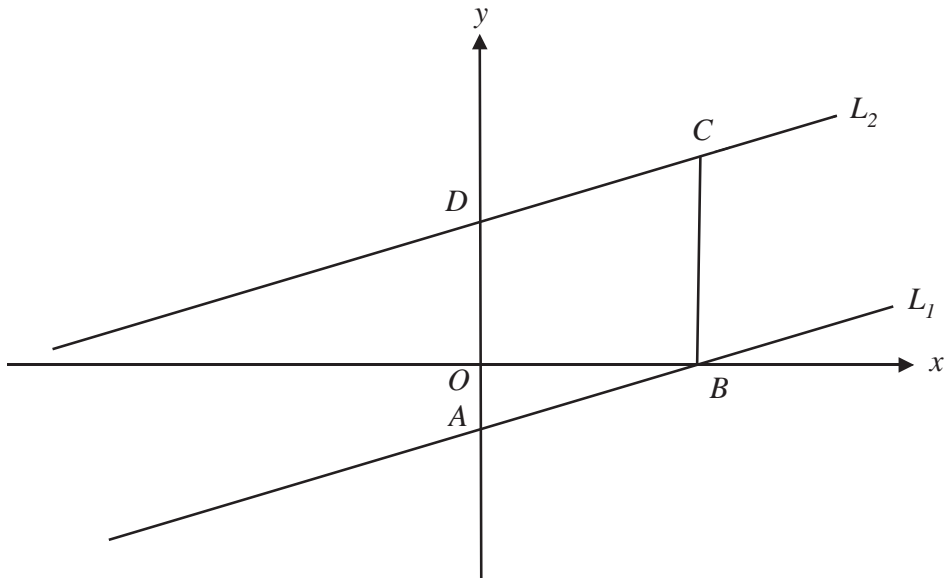
- 19 The diagram shows six points A, B, C, D, E and F on the circumference of a circle with centre at O .
It is given that the diameter BE of the circle is 14 cm, $\angle BED = 35^\circ$ and $AB = ED$.



Calculate the area of the shaded region.

Answer cm² [5]

- 20 In the diagram, the equation of the line L_1 is $2y = 3x - 5$.
 The line L_2 has the same gradient as the line L_1 .
 A and D lie on the y -axis. BC is parallel to the y -axis and $BC = 8$ units.



- (a) Find the equation of the line L_2 .

Answer [2]

- (b) What is the area of quadrilateral $ABCD$?

Answer units² [1]

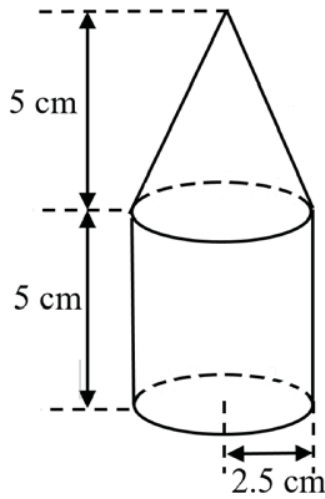
- (c) Find the value of $\tan \angle ABO$.

Answer [1]

- 21 (a) The period of oscillation of a pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$.
Rearrange the formula to make l the subject.

Answer [2]

- (b) A solid is made from a cylinder and a cone.
Both the cylinder and cone have radius 2.5 cm and height 5 cm.



Calculate the total surface area of the solid.

Answer cm² [3]

- 22 A gift company sells three hamper packages containing packets of biscuits, bars of chocolates and bottles of wine.
 The cost of one packet of biscuit, one bar of chocolate and one bottle of wine are \$7.20, \$10.80 and \$32.00 respectively.

	Biscuit	Chocolate	Wine
Hamper A	6 packets	5 bars	3 bottles
Hamper B	9 packets	7 bars	4 bottles
Hamper C	10 packets	8 bars	2 bottles

The quantity of the items packed into each of the three types of hamper packages is shown in the table above.

These information can be represented by the matrices $\mathbf{H} = \begin{pmatrix} 6 & 5 & 3 \\ 9 & 7 & 4 \\ 10 & 8 & 2 \end{pmatrix}$ and $\mathbf{P} = \begin{pmatrix} 7.20 \\ 10.80 \\ 32.00 \end{pmatrix}$.

- (a) Evaluate the matrix $\mathbf{R} = \mathbf{HP}$.

Answer $\mathbf{R} = \dots\dots\dots$ [2]

- (b) State what the elements of \mathbf{R} represent.

..... [1]

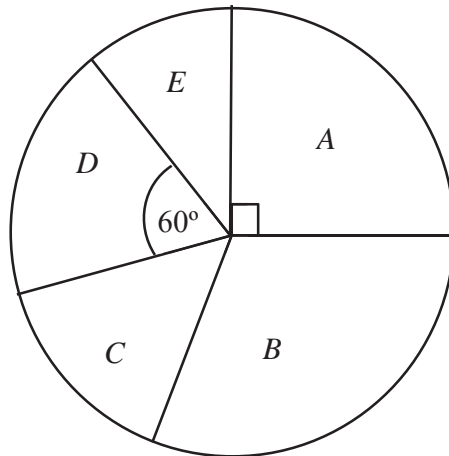
- (c) A total of 20 Hamper A, 25 Hamper B and 30 Hamper C are sold.
 Represent the total number of hamper packages sold in a 1×3 matrix \mathbf{T} .

Answer $\mathbf{T} = \dots\dots\dots$ [1]

- (d) Using matrix multiplication, find the total amount of money obtained by the gift company from the sales of the hamper packages A, B and C.

Answer \$ [2]

- 23 Some boys are placed into five groups, *A*, *B*, *C*, *D* and *E*, based on their heights. The pie chart shows the proportion of boys in each group.
 Group *A* comprises $\frac{1}{4}$ of the boys, Group *B* 30% of the boys and Group *C* has 18 boys.
 Group *D* is represented by a 60° sector.



- (a) Find the percentage of the boys who are in Group *D*.

Answer % [1]

- (b) Given that the number of boys in group *B* is 36, find the total number of boys.

Answer boys [2]

- (c) Calculate the number of boys in group *E*.

Answer boys [2]

24 A bag contains 20 marbles, n of which are red and the rest are yellow.
A marble is chosen at random and not replaced.

(a) Write down, in terms of n , the probability that the marble is yellow.

Answer [1]

A second marble is chosen at random.

(b) Find, in terms of n , the probability that both marbles are yellow.

Answer [1]

(c) (i) The probability that both marbles are yellow is $\frac{39}{95}$.

Show that $n^2 - 39n + 224 = 0$

[2]

(ii) Solve the equation $n^2 - 39n + 224 = 0$ to find the number of yellow marbles in the bag.

Answer [3]

~~ End of Paper 1 ~~



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SECONDARY 4 EXPRESS / 5 NORMAL (ACADEMIC)

CANDIDATE
NAME

CLASS

INDEX NUMBER

MATHEMATICS

4048/02

Paper 2

29 Aug 2019

Additional Material: Graph paper (1 sheet)

2 hours 30 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.

Write in dark blue or black pen.

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

Do not use paper clips, glue or correction fluid.

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

The total number of marks for this paper is 100.

Answers to Questions 1 to 6 must be handed in separately from answers to Questions 7 to 10.

This document consists of **23** printed pages.

Answer **all** the questions.

- 1 (a) Factorise $27a^4 - 3$.

