聖嬰中學
HOLY INNOCENTS' HIGH SCHOOL

MID-YEAR EXAMINATION 2014
SECONDARY 1 EXPRESS

MATHEMATICS **4016/02**

Paper 2

Name : _____ **Date** : **14 May 2014**

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

Class : _____

Additional Materials: 4 sheets of Writing Paper

INSTRUCTIONS TO STUDENTS

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.
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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: Ms Nicole Goh

This paper consists of 8 printed pages, inclusive of this cover page.

Answer all the questions

1 Adam, Benjamin and Charlie worked at the same supermarket.

Each of them was paid \$4 per hour.

Adam worked for x number of hours.

Benjamin worked for 3 hours more than Adam.

Charlie worked twice as long as Benjamin.

(a) Write down an expression, in terms of x, for

(i) the number of hours for which Benjamin worked, [1]

(ii) the number of hours for which Charlie worked. [1]

(b) Write down and simplify the expression, in terms of x, for the total number of hours Adam, Benjamin and Charlie spent on work. [2]

(c) Given that a total of \$169 was paid to Adam, Benjamin and Charlie, form an equation in x, and solve the equation to find the number of hours that Benjamin had worked. [2]

2 (a) Mr Tan's weekly salary \$$A$, is made up of a basic salary of \$50 and \$3.50 for every delivery he makes.

(i) In a particular week, he made a total of 75 deliveries.

Calculate the salary he earned in that week. [1]

(ii) At the end of another week, he received \$372.

How many deliveries did he make? [2]

(iii) If he makes n deliveries in a week, write down the formula for A in terms of n. [1]

(b) Mr Lim is given a basic salary of \$600 for the first 100 deliveries and \$1.50 for every subsequent delivery he makes.

Calculate who will earn more if each of them makes a total of 250 deliveries. [2]

3 (a) Factorise completely $2ab^2 - 8ab$. [1]

(b) Expand and simplify $8b(a-2) - 4a(3-b)$. [2]

(c) Express $\frac{2x}{9} + \frac{2(x-1)}{3}$ as a single fraction. [3]

4 A man cycled from town A to town B at an average speed of 18 km/h for 90 minutes. He then travelled 6 km from town B to town C in 45 minutes.

Find

(a) the time he would reach town C if he left town A at 10 15, [1]

(b) the distance he travelled from town A to town B, [2]

(c) his average speed in his whole journey from town A to town C.
Give your answer in m/s, correct to three significant figures. [3]

5 (a) In 2012, Mr Lim spent $\frac{1}{6}$ of his monthly income on rent, $\frac{1}{4}$ on food, and $\frac{1}{5}$ of the remainder on clothes. His monthly income is \$5400.

(i) In any particular month, calculate the amount of money he spent on clothes, [2]

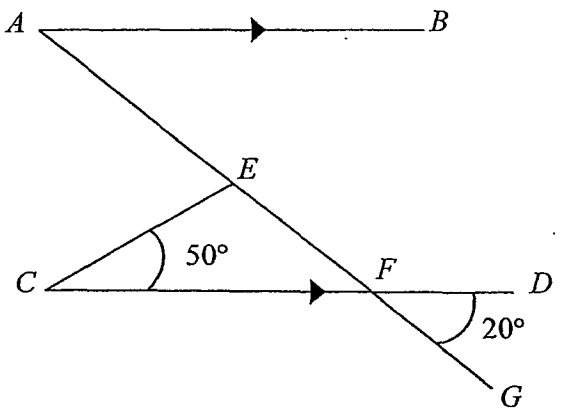
(ii) calculate how much more money he spent on food than on rent. [2]

(b) In 2013, Mr Lim's total expenditure on rent, food and clothes increased by 6%. If the rent remained the same, and the amount spent on food increased by 10%, express the increase in the amount spent on clothes as a percentage of the total expenditure in 2012. [3]

