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Class	Index Number	Name
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BUKIT MERAH SECONDARY SCHOOL



END OF YEAR EXAMINATION 2017 SECONDARY 2 EXPRESS

MATHEMATICS

Paper 1

4048/01

05 October 2017

1 hour 15 minutes

Candidates answer on the Question Paper.

No additional material is required.

READ THESE INSTRUCTIONS FIRST

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

Write in dark blue or black pen on both sides of the paper.

You may use a pencil for any diagram or graphs.

Do not use staples, 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 the 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 number of marks for this paper is 50.

Calculator Model:

For Examiner's Use	
Part A	/ 30
Part B (Algebra Component)	/ 20
Total	/ 50

This document consists of **12** printed pages, including this cover page.

Setter: Ms Loke JY

[Turn over

PART A – Answer all questions.

- 1 (a) Without the use of a calculator, estimate the value of the following $\sqrt{\frac{14.78 \times 80.3}{2.99}}$.
Show your workings clearly.

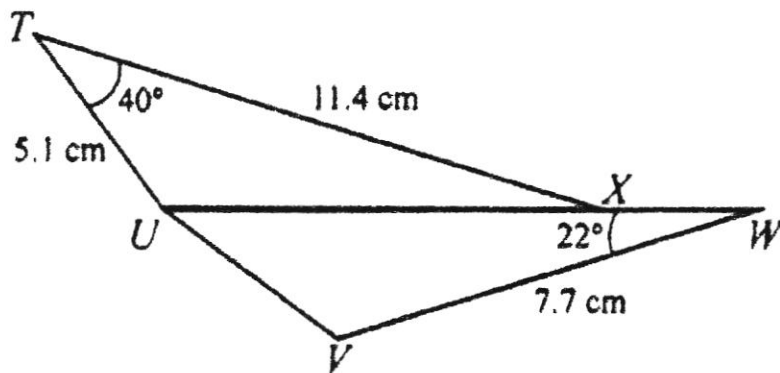
Answer (a) [2]

- (b) Find the HCF of $12a^2b^2$, $9ab^2c$ and $36a^3b^3c$.

Answer (b) [1]

- 2 In the diagram, $\triangle TUX$ is congruent to $\triangle UVW$. $\angle UTX = 40^\circ$, $\angle VWU = 22^\circ$, $TU = 5.1$ cm, $VW = 7.7$ cm and $TX = 11.4$ cm. Find

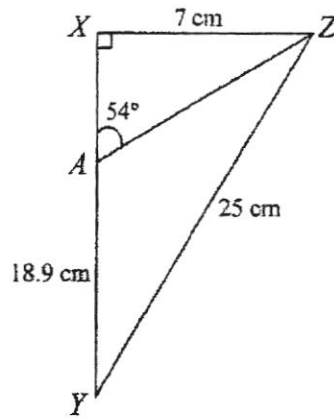
- (a) $\angle TUX$,
(b) the length of WX .



Answer (a) ° [1]

(b) cm [1]

- 3 In triangle XYZ , $XZ = 7$ cm, $AY = 18.9$ cm, $YZ = 25$ cm and $\angle XAZ = 54^\circ$.
 XAY forms a straight line.



Find

- (a) the length of AX ,

Answer (a) cm [1]

- (b) $\sin \angle XYZ$,

Answer (b) [1]

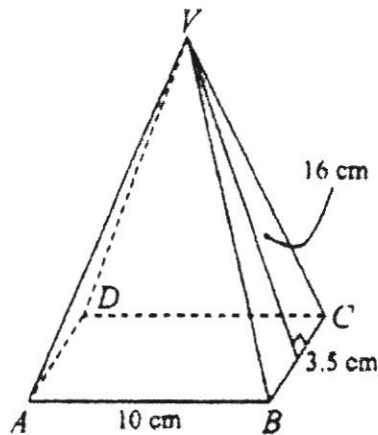
- (c) $\angle XZY$,

Answer (c) $^\circ$ [1]

- (d) the shortest distance from X to YZ .

Answer (d) cm [2]

- 4 $VABC$ is a solid right pyramid with a rectangular base of sides 3.5 cm and 10 cm. It has a slant height of 16 cm.



- (a) Find the height of the pyramid.

Answer (a) cm [1]

- (b) The solid pyramid is melted to form a solid sphere. Calculate the radius of the sphere.
Use the calculator value of π in your calculations.

[Volume of sphere = $\frac{4}{3}\pi r^3$, Surface area of sphere = $4\pi r^2$]

Answer (b) cm [2]

- 5 A group of students took part in a fund raising project. The amount of money, in dollars, collected by each student was counted and shown in the table below.

14	22	30	51	78	57	35	57	49	46
16	24	46	40	57	64	98	78	41	54

The frequency table of the amount of money collected is recorded below.

