15

Candidate Name_____( ) Class: Sec 4 /_____

S4

Anglican High School
Preliminary Examination 2016
Secondary Four
Mathematics Paper 1
[4048 / 01]

Date of Examination: **5 August 2016**

Duration : **2 hours**

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class 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, 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 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 of the marks for this paper is 80.

Table of Penalties		
Error	Penalty	Q No.
Significant figures	–1	
Units	–1	
Presentation/ Missing statements/ Not using ink	–1	

80

Parent's Signature : _____

This document consists of 20 printed pages.

Mathematical Formulae

Compound Interest

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Answer **all** the questions.

1 Calculate $\dfrac{-6.23^2 \div \sqrt[3]{-124.5}}{3.22(-5.003)^2}$.

(a) Write down the first six digits on your calculator display.

Answer (a) ..... [1]

(b) Write your answer to part (a) correct to 2 significant figures.

Answer (b) ..... [1]

2 Given that $\dfrac{\sqrt[4]{x^{-3}} \times x^{\frac{1}{2}}}{x^{-2}} = x^{\frac{2}{3}k}$, find the value of k.

Answer ..... [2]

3 A class of 30 students was randomly divided into two equal groups, A and B.
Each group was taught by 2 teachers with different years of experience.
Their marks in a common test are shown in the stem-and-leaf diagram.

Group A					Group B			
			8	2	7			
	6	0	0	3	2	8		
			2	4	5	6		
		5	1	5	5	9		
8	8	8	3	6	0	1	9	9
			0	7	2	7	8	
			9	8	0			
		9	6	9				

Key (Group A) 8 | 2 means 28

Key (Group B) 2 | 7 means 27

(a) Write down the mode of Group B's marks.

Answer (a) ..... [1]

(b) Write down the median of Group A's marks.

Answer (b) ..... [1]

(c) Explain briefly whether Group A or Group B performed better in the common test.

Answer (c) Group .....performed better because .....

.....

.....

.....

.....

.....

..... [1]

4 (a) The population density of Singapore is 7697 people per square kilometre. The population density in Hong Kong is 17019 people per square mile. State, showing your working, the country that is more densely populated, given that 1 mile = 1.61 kilometre.

Answer..... [2]

(b) Given that the land space in Singapore is 719 km^2, calculate the total population residing in Singapore, leaving your answer in standard form.

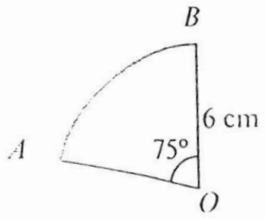
Answer..... [2]

For Examiner's Use

5 A car travelled at an average speed of 80 km/h on a recent journey to Malacca. Along the way, a 15-minute rest stop was taken before continuing on the trip. The ratio of the times of the whole journey is 5 : 3 : 7 . Calculate the distance travelled.

Answer.....km [2]

6 The diagram shows a sector AOB with radius 6 cm.
Angle AOB is $75°$.



(i) Express $75°$ in radians.

Answer (i) ..... [1]

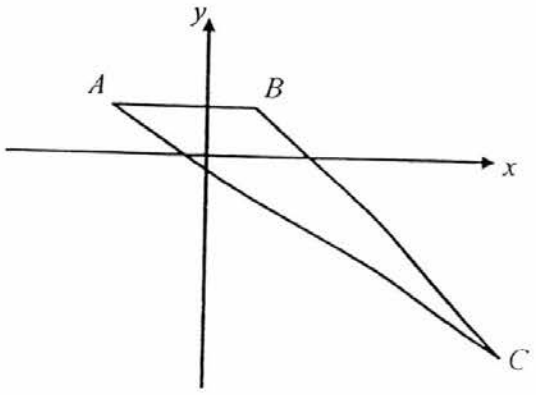
(ii) Hence, find the arc length AB.

Answer (ii) ..... cm [1]

For Examiner's Use

For Examiner's Use

7 The diagram shows a triangle ABC, with AB parallel to the x-axis.



A is $(-2, 2)$, C is $(7, -10)$ and the equation of the line BC is $y = -2x + 4$. Find

(i) the length of AC.

Answer (i) ..... units [1]

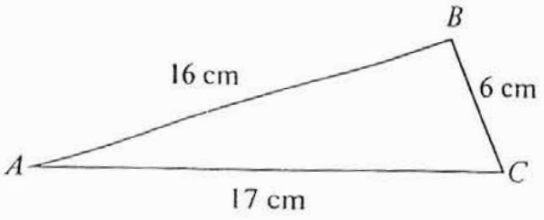
(ii) the x-coordinate of B.

Answer (ii) ..... [1]

(iii) the area of triangle ABC.

Answer (iii) ..... square units [1]

8 Determine whether triangle ABC is right-angled. [2]



Answer .....

.....

.....

.....

9 Peter and Mary competed in a written Mathematics quiz that required them to answer twenty questions.

The table shows the number of questions they have answered correctly, wrongly or did not attempt.

	Correct	Wrong	Did not attempt
Peter	10	5	5
Mary	12	7	1

The table shows the number of points they will be awarded if they answer correctly, wrongly or did not attempt.

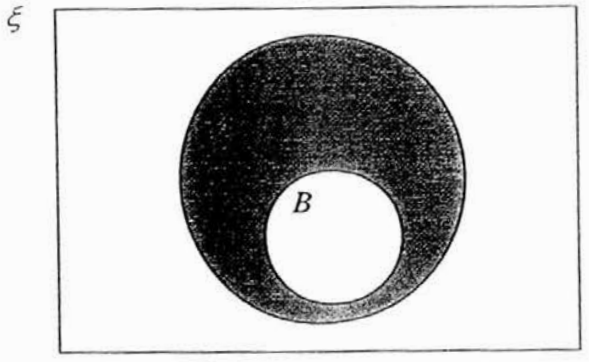
	Correct	Wrong	Did not attempt
Points Awarded	2	−1	0

Using matrix multiplication, find the number of points awarded to Peter and Mary respectively.

