NAME ______________________________ (   ) CLASS: SEC 4A (   )

HOUGANG SECONDARY SCHOOL

PRELIMINARY EXAMINATION 1 2017

PAPER 1 (4045 / 01)

MATHEMATICS
SECONDARY FOUR NORMAL ACADEMIC

23 May 2017, Tuesday **1 hour**

MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE RESPECT OURSELVES RESPECT OTHERS MAKE THE DIFFERENCE
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Instructions to pupils

- Write your name, class register number and target grade in the space provided on this page.
- Write in dark blue or black pen in the spaces provided on the question paper.
- You may use a pencil for any diagrams 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.
- 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 □, use either the calculator value of 3.142, unless the question requires the answer in terms of □.

Information for pupils

- 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 : ______________________

TARGET GRADE	
	50

This question paper consists of 11 printed pages (including this cover page).

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

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

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

Arc length = $r\theta$, where θ is in radians

Sector area = $\frac{1}{2}r^2\theta$, where θ 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

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

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

2

For Examiner's Use Only

1(a) By writing each value correct to 1 significant figure, estimate the value of $\sqrt{\frac{19\times3.89}{5.01}}$

Show your working.

Answer : …….. [2]

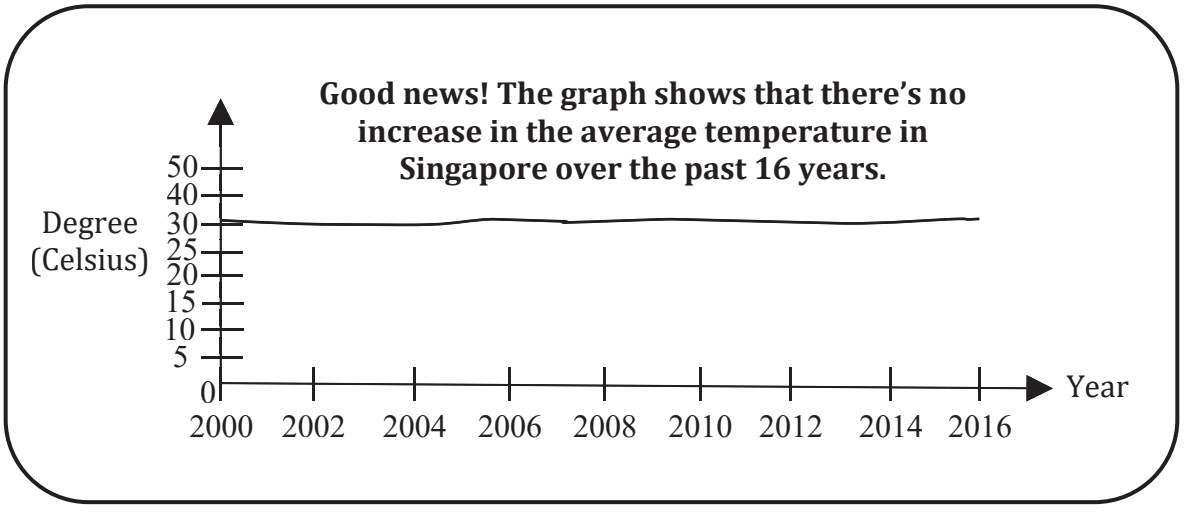
1(b) The dimensions of a rectangle are $(2^3\times5^2)$ cm by $(2\times3^2\times5^2)$ cm.

If a square has the same area as the rectangle, find the length of a side of the square.

Give your answers as a product of its prime factors in index notation.

Answer : …….. [2]

2 Below is a statistical information given by XYZ magazine regarding the temperature change in Singapore over the years.



Explain why the statistical information above might be misleading.

3

[2]

3 Joshua paid a total amount of $92.48 for a pair of jeans from a shop during the Great Singapore sale.

What was the usual price of the jeans?

Answer : ……..…….. [2]

4 Benjamin deposited $15 000 in a bank which pays compound interest at a rate of 1.25% per annum. Calculate the interest Benjamin has accumulated in his bank after 3 years. Give your answer to the nearest cent.

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Answer : …...…….. [3]

5 The population of Singapore for two years is given below:

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Year	Population
2016	5,696,506
2015	5,603,740

(a) Calculate the percentage increase in population in 2016.

Answer : …...…….. [2]

(b) Human population density is defined as the number of people per unit of area in square kilometres. If Singapore's land area is 719 km^2, find the human population density in Singapore in 2016 in standard form.