Amount collected (\$ m)	Mid-value (x)	Frequency (f)	fx
$0 < m \leq 20$	10	2	20
$20 < m \leq 40$	()	()	()
$40 < m \leq 60$	50	9	450
$60 < m \leq 80$	70	3	210
$80 < m \leq 100$	90	1	90
		$\Sigma f = ()$	$\Sigma fx = ()$

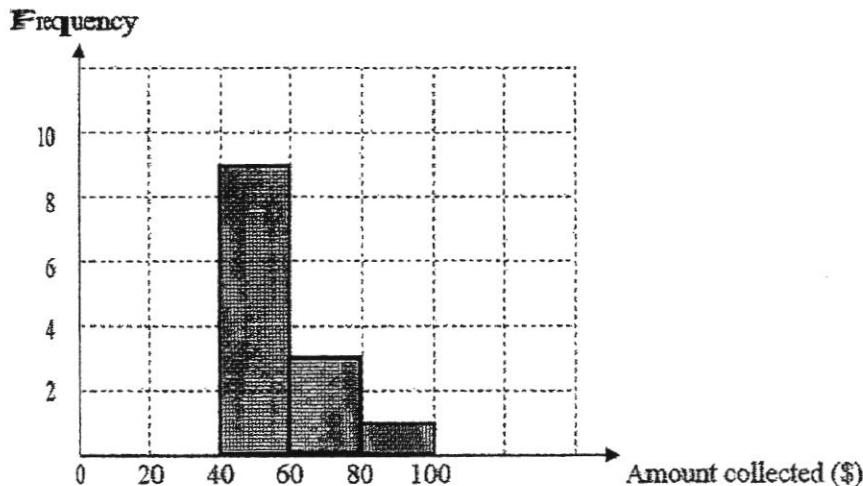
- (a) Write down the modal amount of money collected.

Answer (a) \$ [1]

- (b) Complete the frequency table above and hence estimate the mean amount of money collected by each of the students. [Mean = $\frac{\Sigma fx}{\Sigma f}$]

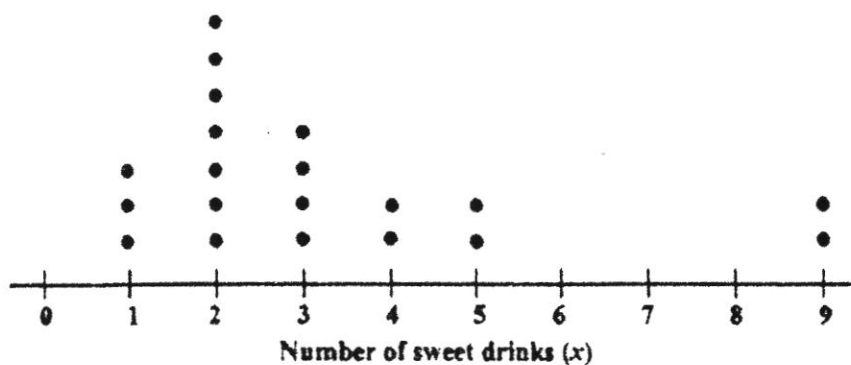
Answer (b) \$ [2]

- (c) Complete the histogram below which represents the given information.



Answer (c) On the grid above [1]

- 6 The number of sweet drinks consumed by 20 students on a daily basis is represented in the dot diagram below.



- (a) State the median number of drinks.

Answer (a) [1]

- (b) If this information is to be represented in a pie chart, calculate the angle of the sector representing students who drink less than 3 sweet drinks on a daily basis.

Answer (b) ° [1]

-
- 7 There are 10 red, 11 green, 13 yellow and 6 brown jelly beans in a bag. A jelly bean is removed at random from the bag.

(a) Find the probability that the jelly bean removed is not brown.

Answer (a) [1]

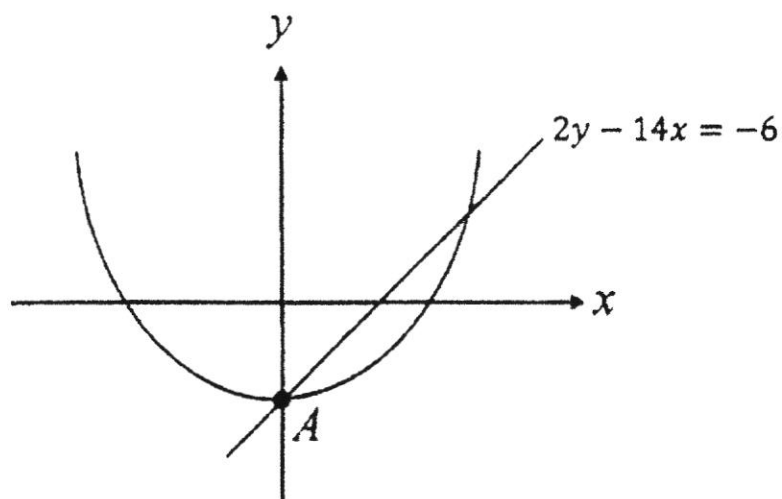
- (b) Given that 2 red jelly beans have been added into the existing bag, find the probability that the bean removed is red.