Answer

Peter is awarded .....points and Mary is awarded ..... points. [3]

10 **(a)** Express in set notation, the set shaded in the Venn diagram.



Answer (a) ..... [1]

(b) $A = \{\text{letters from the word 'THRONES'}\}$
$B = \{\text{letters from the word 'PHONES'}\}$

(i) State an element x such that $x \in A$ and $x \notin B$.

Answer (b)(i) ..... [1]

(ii) List the elements in the set $A \cup B$.

Answer (b)(ii) ..... [1]

11 Given that $\dfrac{\frac{1}{x}+\frac{1}{y}}{\frac{2}{x}} = \dfrac{4}{3}$, find the value of $\dfrac{y}{x}$, where $x \neq 0$.

Answer..... [3]

For Examiner's Use

For Examiner's Use

12 **(i)** If x is directly proportional to y^2, and y is inversely proportional to z. Prove that xy is inversely proportional to z^3.

Answer (i)

[2]

(ii) Given that when $xy = A$, a particular value of z is obtained. Find the percentage change in z when xy is doubled.

Answer (ii) ..... % [2]

For Examiner's Use

For Examiner's Use

13 Ian has written down six numbers 3, 4, 7, a, 3 and b where $b > a$.
If the mode of these numbers is 3, the mean is 6 and the median is 5,
find the value of a and of b.

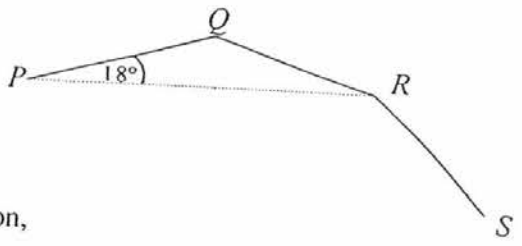
Answer a is ..... and b is ..... [2]

14 Factorise $2x^2 - 8xy + 8y^2 - 18$ completely.

Answer..... [3]

For Examiner's Use

15 PQ, QR and RS are adjacent sides of a regular polygon.
Given that $\angle RPQ = 18°$,



(a) calculate

(i) the exterior angle of the polygon,

Answer (a)(i) ..... [1]

(ii) the number of sides of the polygon,

Answer (a)(ii) ..... [1]

(iii) angle PRS.

Answer (a)(iii) ..... [1]

(b) Write down the name of this polygon.

Answer (b) ..... [1]

For Examiner's Use

For Examiner's Use

16 (a) Written as a product of its prime factors

$$2200 = 2^3 \times 5^2 \times 11 .$$

(i) Express 5880 as the product of its prime factors.

Answer..... [1]

(ii) Hence write down the greatest integer that will divide both 2200 and 5880 exactly.

Answer..... [1]

(iii) Write down an integer k, such that $\sqrt{\frac{2200}{k}}$ will give a whole number.

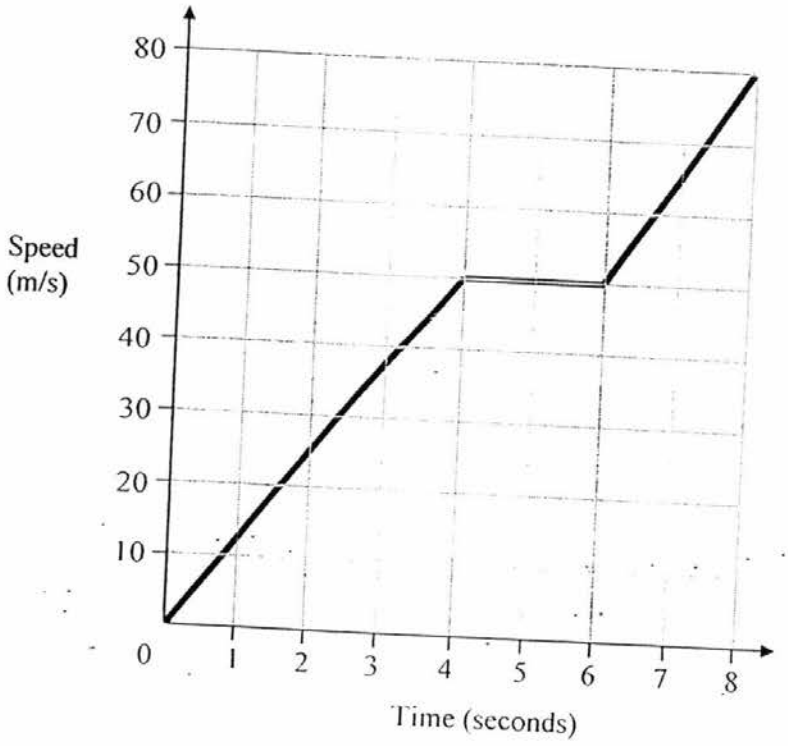
Answer..... [1]

(b) A glass marble has a mass of 30 grams. If the volume of the marble is 13 cm^3, correct to the nearest cubic centimetre. Find the greatest possible mass of 1 cubic centimetre of the marble.