Answer : …...…….. [2]

6 Solve the pair of simultaneous equations

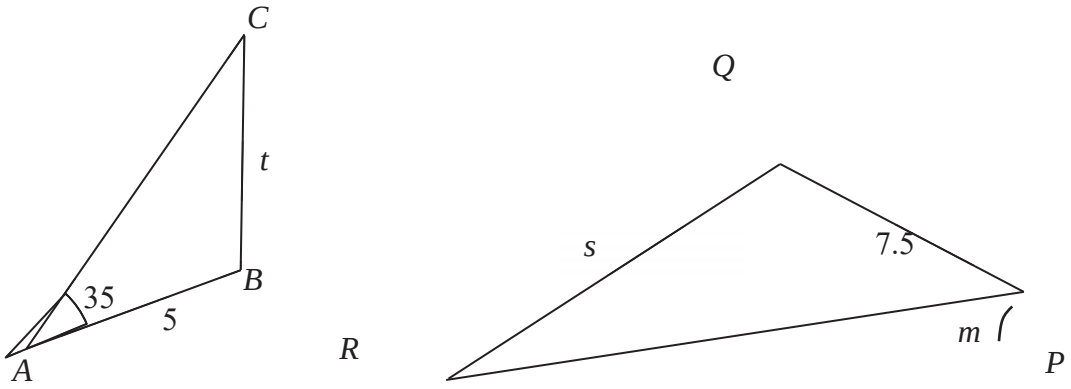
$$4x - 3y = 20$$
$$3x + 2y = 6.5$$

5

Answer : …...…….. [3]

7 Triangle *ABC* and *PQR* are two similar triangles.

All lengths are in centimetres.



(a) Calculate the value of *m*.

(b) Express *t* in terms of *s*.

Answer : (a) ...…….. [1]

(b)…….. [1]

8(a) Expand and simplify $7-2(3x-5)^2$.

6

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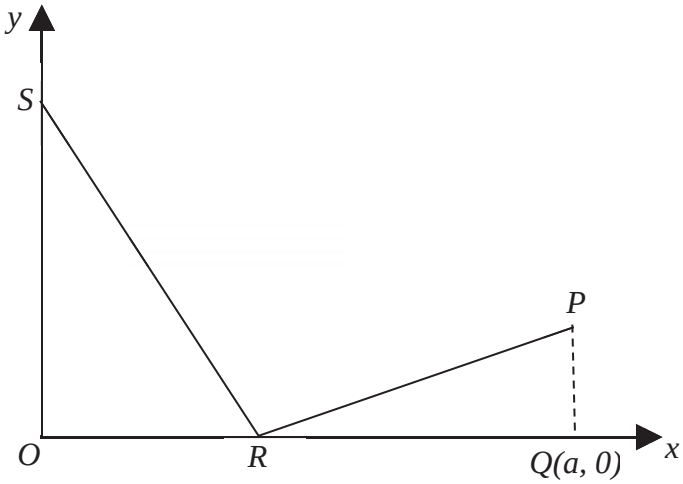
Answer : …….. [2]

8(b) Given that $p = \dfrac{m+a}{m-b}$, express m in terms of a, b and p.

Answer : …….. [2]

9



In the graph above, PQ is parallel to the y-axis and has a length of 4 units.

(a) Show that the coordinates of R is (4, 0). [2]

(b) find $\angle SRO$

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7

Answer : …...…….. [2]

(c) If the gradient of PR is $\frac{1}{4}$, find the value of a.

Answer : …...…….. [2]

10 The box-and-whisker plot below shows the distribution of the weight of 80 students.

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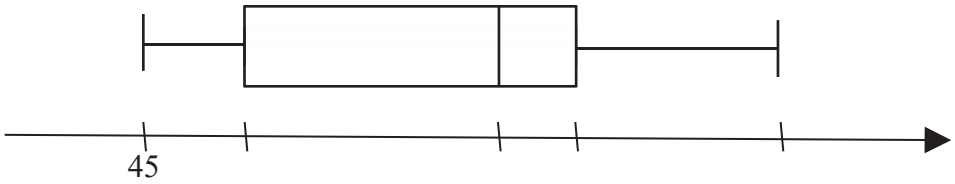


Weight (kg)

Some statistical summary of the distribution are given below :

- the range of the data is 35 kg,
- the interquartile range of the data is 22 kg,
- 40 students have weight less than 68 kg,
- 60 students have weight less than 72 kg,

Find the value of

(a) x

Answer : …...…….. [1]

(b)

8

Answer : …...…….. [1]

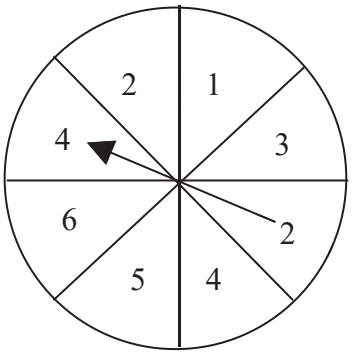
(c)

Answer : …...…….. [1]

(d)

Answer : …...…….. [1]

11



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The diagram shows a fair spinner. The wheel is divided into 8 equal parts.

