3

Index Number	Class	Marks: Paper 1	/ 40

Anglo-Chinese School (Barker Road)

MID-YEAR EXAMINATION 2016

SECONDARY TWO

EXPRESS

MATHEMATICS 4048

2 HOURS 15 MINS

Additional Materials:
Writing papers (4 sheets)

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.
Write your class and candidate number on the cover sheet.
Hand up Paper 1 and Paper 2 separately.
Write in dark blue or black pen.
You may use a soft 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 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 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 marks for Paper One and Two is 90.

3 s.f.		Simplify fraction	
1 d.p.		Truncation error	

This paper consists of 13 printed pages inclusive of this page. [Turn over

MATHEMATICS FORMULAE

Compound Interest

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

PAPER ONE [40 marks]

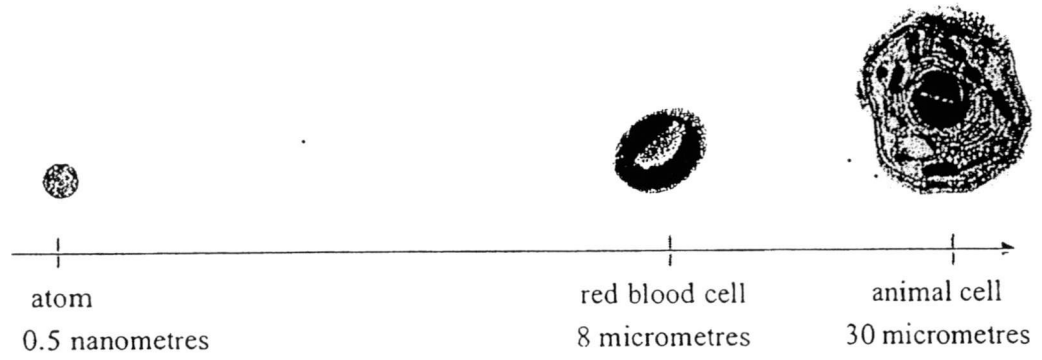
Candidates answer on the Question paper.
Answer **all** questions.

For Examiner's Use

1 Miss Tan bought 84g of red clay, 108g of blue clay and 120g of yellow clay. She divided the clay into small balls of equal mass for her Art lessons. Find the least number of clay balls he obtained for each colour.

Answer: red =..... , blue = ... , yellow =..... [2]

2 The diagram below shows the size of an animal cell, a red blood cell and an atom.



(a) Express the size of a animal cell in metres.
Give your answer in standard form.

Answer (a) _____ m [1]

(b) How many times is an red blood cell as big as an atom?

Answer (b) _____ [1]

For Examiner's Use

3 x is an integer, $x > \frac{9}{2}$ and $x \leq 6$.

(a) Represent the inequality on the number line provided below.

Answer (a) _____

[1]

(b) Write down the possible value(s) of x.

Answer (b) $x =$ _____ [1]

For Examiner Use

4 The cash price of a laptop is \$2500. Malcolm wants to buy the laptop on hire purchase. Below are the information on the hire purchase scheme:

20% deposit
&
36 equal payments of \$60

How much does Malcolm need to pay by the hire purchase scheme?

Answer \$ _____ [2]

For Examiner's Use

5 A map is drawn to a scale of 1 : 20 000.

(a) A road is 5.2 km long. Find the length in centimetres, of the road on the map.

Answer (a) _____ cm [1]

(b) The area of a forest reserve represented on the map is 36 cm^2. Find the area in square kilometres, of the forest reserve.

Answer (b) _____ km^2 [2]

6 **(a)** Simplify the expression $\left(\frac{x^2}{a}\right)^{-3}$.

