聖嬰中學
HOLY INNOCENTS' HIGH SCHOOL

MID-YEAR EXAMINATION 2014
SECONDARY 1 EXPRESS

MATHEMATICS **4016/01**

Paper 1

Name : _____ **Date** : **16 May 2014**

Register No : _____ **Duration : 1 h 30 min**

Class : _____ **Marks** : /60

Additional Materials needed: NIL

Students answer on the Question Paper.

Instructions to Candidates

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 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 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 marks for this paper is 60.

Setter: Mr Jarrod Tan

This paper consists of 11 printed pages, inclusive of this cover page.

For Examiner's Use

For Examiner's Use

Answer **all** the questions.

1 (a) 25% of a number is 30. Find the number.

(b) Mina bought 250 bulbs. 8% of the bulbs are spoilt after less than 10 hours of use. Find the number of bulbs that lasted for at least 10 hours.

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

(b) .....bulbs [1]

2 Evaluate $\dfrac{20\pi - 26.8}{\sqrt{22.57 \div 0.03}}$.

Answer ..... [2]

3 Express

(a) 0.0376 correct to the nearest hundredth,

(b) -127.792 correct to the nearest integer.

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

(b) ..... [1]

For Examiner's Use

For Examiner's Use

4 "343 is a prime number".
State whether this statement is true or false. Give reasons for your answer.

Answer: .....

..... [2]

5 Arrange the following numbers in ascending order.

$$-(1.346)^2, \quad -1.8\dot{1}, \quad -1.\dot{8}\dot{1}, \quad -\sqrt{\frac{43}{13}}, \quad -\frac{181}{1000}$$

Answer ..... [2]

6 Mrs Lim has 2 daughters, Helen and Melissa.
The highest common factor and lowest common multiple of their ages are 3 and 168 respectively. If Helen is 3 years older than her sister, find Helen's age.

Answer ..... years old [2]

7 The freezing point of a liquid is $-7^{\circ}\mathrm{C}$.
The temperature difference between its freezing point and boiling point is $25^{\circ}\mathrm{C}$.

(a) Find the boiling point of the liquid.

(b) An addition of a small quantity of salt into the liquid decreased its freezing point by $0.8^{\circ}\mathrm{C}$ and increased its boiling point by $0.7^{\circ}\mathrm{C}$.

Find the temperature difference between the freezing point and the boiling point of this liquid-salt mixture.

Answer (a) ..... °C [1]

(b) ..... °C [2]

8 Given the list of numbers

$$\sqrt[3]{6},\ 0,\ \sqrt{121},\ \pi,\ 2.\dot{1},\ \frac{151}{-3},\ 1,\ -\sqrt{25},$$

write down

(a) the integer(s),

(b) the irrational number(s),

(c) the prime number(s).

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

(b) ..... [1]

(c) ..... [1]

For Examiner's Use

9 Ferries to Port A and Port B depart from the same ferry terminal.
Ferry to Port B departs every 26 minutes while the ferry to Port A departs every 18 minutes.
If both ferries depart at 1324 hrs, state the next time that both ferries will depart from the same ferry terminal again.

Answer ..... [3]

10 (a) Express 7056 as a product of its prime factors.

(b) **Hence** find the positive square root of 7056, leaving your answer in index notation.

Answer *(a)* 7056 = ... [2]

(b) ..... [1]

11 (a) Solve $\frac{m}{2}+3m \geq \frac{2}{5}$.

(b) Hence write down the smallest integer value of m that satisfies $\frac{m}{2}+3m \geq \frac{2}{5}$.

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

(b) ..... [1]

For Examiner's Use

12 Solve

(a) $\frac{x+1}{3}=15$,

(b) $5y+12=18-3(y-2)$.

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

(b) $y=$ .....[2]

13 Given that $2 \le x < 6$ and $-5 \le y \le -2$, and x and y are integers, find

(a) the least possible value of $y-x$,

(b) the least possible value of $\frac{x}{y}$,

(c) the greatest possible value of x^2y^2.