(a) The pointer is spun once.

Find the probability of obtaining a number "4"

Answer (a)…… [1]

9

(b) The pointer is spun twice.
The score is found by adding the numbers from the two spins.
Find the probability that the sum is an odd number.

Answer (b)…..…….. [2]

12(a) Calculate the size of an exterior angle of a regular 6 sided polygon.

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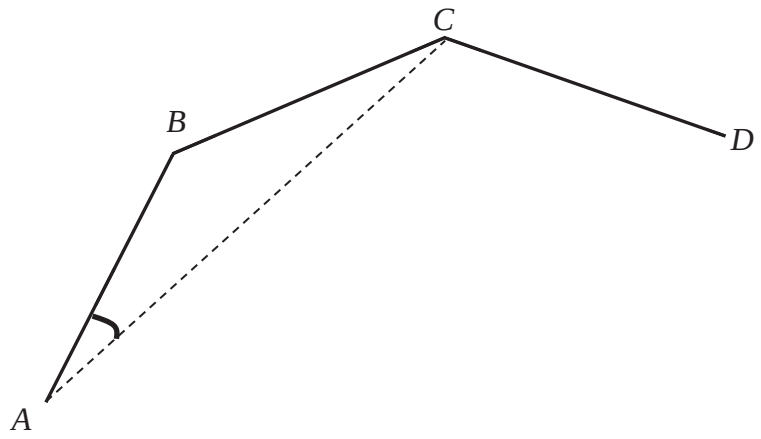
Answer : …….. [1]

12(b) *AB*, *BC* and *CD* are adjacent sides of a regular polygon.

Given that $\angle BAC = 15°$, find the number of sides of the regular polygon.



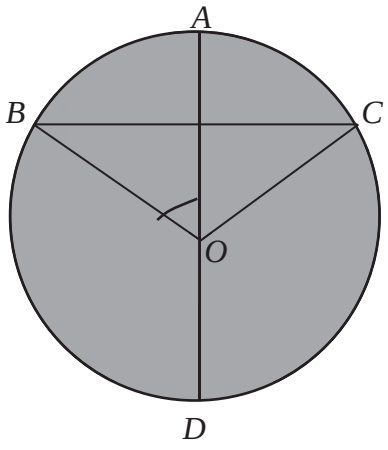
10

Answer : …….. [3]

13 Solve $3x^2 + 4x = 15$.

Answer : *x* = ..…….. [3]

14 In the figure, *O* is the centre of the circle *ABDC*. The line *AD* is the diameter which bisects $\angle BOC$.



Given that $\angle AOB = \frac{\pi}{3} rad$ and *AD* = 13 cm, find

(a) Show that reflex $\angle BOC$ in π radian,

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11

Answer : …….. [1]

(b) the arc length *BAC*,

Answer : …….. [2]

(c) the area of the shaded region.

Answer : …….. [3]

End of Paper

13

NAME ________________________________ (   ) CLASS: SEC 4A(   )

HOUGANG SECONDARY SCHOOL

PRELIMINARY EXAMINATION 1 2017

PAPER 2 (4045 / 02)

MATHEMATICS
SECONDARY FOUR NORMAL ACADEMIC

24 May 2017, Wednesday **1 hour 30 mins**

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- You may use a pencil for any diagrams or graphs.
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Section A
Answer **ALL** questions

Section B
Answer only **ONE** question.

- 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 the calculator value of 3.142, unless the question requires the answer in terms of π.
- At the end of the examination, fasten all your work securely together.

Information for pupils
- 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 : ______________________

TARGET GRADE	
	50

This question paper consists of 7 printed pages (including this cover page).