Answer..... grams [2]

For Examiner's Use

17 The diagram shows the speed-time graph of a plane before taking off from the runway.



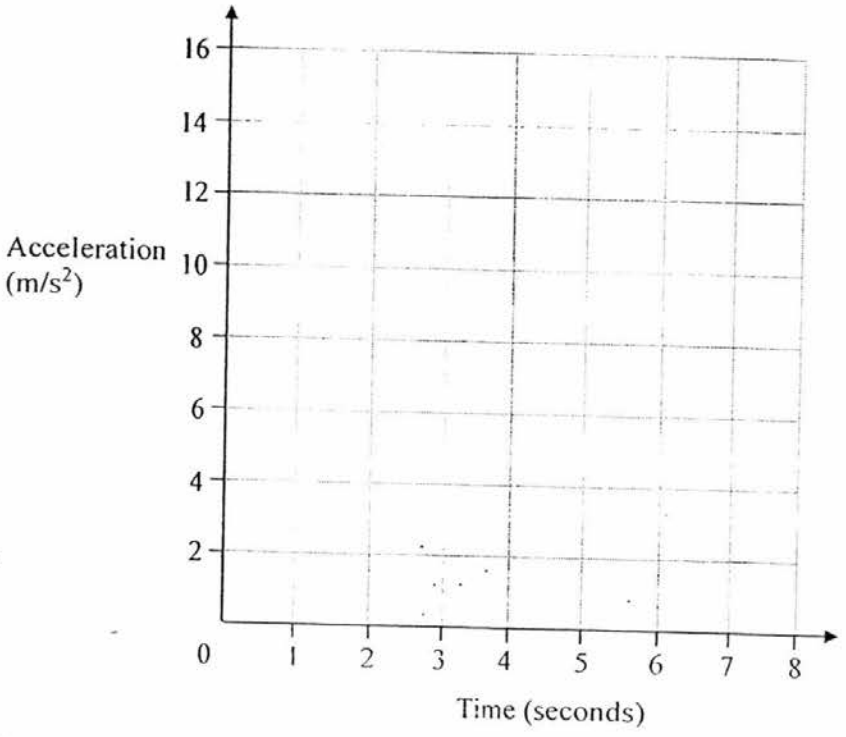
(i) Calculate the acceleration of the plane at 3 seconds.

Answer (i) ..... m/s^2 [1]

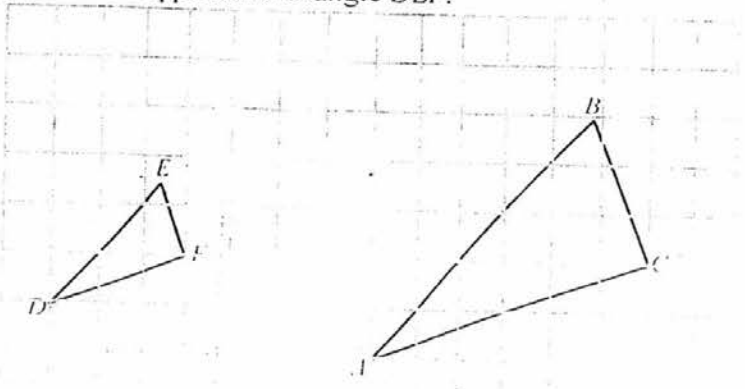
(ii) Calculate the total distance travelled by the plane before taking off from the runway.

Answer (ii) ..... m [2]

(iii) Use the grid below to sketch the acceleration-time graph of the plane during the first eight seconds. [2]



18 Triangle ABC is mapped onto triangle DEF.



(i) Write down the enlargement factor.

Answer (a)(i) ..... [1]

(ii) Given that the area of triangle ABC is 20 square units, calculate the area of triangle DEF.

Answer (a)(ii) ..... square units [1]

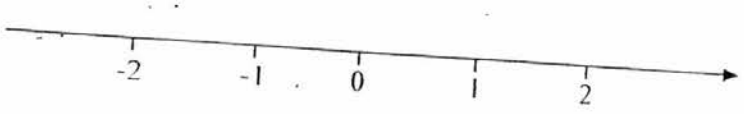
For Examiner's Use

19 (a) Solve the inequality

$$\frac{2-3x}{-3} \geq \frac{x-5}{4}.$$

Illustrate the above solution on the number line given below.

Answer



[3]

(b) State, with reasons, one condition for a, such that the following simultaneous equations have a solution.

$$ax - 2y = 13,$$
$$2x = y + 6.$$

Show your workings clearly.

Answer

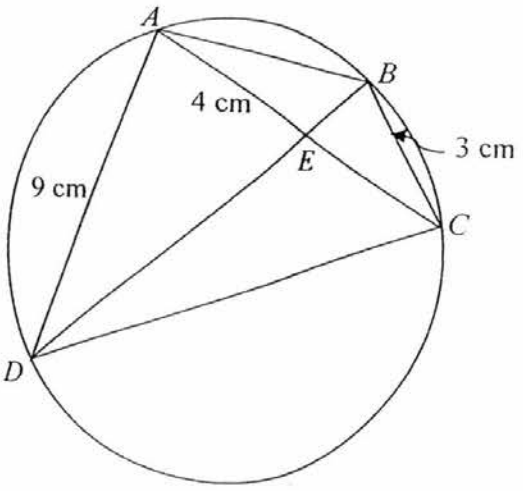
.....

.....

.....

.....[2]

20 In the diagram below, A, B, C and D are points on the circumference of the circle. AEC and DEB are straight lines.



It is also given that $AE = 4$ cm, $BC = 3$ cm and $AD = 9$ cm.

(i) Show that triangles AED and BEC are similar.

Answer (i)

In triangles AED and BEC .....

.....

.....

.....

..... [2]

(ii) Find the length of BE.