Answer (b) [2]

-
- 8 4 water pipes can fill a swimming pool in 30 minutes. How much faster would 6 water pipes take?

Answer [2]

- 9 The point A lies on the straight line $2y - 14x = -6$ as shown in the graph below. Point A also lies on the y -axis and is the minimum point of the curve.



- (a) Find the gradient of the straight line.

Answer (a) [1]

- (b) State the equation of the line of symmetry of the curve.

Answer (b) [1]

10 Consider the pattern

$$L_1: \frac{1}{1} + \frac{1}{2} = \frac{3}{2}$$

$$L_2: \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

$$L_3: \frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

(a) Write down the 9th line in the pattern.

Answer (a) L_9 : [1]

(b) Write down the n^{th} line in the pattern.

Answer (b) L_n : [1]

(c) Hence, find the value of m if $L_m = \frac{11}{30}$.

Answer (c) $m =$ [2]

PART B – Answer all questions.

11 Simplify the following expressions.

(a) $(3x + 5)^2 - 4x(1 - x)$

(b) $\frac{6x}{11y} \times \frac{z^2}{3y} + \frac{8z^3}{5}$

Answer (a) [2]

(b) [2]

12 Factorise each of the following expressions completely.

(a) $(x + y)^2 - 4$

(b) $9a^2b + a - 7b - 63ab^2$

Answer (a) [2]

(b) [2]

- 13 (a) Express as a single fraction $\frac{7}{5x-2} - \frac{3}{x+1}$.

Answer (a) [2]

- (b) Solve the following equations.

(i) $3x - 1 = \frac{14}{x}$

(ii) $45y^2 = 18y$

Answer (bi) [2]

(bii) [2]

14 Solve the simultaneous equations.

$$\begin{aligned}y + 2 &= 2x \\ 3x + 4y &= 36\end{aligned}$$

Answer $x = \dots\dots\dots$, $y = \dots\dots\dots$ [3]

15 It is given that $a = \frac{(b-c)^2}{4}$.

- (a) Express b in terms of a and c .
 (b) Hence, find the values of b when $a = 9$ and $c = -8$.

Answer (a) $\dots\dots\dots$ [2]

(b) $b = \dots\dots\dots$ or $\dots\dots\dots$ [1]

• End of Paper •

Class	Index Number	Name
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BUKIT MERAH SECONDARY SCHOOL



END OF YEAR EXAMINATION 2017 SECONDARY 2 EXPRESS

MATHEMATICS

Paper 2

4048/02

11 October 2017

1 hour 30 minutes

Additional Materials: Cover page (1 sheet)
Writing paper (6 sheets)
Graph paper (1 sheet)

READ THESE INSTRUCTIONS FIRST

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

Write in dark blue or black pen on both sides of the paper.

You may use a pencil for any diagram or graphs.

Do not use staples, 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 the 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 number of marks for this paper is 60.

Calculator Model:

For Examiner's Use	
Part A	/ 53
Part B (Algebra Component)	/ 7
Total	/ 60

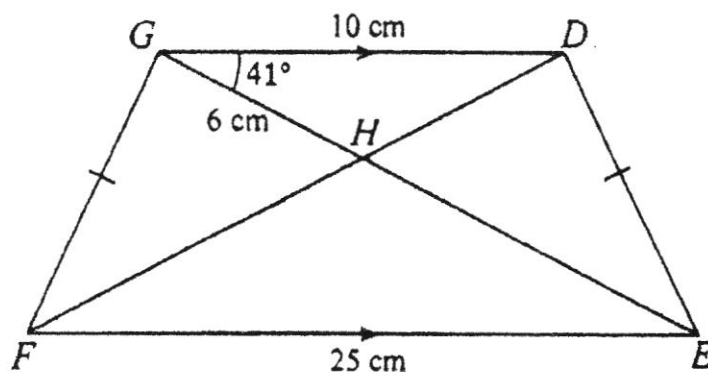
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Setter: Ms Loke JY

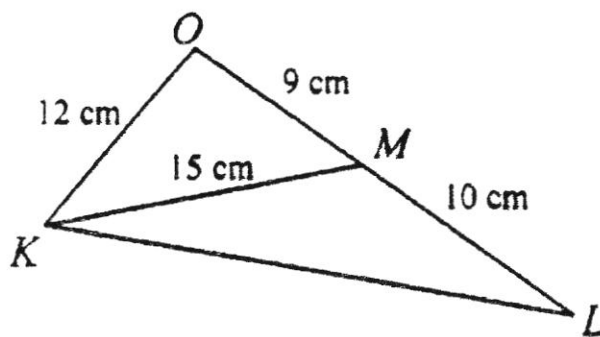
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PART A – Answer all questions.