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

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

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

Arc length = $r\theta$, where θ is in radians

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

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

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

Section A (42 marks)

Answer **ALL** the questions in this section

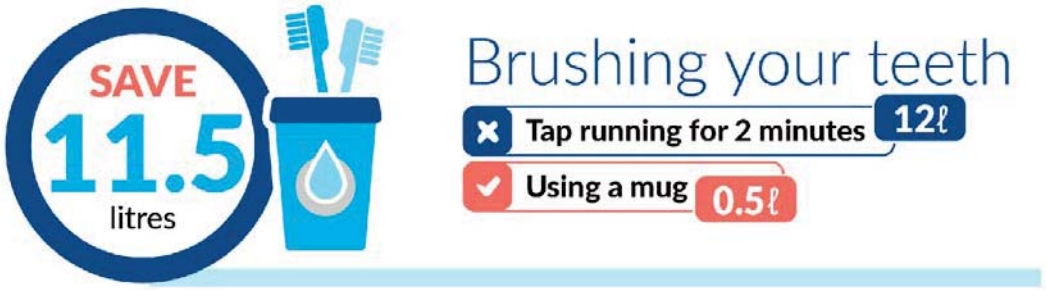
1 A bus left Singapore at 8.15am and reached Johor Bahru at 9.15am. The bus stopped for 20 minutes at a petrol kiosk for a short break. It then travelled for another 3 hours and 25 minutes to reach Kuala Lumpur.

Calculate

(a) the time taken for the whole journey in hours and minutes, [1]

(b) the average speed of the bus in km/h if the distance between Singapore and Kuala Lumpur is 380 km. [2]

2 The PUB, Singapore's National Water Agency, has the following information in its water conservation awareness program.



(a) How many litres of water is saved if you brush your teeth using a mug instead of having the tap running for 7.5 minutes? Make your assumption to justify your working. [2]

(b) According to the information above, how many mugs can contain 22500 cm^3 of water? [2]

3 The *n*th term of a number sequence is in the form of $T_n = 3n + 1$.

(a) List the first 3 terms of the number sequence. [1]

(b) Explain why 243 is **NOT** a term in this number sequence. [2]

4 A straight line passes through the points *P*(2, 3) and *Q* (-1, 4). Find

(a) the length of *PQ*, [2]

(b) the equation of the straight line *PQ*. [2]

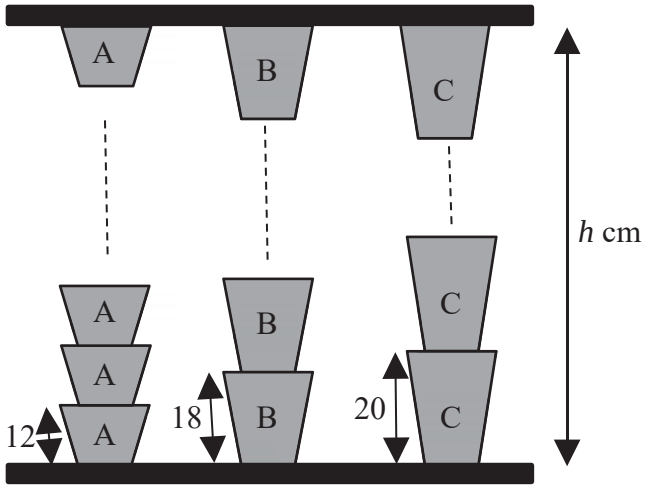
5(a) Factorise $7qy - 7y - 3pq + 3p$ completely. [2]

5(b) Find the value of r if $7^{2r+1} = 1$. [2]

3

5(c) Express $\frac{1}{4m+12} - \frac{1+m}{m+3}$ as a single fraction in its lowest term. [2]

6 Three types of flower pots, *A*, *B* and *C* of the same base were stacked together. Flower pot *A*, *B* and *C* have heights 12 cm, 18 cm and 20 cm respectively.



In the diagram, all the flower pots are stacked to the same height, *h* cm.

(a) Find the minimum value of *h*, [2]

(b) Hence, find the number of flower pot *B* needed for the minimum height. [1]

7 A floor plan of a recreation centre is drawn using a map scale of 2 cm to 1.5 m.

(a) Find the map scale of the floor plan in the form of 1 : n. [1]

(b) The wall of a gymnasium has a height of 5.6 cm on the map.
Calculate the actual height of the gymnasium in metres. [2]

(c) The actual floor area of the gymnasium is 112.5 m^2.
Calculate the floor area of the gymnasium on the map in cm^2. [2]

8(a) Convert 54 km/h into m/s. [1]

8(b) Express the ratio 0.25 kg : 4.5 kg : 750g in its simplest form. [1]

9 Kelvin wanted to find out the mean height of young Singapore males. He obtained the heights of five of his male neighbours to calculate the mean height.
Their heights (in metres) are shown below.