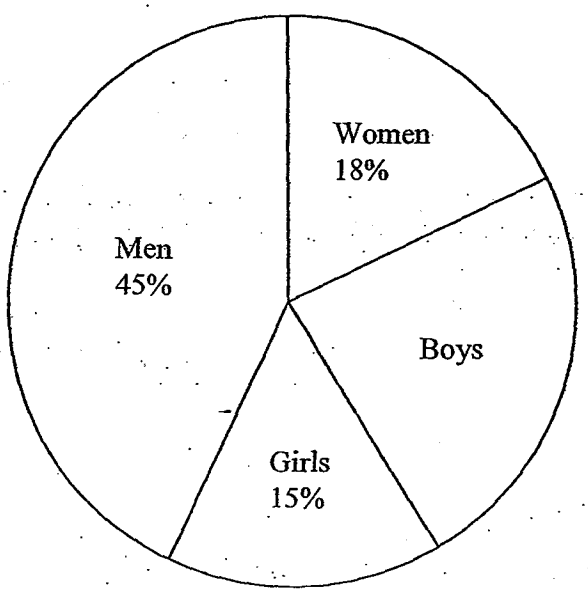
6 (a) In the figure below, $AEFG$ and CFD are straight lines and AB //CD.
$\angle ECF = 50°$ and $\angle DFG = 20°$.
Find

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

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



(b) The pie chart shows the distribution of participants in a marathon.



(i) Find the ratio of the number of boys to the number of women taking part in the marathon. [1]

(ii) There are 621 more men than boys.
Find the total number of men and boys participating in the marathon. [2]

(iii) Calculate the angle of the sector representing the number of girls participating in the marathon. [1]

7 Consider the number patterns in the table below.

Line 1:	$3^2 - 2^2 = 5$
Line 2:	$4^2 - 3^2 = 7$
Line 3:	$5^2 - 4^2 = 9$
Line 4:	
⋮	
Line 7:	
⋮	
Line n:	$p^2 - q^2 = r$

(a) Write down the pattern for Line 4 and Line 7. [2]

(b) Write down an expression, in terms of n, for

(i) p, [1]

(ii) q, [1]

(iii) r. [1]

(c) Find the integer values of p and q when $r = 83$. [2]

8 (a) (i) When an ez-link card is scanned at the MRT gantry, the display shows the stored value in the ez-link card.

Justin used his ez-link card to travel on the MRT train from Orchard to Yishun Station.

At the Orchard station, the display showed \$1.45.

After he alighted at Yishun Station, the display showed −\$0.85.

How much did the ride cost? [2]

(ii) At Yishun Station, Justin topped up his ez-link card with \$30.

What is the stored value of his card now? [1]

(b) Tom and Jerry took part in a game whereby coloured balls are drawn from a bag. There are 5 blue balls, numbered 1 to 5, and 5 red balls, numbered 1 to 5, in the bag.

Drawing a blue ball leads to the deduction of points and drawing a red ball leads to gain of points. For example, if a blue ball with the number 5 on it is drawn, 5 points will be deducted and if a red ball with the number 4 is drawn, 4 points will be gained.

Tom and Jerry each took turns to draw a ball from the bag for 4 rounds and the balls are replaced in the bag after each draw.

The player with the most number of points wins the game.

(i) Calculate the maximum and the minimum number of points a player can obtain. [2]

The table below represents the balls that were drawn by Tom and Jerry in the 4 rounds.

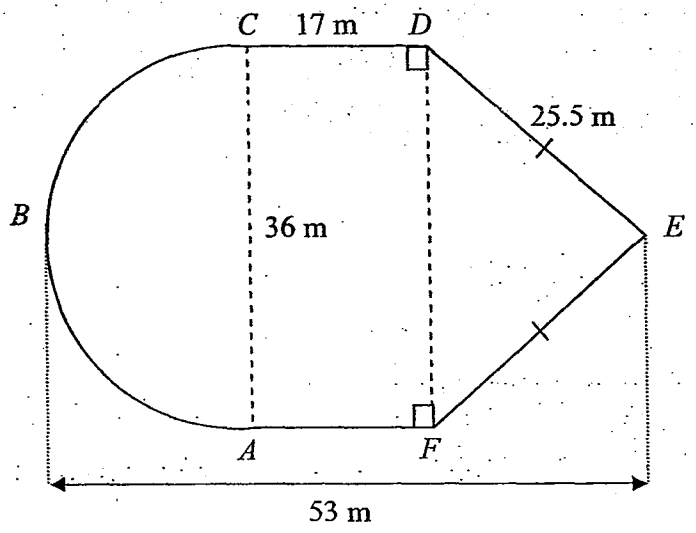
Round	**1**	**2**	**3**	**4**
Tom	Red, 3	Blue, 4	Red, 1	Red, 3
Jerry	Red, 4	Blue, 1	Red, 5	Blue, 2