Answer (a) _____ [1]

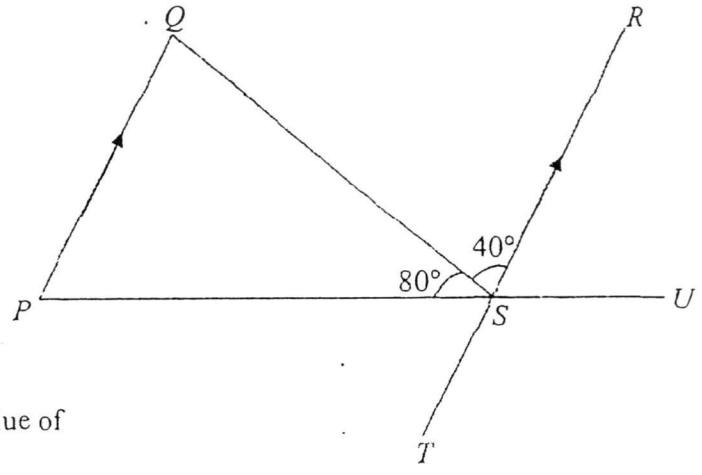
(b) Given that $64 = 2^x \div 2^{3x}$, evaluate x.

Answer (b) _____ [2]

For Examiner's Use

For Examiner Use

7 In the diagram, which is not drawn to scale, RST and PSU are straight lines. PQ is parallel to RT, $Q\hat{S}R = 40°$ and $P\hat{S}Q = 80°$.



Find the value of

(a) $\angle QPS$,

Answer (a) $\angle QPS =$ ..... ° [1]

(b) $\angle TSU$,

Answer (b) $\angle TSU =$ ..... ° [1]

(c) reflex $\angle PQS$.

Answer (c) reflex $\angle PQS =$ ..... ° [1]

For Examiner's Use

8 The length, L cm, and breadth, B cm, of a rectangle are inversely proportional.

(a) Given that $L = 40$ when $B = 0.5$, find L in terms of B.

Answer (a) $L =$ ..... [1]

(b) **(i)** Calculate the value of L when $B = 10$.

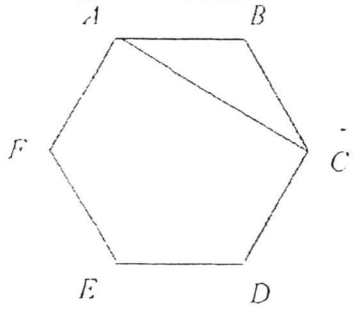
Answer (b)(i) $L =$ ..... cm [1]

(ii) Using the answer for L found in part (b)(i), explain whether the answer is acceptable.

Answer (b)(ii) .....

..... [1]

9 $ABCDEF$ is a regular 6-sided polygon.



(a) Write down the name of a 6– sided polygon.

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

(b) Find

(i) $\angle ABC$,

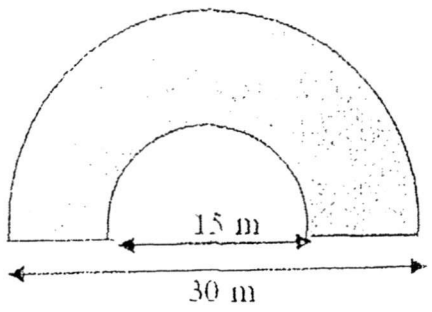
Answer (b) (i) $\angle ABC =$ ..... ° [1]

(ii) $\angle ACD$,

Answer (b) (ii) $\angle ACD =$ ..... ° [1]

For Examiner's Use

10 The shaded region represents a garden bounded by 2 semicircles.



Calculate the total area of the garden in terms of π.

Answer ..... π m² [3]

11 (a) Karen decided to open a new bank account. She deposited $8000 in the account which pays a compound interest at the rate of 5% per annum. Calculate the total amount of money she has in her account after 4 years.

Answer (a) $ ..... [2]

(b) In a shop, a bicycle is priced at $450. This price includes Government Tax of 10%. How much is the tax?

Answer (b) $ ..... [2]

12 The diagram shows some patterns made from dots.

For Use

Diagram 1 **Diagram 2** **Diagram 3**

(a) Complete the table

Diagram number	1	2	3	4
Number of dots	6	10		

[2]

(b) Which diagram would have 26 dots?

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

(c) Write down an expression, in terms of n, for the number of dots in Diagram n.

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

(d) How many dots would there be in Diagram 500?

Answer (d) ..... [1]

13 An ice-cream factory produces three different types of ice-cream: durian, chocolate and strawberry, for distribution to its outlets at various locations. The table below shows the quantity delivered to each location on Monday and Tuesday.