- 1 In the diagram below, $DEFG$ is a trapezium. The point H is the intersection of the lines EG and DF . It is given that $GF = DE$, $DG = 10$ cm, $EF = 25$ cm, $GH = 6$ cm and $\angle EGD = 41^\circ$.



- (a) Name the triangle congruent to triangle EFG . [1]
 - (b) Name the triangle similar to triangle EFH . [1]
 - (c) Find $\angle EHF$. [2]
 - (d) Find the length of EG . [2]
- 2 OKL is a triangle in which M is a point on OL , $KM = 15$ cm, $LM = 10$ cm, $OM = 9$ cm and $OK = 12$ cm.



- (a) Explain why $\angle KOM$ is a right angle. [1]
- (b) Expressing your answers as fractions, in their lowest terms, find $\tan \angle OKM$. [1]
- (c) Calculate $\angle MKL$. [3]

- 3 Joy is investigating the duration of Skipe calls made in a day. She takes a sample of 100 Skipe calls from her classmates and records the duration of each call. The distribution is as follows:

Duration of call (minutes)	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40
Frequency	3	9	16	23	25	20	3	1

- (a) Write down the modal class. [1]
- (b) In which class does the median lies? [1]
- (c) Based on the data above, choose the best statistical diagram from the following options to represent the data. State a reason for your choice.

Option 1: Dot Diagram

Option 2: Histogram

Option 3: Stem-and-leaf diagram

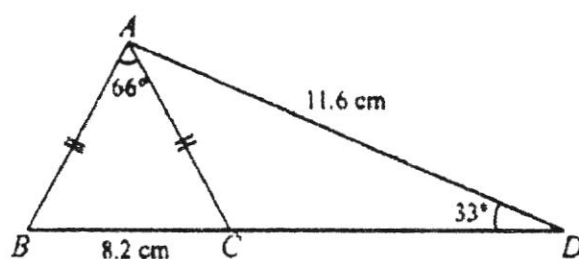
[2]

- 4 Miss Tan recorded the shuttle run timing, in seconds, of 16 students in her Physical Education class.

9.0	9.5	10.1	10.4	11.3	12.1	11.2	12.2
10.3	10.5	9.7	9.6	10.8	9.8	10.8	9.3
Time (seconds)							

- (a) Draw an ordered stem-and-leaf diagram, including a key, for the data above. [2]
- (b) Calculate the mean shuttle run timing, corrected to 2 decimal places. [2]
- (c) The passing time for shuttle run is 11.3 seconds or faster.
Calculate the percentage of students who passed their shuttle run. [2]
- (d) Calculate the angle represented by students who did not pass their shuttle run on a pie chart. [2]

- 5 An opaque box contains 26 identical cards labelled 0 to 25. Amirul draws a card at random from the box. Find the probability that he draws a card that display
- (a) an odd number, [1]
- (b) a number that is a multiple of 4, and [1]
- (c) a number other than multiple of 4. [1]
- 6 In the figure, BCD is a straight line. It is given that $AB = AC$, $BC = 8.2$ cm, $AD = 11.6$ cm, $\angle ADC = 33^\circ$ and $\angle BAC = 66^\circ$. Find



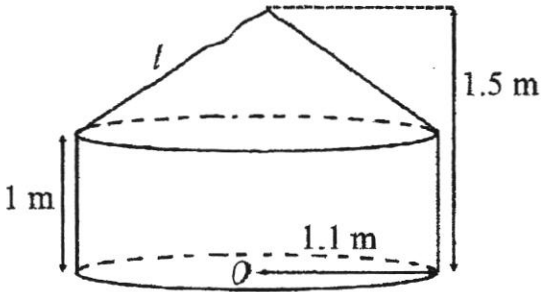
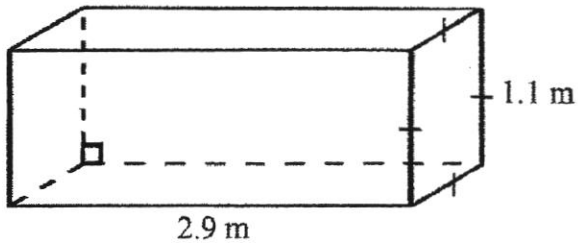
- (a) $\angle CAD$, [1]
- (b) AC , and [2]
- (c) CD . [3]

- 7 Sam owns a tent manufacturing company. As his business advisor, he wants your opinion on choosing between manufacturing Tent A or Tent B so that he makes the **most profit** from his sale.