1.65 1.74 1.68 1.70 1.78

(a) Explain why Kelvin's method is not a good method for obtaining the mean height of young Singapore males. [1]

(b) Calculate the mean height of Kelvin's five male neighbours. [2]

(c) If Kelvin's height is added to his five neighbour's heights, the mean height will decrease by 0.01 metres. What is Kelvin's height in metres? [2]

10 **Answer the whole of this question on graph paper**

The volume of a metal box with a square base is represented by the equation $V = 8x - 0.5x^3$, where V is the volume and length of its base is represented by x cm.

The table below shows the corresponding values of x and V.

x	0	0.5	1	1.5	2	2.2	2.5	3	3.5	4
V	0	3.9	7.5	10.3	12	12.3	12.2	10.5	6.6	0

(a) Using a scale of 4 cm to represent 1 unit on the x-axis and 1 cm to represent 1 unit on the y-axis, draw the graph of $V = 8x - 0.5x^3$ for $0 \le x \le 4$. [3]

(b) Use your graph to estimate

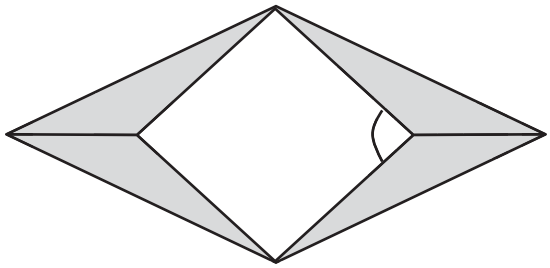
(i) the values of x for which the volume is 8 cm^3, [2]

(ii) the gradient of the curve at $x = 1$. [2]

Section B (8 marks)

Answer **ONE** question only.

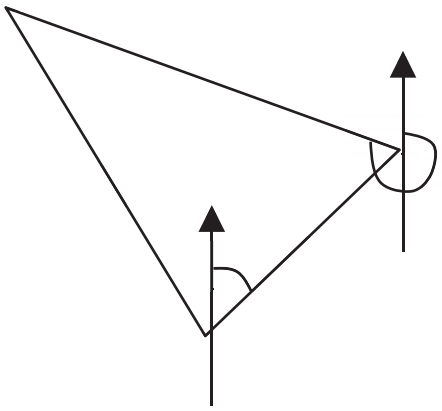
11(a) A metal door ornament *PXRY* is a rhombus with *PS* = 12 cm, *SY* = 5 cm and $\angle PSR = 82°$.
PQRS is a rhombus which is being cut out from the ornament *PXRY*.
PQX, *RQX*, *PSY* and *RSY* are four congruent triangles.



(i) Find the length of *PY*. [3]

(ii) Calculate the area of the door ornament. [2]

11(b) Jonathan wanted to go to the nearby library *L*, which is 15 km away from his house, *M*. He cycled 3 km from his house on a bearing of $036°$ to a supermarket at *C*. He then cycled on a bearing of $290°$ to the library at *L*.



Find

(i) $\angle LCM$, [1]

6

(ii) $\angle MLC$. [2]

12(a) In a supermarket, Brand ACE rice weighing 5kg are sold. The weights of 100 packs of Brand ACE rice were measured and the results are shown in the following table.

Weight of Brand ACE rice (kg)	Frequency
$4.7 \le x < 4.8$	15
$4.8 \le x < 4.9$	16
$4.9 \le x < 5.0$	29
$5.0 \le x < 5.1$	38
$5.1 \le x < 5.2$	2

(i) Find the estimated mean and standard deviation of the weights of the 100 packs of Brand ACE rice. [3]

(ii) The estimated mean and standard deviation of the weight of 100 packs of Brand BEST rice is 4.985 kg and 0.101 kg respectively. Assume that the price and quality of rice of both brands are the same, which brand of rice is a better buy?
Explain your answer. [2]

12(b) A game is played with counters by tossing a fair six-sided dice and a board as shown.
A counter is placed on the red square on the board as shown below.

Green	Blue	(Red)	Violet	Brown	Pink

If the die shows a 6, another counter will be placed on top of the colour. If the die shows 2 or 4, the

counter is moved one square to left. If the die shows any other number, the counter is moved two squares to the right.