Answer [2]

- (b) Express as a single fraction in its simplest form

(i)
$$\frac{2(x-1)^2}{4y^3} \div \frac{6y(x-1)}{8y^2},$$

Answer [1]

(ii)
$$\frac{3}{m-2} - \frac{2}{3m-1}.$$

Answer [2]

- (c) Solve the equation $2^{2-x} = \frac{1}{\sqrt[3]{2^{5x+1}}}.$

Answer [2]

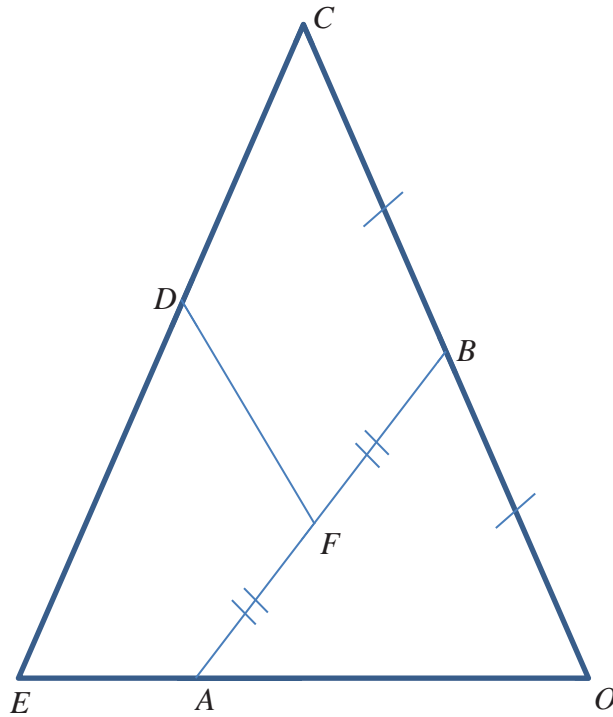
- (d) (i) Express $x^2 - 8x - 6$ in the form $(x - b)^2 - c$.

Answer [1]

- (ii) Hence solve the equation $x^2 - 8x - 6 = 0$, giving your answers correct to one decimal place.

Answer $x =$ or [3]

- 2 In the diagram below, $OB = BC$ and $AF = FB$. It is given that $OA : AE = 2 : 1$ and $ED : DC = 4 : 3$. $\overrightarrow{OA} = 2\mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.



- (a) Express, as simply as possible, in terms of \mathbf{a} and/or \mathbf{b} ,

(i) \overrightarrow{CE} ,

Answer [1]

(ii) \overrightarrow{CD} ,

Answer [1]

(iii) \overrightarrow{BA} ,

Answer [1]

(iv) \overline{OF} ,

Answer [2]

(v) \overline{FD} .

Answer [2]

(b) Find

(i) $\frac{\text{Area of } \triangle OBA}{\text{Area of } \triangle OBE}$,

Answer [1]

(ii) $\frac{\text{Area of } \triangle OBA}{\text{Area of } \triangle OCE}$.

Answer [2]

- 3 (a) Celine wishes to buy a new car. The price of the car is \$98 000.
- (i) The car dealer requires Celine to make a downpayment of \$19 600.
Express this amount as a percentage of the price of the car.

Answer% [1]

- (ii) After making the downpayment, Celine decides to take a bank loan for the rest of the money to be paid to the car dealer.
Bank OCC charges an interest rate of 2.78% per annum compounded half yearly.
Bank DBB charges a simple interest rate of 2.99% per annum.
If Celine decides to take a seven year loan, which bank should she loan from? Justify your answer.

Answer.....

..... [4]

- (b) Celine visits the petrol station weekly to refill petrol, refilling 51 litres of petrol each and every time. In order to save on petrol costs, she decides to drive to Johor Bahru, Malaysia, weekly to refill the petrol.
- (i) How much does she need to pay weekly to refill petrol in Singapore if the price of petrol is \$2.25 per litre?

Answer S\$..... [1]

- (ii) How much does she need to pay to refill petrol weekly in Johor Bahru if the price of petrol is RM 2.08 per litre?

Answer RM..... [1]

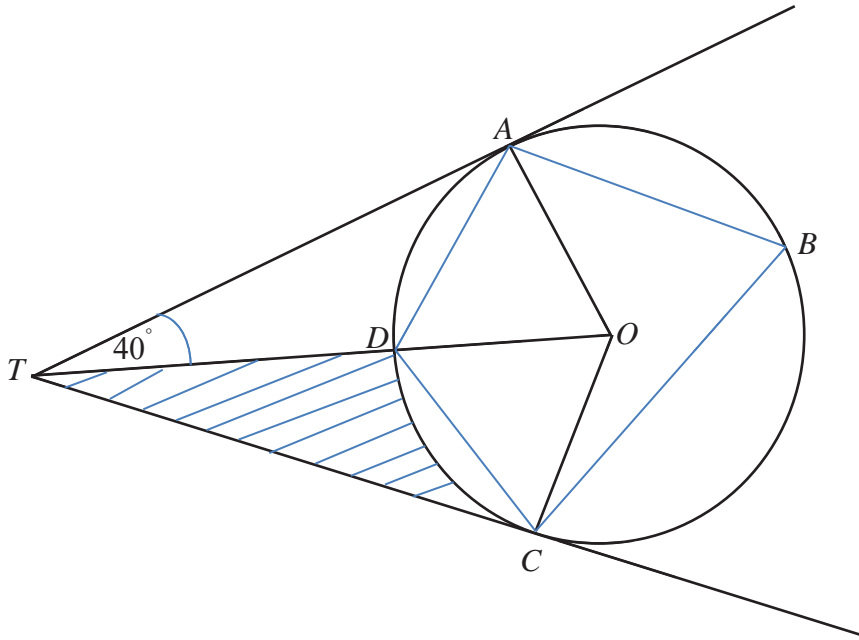
- (iii) (a) How much is Celine able to save weekly if she refills the petrol in Malaysia? Give your answer in terms of Singapore dollars. (Given the exchange rate is S\$1 = RM 3.05)

Answer S\$..... [2]

- (b) Express the amount of savings as a percentage of the cost of refilling petrol weekly in Singapore.

Answer% [1]

- 4 The diagram below shows a circle $ABCD$ with centre O . AT and CT are tangents to the circle and angle $ATO = 40^\circ$.



(a) Find, giving reasons for each answer,

(i) angle AOD ,

Answer $^\circ$ [2]

(ii) angle ABC ,

Answer $^\circ$ [2]

(iii) angle ADC ,

Answer $^\circ$ [1]

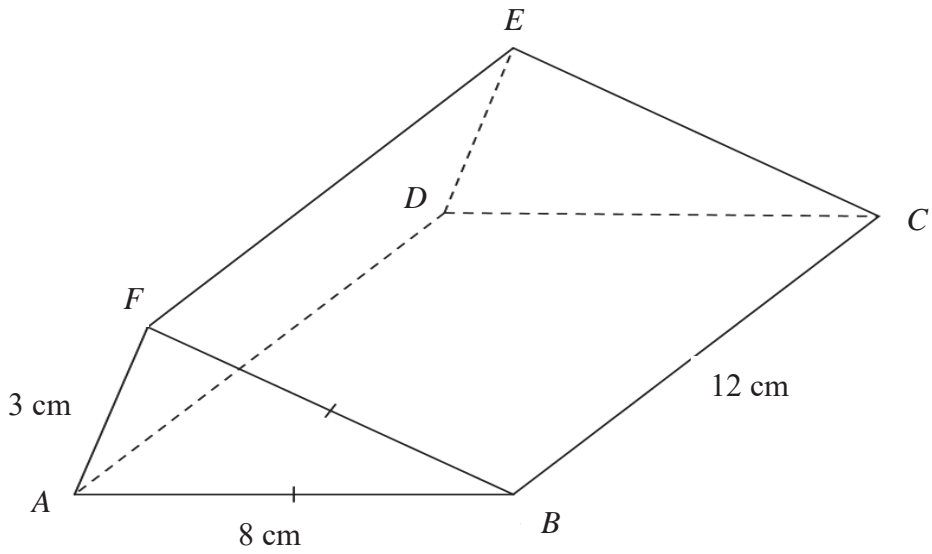
(iv) angle OCD .

Answer $^\circ$ [1]

- (b) Calculate the area of the shaded region, given that the radius of the circle is 5 cm.

Answercm² [4]

5



The diagram above shows a prism $ABCDEF$ whose cross section is an isosceles triangle.

It is given that $AB = 8$ cm, $BC = 12$ cm, and $AF = 3$ cm.

(a) Show that $\angle ABF = 21.6^\circ$, correct to 1 decimal place. [3]

(b) Find the angle of elevation of E from B .

Answer $^\circ$ [3]

- (c) (i) Calculate the volume of the prism $ABCDEF$.

Answercm³ [2]

- (ii) The prism is melted and moulded into a hemisphere. Calculate the radius of the hemisphere.