Answer (b)(ii) ..... cm [2]

21 D is the point $(-2, 1)$ and E is $(h, 6)$ and $\overrightarrow{AB} = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$.

(i) Express $\overrightarrow{DE}$ as a column vector, in terms of h.

Answer (i) ..... [1]

(ii) If $\overrightarrow{DE}$ is parallel to $\overrightarrow{AB}$, find the value of h.

Answer (ii) $h =$ ..... [2]

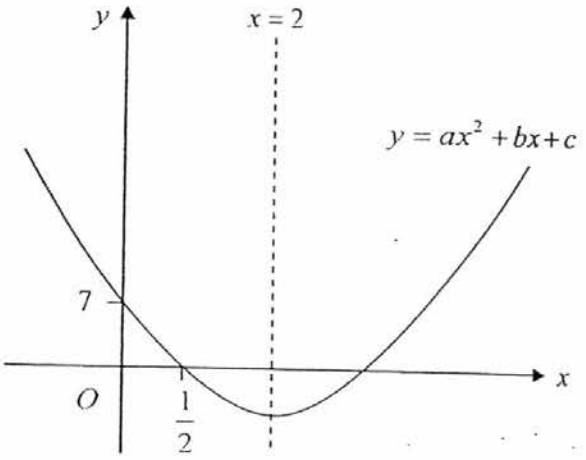
(iii) If instead, $|\overrightarrow{DE}| = |\overrightarrow{AB}|$, find the value(s) of h.

Answer (b)(iii) $h =$ ..... or ..... [3]

For Examiner's Use

For Examiner's Use

22 (a) A sketch of the graph $y = ax^2 + bx + c$, where a, b and c are integers, is given in the diagram below. The line of symmetry is $x = 2$, and the graph cuts the y-axis at 7, and the x-axis at $\frac{1}{2}$. Find the values of a, b and c.



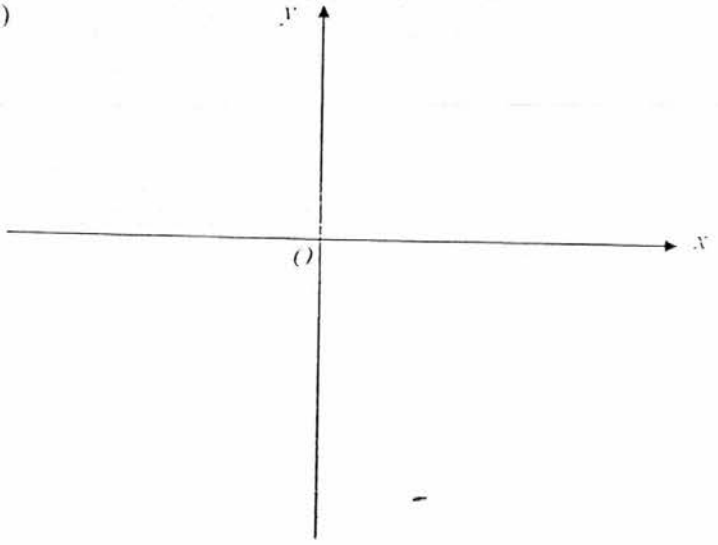
Answer $a =$ .....

$b =$ .....

$c =$ .....[3]

(b) Sketch the graph of $y = -x^2 + 3x - 5$, indicating clearly the coordinates of the turning point and intercepts.

Answer (b)



[3]

For Examiner's Use

23 $ABCD$ is a trapezium. AB has already been drawn.

Answer (a) and (b).

(a) C is the point equidistant from A and B and angle ABC is $50°$.
Construct and label the point C. [2]

(b) Construct the trapezium $ABCD$ with DC parallel to AB and the point D equidistant from the lines BC and BA. [2]

(c) Measure and write down the value of reflex angle BAD.

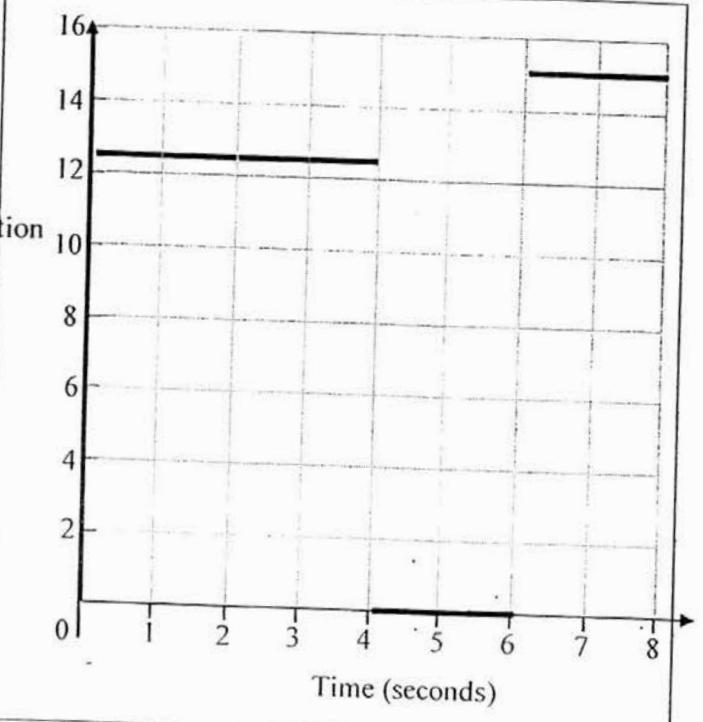
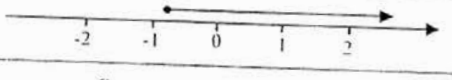
Answer (c) ..... [1]

