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Class	Register Number	Name
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南洋女子中學校

NANYANG GIRLS' HIGH SCHOOL

Mid-Year Examination 2014

Secondary One

INTEGRATED MATHEMATICS

1 hour

PAPER 1

Monday

12 May 2014

0845 - 0945 hrs

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

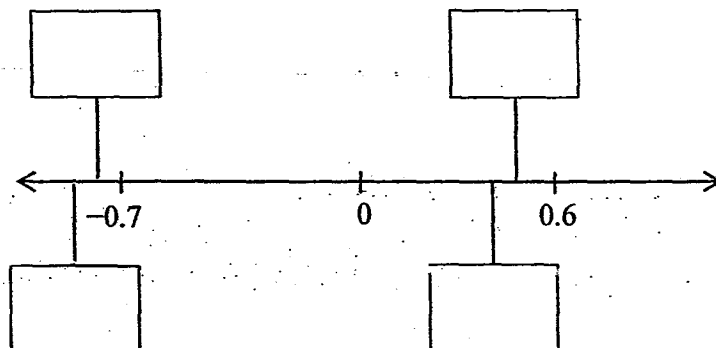
1. Write your name, register number and class in the spaces at the top of this page.
2. Answer all the questions from number 1 to 8.
3. Write your answers in the spaces provided on the question paper.
4. If working is needed for any question, show it in the space below that question. All working must be written in ink.
5. Omission of essential working will result in loss of marks.
6. Electronic calculators are NOT 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.

1. Place each of the following numbers in the correct box which indicates its position on the number line given below: [2]

$$-\frac{3}{4}, 0.5\dot{6}, -0.7\dot{5}, \frac{5}{9}$$



2. (a) Given the polynomial $4y^2 - 8y + 3$, write down the
- (i) the coefficient of y ,
 - (ii) the constant term.
- (b) Given that $a = -8$, $b = 2$ and $c = -1$, find the value of $\frac{\sqrt[3]{a} - 3b}{4c^7}$.

Ans: (a)(i) _____ [1]

(a)(ii) _____ [1]

(b) _____ [3]

3. (a) (i) Find the value of $\sqrt{3^6 \times 7^4}$, leaving your answer in index notation.
- (ii) Find the smallest possible natural number n , such that $3^6 \times 7^4 \times n$ is a perfect cube.
- (b) Find a pair of possible value of the natural numbers p and q , such that the HCF of the two distinct numbers $2^p \times 3^7$ and $2^5 \times 3^q$ is $2^5 \times 3^7$.

Ans: (a)(i) _____ [1]

(a)(ii) _____ [1]

(b) $p =$ _____; $q =$ _____ [2]

4. Given that Y is greater than 6, by using the tests of divisibility, find the largest possible six-digit number $834X4Y$ that is divisible by 3 and 4.

Ans: _____ [3]

5. (a) Name the correct number law (Commutative Law, Associative Law or Distributive Law) used to achieve Step 2 of the working shown below.

$$\begin{aligned} &4 \times 33 \times 25 \times 3 \\ &= 33 \times 4 \times 25 \times 3 \\ &= 33 \times 100 \times 3 \quad (\text{Step 2}) \\ &= 3300 \times 3 \\ &= 9900 \end{aligned}$$

- (b) Evaluate the following using number laws (Commutative Law, Associative Law or Distributive Law). There is no need to state which law is being used.

(i) $733 \times 42 + 68 \times 733 - 733 \times 10$

(ii) 498×12

(iii) $24 \div \frac{4}{3} + 0.75 \times 11 - 8\frac{3}{4} \times 3$

Ans: (a) Law used: _____ [1]

(b) (i) _____ [2]

(b) (ii) _____ [2]

(b)(iii) _____ [2]

6. Evaluate the following:

(a) $1\frac{3}{42} \times [12 - (-2) + 10 + (-3)]$

(b) $(-3) \times 9 + (-0.1)^2 + 8\left(-\frac{3}{2}\right)^3$

(c) $\frac{-\frac{3}{5} + \frac{2}{3} \times 4}{-\frac{1}{2} - \frac{1}{3}}$

Ans: (a) _____ [2]

(b) _____ [4]

(c) _____ [3]

7. (a) (i) Estimate the value of $\frac{13665}{0.3511 \times 1.993}$, giving your answer to one significant figure.

(ii) Use your result in (i) to estimate the value of $\frac{13665}{35.11 \times 19.93}$.