Answercm [2]

6 Answer the whole of this question on the sheet of graph paper.

The variables x and y are connected by the equation

$$y = \frac{x^2}{3} + \frac{2}{x} - 3.$$

Some corresponding values of x and y , correct to two decimal places, are given in the table below.

x	0.5	1	1.5	2	2.5	3	4	5
y	p	-0.67	-0.92	-0.67	-0.12	0.67	2.83	q

- (a) Find the values of p and q .

Answer $p = \dots\dots\dots$

$q = \dots\dots\dots$ [2]

- (b) Using a scale of 2 cm to represent 1 unit on each axis, draw a horizontal x -axis for $0 \leq x \leq 5$ and a vertical y -axis for $-2 \leq y \leq 6$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

- (c) Use your graph to find the solutions to the equation $\frac{x^2}{3} + \frac{2}{x} = 3$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- (d) By drawing a tangent, find the gradient of the curve at $(3, 0.67)$.

Answer [2]

- (e) By drawing a suitable line on the graph, solve the equation

$$\frac{x^2}{3} + \frac{2}{x} + 2x - 6 = 0$$

Answer Equation of line $y =$ [1]

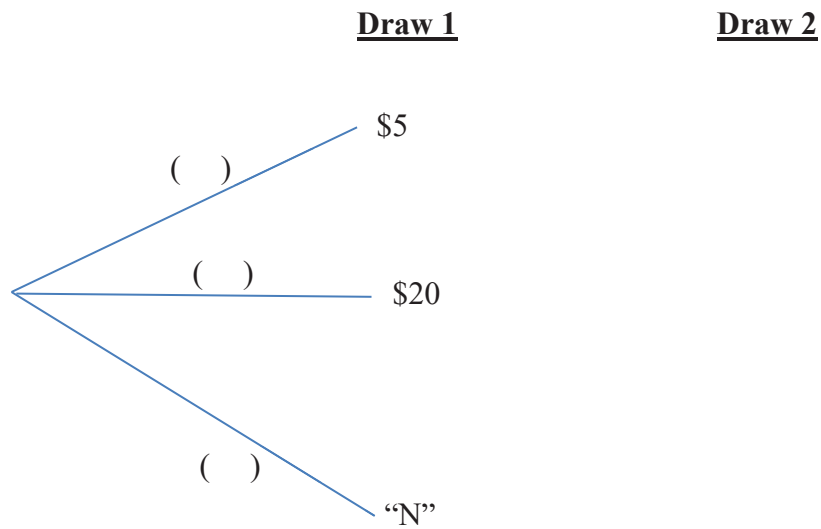
$x =$ [1]

Name:()

Class:

- 7 (a) In the lucky draw, there are 3 types of tickets to be drawn from a box: \$5 tickets, \$20 tickets and “N” tickets. If a customer draws a \$5 or a \$20 ticket, the ticket will be exchanged for a \$5 or \$20 shopping voucher respectively. However, if the customer draws an “N” ticket in the first draw, the “N” ticket will be placed back into the box and the customer will draw a ticket a second time. The second draw is the final one.

Given $\frac{3}{5}$ of the tickets are \$5 tickets, $\frac{1}{10}$ of the tickets are \$20 tickets and the rest are “N” tickets, complete the tree diagram below.



[2]

- (i) Find the probability that a customer will draw an “N” ticket.

Answer [1]

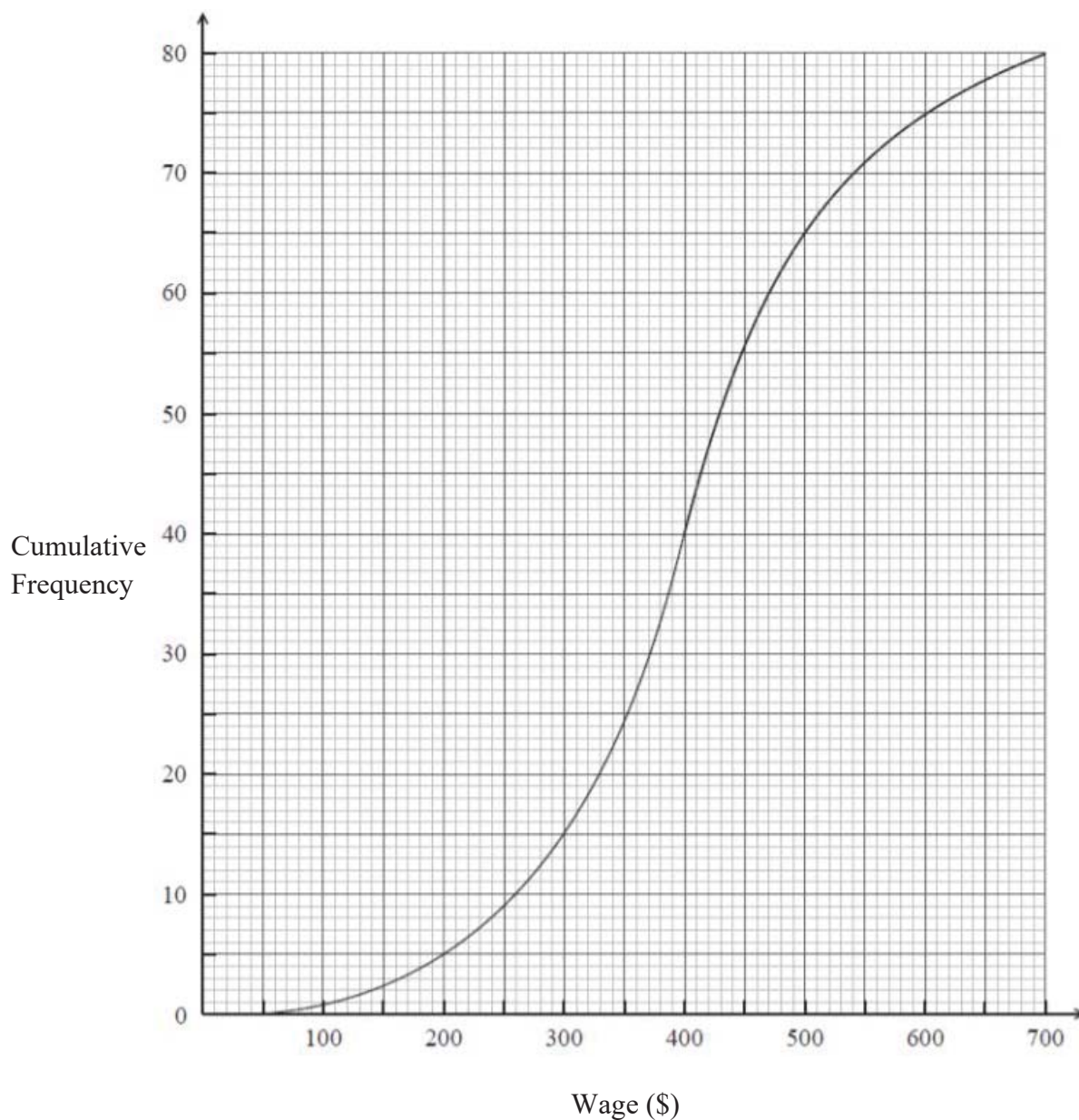
- (ii) Find the probability that a customer will win a cash voucher.

Answer [2]

- (iii) If both Mary and Peter take part in the lucky draw, what is the probability that at least one of them will win a cash voucher?

Answer [2]

- (b) The cumulative frequency curve below shows the distribution of the weekly wages of 80 employees.



Use the curve to estimate

(i) the median wage,

Answer \$..... [1]

(ii) the interquartile range of the wages,

Answer \$..... [1]

(iii) the percentage of the employees who earned at least \$500.

Answer% [2]

- 8 (a) The first four terms in a sequence are $\frac{1}{3}$, $-\frac{1}{6}$, $\frac{1}{12}$, $-\frac{1}{24}$

Find the 5th term .

Answer [1]

- (b) The n th term of a sequence is given by $T_n = \frac{1}{n^2 + 1}$. Find the sum of the 4th and 5th terms.

Answer [3]

- (c) The first four terms in a sequence of numbers are given below

$$T_1 = 1^3 + 5 = 6$$

$$T_2 = 2^3 + 7 = 15$$

$$T_3 = 3^3 + 9 = 36$$

$$T_4 = 4^3 + 11 = 75$$

(i) Find T_5 .