END OF PAPER

Marking Scheme for AHS 2016 EM Paper 1

1(a)	0.09644
1(b)	0.096 (2s.f)
2	$\frac{7}{4}=\frac{2}{3}k$ $k=2\frac{5}{8}\ (o.e)$
3(a)	69
3(b)	63
3(c)	Group A ... higher mean or median
4 (a)	$\frac{17019}{1.61^2}=6565.718915\text{pop./km}^2$ Singapore is more densely populated.
4(b)	$total\ population=5.53\times10^6$
5	distance travelled $=80\times\frac{5}{4}$ $=100km$
6(i)	1.31 / $\frac{5\pi}{12}$ or o.e.
6(ii)	$6\times\frac{5\pi}{12}=7.85\text{cm}$
7(i)	15 units
7(ii)	$x=1$
7(iii)	$\frac{1}{2}\times3\times12=18$ sq units
8	According to Pythagoras' Theorem, triangle ABC is not right-angled. $16^2+6^2=292$ $17^2=289$ $AB^2+BC^2\neq AC^2$
9	$\begin{pmatrix}15\\17\end{pmatrix}$

	Peter is awarded 15 points and Mary is awarded 17 points.
10 (a)	$A \cap B'$
10(b)(i)	Any of the following answers. $x = T, R$
10(b)(ii)	$A \cup B = \{T, H, R, O, N, E, S, P\}$
11	$\frac{y}{x} = \frac{3}{5}$
12 (i)	$x = ky^2 \quad \& \quad y = \frac{l}{z}$ $xy = \left(ky^2\right)\left(\frac{l}{z}\right)$ $= k\left(\frac{l}{z}\right)^2\left(\frac{l}{z}\right)$ $= \frac{kl^3}{z^3}$, where kl^3 is a constant. $\therefore xy \propto \frac{1}{z^3}$ (shown)
12 (ii)	Percentage change of $z = -20.6\%$
13	$a = 6$ $b = 13$
14	$2(x - 2y - 3)(x - 2y + 3)$
15(a)(i)	36°
15(a)(ii)	10
15(a)(iii)	Angle $PRS = 126°$
15(b)	Decagon
16(a)(i)	$5880 = 2^3 \times 3 \times 5 \times 7^2$
16(a)(ii)	$HCF = 2^3 \times 5 = 40$
16(a)(iii)	Either $k = 2 \times 11 = 22$ (minimum) Or $k = 2200$ (maximum)
16(b)	greatest possible mass = $2.4 gram$
17(i)	12.5 m/s^2
17(ii)	330 m

17(iii)	
18(i)	$\frac{1}{2}$
18(ii)	5 sq units
19(a)	$x \geq -\frac{7}{9}$ 
19(b)	Gradient of equation 1 $= \frac{a}{2}$ Gradient of equation 2: Gradient = 2 $\frac{a}{2} \neq 2$ $a \neq 4$ For solution. the two equations must not be parallel to each other.
20(ii)	$BE = 1\frac{1}{3}$ cm o.e.
21(i)	$h = 2$ 5
21(ii)	$h = 33$
21(iii)	$h = -7$ or $h = 3$
22(a)	$a = 4$. $b = -16$. $c = 7$

Name _____ ( ) Class 4 _____

ANGLICAN HIGH SCHOOL
Preliminary Examination
Secondary Four
MATHEMATICS 4048/02

S4

Friday **22 July 2016** **2 hours 30 minutes**

Additional Materials: 7 writing papers and 1 graph paper

READ THESE INSTRUCTIONS FIRST

Write your name 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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
Write your answers on the writing papers provided.
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 answer in terms of π.

At the end of the examination, attach the entire set of question papers on top of your answer scripts.
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**.

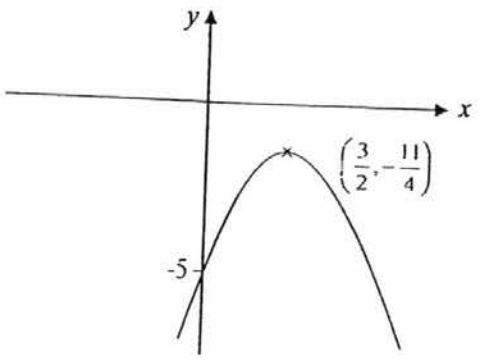
For Examiner's Use

Question	1	2	3	4	5	6	7	8	9	10
Marks										

	Table of Penalties		Qn. No.
Parent's Name/Signature/Date	*Presentation*	−1	
	Units	−1	
	Significant Figures	−1	

100

This question paper consists of 9 printed pages.

22(b)	
23(c)	245° ± 3°

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone $= \pi rl$

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Answer **all** the questions.

1 **(a)** Simplify $2x^3y^2 \div \frac{6x^2}{5y}$. [2]

(b) Express as a single fraction in its simplest form $\frac{3}{x-1} + \frac{6x}{1-x^2}$. [2]

(c) **(i)** Factorize $4ab - 10c + 6a^2b - 15ac$ completely. [2]

(ii) Given that $\frac{3x-7y}{4x+y} = \frac{2}{5}$, find the value of $\frac{x}{8y}$. [2]

---

2 **(a)** In the diagram, $ABCDE$ is a regular pentagon and $ABQRST$ is a regular hexagon. Calculate