Location / Type	Monday			Tuesday		
	Durian	Chocolate	Strawberry	Durian	Chocolate	Strawberry
City Hall	30	45	35	28	40	30
Bishan	35	50	20	30	40	20

(a) Evaluate $\begin{pmatrix} 30 & 45 & 35 \\ 35 & 50 & 20 \end{pmatrix}\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$, and state the order of the product matrix.

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

Order = ... [1]

(b) Explain what your answer to (a) represent.

Answer (b) .....

..... [1]

(c) Evaluate $\frac{1}{2}\left[\begin{pmatrix} 30 & 45 & 35 \\ 35 & 50 & 20 \end{pmatrix}+\begin{pmatrix} 28 & 40 & 30 \\ 30 & 40 & 20 \end{pmatrix}\right]$ explain what the numbers given in your answer to part (c) represent.

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

Answer (c) .....

..... [1]

END OF PAPER 1

PAPER 2 [50 marks]

Write your answers and working on the writing papers provided.

At the end of the examination, fasten all your work in Paper 2 securely together.

Attach the cover page on top of your answer script.

Answer **all** questions.

(a) A cyclist took $3\frac{1}{3}$ hours to cover 46 km. For the first 30 km, he cycled at 15km/h. Find his speed for the remaining part of his journey. [2]

(b) p is inversely proportional to q^3. It is known that $p = 24$ for a particular value of q. Find this value of p when q is doubled. [1]

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2 (a) Expand and simplify $(y - 5)(y + 5)$. [1]

(b) Factorise $x^2 - 3x - 10$. [1]

(c) Factorise completely $m^2n - 4n - 4p + m^2p$. [3]

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3 A survey was conducted on a class of 35 students on the sports that they play.

25 students play soccer. 15 students play basketball. x students play both soccer and basketball. 2 students play neither soccer nor basketball.

(a) Illustrate the above information on a Venn diagram. [2]

(b) Find the value of x. [1]

(c) How many students play soccer but not basketball? [1]

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4 Simplify

(a) $\dfrac{15p^3q^3}{12p^2q}$. [1]

(b) $\dfrac{a}{2b} \div \dfrac{5ab}{4b}$, [2]

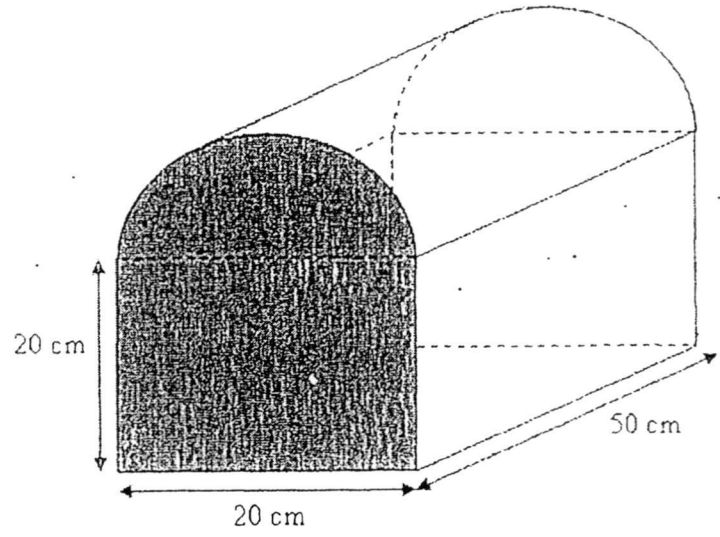
(c) $\dfrac{5}{x-4} + \dfrac{3}{x+3}$ [2]

5 It is given that $v = \sqrt{2as + u^2}$.

(a) Find the positive value of v when $s = 13.2$, $u = 5$ and $a = 30$, correct to 2 decimal places. [2]

(b) make a the subject of the formula. [3]

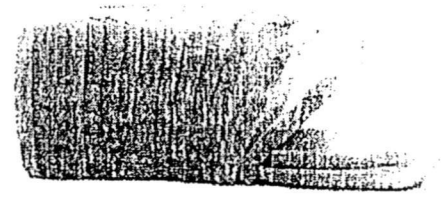
6 The diagram shows a loaf of bread with a cross-section made of a semicircle joined to a square along its diameter. The side of the square is 20 cm. The length of the prism is 50 cm.