Answer [1]

(ii) Express T_n in the form of $an^3 + bn^2 + cn + d$, where a, b, c and d are integers to be determined.

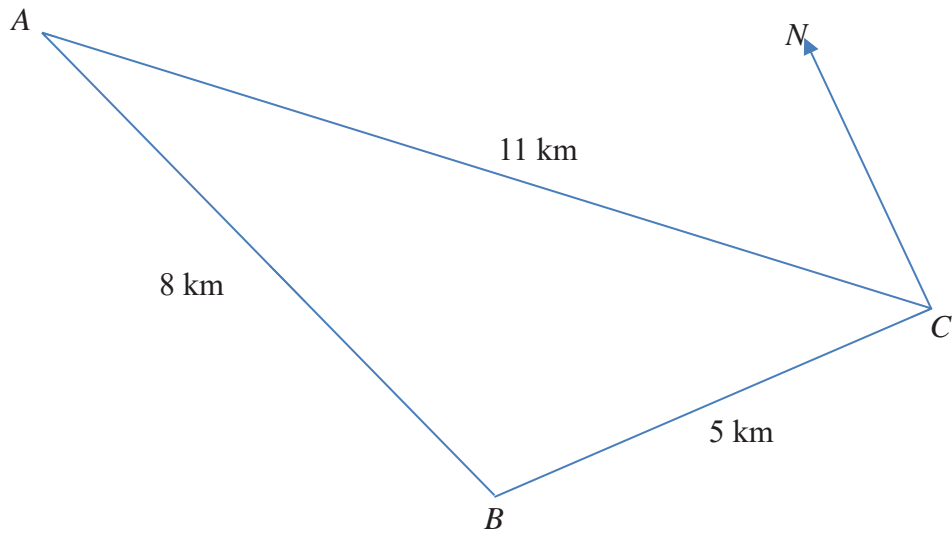
Answer $a =$

$b =$

$c =$

$d =$ [2]

- 9 ABC represents a triangular plot of land on horizontal ground.
 $AB = 8$ km, $BC = 5$ km, $AC = 11$ km and B is due west of C .



- (a) Calculate
 (i) the bearing of A from C ,

Answer° [3]

- (ii) the bearing of C from A ,

Answer° [2]

(iii) the reflex angle ABC ,

Answer ° [2]

(iv) the area of the triangular plot of land ABC .

Answer km² [2]

(b) A vertical lamp post is erected at point A . State with a reason, whether the angle of depression of B or of C is larger from the top of the lamp post.

Answer.....
.....[2]

- 10 Mr Wong is thinking of applying for a credit card that gives the most savings in terms of dining, grocery and petrol. His gross monthly expenses (before any discounts) are listed in the table below:

Type of Expenses	Amount (\$)
Petrol	350
Grocery	100
Dining	400

After doing some research, he decided to narrow his options to the three cards listed below:

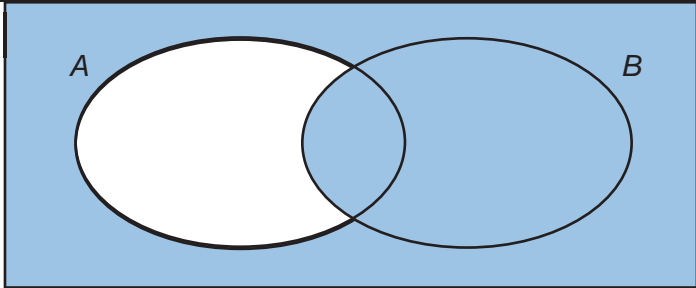
Credit Card	Savings on Petrol	Savings on Dining	Savings on Grocery
CBSH Card	<ul style="list-style-type: none"> 14% upfront discount plus 5% cash rebate (on monthly petrol expenses) with monthly minimum spending of \$600 on the CBSH card 	<ul style="list-style-type: none"> 5% cash rebate on dining expenses with monthly minimum spending of \$600 on the CBSH card 	<ul style="list-style-type: none"> 5% cash rebate on grocery expenses with monthly minimum spending of \$600 on the CBSH card
BSOP Card	<ul style="list-style-type: none"> 15% upfront discount plus 6% cash rebate (on monthly petrol expenses) with minimum spending of \$1000 on BSOP Card 	<ul style="list-style-type: none"> 5% cash rebate on all dining expenses with minimum monthly spending of \$1000 on the BSOP Card 	<ul style="list-style-type: none"> 5% cash rebate on grocery expenses
CBCO Card	<ul style="list-style-type: none"> 14% upfront discount plus 4.3% cash rebate (on monthly petrol expenses) with monthly minimum spending of \$800 on the CBCO Card plus 2.1% cash rebate (on monthly petrol expenses) with monthly minimum spending of \$400 on petrol 	<ul style="list-style-type: none"> 5% cash rebate on all dining expenses with monthly minimum spending of \$800 on the CBCO Card 	<ul style="list-style-type: none"> 5% cash rebate on grocery expenses with monthly minimum spending of \$800 on the CBCO Card

Which credit card should Mr Wong apply for so as to maximise his savings, given that he can only apply for one card and this card is to be used only for these three types of expenses? Show your working clearly. [9]

~ End of Paper 2~

Remember to check your work carefully

Marking Scheme for Sec 4E/5NA EMath P1

Qn	Solutions	Marks
1	$\frac{x}{4} + 13 = 6$ $\frac{x}{4} = -7$ $x = -28$	B1
2	$25 \text{ min} = \frac{25}{60} = \frac{5}{12} \text{ hrs}$ $D = S \times T$ $D = 60 \times \frac{5}{12} = 25 \text{ km}$	M1 A1
3	5, 5, 6, 9, 15	B1 (1 st 3 numbers), B1 (last 2 numbers)
4	$4047 \text{ m}^2 = 1 \text{ Acre grows } 20\,000 \text{ sunflower plants}$ $= 20000 \times 1500 \text{ seeds}$ $= 3 \times 10^7 \text{ seeds}$ $1 \text{ m}^2 = \frac{3 \times 10^7}{4047} \text{ seeds}$ $1800 \text{ m}^2 = \frac{3 \times 10^7}{4047} \times 1800 \text{ seeds}$ $= 1.33 \times 10^7$	M1 A1
5	$\frac{3x}{5} - \frac{4(2-3x)}{7} = \frac{21x}{35} - \frac{20(2-3x)}{35}$ $= \frac{21x - 20(2-3x)}{35}$ $= \frac{21x - 40 + 60x}{35}$ $= \frac{81x - 40}{35}$	M1 A1
6a	2	B1
6b	ξ 	B1

7	$6ac + 9ad - 12bd - 8bc$ $= 3a(2c + 3d) - 4b(3d + 2c)$ $= (3a - 4b)(2c + 3d)$	M1 A1	
8a	$\overrightarrow{OB} = \overrightarrow{OA} - \overrightarrow{BA}$ $\overrightarrow{OB} = \begin{pmatrix} -2 \\ 5 \end{pmatrix} - \begin{pmatrix} -4 \\ 8 \end{pmatrix} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ $B = (2, -3)$	B1	
8b	$ \overrightarrow{AB} = \sqrt{(-4)^2 + (8)^2} = 8.94$	B1	
9	Mean = 10 720 g SD = 362.8 g	B1 B1	
10	Cost of painting in 2017 = $\frac{73288.8}{1.2} = \$61074$ Cost of painting in 2016 = $\frac{61704}{1.08} = \$56550$ Percentage = $\frac{56550}{73288.8} \times 100\% = 77.2\%$	M1 M1 A1	
11a	7 units represent 2.1l 1 units represent 0.3l 3 units represent 0.9l	B1	
11b	1 units represent 0.3l 12 units represent 3.6l	B1	
11c	Lemon : Simply Syrup : Coconut water $\frac{1}{2} : \frac{1}{3} : 1$: : 8 $\frac{1}{2} \times 6 : \frac{1}{3} \times 6$: : 8 1 × 2 : 8 × 2 3 : 2 : 16	M1 A1	
12	$x + (x - 20) + 3x = 180$ $5x - 20 = 180$ $5x = 200$ $x = 40^\circ$ 40°, 20°, 120°	$(x + 20) + x + 3(x + 20) = 180$ $5x + 80 = 180$ $5x = 100$ $x = 20^\circ$ 40°, 20°, 120°	M1 M1 A1