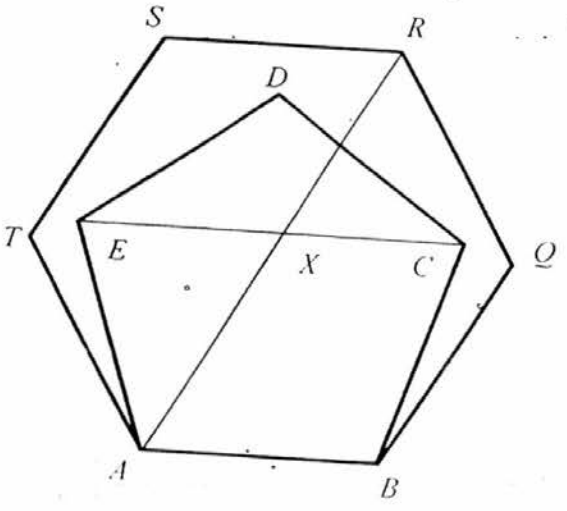
(i) $\angle BAE$, [1]

(ii) $\angle BAX$, [1]

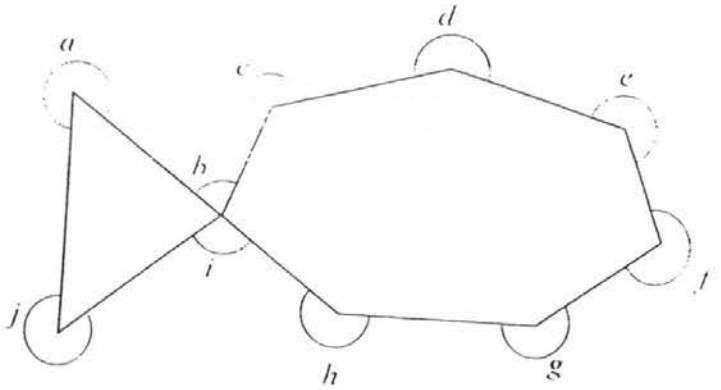
(iii) $\angle EAX$, [1]

(iv) $\angle EXR$, [1]

(v) $\angle XAC$. [2]



(b) Calculate the sum of the angles a, b, c, d, e, f, g, h, i and j in the diagram below. [3]



---

3 In this question, leave all your answers to 2 decimal places.
The table below shows the exchange rate in April 2016. To convert from the foreign currency to Singapore Dollars, we use the rate listed in the "Buy" column. To convert from Singapore Dollars to the foreign currency, we use the rate listed in the "Sell" column.

Currency	Amount	Buy (S$)	Sell (S$)
US Dollars	US$1	1.363	1.38
Australian Dollars	AU$1	1.050	1.10
Japanese Yen	¥1000	12.434	12.55
Hong Kong Dollars	HK$100	17.576	18.25
Malaysian Ringgit	RM100	35.080	36.00

(a) John wants to tour Hong Kong and wants to bring HK$2000. Calculate the amount of Singapore dollars he must pay to buy the foreign currency. [2]

(b) By using the rate listed in the "Buy" column, calculate the exchange rate between US$1 and the Malaysian Ringgit. [2]

(c) Mr Lim was originally going on a business trip to Japan and converted S$2000 to Japanese Yen. However, the trip was cancelled. He decided to convert the Japanese Yen he had back to Singapore dollars. Show that the amount he lost as a percentage of his original sum is less than 1%. [4]

(d) Sharon went to Australia and bought a luxury watch at AU$ 10 079. Calculate the amount of money (in Singapore dollars) she would need to exchange before the trip, if she paid in cash. [2]

---

4 **(a)** Consider the pattern.

$11 - 2 = 3^2$

$1111 - 22 = 33^2$

$111111 - 222 = 333^2$

$\vdots$

$x - y = 333\,333\,333^2$

(i) Write down the 4^{th} line in the pattern. [2]

(ii) Find the number of 1s in x. [1]

(iii) Find the value of y. [1]

(b) The first four numbers of a sequence are 1, 4, 7, and 10.

(i) Write down the 10^{th} term. [1]

(ii) Find, in terms of n, a formula for the general term, T_n, of the sequence. [1]

(iii) Show, with working, whether or not 45 is in this sequence. [3]

---

5 **(a)** Express $y = x^2 - 7x + 12$ in the form of $y = (x-a)^2 - b$. [2]

(i) Write down the equation of the line of symmetry and the minimum value of y. [2]

(ii) Find the solutions of $y - \frac{15}{4} = 0$. [3]

(b) Solve $\frac{15x}{x-9} - 3 = 0$. [3]

---

6 The diagram (not drawn to scale) shows a badge designed by a student for his CCA. It is made up of a regular octagon and a circle with centre X.
The line segments AC, CE, EG, GI, IK, KM, MO, OA are tangents to the circle at B, D, F, H, J, L, N, P respectively.

(a) Find, giving reasons for each answer,

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

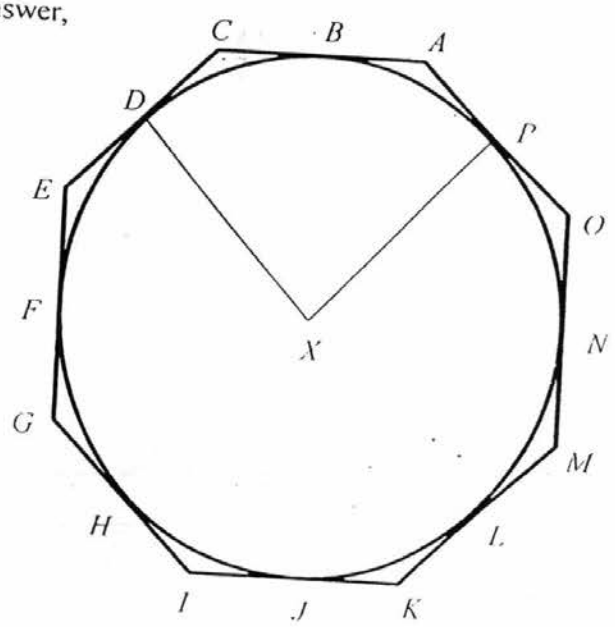
(ii) $\angle PXE$, [1]