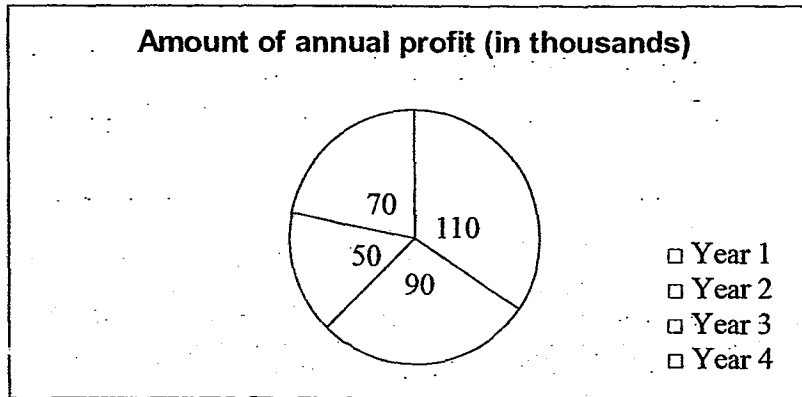
(b) Given that $\sqrt[3]{144} \approx 5.24$ and $\sqrt[3]{1440} \approx 11.29$. Using as much of the given information as possible, evaluate $\sqrt[3]{1.44}$.

Ans: (a)(i) _____ [2]

(a)(ii) _____ [2]

(b) _____ [2]

8. The pie chart below is used to represent the 4 years' annual profit (in thousands) made by a company from 2010 to 2013.



- (a) Using appropriate statistical terminology, suggest 2 reasons why the data is not clearly represented by the above pie chart.

Ans:1) _____ [1]

2) _____ [1]

- (b) Would a pie chart or line graph be more appropriate to represent these 4 years' annual profit? Give a reason to justify your choice.

Ans: _____ [2]

END OF PAPER

MID-YEAR EXAMINATION 2014

SEC 1 MATHEMATICS PAPER 1

Solution

Qn.	Solution						
1	In the following order: $-0.7\dot{5}, -\frac{3}{4}, \frac{5}{9}, 0.5\dot{6}$						
2(a)(i)	- 8						
2(a)(ii)	3						
2(b)	$\frac{\sqrt[3]{a} - 3b}{4c^7}$ $= \frac{\sqrt[3]{-8} - 3(2)}{4(-1)^7}$ $= \frac{-2 - 6}{-4}$ $= 2$						
3(a)(i)	$3^3 \times 7^2$						
3(a)(ii)	$7^2 = 49$						
3(b)	Possible pairs: (i) $p = 5, q > 7$ (ii) $p > 5, q = 7$ (iii) $p > 5, q > 7$						
4	Possible $Y = 8$ $8+3+4+X+4+Y = 19+X+Y$ <table border="1"><tr><td>Y</td><td>$19+X+Y$</td><td>largest X</td></tr><tr><td>8</td><td>$27+X$</td><td>9</td></tr></table> Largest number = 834948	Y	$19+X+Y$	largest X	8	$27+X$	9
Y	$19+X+Y$	largest X					
8	$27+X$	9					
5(a)	Associative						
5(b)(i)	$733 \times 42 + 68 \times 733 - 733 \times 10$ $= 733 \times (42 + 68 - 10)$ $= 733 \times 100$ $= 73300$						

5(b)(ii)	498×12 $= (500 - 2) \times 12$ $= 500 \times 12 - 2 \times 12$ $= 6000 - 24$ $= 5976$
5(b)(iii)	$24 \div \frac{4}{3} + 0.75 \times 11 - 8\frac{3}{4} \times 3$ $= \frac{3}{4} \times (24 + 11) - 8\frac{3}{4} \times 3$ $= \frac{3}{4} \times 35 - \frac{35}{4} \times 3$ $= 0$
6(a)	$1\frac{3}{42} \times [12 - (-2) + 10 + (-3)]$ $= 1\frac{3}{42} \times [12 + 2 + 10 - 3]$ $= \frac{45}{42} \times 21$ $= \frac{45}{2}$ or 22.5 or $22\frac{1}{2}$
6(b)	$(-3) \times 9 + (-0.1)^2 + 8\left(-\frac{3}{2}\right)^3$ $= -27 + (-0.1)^2 + 8\left(-\frac{3}{2}\right)^3$ $= -27 + 0.01 + 8\left(-\frac{27}{8}\right)$ $= -26.99 - 27$ $= -53.99$