The following are some information that Sam has provided you with:

- Cost of tent cloth material per m^2 : \$6
- Selling price of Tent A: \$120
- Selling price of Tent B: \$130

Tent A and Tent B designs are as follow: (diagrams are not drawn to scale)

Tent A	Tent B
 - A cylinder with base radius of 1.1 m and height 1 m - A right cone, with vertex directly above the centre of the cylinder and slant height l - Total height of cylinder and cone is 1.5 m	 - A rectangular cuboid with base length of 2.9 m and height of 1.1 m

- (a) Calculate the slant height, l , of the cone of Tent A. [2]
- (b) Show that the total surface area of Tent A, inclusive of the base of the tent, is 14.9 m^2 , corrected to 3 significant figures. [2]
- (c) Hence, calculate the profit from selling one unit of Tent A, rounding your answer to two decimal places. [2]
- (d) Based on all the information provided, should Sam manufacture Tent A or Tent B? Show all necessary calculations and reasons to support your decision. [3]

[Curved surface area of a cone = $\pi r l$, Volume of a cone = $\frac{1}{3} \pi r^2 h$]

- 8 In the Legacy Shopping Mall project, the proposed actual area of a children's playground is 0.16 km^2 .

The playground is 4 cm^2 on the floor plan.

- (a) Given that the floor plan is drawn on a scale of $1:n$, find the value of n . [2]
- (b) Calculate the actual distance, in metres, between the playground and the nearest child-friendly toilet, which is 0.7 cm apart on the floor plan. [1]

- 9 Answer the whole of this question on a sheet of graph paper.

The variables x and y are connected by the equation $y = 19 - x(4 + 3x)$.

x	-4	-3	-2	-1	0	1	2	3	4
y	-13	4	15	p	19	12	-1	q	-45

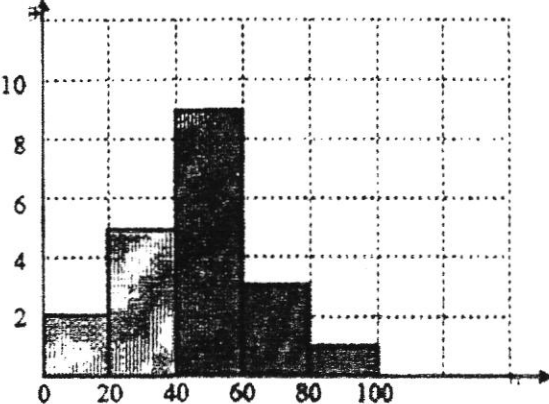
- (a) Calculate the value of p and q . [2]
- (b) Using a scale of 2 cm to represent 1 unit on the x -axis and 2 cm to represent 10 units on the y -axis, draw the graph of $y = 19 - x(4 + 3x)$ for $-4 \leq x \leq 4$. [3]
- (c) Using your graph,
- (i) find the coordinates of the x -intercepts, and [1]
- (ii) the maximum value of y . [1]
- (d) Draw and label the straight line $y = -5$. Hence, solve the equation $-5 = 19 - x(4 + 3x)$. [2]

PART B – Answer all questions.

- 10 (a) Given that $9x^2 + 49y^2 = 81$ and $6xy = -5$, find the value of $(3x - 7y)^2$. [1]
- (b) Express as a single fraction in its simplest form
- (i) $\frac{x^2 + 2x}{x^2 + x - 2} + \frac{2x}{1 - x}$ [3]
- (ii) $\frac{x^2 - 4}{3x^2 - 6x} + \frac{x^2 + 5x + 6}{(3x)^2}$ [3]

Mark Scheme for BMSS S2 EXP Maths Paper 1 EOY 2017

Qn	Answer	Marks	Total
1(a)	$\sqrt{\frac{14.78 \times 80.3}{2.99}}$ $= \sqrt{\frac{15 \times 80}{3}}$ $= 20$	M1 A1	2
1(b)	$12a^2b^2 = 2^2 \times 3 \times a^2 \times b^2$ $9ab^2c = 3^2 \times a \times b^2 \times c$ $36a^3b^3c = 2^2 \times 3^2 \times a^3 \times b^3 \times c$ $\text{HCF} = 3 \times a \times b^2 = 3ab^2$	B1	1
2(a)	$\angle TUX = 180^\circ - 40^\circ - 22^\circ = 118^\circ$	B1	1
2(b)	$WX = 11.4 - 7.7 = 3.7 \text{ cm}$	B1	1
3(a)	$\tan 54^\circ = \frac{7}{AX}$ $AX = \frac{7}{\tan 54^\circ}$ $AX = 5.0857$ $AX = 5.09 \text{ cm (3 s.f.)}$	B1	1
3(b)	$\sin \angle XYZ = \frac{7}{25}$	B1	1
3(c)	$\cos \angle XZY = \frac{7}{25}$ $\angle XZY = \cos^{-1} \frac{7}{25}$ $\angle XZY = 73.739$ $\angle XZY = 73.7^\circ (1 \text{ d.p.})$	B1	1
3(d)	$\text{Area of } \triangle XYZ$ $= \frac{1}{2} \times (18.9 + 5.0857) \times 7$ $= 83.949$ $\frac{1}{2} \times 25 \times h = 83.949$ $12.5h = 83.949$ $h = 6.7159$ $h = 6.72 \text{ cm (3 s.f.)}$	M1 A1	2
4(a)	$16^2 = h^2 + 5^2$ $h^2 = 16^2 - 5^2$ $h^2 = 231$ $h = \sqrt{231}$ $h = 15.198$ $h = 15.2 \text{ cm (3 s.f.)}$	B1	1