(iii) $\angle PND$, [1]

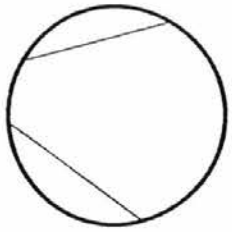
(iv) $\angle DNL$, [1]

(v) $\angle PNL$, [1]

(vi) $\angle PFL$. [1]

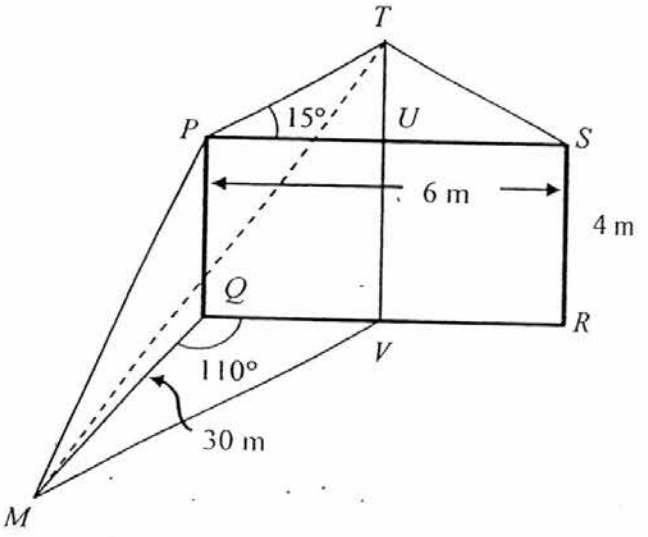


(b) Another student drew a circle on paper by tracing the circumference of a cup.
Explain how he can obtain the centre of the circle after he drew 2 more chords on the circle. [2]



---

7 The diagram shows the front view of the N.R.G. greenhouse which is vertical to the ground. PT and ST make up the roof which make angles of 15° with the horizontal.



Given that $SR = 4$ m, $QR = 6$ m and M is a point due south of Q on the ground such that $MQ = 30$ m and angle $MQR = 110°$. U and V are the mid points of PS and QR respectively.

(a) Find

(i) the distance between T and V. [2]

(ii) the angle of elevation of T from M. [4]

(iii) the bearing of V from M. [2]

(b) A student walks from M to V. Find the distance that he has to walk so that he is closest to Q. [2]

8 **Answer the whole of this question on a sheet of graph paper.**

The variables x and y are connected by the equation

$$y = 24x^2 - 6x^3.$$

The table below shows some values of x and the corresponding values of y.

x	0	0.5	1	1.5	2	2.5	3	3.5	4
y	0	p	18	33.75	48	q	54	36.75	0

(a) Calculate the value of p and of q. [2]

(b) Using a scale of 2 cm to 0.5 units, draw a horizontal x-axis for $0 \le x \le 4$.
Using a scale of 2 cm to 10 units, draw a vertical y-axis for $0 \le y \le 60$.
On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) By drawing a tangent, find the gradient of the curve at $x = 2$. [2]

(d) By drawing a suitable straight line on your graph, solve $24x - 6x^2 - \frac{50}{x} = -55$. [3]

(e) Using the graph, solve $y \ge 40$. [2]

9 (a) The waiting time, in seconds, for 20 students queueing up to buy food in the canteen from 2 different stalls are recorded as follows.

Stall *A*

Time (s)	$30 < t \leq 35$	$35 < t \leq 40$	$40 < t \leq 45$	$45 < t \leq 50$
Number of students	6	11	1	2

Stall *B*

Mean	36 s
Standard Deviation	5 s

(i) For Stall A, calculate an estimate of
(a) the mean waiting time, [1]
(b) the standard deviation. [1]

(ii) Make two comparisons between the waiting times for the two stalls. [2]

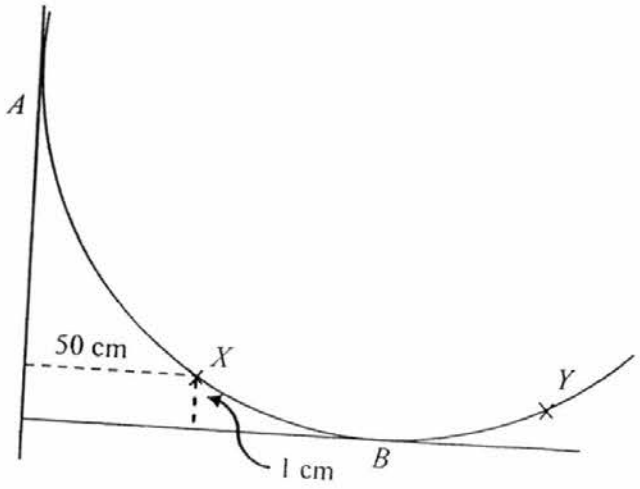
(iii) Stall C has a standard deviation of 0s for its waiting time. suggest a reason for this. [1]

(b) A bag contains three identical red balls numbered 1 to 3 and two identical blue balls numbered 1 and 2.
Two balls are taken from the bag at random without replacement.
(i) Draw a possibility diagram to show all the possible outcomes. [2]

Using the possibility diagram or otherwise, find the probability that
(ii) the two balls bear the same number. [1]
(iii) the two balls are of different colours. [1]

A third ball is next chosen from the bag without replacement after the first two.
(iv) What is the probability that all are blue? [1]
(v) What is the probability that only two red balls are chosen? [2]

10



The diagram shows part of a circular table that is pushed into a corner of a room. A boy measures a point, X, on the circumference of the table to be 1 cm from the south wall and 50 cm from the west wall. Points A and B are the points where the table meets the walls.