6(c)	$-\frac{3}{5} + \frac{2}{3} \times 4$ $-\frac{1}{2} - \frac{1}{3}$ $\frac{31}{15}$ $= \frac{15}{5}$ $-\frac{6}{5}$ $= \frac{31}{15} \times \left(-\frac{6}{5}\right)$ $= -\frac{62}{25}$ $= -2\frac{12}{25}$
7(a)(i)	$\frac{13665}{0.3511 \times 1.993}$ $\approx \frac{14000}{0.35 \times 2.0}$ $= \frac{14000}{0.7}$ $= 20000$
7(a)(ii)	$\frac{13665}{35.11 \times 19.93}$ $= \frac{13665}{0.3511 \times 1.993} \times \frac{1}{1000}$ $\approx 20000 \times \frac{1}{1000}$ $= 20$
7(b)	$\sqrt[3]{1.44}$ $= \sqrt[3]{\frac{1440}{1000}}$ $\approx \frac{11.29}{10}$ $= 1.129$
8(a)	1) It is unclear what category is represented by which year in the legend. 2) It is unclear which category is represented by which sector. 3) Profit of each year should be expressed in percentage or angle

8(b)	Line graph. It is more suitable to show the trends over a period of time.
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南洋女子中學校
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.
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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

Setter: C. S. Seah

This document consists of 8 printed pages.

NANYANG GIRLS' HIGH SCHOOL

[Turn over

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]

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]

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

- the mean number of trips made by the class if x has a value of 3,
- the highest possible value of x if the median number of trips made is 2,
- all possible values of x if the mode is 1.

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

(b) _____ [2]

(c) _____ [1]

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]

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	9
				7	9	1	4		

Key: 5 | 4 represents 45

Key: 5 | 0 represents 50

- What is the modal score for the above distribution?
- What is the median score for the girls?
- State whether the girls or the boys performed better in the test and give a brief reason for your answer.
- 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]

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

Ans: (a) _____ [3]

(b) _____ [4]

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

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 $x = 0.069696\ldots$ $100x = 6.969696\ldots$ $99x = 6.9$ $x = \frac{69}{990} = \frac{23}{330}$
3b	$0.0\dot{6}9 + \frac{1}{10}$ $= \frac{23}{330} + \frac{33}{330}$ $= \frac{56}{330}$ $= \frac{28}{165}$
4	LCM of (5, 6, 7, 8, 9) = 2520 $x - 1$ is a multiple of 2520 $x - 1 = 2520$ $x = 2521$
5	$HCF = 2^2 \times 5$ $LCM = 2^3 \times 3^2 \times 5 \times 11$ $60 = 2^2 \times 3 \times 5$ $180 = 2^2 \times 3^2 \times 5$ The third number = $2^3 \times 5 \times 11$ $= 440$

6a	$Mean = \frac{(0 \times 4) + (1 \times 7) + (2 \times 5) + (3 \times 3) + (4 \times 4) + (5 \times 2) + (6 \times 3)}{(4 + 7 + 5 + 3 + 4 + 2 + 3)}$ $= 2.5$ OR $Mean = \frac{-70}{28} = 2.5$
6b	$4 + 7 + 4 = x + 4 + 2 + 3$ $x = 6$ OR Position of median = $(4 + 7 + 5)th$ $= 16^{th} \text{ position}$ $\frac{n+1}{2} = 16$ $n = 16 \times 2 - 1 = 31$ $x = 31 - 4 - 7 - 5 - 4 - 3 - 2 = 6$
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 $x = 2 \text{ (NA)}$

8a	86 marks
8b	$\text{Median position} = \frac{14+1}{2} = 7.5$ $\text{Median marks} = \frac{66+68}{2} = 67$
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 ≈ 68.6 Boys performed better as their mean mark is higher
8d	Total students = $14 + 13 = 27$ 30% of 27 = $8.1 \approx 8$ 8th 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	$\frac{(-xy)^2}{12} \times \frac{\sqrt{x^4 y^2}}{3} \times \left(\frac{x}{2y}\right)^3$ $= \frac{x^2 y^2}{12} \times \frac{x^2 y}{3} \times \frac{x^3}{8y^3}$ $= \frac{x^7}{288}$
10	The total least number of pens is $90 \times 12 \times n$ where n is the minimum number of boxes in each container $2 \times 3^2 \times 5 \times 2^2 \times 3 \times n = 2^3 \times 3^3 \times 5^3$ The minimum number of boxes required to pack <u>all</u> the pens $= \frac{2^3 \times 3^3 \times 5^3}{12}$ $= 2250$