4(b)	Volume of pyramid $= \frac{1}{3} \times 10 \times 3.5 \times 15.198$ $= 177.31$ Volume of sphere = Volume of pyramid $\frac{4}{3}\pi r^3 = 177.31$ $r^3 = 42.329$ $r = \sqrt[3]{42.329}$ $r = 3.4850$ $r = 3.49 \text{ cm (3 s.f.)}$	M1 A1	 2
5(a)	\$57	B1	1
5(b)	30, 5, 150, 20, 920 Estimated mean = $\frac{920}{20} = 46$	B1 B1	 2
5(c)	Frequency  Amount collected (\$)	B1	1
6(a)	Median = $\frac{2+3}{2} = 2.5$	B1	1
6(b)	$\frac{10}{20} \times 360^\circ = 180^\circ$	B1	1
7(a)	P (not brown) $= \frac{10+11+13}{10+11+13+6}$ $= \frac{17}{20}$ Or P (not brown) $= 1 - \frac{3}{20}$ $= \frac{17}{20}$	B1 [B1]	 1

7(b)	$P \text{ (red)}$ $= \frac{10+2}{40+2}$ $= \frac{2}{7}$	M1 A1	2
8	Let "w" be number of pipes and "t" be the time taken to fill the swimming pool. $w = \frac{k}{t}$ $4 = \frac{k}{30}$ $k = 120$ $w = \frac{120}{t}$ $w = \frac{120}{6}$ $w = 20$ Difference in time $= 30 - 20$ $= 10 \text{ minutes}$	M1 A1	2
9(a)	$2y - 14x = -6$ $2y = 14x - 6$ $y = 7x - 3$ Gradient = 7	B1	1
9(b)	$x = 0$	B1	1
10(a)	$L_9: \frac{1}{9} + \frac{1}{10} = \frac{19}{90}$	B1	1
10(b)	$\frac{1}{n} + \frac{1}{n+1} = \frac{n+1+n}{n(n+1)} = \frac{2n+1}{n(n+1)}$ $L_n: \frac{1}{n} + \frac{1}{n+1} = \frac{2n+1}{n(n+1)} \left[\frac{1}{n} + \frac{1}{n+1} \text{ accepted as well} \right]$	B1	1
10(c)	$\frac{11}{30} = \frac{2n+1}{n(n+1)}$ $11n(n+1) = 30(2n+1)$ $11n^2 + 11n = 60n + 30$ $11n^2 - 49n - 30 = 0$ $(11n+6)(n-5) = 0$ $n = -\frac{6}{11} \text{ (rejected) or } 5$ $\therefore m = 5$	M1 A1 (trial and error is not accepted here as the question has used the word "hence")	2

11(a)	$(3x + 5)^2 - 4x(1 - x)$ $= 9x^2 + 30x + 25 - 4x + 4x^2$ $= 13x^2 + 26x + 25$	M1 A1	2
11(b)	$\frac{6x}{11y} \times \frac{x^2}{3y} + \frac{8x^5}{5}$ $= \frac{6x}{11y} \times \frac{x^2}{3y} \times \frac{5}{8x^5}$ $= \frac{5x}{44y^2x^3}$	B1 $-\frac{5}{44}$ B1 $-\frac{x}{y^2x^3}$	2
12(a)	$(x + y)^2 - 4$ $= (x + y)^2 - 2^2$ $= (x + y + 2)(x + y - 2)$	M1 s.o.i A1	2
12(b)	$9a^2b + a - 7b - 63ab^2$ $= a(9ab + 1) - 7b(1 + 9ab)$ $= (9ab + 1)(a - 7b)$	M1 s.o.i A1	2
13(a)	$\frac{7}{5x-2} - \frac{3}{x+1}$ $= \frac{7(x+1) - 3(5x-2)}{(5x-2)(x+1)}$ $= \frac{7x+7-15x+6}{(5x-2)(x+1)}$ $= \frac{13-8x}{(5x-2)(x+1)}$	M1 A1	2
13(b)(i)	$3x - 1 = \frac{14}{x}$ $x(3x - 1) = 14$ $3x^2 - x - 14 = 0$ $(3x - 7)(x + 2) = 0$ $3x - 7 = 0$ or $x + 2 = 0$ $x = \frac{7}{3}$ or -2	M1 A1	2
13(b)(ii)	$45y^2 = 18y$ $45y^2 - 18y = 0$ $9y(5y - 2) = 0$ $9y = 0$ or $5y - 2 = 0$ $y = 0$ or $y = 0.4$ [Accept $\frac{2}{5}$]	M1 A1	2