(i) Find the probability that a counter lands on the blue colour on the first toss, [1]

(ii) If the dice is tossed twice, find the probability that two counters lands on the brown colour. [2]

End of Paper

Hougang Secondary School
Mathematics Department
Mark Scheme
Mathematics Syllabus Normal Academic

Subject : Mathematics
Examination : Preliminary Examination 1 2017
Level : Secondary Four Normal Academic
Paper : 1

Qn	Working	Marks	Remarks
1(a)	$\sqrt{\frac{19\times3.89}{5.01}}$ $=\sqrt{\frac{20\times4}{5}}$ $=4$	M1 A1	All values must be correct.
1(b)	Area of a square $=(2^3\times5^2)\times(2\times3^2\times5^2)$ $=(2^4\times3^2\times5^4)$ cm^2 Length of a square $=\sqrt{2^4\times3^2\times5^4}$ $=(2^2\times3\times5^2)$ cm	M1 A1	Award marks for any multiplication of length and breadth.
2	(1) The straight line implied that there is no change in average temperature of Singapore over the past 16 years. (2) However, if we zoom into the scale of *y*-axis, we could see actual rise in temperature between 30^0C to 40^0C.	B1 B1	Straight line - causes for misleading information. Enlarge scale of *y*-axis.
3	70% = \$ 92.48 $100\% = \frac{92.48}{70}\times100$ = \$ 132.11 (2 dp)	M1 A1	
4	Amount Rec $=15000\left(1+\frac{1.25}{100}\right)^3$ = \$ 15569.56055 Interest = \$15569.56055 - \$15000 = \$ 569.56 (2 dp)	M1 A1	Substitution
5(a)	Percentage increase $=\frac{5,696,505-5,603,740}{5,603,740}\times100$ = 1.66% (3 sf)	M1 A1	

5(b)	Human population density $= \frac{5{,}696{,}506}{719}$ $= 7922.8178$ $= 7.92 \times 10^3$ (3 sf)	M1 A1	
6	$4x - 3y = 20$ --- [1] $3x + 2y = 6.5$ --- [2] [1] x 2 $8x - 6y = 40$ [2] x 3 $9x + 6y = 19.5$ $17x = 59.5$ $x = 3.5$ Subst. $x = 3.5$ into [1] $4(3.5) - 3y = 20$ $y = -2$	M1 A1 A1	Award for any method
7(a)	$35°$	B1	
7(b)	$AB : QP$ $5 : 7.5$ $2 : 3$ $\therefore 3t = 2s$ $t = \frac{2}{3}s$ or	B1	Accept answer in any equivalent form.
8(a)	$7 - 2(3x - 5)^2$ $= 7 - 2(9x^2 - 30x + 25)$ $= 7 - 18x^2 + 60x - 50$ $= -18x^2 + 60x - 43$	M1 A1	Expansion for $(3x - 5)^2$
8(b)	$p = \frac{m + a}{m - b}$ $pm - pb = m + a$ $pm - m = a + pb$ $m(p - 1) = a + pb$ $m = \frac{a + pb}{p - 1}$	M1 A1	Factorisation
9(a)	Subst. $y = 0$ into $y = -3x + 12$ $0 = -3x + 12$ $3x = 12$ $x = 4$ Hence, coordinates of R is (4, 0). (Shown)	M1 A1	Subst. $y = 0$ into equation x coordinates is 4 and a concluding statement
9(b)	The y-intercept of $y = -3x + 12$ is 12. Hence, OS is 12 units. $\therefore \tan \angle SRO = \frac{OS}{OR}$	M1	Award any working for 12 units.

	$\tan \angle SRO = \frac{12}{4}$ $\angle SRO = 71.6°$ (1 dp)	A1	
9(c)	Gradient of $PR = \frac{1}{4}$ Hence, $\frac{PQ}{RQ} = \frac{1}{4}$ $\frac{4}{RQ} = \frac{1}{4}$ $\therefore RQ = 16$ $a = 4 + 16$ $= 20$	M1 A1	Award marks for any other method of getting RQ.
10(a)	$x = 72 - 22 = 50$ kg	B1	
10(b)	$y = 68$ kg	B1	
10(c)	$z = 72$ kg	B1	
10(d)	$p = 44 + 35 = 80$ kg	B1	
11(a)	$\frac{2}{8} = \frac{1}{4}$	B1	
11(b)	P (odd & even) + P (even & odd) $= \left(\frac{3}{8} \times \frac{5}{8}\right) + \left(\frac{5}{8} \times \frac{3}{8}\right)$ $= \frac{15}{32}$	M1 A1	
12(a)	Each exterior angle $= \frac{360°}{6}$ $= 60°$	B1	
12(b)	$\angle ABC = 180° - 2(15)$ $= 150°$ Each exterior angle $= 180° - 150°$ $= 30°$ Number of sides $= \frac{360°}{30°}$ $= 12$	M1 A1 A1	
13	$3x^2 + 4x = 15$ $3x^2 + 4x - 15 = 0$ $x = \frac{-4 \pm \sqrt{4^2 - 4(3)(-15)}}{2(3)}$ $x = 1.67$ or -3 (3 s.f)	M1 M1 A1	Award marks for substitution For both answers