(ii) Find the points obtained by Tom and Jerry respectively.

Who won the game? [2]

9 The figure below shows the floor plan of a function room in a hotel.
The function room is made up of a semi-circle ABC with diameter AC, a rectangle $ACDF$ and an isosceles triangle DEF.

$CA = 36$ m, $CD = 17$ m, $DE = EF = 25.5$ m and $BE = 53$ m.



[Take $\pi = 3.142$]

(a) Calculate

(i) the perimeter of the function room, [2]

(ii) the area of the function room. [3]

(b) (i) The entire floor of the function room is to be carpeted.
Calculate the cost of carpeting the entire function room if the price of the carpet is \$7.65 per square metre. [1]

(ii) A goods and services tax (GST) of 7% is imposed on the total cost of carpeting the entire function room.
Find the total cost of carpeting the entire function room inclusive of GST. [2]

END OF PAPER

Sec 1 Express Mid-Year Exam 2014 Paper 2 Answer

1(a)(i) $x+3$ (ii) $2(x+3)=2x+6$ (b) $4x+9$ (c) 11.3 hours	7(a) Line 4: $6^2-5^2=11$ Line 7: $9^2-8^2=17$ (b)(i) $p=n+2$ (ii) $q=n+1$ (iii) $r=n+2+n+1=2n+3$ (b) $p=40+2=42$ $q=40+1=41$
2(a)(i) \$312.50 (a)(ii) 92 deliveries (iii) $A=50+3.50n$ (b) Mr Tan earns more	8(a) (i) \$2.30 (ii) \$29.15 (b)(i) Max = 20; Min = -20 (ii) Jerry won the game
3(a) $2ab(b-4)$ (b) $12ab-16b-12a$ (c) $\frac{8x-6}{9}$	9(a) 141.556m (b) $1445.004m^2$ (c) \$11054 (d) \$11828.08
4(a) 12 30 (b) 27 km (c) $14\frac{2}{3}$ km/h $=4\frac{2}{27}$ m/s or 4.07m/s	
5(a)(i) \$630 (ii) \$450 (b) 1.3125%	
6(a) $\angle EFC=20°, \angle AEC=70°$ 6(b)(i) Boys : Women = 11 : 9 (ii) 1809 (iii) 54°	

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1(a) (i) $x + 3$.....B1

(ii) $2(x + 3) = 2x + 6$.....B1 (can accept $2(x + 3)$)

(b) $x + x + 3 + 2(x+3)$.....M1

$= x + x + 3 + 2x + 6$

$= 4x + 9$.....A1

(c) $4(4x + 9) = 169$.....M1

$16x + 36 = 169$

$16x = 133$

$x = 8.3125$

8.3125 + 3 = 11.3125 hours Benjamin worked 11.3 hours.....A1

2(a)(i) \$50 + \$3.50(75)

= \$312.50.....B1

(a)(ii) \$372 – \$50 = \$322.....M1

\$322 ÷ \$3.50 = 92

He made 92 deliveries.....A1

(iii) $A = 50 + 3.50n$.....*B1*

(b)\$600 + \$1.50(250 – 100)
=\$825
Mr Lim earns \$825
} M1

\$50 + \$3.50(250)

=\$925

Mr Tan earns \$925.

