Class	Register Number	Name

南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

Mid-Year Examination 2014
Secondary One

INTEGRATED MATHEMATICS 1 hour

Paper 2

Thursday 8 May 2014 1030 – 1130 hrs

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Write your name, register number and class in the spaces at the top of this page.
2. Answer all the questions from number 1 to 9 before attempting the Bonus Question number 10.
3. Write your answers in the spaces provided on the question paper.
4. If working is needed for any question, show it in the space below that question. All working must be written in ink.
5. **Omission of essential working will result in loss of marks.**
6. **Electronic calculators are allowed for this paper.**

INFORMATION FOR CANDIDATES

1. The number of marks is given in brackets [ ] at the end of each question or part question.
2. The total number of marks for this paper is 40.
3. You are reminded of the need for **clear presentation** in your answers.

Parent's Signature: Score:

_____ _____/40

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1. Consider the following list of numbers

$-2, \sqrt{25}, 0, 2.47, \pi, \sqrt[3]{29}, \frac{34}{5}, 1.\dot{3}$.

List

(a) all the irrational numbers,

(b) all the whole numbers.

Ans: (a) _____ [2]

(b) _____ [2]

2. 27 workers can build a house in 60 days.

(a) If the job is to be completed in 45 days, find the number of additional workers needed for the job.

(b) What essential assumption did you make in your solution in (a)?

Ans: (a) _____ [2]

(b) _____ [1]

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3. Let $x = 0.0\dot{6}\dot{9}$.

(a) Express x as a fraction in its lowest form.

(b) Hence, evaluate $x + \frac{1}{10}$.

Ans: (a) _____ [2]

(b) _____ [1]

4. A number x when divided by 5, 6, 7, 8 and 9 leaves a remainder of 1. Find the smallest possible value of x.

Ans: _____ [3]

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5. The HCF and LCM of 3 numbers are $2^2 \times 5$ and $2^3 \times 3^2 \times 5 \times 11$ respectively. If two of the numbers are 60 and 180, find the third number.

Ans: _____ [3]

6.

No. of trips to the zoo	0	1	2	3	4	5	6
Number of Students	4	7	5	x	4	2	3

The table shows the number of trips made by students in a class to the zoo in 2013. Find
(a) the mean number of trips made by the class if x has a value of 3,
(b) the highest possible value of x if the median number of trips made is 2,
(c) all possible values of x if the mode is 1.

Ans: (a) _____ trips per student [2]
(b) _____ [2]
(c) _____ [1]

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7. Solve the following equations:

(a) $2(3-2x)=\frac{5x}{3}$

(b) $\frac{3}{x-2}+\frac{1}{2-x}=-1$

Ans: (a) _____ [3]

(b) _____ [3]

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8. A group of boys and girls took a test. The stem-and-leaf diagram below shows their scores.

Girls						Boys				
				5	4					
			7	1	5	0	3			
8	6	3	2	0	6	2	4	7		
		5	3	3	7	2				
			6	4	8	0	3	6	6	9
				7	9	1	4			

Key: 5 | 4 represents 45 Key: 5 | 0 represents 50

(a) What is the modal score for the above distribution?
(b) What is the median score for the girls?
(c) State whether the girls or the boys performed better in the test and give a brief reason for your answer.
(d) Bursary is awarded to the top 30% of the above group. Find the lowest mark of the bursary recipient.

Ans: (a) _____ marks [1]

(b) _____ marks [1]

(c) _____

_____ [2]

(d) _____ marks [2]

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9. Simplify the following, giving your answer as a single fraction in its simplest form:

(a) $2+\frac{3a-4}{5}-\frac{2-a}{3}$

(b) $\frac{(-xy)^2}{12}\times\frac{\sqrt{x^4y^2}}{3}\times\left(\frac{x}{2y}\right)^3$

Ans: (a) _____ [3]

(b) _____ [4]

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Bonus Question

10. A stationery distributor sorted out his pens equally into 90 containers. The pens in each container are all repacked into boxes of a dozen pens each. Knowing that the original total number of pens is a non-zero perfect cube, what is the minimum number of boxes required to pack all the pens?