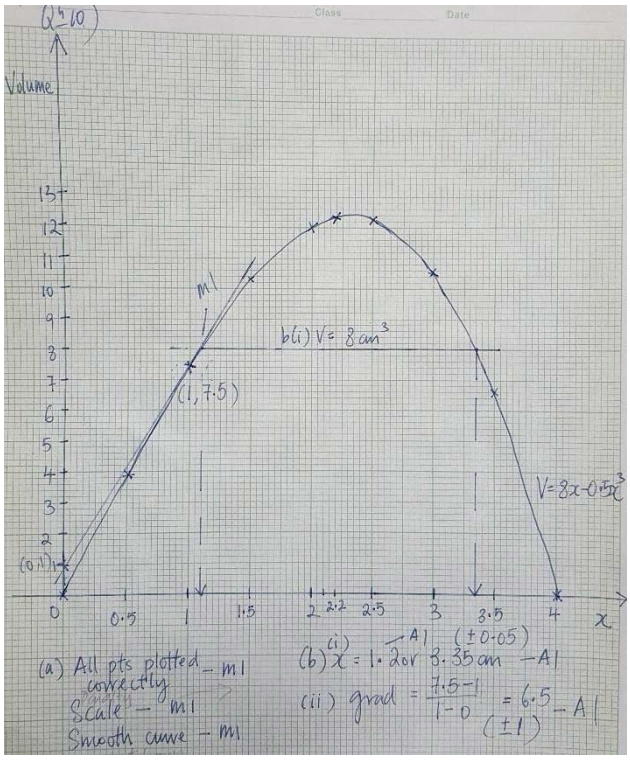
14(a)	$\angle BOC = 2\pi - 2\left(\frac{\pi}{3}\right)$ $= \frac{6\pi - 2\pi}{3} = \frac{4\pi}{3}$	B1	Award marks for any equivalent answer
14(b)	Arc length = $6.5\left(\frac{2\pi}{3}\right)$ = 13.6 cm	M1 A1	Accept any other method (formula for which angle is in degree)
14(c)	Area of sector = $\frac{1}{2}(6.5)^2\left(\frac{2\pi}{3}\right)$ = 44.24410 cm^2 Area of triangle BOC = $\frac{1}{2}(6.5)(6.5)\sin\left(\frac{2\pi}{3}\right)$ = 18.29479 cm^2 Area of shaded region = 44.24410 – 18.29470 = 25.9 cm^2 (3 sf)	M1 M1 A1	Accept any other method (formula for which angle is in degree)

Hougang Secondary School
Mathematics Department
Mark Scheme
Mathematics Syllabus Normal Academic

Subject : Mathematics
Examination : Preliminary Examination 1 2017
Level : Secondary Four Normal Academic
Paper : 2

Qn	Working	Marks	Remarks
1(a)	4 hr 45 mins	B1	
1(b)	Speed $= \frac{D}{T}$ $= \frac{380km}{4.75hr}$ = 80 km/h	M1 A1	
2(a)	2 mins = 2 litres 7.5 mins = $\frac{12}{2} \times 7.5$ = 45 litres Hence, saves $45 - 0.5 = 44.5$ litres (Assumes that the rate of amount of water wasted under running tap is constant throughout every minute)	M1 A1	Award marks for 44.5 litres with appropriate assumption.
2(b)	22500 cm^3 = 22.5 litres Hence, $\frac{22.5}{0.5} = 45$ mugs	M1 A1	Change 22500 cm^3 to litres
3(a)	$T_n = 3n + 1$ $T_1 = 3(1) + 1 = 4$ $T_2 = 3(2) + 1 = 7$ $T_3 = 3(3) + 1 = 10$	A1	Marks for all three answers.
3(b)	$243 = 3n + 1$ $n = 80\frac{2}{3}$ Since *n* is not an integer, 243 cannot be a term in the sequence.	M1 A1	Accept any other equivalent answer.
4(a)	$PQ = \sqrt{(4-3)^2 + (-1-2)^2}$ = 3.16 units	M1 A1	