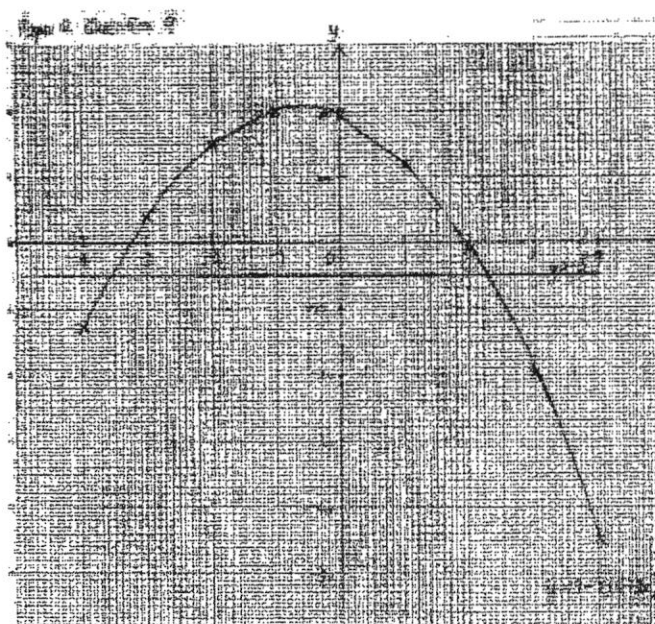
Mark Scheme for BMSS S2 EXP Maths Paper 2 EOY 2017

Qn	Answer	Marks	Total
1(a)	Triangle <i>FED</i>	B1	1
1(b)	Triangle <i>GDH</i>	B1	1
1(c)	$\angle EHF$ $= 180^\circ - 41^\circ - 41^\circ$ $= 98^\circ$	M1 A1	2
1(d)	$\frac{EH}{6} = \frac{25}{10}$ $EH = 15$ $EG = 15 + 6 = 21 \text{ cm}$	M1 A1	 2
2(a)	$KM^2 = 15^2 = 225$ $OK^2 + OM^2 = 12^2 + 9^2 = 225$ Since $KM^2 = OK^2 + OM^2$, by the converse of Pythagoras Theorem, $\angle KOM$ is a right angle.	B1	1
2(b)	$\tan \angle OKM = \frac{9}{12} = \frac{3}{4}$	B1	1
2(c)	$\tan \angle OKM = \frac{9}{12}$ $\angle OKM = \tan^{-1}\left(\frac{9}{12}\right)$ $\angle OKM = 36.869$ $\tan \angle OKL = \frac{19}{12}$ $\angle OKL = \tan^{-1}\left(\frac{19}{12}\right)$ $\angle OKL = 57.724$ $\angle MKL = 57.724 - 36.869$ $\angle MKL = 20.855$ $\angle MKL = 20.9^\circ (1 \text{ d.p.})$	M1 M1 A1	 3
3(a)	21 – 25	B1	1
3(b)	16 – 20	B1	1
3(c)	Option 2 – Histogram <u>Suitable for large data sets</u> and all the information required to draw a histogram is already provided. <i>Dot diagram should not be used as there is too much data to draw. Too many dots can cause the diagram to appear cluttered.</i> <i>Stem-and-leaf diagram should not be used as there is no information about the duration of each individual call.</i>	B1 – with valid reason given B1	 2