Mr Tan earns more.....A1

3(a) $2ab(b-4)$ B1

(b) $8b(a-2)-4a(3-b)$

$=8ab-16b-12a+4ab$ M1

$=12ab-16b-12a$ A1

(c) $\frac{2x}{9}+\frac{2(x-1)}{3}$

$=\frac{2x}{9}+\frac{2x-2}{3}$ .....M1(for expansion)

$=\frac{2x}{9}+\frac{6x-6}{9}$ .....M1(for common denominator)

$=\frac{8x-6}{9}$ A1

4(a) $90+45=135\,\text{min}=2h\,15\,\text{min}$

10 15 + 2h 15min = 12 30.....B1

(b) $18\times\frac{90}{60}$ M1

$=27\,\text{km}$.....A1

(c) $(27+6)\div\frac{45+90}{60}$ M1

$=33\div\frac{135}{60}$

$=14\frac{2}{3}\,\text{km/h}$.....A1

$=4\frac{2}{27}\,\text{m/s}$.....A1(can accept 4.07m/s)

5(a)(i) $1-\frac{1}{6}-\frac{1}{4}=\frac{7}{12}$ .....M1(find remainder)

$\frac{1}{5}\times\frac{7}{12}=\frac{7}{60}$

$\frac{7}{60}\times\$5400=\$630$

He spent \$630 on clothes.....A1

(ii) Amount spent on rent $=\frac{1}{6}\times\$5400=\$900$

Amount spent on food $=\frac{1}{4}\times\$5400=\$1350$ } M1

Difference $=\$1350-\$900=\$450$

He spent \$450 more on food than on rent.....A1

(b) Total original amount spent $=\$630+\$900+\$1350=\$2880$

Total new amount spent $=\frac{106}{100}\times\$2880=\$3052.80$ M1

New amount spent on food $=\frac{110}{100}\times\$1350=\$1485$

New amount spent on clothes $=\$3052.80-\$1485-\$900=\$667.80$ M1

Percentage increase $=\frac{667.80-630}{2880}\times100\%=1.3125\%$ .....A1(accept $1\frac{5}{16}\%$)

6(a) $\angle EFC = 20°$ B1

$\angle CEF = 180° - 20° - 50°$ M1

$= 110°$

$\angle AEC = 180° - 110°$ A1

$= 70°$

6(b)(i) Boys $= 100\% - 18\% - 15\% - 45\% = 22\%$

Boys : Women

22 . 18

11 : 9.....B1

(ii) $45\% - 22\% = 23\%$

23% rep 621.....M1

1% rep 27

67% rep 1809

There are 1809 men and boys.....A1

(iii) $\frac{15}{100} \times 360°$

$= 54°$ B1

7(a) Line 4: $6^2 - 5^2 = 11$ B1

Line 7: $9^2 - 8^2 = 17$ B1

(b)(i) $p = n + 2$.....B1

(ii) $q = n + 1$.....B1

(iii) $r = n + 2 + n + 1 = 2n + 3$.....B1

(b) $p + q = 83$

$2n + 3 = 83$

$2n = 80$

$n = 40$

$p = 40 + 2 = 42$ B1

$q = 40 + 1 = 41$ B1

8(a) (i) $\$1.45-(-\$0.85)$ M1

$=\$2.30$ A1

(ii) $-\$0.85+\$30=\$29.15$ B1

(b)(i) Max $= 5(4) = 20$.....B1

Min $= (-5)(4) = -20$.....B1

(ii) Tom

$=3-4+1+3$

$=3$

Jerry

$=4-1+5-2$

$=6$

} M1

Jerry won the game.....A1

9(a) $Perimeter = \left(\frac{1}{2}\times 3.142\times 36\right)+2(17)+2(25.5)$.....M1(correct formula for circle)

$=141.556\,\text{m}$.....A1

(b) $Area = \left(\frac{1}{2}\times 3.142\times 18^2\right)+(17\times 36)+\left(\frac{1}{2}\times 36\times 18\right)$.....M2(correct formula for circle and triangle)

$=1445.004m^2$ A1

(c) *Cost of carpetting* $=1445.004\times\$7.65$

$=\$11054.28$

$\approx\$11054$ B1

(d) $\frac{107}{100}\times\$11054.28$ M1

$=\$11828.08$.....A1(ans must be in 2 dp)