(a) the area of the cross-section, [2]

(b) the volume of the prism, [1]

(c) the total surface area of the prism. [3]



(d) the number of full slices of bread that the bread machine can cut if the thickness of each slice of bread is 15 mm. [1]

7 John is x years old this year. His father is now 2 times as old as his son. Six years ago, the product of their ages was 476.

(a) Use the above information, copy and complete the table on a piece of paper. [3]

	John's age	Father's age
Now	x	
6 years ago		

(b) Form an equation in x and show that it reduces to $x^2 - 9x - 220 = 0$. [2]

(c) Solve the equation $x^2 - 9x - 220 = 0$. [3]

(d) Find the age of John's father six years ago. [1]

8 In 2007, a swimming lesson at ACS Swimming Pool lasted 40 minutes. The ratio of the times spent in getting ready, swimming and getting dressed was 1 : 5 : 2.

(a) (i) Find the time taken to get ready. [1]

(ii) Find the percentage of the lesson time that was spent in swimming. [1]

(b) The total lesson time in 2008 will be 45 minutes. Find the percentage increase in lesson time. [2]

(c) The total lesson time in 2007 is 25% more than the total lesson time in 2006. Find the total lesson time in 2006. [2]

(d) At present, Shawn takes 100 seconds to swim 50 metres.

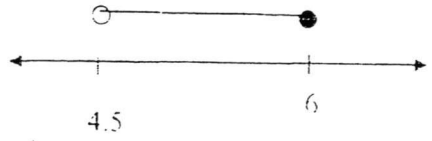
(i) Find Shawn's swimming speed in kilometres per hour. [3]

(ii) In a year from now, Shawn will have increased his swimming speed by 20%. Calculate the time in seconds he will take to swim 50 metres in a year from now. [3]

END OF PAPER 2

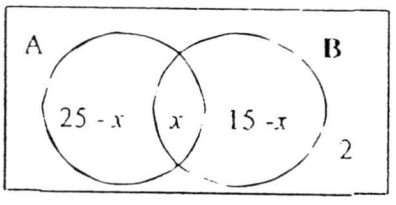
2016 MYE Answers

Paper 1

1	HCF = 12 Red = 7, blue = 9, yellow 10
2(a)	3×10^{-5}
2(b)	16 000
3(a)	
3(b)	5,6
4	$2660
5(a)	26
5(b)	$1cm^2 : 0.04km^2$ $1.44km^2$
6(a)	$\frac{a^3}{x^6}$
6(b)	$x = -3$
7(a)	60°
7(b)	120°
7(c)	210°
8(a)	$L = \frac{20}{B}$
8(b)(i)	2
8(b)(ii)	Not acceptable, length should be more than breadth in a rectangle
9(a)	hexagon
9(b)	120

9(c)	90
10	84.375
11(a)	9724.05
11(b)	$40.91
12(a)	14, 18
12(b)	6
12(c)	4n + 2
12(d)	2002

Paper 2

1a)	$12km/hr$
1b)	3
2a)	$y^2 - 25$
2b)	$(x-5)(x+2)$
2c)	$(p+1)(m+2)(m-2)$
3a)	
3b)	$x = 7$
3c)	18
4a)	$\frac{3pq^2}{4}$
4b)	$\frac{2}{5b}$

4c)	$\frac{8x+3}{(x-3)(x-4)}$
5a)	28.58(2d.p)
5b)	$a=\frac{v^2-u^2}{2s}$
6a)	557 cm^2
6b)	27900 cm^3
6c)	5690cm^2
6d)	33 slices
7(a)	x | $2x$ $x-6$ | $2x-6$
7(c)	$x = 20$ or $x = -11$
7(d)	34 years old
8(a)i)	- 5 mins
8(a)ii)	62.5%
8(b)	12.5%
8(c)	32 mins
8(d)i)	$1.8 km/h$
8(d)ii)	$83\frac{1}{3} km/h$