4(a)	$ \begin{array}{c cccccc} 9 & 0 & 3 & 5 & 6 & 7 & 8 \\ 10 & 1 & 3 & 4 & 5 & 8 & 8 \\ 11 & 2 & 3 & & & & \\ 12 & 1 & 2 & & & & \end{array} $ Key: 9 1 represents 9.1	B1 B1	 2
4(b)	Mean Time $= \frac{166.6}{16}$ $= 10.4125\text{s}$ $= 10.41\text{s} \text{ (2 d.p.)}$	M1 A1	 2
4(c)	Percentage pass $= \frac{14}{16} \times 100\%$ $= 87.5\%$	M1 A1	 2
4(d)	$\frac{2}{16} \times 360^\circ = 45^\circ$	M1, A1	2
5(a)	Odd numbers = 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 $P(\text{odd number}) = \frac{13}{26} = \frac{1}{2}$	B1	1
5(b)	Multiple of 4 = 4, 8, 12, 16, 20, 24 $P(\text{multiple of 4}) = \frac{6}{26} = \frac{3}{13}$	B1	1
5(c)	$P(\text{not multiple of 4}) = 1 - \frac{3}{13} = \frac{10}{13}$	B1	1
6(a)	$\angle ACB = \frac{180-66}{2} = 57^\circ$ $\angle CAD = 57 - 33$ $= 24^\circ$	B1	1
6(b)	$\sin 33^\circ = \frac{4.1}{AC}$ $AC = \frac{4.1}{\sin 33^\circ}$ $AC = 7.5279$ $AC = 7.53 \text{ cm (3 s.f.)}$ [Accept students who find AB first and then state that $AC = AB$]	M1 A1	 2
6(c)	Observe that $\angle BAD = 90^\circ$, so $BD^2 = 7.5279^2 + 11.6^2$ $BD = \sqrt{191.22}$ $BD = 13.828$ $CD = 13.828 - 8.2$ $= 5.63 \text{ cm (3 s.f.)}$	M1 M1 A1	 3

7(a)	$l^2 = 0.5^2 + 1.1^2$ $l^2 = 1.46$ $l = \sqrt{1.46}$ $l = 1.2083$ $l = 1.21 \text{ m (3 s.f.)}$	M1 A1	 2
7(b)	Surface Area of Tent A = Curved Surface Area of Cone + Curved Surface Area of Cylinder + Base Area of Cylinder $= \pi \times 1.1 \times 1.2083 + 2\pi \times 1.1 \times 1 + \pi \times 1.1^2$ $= 14.888$ $= 14.9 \text{ m}^2 \text{ (3 s.f.)}$	M1 A1	 2
7(c)	Profit from selling Tent A = Selling Price of Tent A – Cost of manufacturing Tent A $= 120 - 14.888 \times 6$ $= 30.672$ $= \$30.67 \text{ (2 d.p.) } [\$30.60 \text{ accepted from using } 14.9]$	M1 A1	 2
7(d)	Total Surface Area of Tent B $= 4 \times 2.9 \times 1.1 + 2 \times 1.1 \times 1.1$ $= 15.18$ Profit from selling Tent B $= 130 - 15.18 \times 6$ $= 38.92 > 30.67$ Mr Lee should manufacture Tent B as he will earn <u>more</u> profit from it.	M1 M1 A1	 3
8(a)	$4 \text{ cm}^2 : 0.16 \text{ km}^2$ $2 \text{ cm} : 0.4 \text{ km}$ $1 \text{ cm} : 0.2 \text{ km}$ $1 \text{ cm} : 20000 \text{ cm}$ $1 : 20000$ $\therefore n = 20000$	M1 A1	 2
8(b)	$0.7 \times 20000 = 14000 \text{ cm}$ $14000 \text{ cm} = 140 \text{ m}$	B1	1
9(a)	$p = 20, q = -20$	B1, B1	2
9(b)	Draw graph of $y = 19 - x(4 + 3x)$. (S) Scale – 2 cm to 1 unit on x-axis and 2 cm to 10 units on y-axis (S) Smooth curve (P) Plotted Points – 9 points	B1 B1 B1	3

9(c)(i)	Coordinates of x-intercepts (-3.3, 0) [Accept -3.4 to -3.2] (1.9, 0) [Accept 1.8 to 1.95]	B1	1
9(c)(ii)	Maximum value = 20.3 [Accept 20 to 22]	B1	1
9(d)	Draw and label $y = -5$. $x = -3.5$ or 2.2 [Accept $x = -3.7$ to -3.4 or 2.1 to 2.4]	M1 A1	2
10(a)	$(3x - 7y)^2$ $= (3x)^2 - 2(3x)(7y) + (7y)^2$ $= 9x^2 - 42xy + 49y^2$ $= 9x^2 + 49y^2 - 7(6xy)$ $= 81 - 7(-5)$ $= 116$	B1	1
10(b)(i)	$\frac{x^2+2x}{x^2+x-2} + \frac{2x}{1-x}$ $= \frac{x(x+2)}{(x+2)(x-1)} + \frac{2x}{1-x}$ $= \frac{x}{x-1} - \frac{2x}{x-1}$ $= -\frac{x}{x-1}$	M1 M1 A1	3
10(b)(ii)	$\frac{x^2-4}{3x^2-6x} \div \frac{x^2+5x+6}{(3x)^2}$ $= \frac{(x+2)(x-2)}{3x(x-2)} \times \frac{(3x)^2}{(x+2)(x+3)}$ $= \frac{3x}{x+3}$	M1 – factorising terms in the 1 st fraction M1 – factorising terms in the 2 nd fraction A1	3



Paper 2 Question 9