13a	$y = kx$ or $x = ky$ $y = 5k$ ----- (1) $5 = ky$ ----- (1) $y = 17k$ ----- (2) $17 = ky$ ----- (2) (2) – (1); $17k - 5k = 54$ $\frac{17}{k} - \frac{5}{k} = 54$ $12k = 54$ $17 - 5 = 54k$ $k = 4.5$ $k = \frac{2}{9}$ $y = 4.5x$ $x = \frac{2}{9}y$	M1 M1 A1
13b	$y = 4.5x$ $84 = 4.5x$ $x = 18\frac{2}{3}$	B1
14a	20	B1
14b	1210	B1
14c	924	B1
15a	$-15 \leq 8 - 3x$ $8 - 3x < 2$ $3x \leq 23$ and $6 < 3x$ $x \leq \frac{23}{3}$ $2 < x$ $2 < x \leq \frac{23}{3}$	M1 (Either 1) A1
15b	3, 4, 5, 6, 7	B1
16a	Sum of interior angles = $(6 - 2) \times 180 = 720^\circ$	B1
16b	Sum of angles = $7 \times$ angles at a point – [Sum of interior angle of hexagon + sum of interior angle of triangle] = $7 \times 360 - [720 + 180]$ = 1620° Or $\angle a + \angle g + \angle f + \angle b = 4 \times (360 - 120) = 960^\circ$ $\angle d + \angle c + \angle e = (3 \times 360) - 2(120) - 180 = 660^\circ$ Sum of angles = $960^\circ + 660^\circ = 1620^\circ$	M1 A1 M1 A1

17a	$\frac{A_A}{A_{A+B}} = \left(\frac{l_A}{l_{A+B}}\right)^2$ $= \left(\frac{h}{2h}\right)^2$ $= \left(\frac{1}{4}\right)$	B1
17b	$\frac{200}{200+B} = \left(\frac{1}{4}\right)$ $B = 600$	B1
17c	$\frac{V_A}{V_{A+B+C}} = \left(\frac{l_A}{l_{A+B+C}}\right)^3$ $= \left(\frac{h}{3h}\right)^3$ $= \left(\frac{1}{27}\right)$ $\frac{V_A}{V_{A+B}} = \left(\frac{l_A}{l_{A+B}}\right)^3$ $= \left(\frac{h}{2h}\right)^3$ $= \left(\frac{1}{8}\right)$ <p>Vol of B : Vol of C = 7 : 19</p>	M1 M1 A1
18	$\angle PQR = 235 - 205 = 30^\circ$ $PR^2 = 35^2 + 45^2 - 2(35)(45)\cos 30^\circ$ $= 522.0199781$ $PR = \sqrt{522.0199781}$ $= 22.8 \text{ km}$	M1 M1 A1

19	$\angle DOE = 180 - 35 - 35 = 110^\circ$ <p>Area of segment = area of sector DOC – area of triangle DOC</p> $= \frac{110}{360} \times \pi \times (7)^2 - \frac{1}{2} (7)(7) \sin 110^\circ$ $= 24.01415413$ <p>Area of section of circle = area of circle – 2 x area of segment</p> $= \pi(7)^2 - 2(24.01415413)$ $= 106\text{cm}^2$ <p>OR</p> $\angle DOE = 180 - 35 - 35 = 110^\circ$ <p>2 x (Area of sector BOD + Area of triangle DOE)</p> $= 2 \times \left(\frac{180-110}{360} \times \pi \times (7)^2 + \frac{1}{2} (7)(7) \sin 110^\circ \right)$ $= 2 (29.932396 + 23.224692)$ $= 106\text{cm}^2$	<p>M1</p> <p>M1, M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>M1, M1</p> <p>A1</p>
20a	<p>Line L_1: $2y = 3x - 5$</p> <p>Gradient = 1.5</p> <p>Line L_2: $y = 1.5x + 5.5$ or $2y = 3x + 11$</p>	<p>B1</p> <p>B1</p>
20b	$\text{area} = \frac{5}{3} \times 8 = 13\frac{1}{3} \text{ units}^2$	<p>B1</p>
20c	$\tan \angle ABO = \frac{\frac{5}{2}}{\frac{5}{3}} = 1.5$	<p>B1</p>
21a	$T = 2\pi \sqrt{\frac{l}{g}}$ $\frac{T}{2\pi} = \sqrt{\frac{l}{g}}$ $\left(\frac{T}{2\pi} \right)^2 = \frac{l}{g}$ $l = \frac{T^2 g}{4\pi^2}$	<p>M1</p> <p>A1</p>

21b	$l = \sqrt{5^2 + 2.5^2} = 5.59016994$ <p>Total surface area = curved SA of cone + curved surface area of cylinder + base area</p> $= \pi(2.5)(\sqrt{31.25}) + 2\pi(2.5)(5) + \pi(2.5)^2$ $= 142 \text{ cm}^2 \text{ (3sf)}$	M1, M1 (any 2) A1
22a	$R = \begin{pmatrix} 6 & 5 & 3 \\ 9 & 7 & 4 \\ 10 & 8 & 2 \end{pmatrix} \begin{pmatrix} 7.20 \\ 10.80 \\ 32 \end{pmatrix}$ $= \begin{pmatrix} 193.20 \\ 268.40 \\ 222.40 \end{pmatrix}$	M1 A1
22b	R represent the cost of each hamper.	B1
22c	$T = (20 \ 25 \ 30)$	B1
22d	$(20 \ 25 \ 30) \begin{pmatrix} 193.20 \\ 268.40 \\ 222.40 \end{pmatrix}$ $= \$ 17\ 246$	M1 A1
23a	$\frac{60}{360} \times 100\% = 16.7\%$	B1
23b	<p>30% rep 108° represent 36 boys</p> <p>1° represent $\frac{36}{108}$ boys</p> <p>360° represent $\frac{36}{108} \times 360 = 120$ boys</p>	M1 A1
23c	<p>No of boys in group E = Total boys – boys in (A + B + C + D)</p> $= 120 - 30 - 36 - 18 - 20$ $= 16 \text{ boys}$	M1 A1
24a	$\frac{20-n}{20}$	B1
24b	$\frac{20-n}{20} \times \frac{19-n}{19}$ $= \frac{(20-n)(19-n)}{380} \text{ or } = \frac{380 - 39n + n^2}{380}$	B1

24c	$\frac{(20-n)(19-n)}{380} = \frac{39}{95}$ $(20-n)(19-n) = 156$ $380 - 20n - 19n + n^2 = 156$ $n^2 - 39n + 224 = 0 \text{ (Shown)}$	M1 A1
24d	$n^2 - 39n + 224 = 0$ $(n-32)(n-7) = 0$ Either $n = 32$ or $n = 7$ No of yellow marbles = $20 - 7$ = 13	M1 M1 A1



2019 4E5N Prelims EMath P2 Mark Scheme

Qn	Solution	Marks
1a	$27a^4 - 3 = 3(9a^4 - 1)$ $= 3[(3a^2)^2 - 1]$ $= 3(3a^2 - 1)(3a^2 + 1)$ <p><u>Comments:</u> Students did not factorise $(9a^4 - 1)$</p>	M1 A1
1b	<p>(i)</p> $\frac{2(x-1)^2}{4y^3} \div \frac{6y(x-1)}{8y^2} = \frac{2(x-1)^2}{4y^3} \times \frac{8y^2}{6y(x-1)}$ $= \frac{2(x-1)}{3y^2}$ <p><u>Comments:</u> Students made careless mistake as they cancelled the powers instead of applying the indices rules</p> <p>(ii)</p> $\frac{3}{m-2} - \frac{2}{3m-1} = \frac{3(3m-1) - 2(m-2)}{(m-2)(3m-1)}$ $= \frac{7m+1}{(m-2)(3m-1)}$ <p><u>Comments:</u> Students made mistake when they expand $-2(m-2)$.</p>	B1 M1 A1