4(b)	Gradient $= \frac{4-3}{-1-2} = -\frac{1}{3}$ Therefore, $y = -\frac{1}{3}x + c$ Substitute P (2, 3) into equation $3 = -\frac{1}{3}(2) + c$ $c = 3\frac{2}{3}$ Equation of the line is $y = -\frac{1}{3}x + 3\frac{2}{3}$	M1 A1	
5(a)	$7qy - 7y - 3pq + 3p$ $= 7y(q-1) - 3p(q-1)$ $= (q-1)(7y-3p)$	M1 A1	For factorisation
5(b)	$7^{2r+1} = 1$ $7^{2r+1} = 7^{\circ}$ $2r + 1 = 0$ $r = -\frac{1}{2}$	 M1 A1	Comparing index
5(c)	$\frac{1}{4m+12} - \frac{1+m}{m+3}$ $= \frac{1}{4(m+3)} - \frac{1+m}{m+3}$ $= \frac{1-4(1+m)}{4(m+3)}$ $= \frac{1-4-4m}{4(m+3)}$ $= \frac{-3-2m}{4(m+3)}$	 M1 A1	Award marks for common denominator $4(m + 3)$.
6(a)	LCM of 12, 18 & 20. $12 = 2^2 \times 3$ $18 = 2 \times 3^2$ $20 = 2^2 \times 5$ LCM = $2^2 \times 3^2 \times 5$ = 180 cm	 M1 A1	For factorisation
6(b)	$\frac{180}{18} = 10$	 B1	
7(a)	2 cm = 1.5 m 1 cm = 0.75 m 1 cm = 75 cm Hence, map scale is 1 : 75	 B1	
7(b)	5.6×0.75 = 4.2 m	M1 A1	

7(c)	1 cm = 0.75 m $1\ cm^2 = 0.75^2\ m^2$ $1\ cm^2 = 0.5625\ m^2$ Hence, $\frac{112.5}{0.5625} = 200\ cm^2$	 M1 A1	 Area scale
8(a)	$\frac{54000}{3600} = 15 m/s$	B1	
8(b)	0.25 kg : 4.5 kg : 750g 250 g : 4500 g : 750 g 1 : 18 : 3	 B1	
9(a)	Sample size is too small	B1	Award mark for any other appropriate answer.
9(b)	Mean = $\frac{1.65+1.74+1.68+1.7+1.78}{5}$ = 1.71 m	M1 A1	
9(c)	1.71 – 0.01 = 1.7 m Total height of 6 persons = $1.7 \times 6 = 10.2$ m Kelvin's height = 10.2 – 5(1.71) = 1.65 m	 M1 A1	
10(a)	 All points correctly plotted Correct scale Smooth curve	 B1 B1 B1	
10(b)(i)	$x = 1.2$ cm or 3.35 cm (± 0.05)	B2	
10(b)(ii)	Draw a suitable tangent	B1	

	Gradient = $\frac{7.5-1}{1-0} = 6.5$ (± 1)	B1	
11(a)(i)	$\angle PSY = \frac{360° - 82°}{2} = 139°$ $PY^2 = 12^2 + 5^2 - 2(12)(5)\cos 139°$ $PY = 16.1$ cm (3 sf)	M1 M1 A1	
11(a)(ii)	Area = $4 \times \frac{1}{2} \times 12 \times 5 \times \sin 139°$ $= 78.7$ cm^2 (3 sf)	M1 A1	
11(b)(i)	$\angle LCM = 290° - 180° - 36°$ $= 74°$	A1	
11(b)(ii)	$\frac{\sin \angle MLC}{3} = \frac{\sin 74°}{15}$ Hence, $\angle MLC = 11.1°$ (1 dp)	M1 A1	
12(a)(i)	Estimated mean = $\frac{4.75(15) + 4.85(16) + 4.95(29) + 5.05(38) + 5.15(2)}{100}$ = 4.946 kg SD = $\sqrt{\frac{2447.51}{100} - (4.946)^2}$ = 0.110 kg (3 sf)	B1 M1 A1	Award mark for $\sum fx^2 =$ 2447.51
12(a)(ii)	Brand BEST Because the mean weight of brand BEST is nearer to 5 kg as compared to Brand ACE. It also has more consistent weight in packs of rice as standard deviation is smaller than Brand ACE.	B1 B1 B1	Award marks for comparison of mean. Award marks for comparison of SD.
12(b)(i)	$\frac{2}{6} = \frac{1}{3}$	B1	
12(b)(ii)	P (6, "1, 3, 5") + P("1, 3, 5", 6) $= \left(\frac{1}{6} \times \frac{3}{6}\right) + \left(\frac{3}{6} \times \frac{1}{6}\right)$ $= \frac{1}{6}$	M1 A1	