(a) By the use of the Pythagoras' Theorem, verify that the radius of the table is 61 cm.

(b) Find the length of arc XB. [3]

(c) Calculate the length of the chord XB. [3]

(d) These tables are used by a restaurant as dining tables in a dining area of 100 m^2. [1]

Useful information		
	Casual dining	Fine dining
Minimum area of table space per diner	1 700 cm^2	2 700 cm^2
Number of tables	12	9
Recommended amount of dining space (in square metres) per diner	1.4 m^2/ diner	1.8 m^2/ diner

Determine if the restaurant should be a casual dining or fine dining establishment. Justify your decision with calculations.

[5]

End of Paper.

2016 AHS Prelim Math P2 Worked Solution

1(a)	$\frac{5xy^3}{3}$
(b)	$-\frac{3}{x+1}$
(c)(i)	$(3a+2)(2ab-5c)$
(ii)	$\frac{x}{8y}=\frac{37}{56}$
2 (a)(i)	108°
(ii)	60°
(iii)	48°
(iv)	120°
2a(v)	24°
(b)	2160°
3(a)	S$365.00
(b)	US$1 ≈ RM3.89
(c)	Percentage loss = 0.924305% < 1% (shown)
(d)	She needed to exchange S$11 086.90 before the trip.
4(i)	$11111111-2222=3333^2$
(ii)	18
(iii)	$y = 222\,222\,222$
(b)(i)	10^{th} term = 28
(ii)	$3n-2$
4b(iii)	$3n-2=45$ $3n=47$ $n=\frac{47}{3}$ or $15\frac{2}{3}$ Since n has to be a positive integer. 45 is not in the sequence.
5(a)	$(x-\frac{7}{2})^2-\frac{1}{4}$
(i)	$x=\frac{7}{2}$ Minimum value of $y=-\frac{1}{4}$
(ii)	$x=5\frac{1}{2}$ or $1\frac{1}{2}$
(b)	

	$-\frac{9}{4}$ or $-2\frac{1}{4}$
6(a)(i)	45°
(ii)	112.5°
(iii)	45°
(iv)	90°
(v)	135°
(vi)	45°
(b)	Draw perpendicular bisectors for the 2 chords The perpendiculars will intersect at the centre, since the perpendicular bisectors of a chord will pass through the centre
7(a)(i)	4.80 m (3 sf)
(ii)	$\angle TMV° = 8.767°... \approx 8.8°$ (1 dp)
(iii)	Bearing is 005.2°
(b)	29.9 m
8(a)	$p = 5.25$, $q = 56.25$
(b)	
(c)	Gradient = 24
(d)	From the graph, $x \approx 0.7$
(e)	From the graph, $1.7 \leq x \leq 3.4$
9(a)(i)(a)	Mean = 37.25 s
(b)	s.d. = 4.32 s
(ii)	On average Stall *A* has a longer waiting time, due to a higher mean. The spread of the waiting time for Stall *A* is smaller as it has a smaller s.d.
(iii)	All the students who bought from Stall *C* had the same waiting time
9(b)(i)	

	1ST DRAW					
2ND DRAW		R1	R2	R3	B1	B2
	R1		R2R1	R3R1	B1R1	B2R1
	R2	R1R2		R3R2	B1R2	B2R2
	R3	R1R3	R2R3		B1R3	B2R3
	B1	R1B1	R2B1	R3B1		B2B1
	B2	R1B2	R2B2	R3B2	B1B2	

(ii)	$\frac{1}{5}$
(iii)	$\frac{3}{5}$
(iv)	0
(v)	$\frac{3}{5}$
10(a)	Let the radius be R $R^2 = (R-50)^2 + (R-1)^2$ $R^2 - 102R + 2501 = 0$ Solve to get $R = 61$ only
(b)	11.1 cm
(c)	11.0 cm (3 sf)
10(d)	Number of diners the table can take for casual dining $= \pi \times 61 \times 61 \div 1700$ ≈ 6 Number of diners the table can take for fine dining $= \pi \times 61 \times 61 \div 2700$ ≈ 4 Number of diners the restaurant can host for casual dining $= 12 \times 6$ $= 72$ Number of diners the restaurant can host for fine dining $= 9 \times 4$ $= 36$ Recommended number of diners for casual dining $= 100 \div 1.4$ ≈ 71 Recommended number of diners for fine dining $100 \div 1.8$ ≈ 55 Since the number of diners the restaurant can host for casual dining is closer to the recommended number, it would appear that the restaurant is a casual dining establishment.

ALL PAPERS ARE STAPLED

2016 $25

SEC 4 EXP E-MATH (PART 2)

1. CRESCENT GIRLS' 502
2. ANG MO KIO
3. NAN CHIAU HIGH
4. PAYA LEBAR MGS GIRLS'
5. MONTFORT
6. BALESTIER HILL
7. BEDOK VIEW
8. ST JOSEPH'S INSTITUTION
9. ST. MARGARET'S SEC
10. WOODGROVE
11. CHONG BOON SEC
12. GAN ENG SENG
13. HOLY INNOCENT'S HIGH
14. KRANJI SEC
15. CHIJ KATONG CONVENT