1c	$2^{2-x} = \frac{1}{\sqrt[3]{2^{5x+1}}}$ $2^{2-x} = 2^{-\frac{1}{3}(5x+1)}$ $2-x = -\frac{5}{3}x - \frac{1}{3}$ $\frac{2}{3}x = -\frac{7}{3}$ $x = -\frac{7}{2}$ <p><u>Comments:</u> Students did not apply the indices rules $\frac{1}{a^{-m}} = a^m$, $\sqrt[3]{a} = a^{\frac{1}{3}}$ and $1 = a^0$</p>	M1 A1
1d	<p>(i)</p> $x^2 - 8x - 6 = (x-4)^2 - 16 - 6$ $= (x-4)^2 - 22$ <p><u>Comments:</u> Majority of the students did it correctly.</p> <p>(ii)</p> $(x-4)^2 - 22 = 0$ $(x-4)^2 = 22$ $x = 4 \pm \sqrt{22}$ $x = -0.7 \text{ or } x = 8.7 \text{ (to 1 dp)}$ <p><u>Comments:</u> Many students did not follow the instruction and use the requested method. Some of them did not correct the answers to one decimal place.</p>	B1 M1 A1, A1
2	<p>(a)(i) $3a - 2b$</p> <p>(ii) $\frac{3}{7}(3a - 2b)$</p> <p>(iii) $2a - b$</p> <p>(iv) $a + \frac{1}{2}b$</p>	B1 B1 B1 M1A1

	<p>(v)</p> $\overline{FD} = \overline{FB} + \overline{BC} + \overline{CD}$ $= -\frac{1}{2}(2a - b) + \frac{1}{2}(2b) + \frac{3}{7}(3a - 2b)$ $= \frac{2}{7}a + \frac{9}{14}b$ <p>(b)(i) $\frac{2}{3}$</p> <p>(ii)</p> $\frac{\text{Area of } \triangle OBA}{\text{Area of } \triangle OCE} = \frac{\frac{1}{2} \times OB \times OA \times \sin BOA}{\frac{1}{2} \times OC \times OE \times \sin BOA}$ $= \frac{\frac{1}{2} \times 1 \times 2 \times \sin BOA}{\frac{1}{2} \times 2 \times 3 \times \sin BOA}$ $= \frac{1}{3}$ <p><u>Comments:</u></p> <p>Badly done. Students did not consider the direction of the vectors, answers without vector notation. Could not find the ratio of areas, answers given with units.</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p>
3a	<p>(i)</p> $\frac{19600}{98000} \times 100\% = 20\%$ <p>(ii)</p> <p>Bank OCC</p> $A = 78400 \left(1 + \frac{2.78}{100} \right)^{14} = \95114.73 <p>Interest paid = $95114.73 - 78400 = \\$16714.73$</p> <p>Bank DBB</p>	<p>B1</p> <p>B1</p> <p>B1</p>

	$I = 78400 \times \frac{2.99}{100} \times 7 = \16409.12 <p>Choose Bank DBB as lesser interest charged.</p> <p><u>Comments:</u> Students thought that the bank with more interest is to be chosen. Forgot that this is a loan.</p>	<p>B1</p> <p>B1</p>
3b	<p>(i) $2.25 \times 51 = \\$114.75$</p> <p>(ii) $2.08 \times 51 = RM106.08$</p> <p>(iii)(a) Converting to Singapore dollars, Celine paid $\frac{106.08}{3.05} = S\\34.78 She saves S\$79.97 weekly</p> <p>(iii)(b) $\frac{79.97}{114.75} \times 100\% = 69.691\% \approx 69.7\%$</p> <p><u>Comments:</u> Students did not give answers correct to 2 decimal places.</p>	<p>B1</p> <p>B1</p> <p>M1 A1</p> <p>B1</p>
4	<p>(a)</p> <p>(i) Angle DAT = 90° (tangent perpendicular to radius) Angle AOD = $90^\circ - 40^\circ = 50^\circ$ (sum of angles in a triangle)</p> <p>(ii) Angle AOC = $50^\circ \times 2 = 100^\circ$ Angle ABC = $100^\circ \div 2 = 50^\circ$ (angle at centre = 2 times angle at Circumference)</p> <p>(iii) Angle ADC = $180^\circ - 50^\circ = 130^\circ$ (angles in opp segments)</p> <p>(iv) Angle OCD = $\frac{180^\circ - 50^\circ}{2} = 65^\circ$ (Base angles of isosceles triangle)</p> <p><u>Comments:</u> Students did not write the angle properties properly.</p>	<p>B1</p> <p>B1</p> <p>M1 A1</p> <p>B1</p> <p>B1</p>

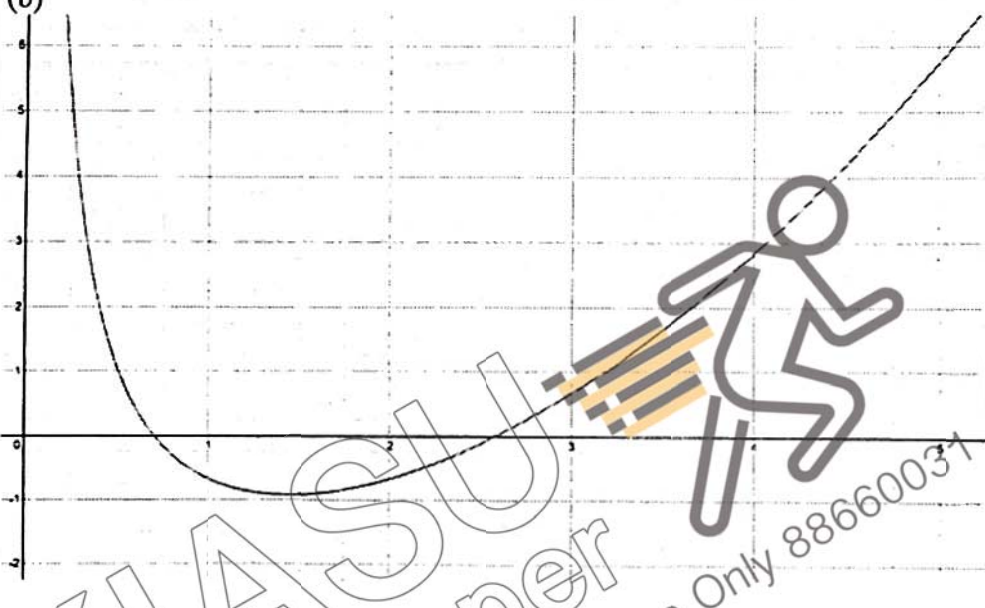
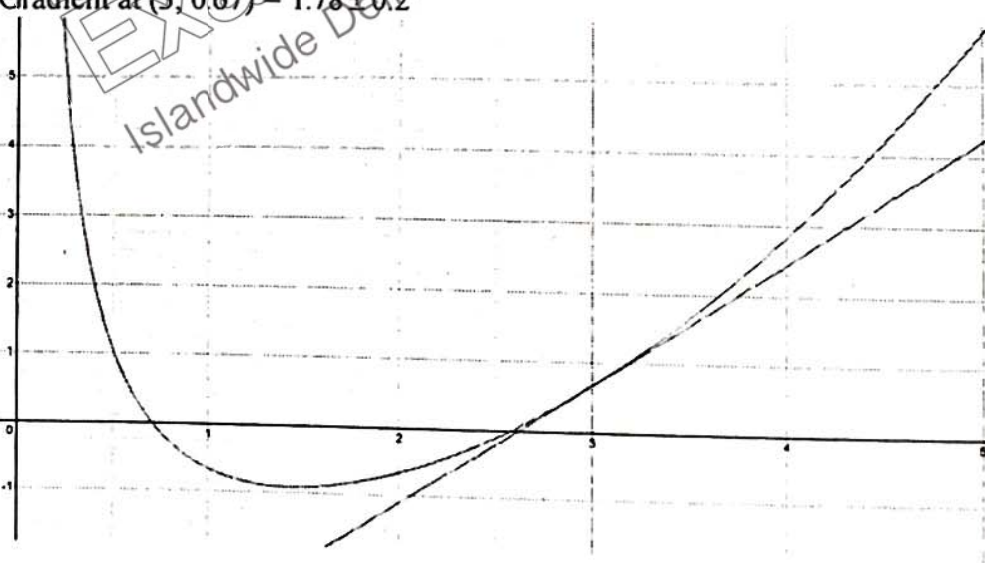
	$I = 78400 \times \frac{2.99}{100} \times 7 = \16409.12 <p>Choose Bank DBB as lesser interest charged.</p> <p><u>Comments:</u> Students thought that the bank with more interest is to be chosen. Forgot that this is a loan.</p>	<p>B1</p> <p>B1</p>
3b	<p>(i) $2.25 \times 51 = \\$114.75$</p> <p>(ii) $2.08 \times 51 = RM106.08$</p> <p>(iii)(a) Converting to Singapore dollars, Celine paid $\frac{106.08}{3.05} = \\$34.78$ She saves S\$79.97 weekly</p> <p>(iii)(b) $\frac{79.97}{114.75} \times 100\% = 69.691\% \approx 69.7\%$</p> <p><u>Comments:</u> Students did not give answers correct to 2 decimal places.</p>	<p>B1</p> <p>B1</p> <p>M1 A1</p> <p>B1</p>
4	<p>(a)</p> <p>(i) Angle DAT = 90° (tangent perpendicular to radius) Angle AOD = $90^\circ - 40^\circ = 50^\circ$ (sum of angles in a triangle)</p> <p>(ii) Angle AOC = $50^\circ \times 2 = 100^\circ$ Angle ABC = $100^\circ \div 2 = 50^\circ$ (angle at centre = 2 times angle at Circumference)</p> <p>(iii) Angle ADC = $180^\circ - 50^\circ = 130^\circ$ (angles in opp segments)</p> <p>(iv) Angle OCD = $\frac{180^\circ - 50^\circ}{2} = 65^\circ$ (Base angles of isosceles triangle)</p> <p><u>Comments:</u> Students did not write the angle properties properly.</p>	<p>B1 B1</p> <p>M1 A1</p> <p>B1</p> <p>B1</p>