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

(b) ..... [1]

(c)..... [1]

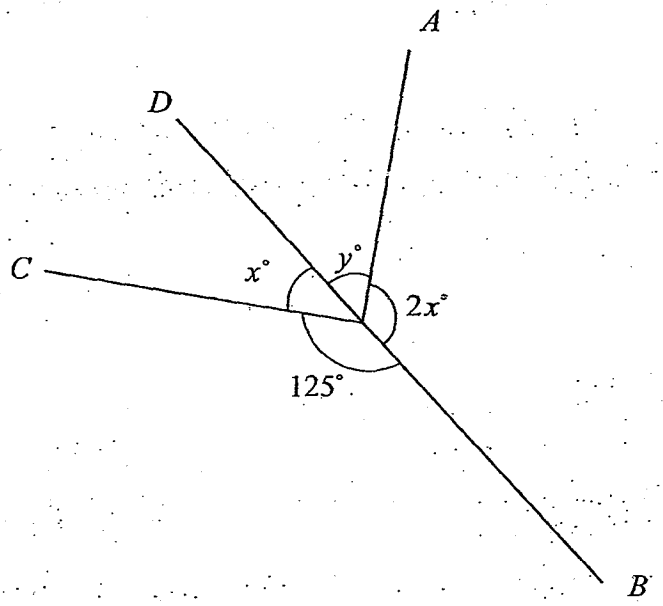
For Examiner's Use

14 (a) In the diagram, BD is a straight line.

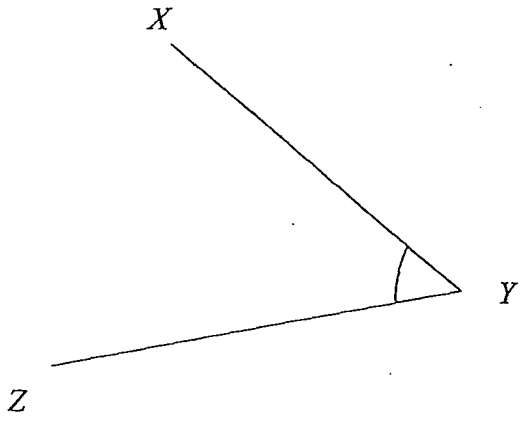
Find the value of

(i) x,

(ii) y.



(b) Using a protractor, measure $\angle XYZ$.



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

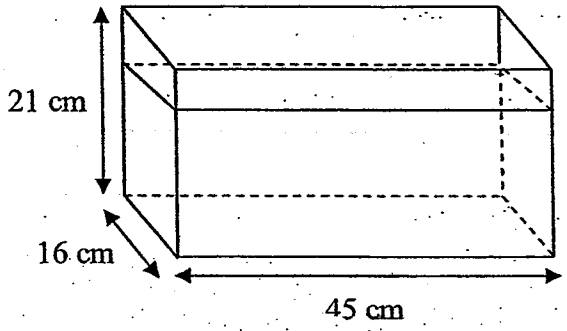
(ii) y = ... [2]

(b) $\angle XYZ$ = ...° [1]

For Examiner's Use

For Examiner's Use

15 The figure shows an open fish tank measuring 45 cm by 16 cm by 21 cm.
The tank is $\frac{6}{7}$ filled with water.



(a) Find
(i) the height of water in the tank,

(ii) the volume of the water in the tank.

(b) An additional amount of water is then poured into the tank.

(i) Calculate the volume of water that is required to fill the tank completely.

(ii) Water in the tank is now poured into glasses with a capacity of 600 ml each. Calculate the number of glasses that can be completely filled with water.

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

(ii) ..... cm^3 [1]

(b)(i) ..... cm^3 [1]

(ii) ..... glasses [2]

For Examiner's Use

16 (a) Given a polynomial $5x-12+3x^2$, state

(i) the coefficient of x^2,

(ii) the constant term .

(b) What polynomial must be added to $-p+8q-11$ to give $p+6q-3$?

(c) Express the following statements algebraically, leaving your answer in its simplest form.

(i) Add the square of a to the quotient of $51a^3$ divided by $3a$,

(ii) Subtract the square of w from the cube root of y.

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

(ii) ..... [1]

(b) ..... [2]

(c) (i) ..... [1]

(ii) ..... [1]

For Examiner's Use

17 (a) Simplify $4ab^2 - a(-3a)^2$.

(b) Given that $\frac{6x+4y}{-2y+4x} = \frac{4}{3}$, find the value of $\frac{y}{x}$.

(c) It is given that $h^2 = 3m - ef$.
Find the value of m when $e = -7$, $f = 3$ and $h = -3$.