Ans: _____ boxes [3]

END OF PAPER

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Nanyang Girls' High School
Mathematics Department

MID-YEAR EXAMINATION 2014

SEC 1 MATHEMATICS PAPER 2

Solution

Qn	
1(a) 1(b)	$\pi, \sqrt[3]{29}$ $0, \sqrt{25}$
2	$\frac{27}{x}=\frac{45}{60}$ $x=36$ $36-27=9$ 9 more workers are needed. The assumption is the productivity of all workers are the same or they work at the same rate.
3a	Let $x=0.069696...$ $100x=6.969696...$ $99x=6.9$ $x=\frac{69}{990}=\frac{23}{330}$
3b	$0.0\dot{6}\dot{9}+\frac{1}{10}$ $=\frac{23}{330}+\frac{33}{330}$ $=\frac{56}{330}$ $=\frac{28}{165}$
4	LCM of $(5, 6, 7, 8, 9) = 2520$ $x-1$ is a multiple of 2520 $x-1=2520$ $x=2521$
5	$HCF=2^2\times5$ $LCM=2^3\times3^2\times5\times11$ $60=2^2\times3\times5$ $180=2^2\times3^2\times5$ The third number $=2^3\times5\times11$ $=440$

6a	$Mean=\frac{(0\times4)+(1\times7)+(2\times5)+(3\times3)+(4\times4)+(5\times2)+(6\times3)}{(4+7+5+3+4+2+3)}$ $=2.5$ OR $\text{Mean}=\frac{70}{28}=2.5$
6b	$4+7+4=x+4+2+3$ $x=6$ OR Position of median = (4 + 7 + 5)th = 16th position $\frac{n+1}{2}=16$ $n=16\times2-1=31$ $x=31-4-7-5-4-3-2=6$
6c	$x=0$ *to* 6, x is an integer OR $x=0, 1, 2, 3, 4, 5, 6$
7a	$2(3-2x)=\frac{5x}{3}$ $6-4x=\frac{5x}{3}$ $18-12x=5x$ $17x=18$ $x=1\frac{1}{17}$
7b	$\frac{3}{x-2}+\frac{1}{2-x}=-1$ $\frac{3}{x-2}-\frac{1}{x-2}=-1$ $\frac{2}{x-2}=-1$ $2=-x+2$ $x=0$ OR $3(2-x)+(x-2)=-(x-2)(2-x)$ $6-6x+x-2=x^2-4x+4$ $x^2-2x=0$ $x(x-2)=0$ $x=0$ or $x=2$ (NA)

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8a	86 marks
8b	Median position $= \frac{14+1}{2} = 7.5$ Median marks $= \frac{66+68}{2} = 67$
8c	Median marks of boys = 80 Boys performed better as their median mark is higher Or Mean marks of boys ≈ 75.2 Mean marks of girls ≈ 58.6 Boys performed better as their mean mark is higher
8d	Total students = 14 + 13 = 27 30% of 27 = 8.1 ≈ 8 8^{th} highest mark= 84. The least mark of the bursary recipient is 84.
9a	$2+\frac{3a-4}{5}-\frac{2-a}{3}$ $=\frac{30}{15}+\frac{3(3a-4)}{15}-\frac{5(2-a)}{15}$ $=\frac{30+9a-12-10+5a}{15}$ $=\frac{14a+8}{15}$
9b	$\frac{(-xy)^2}{12}\times\frac{\sqrt{x^4y^2}}{3}\times\left(\frac{x}{2y}\right)^3$ $=\frac{x^2y^2}{12}\times\frac{x^2y}{3}\times\frac{x^3}{8y^3}$ $=\frac{x^7}{288}$
10	The total least number of pens is $90\times12\times n$ where n is the minimum number of boxes in <u>each container</u> $2\times3^2\times5\times2^2\times3\times n = 2^3\times3^3\times5^3$ The minimum number of boxes required to pack <u>all</u> the pens $=\frac{2^3\times3^3\times5^3}{12}$ $=2250$

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