2019 4E5N Prelims EMath P2 Mark Scheme

Qn	Solution	Marks
1a	$27a^4 - 3 = 3(9a^4 - 1)$ $= 3[(3a^2)^2 - 1]$ $= 3(3a^2 - 1)(3a^2 + 1)$ <p><u>Comments:</u> Students did not factorise $(9a^4 - 1)$</p>	<p>M1</p> <p>A1</p>
1b	<p>(i)</p> $\frac{2(x-1)^2}{4y^3} \div \frac{6y(x-1)}{8y^2} = \frac{2(x-1)^2}{4y^3} \times \frac{8y^2}{6y(x-1)}$ $= \frac{2(x-1)}{3y^2}$ <p><u>Comments:</u> Students made careless mistake as they cancelled the powers instead of applying the indices rules</p> <p>(ii)</p> $\frac{3}{m-2} - \frac{2}{3m-1} = \frac{3(3m-1) - 2(m-2)}{(m-2)(3m-1)}$ $= \frac{7m+1}{(m-2)(3m-1)}$ <p><u>Comments:</u> Students made mistake when they expand $-2(m-2)$.</p>	<p>B1</p> <p>M1</p> <p>A1</p>

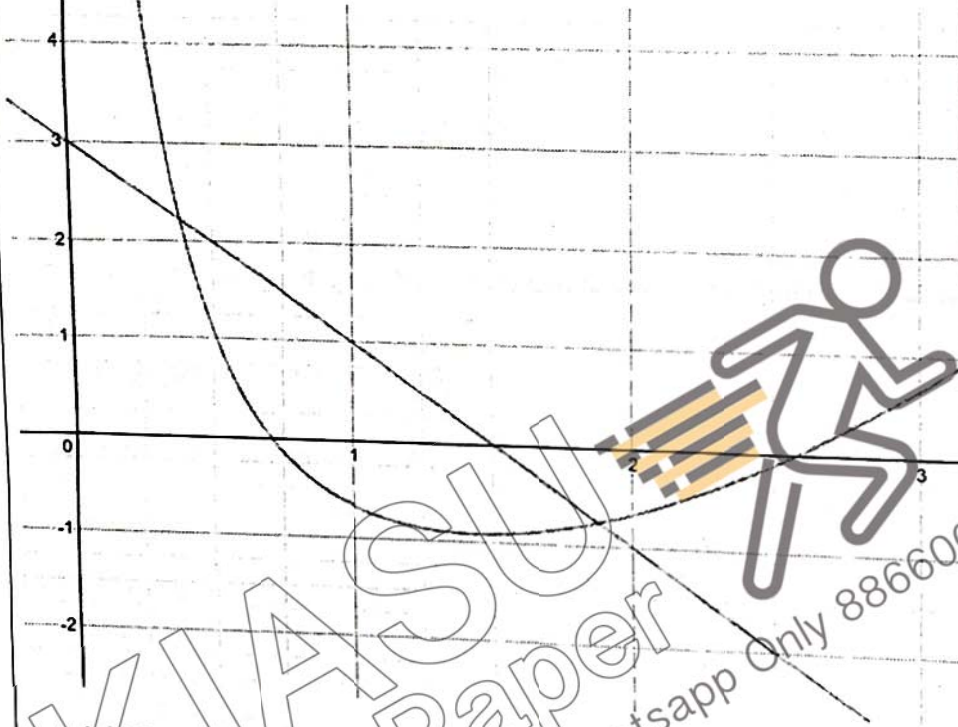
1c	$2^{2-x} = \frac{1}{\sqrt[3]{2^{5x+1}}}$ $2^{2-x} = 2^{-\frac{1}{3}(5x+1)}$ $2-x = -\frac{5}{3}x - \frac{1}{3}$ $\frac{2}{3}x = -\frac{7}{3}$ $x = -\frac{7}{2}$ <p><u>Comments:</u> Students did not apply the indices rules $\frac{1}{a^{-m}} = a^m$, $\sqrt[3]{a} = a^{\frac{1}{3}}$ and $1 = a^0$.</p>	<p>M1</p> <p>A1</p>
1d	<p>(i)</p> $x^2 - 8x - 6 = (x-4)^2 - 16 - 6$ $= (x-4)^2 - 22$ <p><u>Comments:</u> Majority of the students did it correctly.</p> <p>(ii)</p> $(x-4)^2 - 22 = 0$ $(x-4)^2 = 22$ $x = 4 \pm \sqrt{22}$ $x = -0.7 \text{ or } x = 8.7 \text{ (to 1 dp)}$ <p><u>Comments:</u> Many students did not follow the instruction and use the requested method. Some of them did not correct the answers to one decimal place.</p>	<p>B1</p> <p>M1</p> <p>A1, A1</p>
2	<p>(a)(i) $3a - 2b$</p> <p>(ii) $\frac{3}{7}(3a - 2b)$</p> <p>(iii) $2a - b$</p> <p>(iv) $a + \frac{1}{2}b$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>M1A1</p>

	<p>(b)</p> $\tan 40^\circ = \frac{5}{TC}$ $TC = 5.9588 \text{ cm}$ $\text{Area of } \triangle OTC = \frac{1}{2} \times 5.9588 \times 5 = 14.897 \text{ cm}^2$ $\text{Area of sector ODC} = \frac{1}{2} \times (5)^2 \times \frac{50\pi}{180} = 10.908 \text{ cm}^2$ $\text{Area of shaded region} = 14.897 - 10.908 = 3.989 \approx 3.99 \text{ cm}^2$ <p><u>Comments:</u> Some students could not find the area of sector correctly. Did not convert the angle from degrees to radians correctly or choose the right formula for area of sector.</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
5	<p>(a)</p> $3^2 = 8^2 + 8^2 - 2(8)(8) \cos ABF$ $\angle ABF = \cos^{-1} \left(\frac{119}{128} \right)$ $= 21.61384575^\circ$ $= 21.6^\circ \text{ (shown)}$ <p>(b)</p> $\text{Length of BE} = \sqrt{12^2 + 8^2} = 14.422 \text{ cm}$ $\text{Area of triangle DCE} = \frac{1}{2} \times 8 \times 8 \times \sin 21.614^\circ = 11.787 \text{ cm}^2$ $\text{Perpendicular height from E to CD} = \frac{2 \times 11.787}{8} = 2.94675 \text{ cm}$ $\text{Angle of elevation} = \sin^{-1} \left(\frac{2.94675}{14.422} \right) = 11.8^\circ$ <p><u>Comments:</u> Students used the wrong triangle EDB to find angle of elevation of E from B and assumed that $\angle EDB = 90^\circ$.</p> <p>(c)(i)</p> $\text{Volume of prism} = 11.787 \times 12 = 141.447 \text{ cm}^3 \approx 141 \text{ cm}^3$	<p>B1, B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1 A1</p>