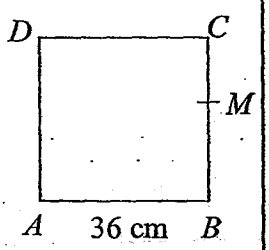
Answer (a) ..... [1]

(b) $\frac{y}{x}$ = ... [3]

(c) m = ... [2]

For Examiner's Use

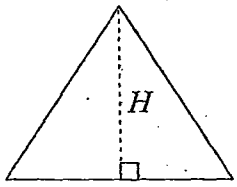
18 (a)(i) $ABCD$ is a square.
$AB = 36$ cm.
A point M is on the side BC where $BM : MC = 5 : 4$.
Find the length of BM.



(ii) Given that AM is 14% longer than AB, find the length of AM.
Give your answer correct to the nearest whole number.

(b)(i) Triangle A has a base length of 14 cm and a perpendicular height of H cm.
Express the area of Triangle A in terms of H.

(ii) Triangle B has a base length three times that of Triangle A and its perpendicular height twice that of Triangle A.
Find the ratio of the area of the Triangle B to Triangle A.



Triangle A

Answer(a)(i)..... cm [2]

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

(b)(i) ..... cm^2 [1]

(ii) ..... : ..... [2]

- End of paper -

One-page answers to 2014 Sec 1 Express Maths MYE P1

Qn	Answers	Qn	Answers
1a	120	14ai	$x = 55°$
b	230 bulbs	14b	$\angle XYZ = 51°$
2	1.31 (3 s.f.)	15ai	18 cm
3a	0.04 (nearest hundredth)	aii	Vol. of water in tank $= 12960\ \text{cm}^3$
b	-128 (nearest integer)	15bi	Vol. of water required to fill the tank $= 2160\ \text{cm}^3$
4	No. 343 can be divided by more than 2 factors (e.g. 7 and 49)	bii	No. of cups ≈ 25
5	$-\sqrt{\frac{43}{13}}, -1.\dot{8}\dot{1}, -(1.346)^2, -1.8\dot{1}, -\frac{181}{1000}$	16ai	Coefficient of x^2 is 3
6	24 years old	aii	Constant term is -12
7a	18° C	b	$2p - 2q + 8$
b	26.5° C	ci	$18a^2$ (after simplification)
8a	$0, 1, \sqrt{121}, -\sqrt{25}$	cii	$\sqrt[3]{y} - w^2$
b	$\sqrt[3]{6}, \pi$	17a	$4ab^2 - 9a^3$
c	$\sqrt{121}$	b	$\frac{y}{x} = -\frac{1}{10}$
9	Required time will be at 17 18hrs or 5.18pm	c	$m = -4$
10a	$7056 = 2^4 \times 3^2 \times 7^2$	18ai	$BM = 20$ cm
b	$2^2 \times 3 \times 7$	aii	$AM \approx 41$ cm.
11a	$m \geq \frac{4}{35}$	18bi	$7H\ \text{cm}^2$
11b	Smallest integer value is 1	bii	6 : 1
12a	$x = 44$		
b	$y = 1\frac{1}{2}$		
13a	-10		
b	-1		
c	625		

Marking Scheme for 2014 Sec 1 Express Maths MYE P1

Qn	Answers	Marks	Remarks
1a	$30 \div 25\% = 120$	B1	
b	$92\% \times 250 = 230$	B1	
2	$1.313655 \approx 1.31$ (3.s.f)	B2	Must approx. to 3 s.f.
3a	$0.0376 \approx 0.04$ (nearest hundredth)	B1	
b	-128 (nearest integer)	B1	
4	No. 343 can be divided by more than 2 factors (e.g. 7 and 49)	B2	No marks awarded for any answer without reasons
5	$-\sqrt{\frac{43}{13}}, -1.8\dot{1}, -(1.346)^2, -1.8\dot{1}, -\frac{181}{1000}$	B2	1 mark for 3 consecutive answers
6	HCF $= 3$ LCM (168) $= 2^3 \times 7 \times 3$ Their ages are $2^3 \times 3$ and 7×3 i.e. 24 and 21 $\therefore$ Helen's age is 24.	M1 A1	Marks awarded for LCM of 168 Marks awarded for obtaining their ages using HCF and LCM
7a	$18^\circ C$	B1	
b	$18.7^\circ C - (-7.8^\circ C) = 26.5^\circ C$	B2	1 mark for correct new boiling **and** freezing points.
8a	$0, 1, \sqrt{121}, -\sqrt{25}$	B1	
b	$\sqrt[3]{6}, \pi$	B1	
c	$\sqrt{121}$	B1	
9	$26 = 2 \times 13$ $18 = 2 \times 3^2$ LCM $= 2 \times 3^2 \times 13$ $= 234$ mins 234 mins equilvalent to 3h 54 min Required time will be at 17 18hrs or 5.18pm	M1 M1 A1	
10a	$7056 = 2^4 \times 3^2 \times 7^2$	B2	Marks awarded for factor tree method
b	$7056 = (2^2 \times 3 \times 7)^2$ $\therefore \sqrt{7056} = \sqrt{(2^2 \times 3 \times 7)^2}$ $= 2^2 \times 3 \times 7$	B1	Must show working for mark to be awarded