	<p>(c)(ii) Since volume of prism equals to volume of hemisphere,</p> $\text{Radius} = \sqrt[3]{\frac{141.447 \times 3}{2\pi}} = 4.0723 \text{ cm} \approx 4.07 \text{ cm}$ <p><u>Comments:</u> Students did not apply the formula to find volume of hemisphere.</p>	M1 A1
6	<p>(a) $p = 1.08$, $q = 5.73$</p> <p>(b)</p>  <p>(c) $x = 0.7 \pm 0.1$ or $x = 2.6 \pm 0.1$</p> <p>(d)</p>  <p>Gradient at $(3, 0.67) = 1.78 \pm 0.2$</p>	<p>B1, B1</p> <p>B1: correct plot</p> <p>B1: correct shape</p> <p>B1: correct scale and axes</p> <p>B1 B1</p> <p>B1: draw the tangent line on graph</p> <p>B1 for the answer</p>

(e)

$$y = -2x + 3$$



B1

$$x = 1.88 \text{ (accept } x = 1.85 \text{ to } 1.9)$$

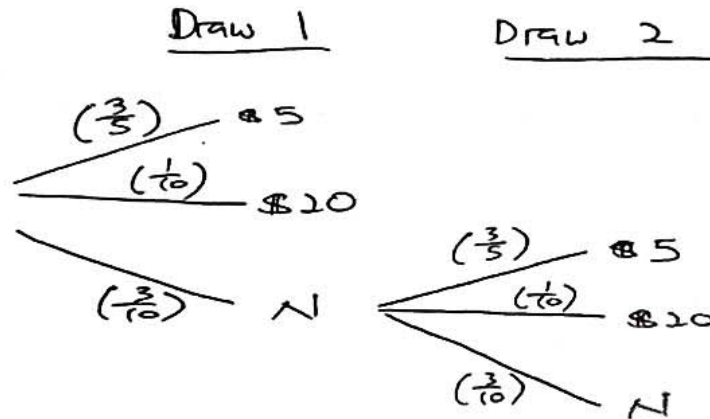
Comments:

Many students did not answer the part: equation of the line.

B1

7

(a)

B1:
draw 1B1:
draw 2

(a)(i) $\frac{3}{10}$

(ii) $\frac{3}{5} + \frac{1}{10} + \left(\frac{3}{10} \times \frac{3}{5}\right) + \left(\frac{3}{10} \times \frac{1}{10}\right) = \frac{91}{100}$

(iii) $\left(\frac{91}{100}\right)^2 + 2\left(\frac{91}{100} \times \frac{9}{100}\right) = \frac{9919}{10000}$

(b)(i) \$400

(ii) $470 - 330 = \$140$

(iii) $\frac{15}{80} \times 100\% = 18.75\%$

B1

M1 A1

M1 A1

B1

B1

M1 A1

Comments:

1. For part (a), many students drew the tree diagram for the 2nd draw for the cash vouchers side. This would not have happened if they understood the question that once the customer drew a cash voucher, they will not be given a chance to draw again.

2. For part (aiii), many students did not know that they should use the answer to part (aii) to help them find the answer. They went on to use other ways to find the answer which was wrong.

	3. For part (biii), many left their answers as 18.8 (correct to 3 sf), which is not right as the answer is 18.75 which is an exact answer, hence had to penalize students who rounded their answers to 3 sf.	
8	<p>(a) $T_5 = \frac{1}{48}$</p> <p>(b)</p> $T_4 = \frac{1}{17}$ $T_5 = \frac{1}{26}$ $\text{Sum} = \frac{1}{17} + \frac{1}{26} = \frac{43}{442}$ <p>(c)(i) $T_5 = 5^3 + 13 = 138$</p> <p>(ii)</p> $T_n = n^3 + 2n + 3$ $a = 1, b = 0, c = 2, d = 3$ <p><u>Comments:</u> This question is ok and most students are able to get full marks. Those who did not made mistakes/gave up the last part which they should not have as it was just an expansion of algebraic expression.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B2: all correct B1: any 1 correct</p>
9	<p>(a)(i)</p> $\text{Bearing} = 270^\circ + \cos^{-1}\left(\frac{11^2 + 5^2 - 8^2}{2 \times 11 \times 5}\right) = 270^\circ + 41.801^\circ \approx 311.8^\circ$ <p>(ii)</p> $\text{Bearing} = 180^\circ - (90^\circ - 41.8^\circ) = 131.8^\circ$ <p>(iii)</p> $\frac{8}{\sin 41.8} = \frac{11}{\sin ABC}$ $\angle ABC (\text{acute}) = 66.4^\circ$ <p>However, angle ABC is obtuse (seen from the diagram), hence actual angle $ABC = 180^\circ - 66.4^\circ = 113.6^\circ$ Reflex $\angle ABC = 360^\circ - 113.6^\circ = 246.4^\circ$</p> <p>OR</p>	<p>M2 A1</p> <p>M1 A1</p> <p>M1</p> <p>A1</p> <p>M1 A1</p> <p>B1 B1</p>

$$\cos ABC = \frac{8^2 + 5^2 - 11^2}{2 \times 5 \times 8}$$

$$\text{Angle } ABC = 113.5782^\circ$$

$$\text{Reflex } \angle ABC = 360^\circ - 113.5782^\circ = 246.4^\circ \text{ (to 1 dp)}$$

(iv)

$$\text{Area} = \frac{1}{2} \times 11 \times 5 \times \sin 41.8 = 18.3 \text{ km}^2$$

(b) Point B. Point B is nearer to point A than point C

Comments:

1. Students lost marks in part (iii), especially those who used sine rule to get the angle ABC. Many did not find the obtuse angle ABC and used the acute angle ABC instead as they have forgotten that $\sin \theta = \sin (180^\circ - \theta)$.

2. Many students leave their answers to 3 sf for angles which is incorrect as it should be to 1 dp. Pls take note of this small but important detail.

10

CBSH Card

$$\text{Petrol savings} = 0.14 \times 350 + 0.05 \times 350 = \$66.50$$

$$\text{Dining Savings} = 0.05 \times 400 = 20$$

$$\text{Grocery savings} = 0.05 \times 100 = 5$$

$$\text{Total savings} = \$91.50$$

BSOP Card

$$\text{Petrol savings} = 0.15 \times 350 = \$52.50$$

Dining Savings = 0 (as minimum monthly spending on the card is less than \$1000)

$$\text{Grocery savings} = 0.05 \times 100 = 5$$

$$\text{Total savings} = \$57.50$$

CBCO Card

$$\text{Petrol savings} = 0.14 \times 350 + 0.043 \times 350 = \$64.05$$

$$\text{Dining Savings} = 0.05 \times 400 = 20$$

$$\text{Grocery savings} = 0.05 \times 100 = 5$$

$$\text{Total savings} = \$89.05$$

He should apply for the CBSH card

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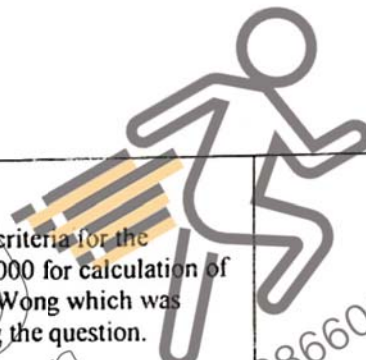
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	<p>Comments:</p> <p>1. Some students use the amount that was listed in the criteria for the rebates/discount to be used: example, students used \$1000 for calculation of savings for BSOP card rather than the expenses of Mr Wong which was given in the question. This is a result of misinterpreting the question.</p> <p>2. Students cannot understand the term 'upfront discount' which means regardless of the amount spent, the discount will be given the moment the customer presents the card. Quite a number of students lost marks here.</p>	



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