11a	$\frac{m}{2}+3m \geq \frac{2}{5}$ $(\frac{m}{2}\times 10)+(3m\times 10) \geq \frac{2}{5}\times 10$ $5m+30m \geq 4$ $m \geq \frac{4}{35}$	M1 A1	 Also accept $m \geq 0.114$ (3 s.f.)
11b	Smallest integer value is 1	B1	(Note: $\frac{4}{35}=0.1142857.....$)
12a	$\frac{x+1}{3}=15$ $x+1=45$ $x=44$	 B1	
b	$5y+12=18-3(y-2)$ $5y+12=18-3y+6$ $8y=24-12$ $y=\frac{12}{8}$ $y=1\frac{1}{2}$ or $y=1.5$	M1 A1	1 mark awarded for correct expansion
13a	x : 2 ,3 4, 5 y : $-5,-4,-3,-2$ Least value $y-x=-5-5$ $=-10$	 B1	
b	Least value $\frac{x}{y}=\frac{5}{-2}$ $=-2.5$	 B1	
c	Greatest value $x^2y^2=5^2(-5)^2$ $=625$	 B1	
14ai	$x+125°=180°$ (adj. $\angle$ on a st. line) $x=55°$	 B1	
aii	$y+2(55)=180°$ $y=70°$	M1 A1	
b	$\angle XYZ = 50° (\pm 1°)$	B1	
15ai	Height of water $=\frac{6}{7}\times 21$ $=18$ cm	B1	

aii	Vol. of water in tank $= 45\times16\times18$ $= 12960\ \text{cm}^3$	B1	
15bi	Vol. of water required to fill the tank $= 45\times16\times3$ $= 2160\ \text{cm}^3$	B1	
bii	No. of cups $= (12960+2160)\div600$ $= 25.2$ ≈ 25	M1 A1	
16ai	Coefficient of x^2 is 3	B1	
aii	Constant term is -12	B1	
b	$(p+6q-3)-(-p+8q-11)$ $= 2p-2q+8$	M1 A1	Award 1 mark for *correct order* of subtraction of polynomials
ci	$\frac{51a^3}{3a}+a^2=18a^2$	B1	
cii	$\sqrt[3]{y}-w^2$	B1	
17a	$4ab^2-a(3a)^2$ $= 4ab^2-9a^3$	B1	
b	$\frac{6x+4y}{-2y+4x}=\frac{4}{3}$ $18x+12y=-8y+16x$ $20y=-2x$ $\frac{y}{x}=-\frac{2}{10}$ $\therefore\frac{y}{x}=-\frac{1}{10}$	M2 A1	1 mark for correct expansion for each expression
c	$h^2=3m-ef$ $(-3)^2=3m-(-7)(3)$ $9=3m+21$ $3m=-12$ $m=-4$	M1 A1	
18ai	9 units rep 36 cm 1 unit rep 4 cm 5 units rep 20 cm $\therefore BM = 20$ cm	M1 A1	
aii	$AM = 114\%\times36$ $= 41.04$ ≈ 41 cm.(nearest whole no.)	B1	

18bi	Area of triangle $= \frac{1}{2} \times 14 \times H$ $= 7H \text{ cm}^2$	B1	
bii	New area $= \frac{1}{2} \times (14 \times 3) \times (H \times 2)$ $= 42H \text{ cm}^2$ Ratio of new area : Original area $42H : 7H$ $6 : 1$	M1 A1	Award mark for area of triangle B
	Total marks	60	