Name ______________________ Class ______ Register Number ______

08/1F/EM/1

MATHEMATICS

PART 1

Thursday **09 October 2008** **1 hour**

VICTORIA SCHOOL

END OF YEAR EXAMINATION
SECONDARY ONE

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number 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 paper clips, highlighters, glue or correction fluid.

Answer **ALL** the questions.
Omission of essential working will result in loss of marks.
Calculators may **NOT** be used.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this part is 50.

Part 1 consists of 7 printed pages, including the cover page.

[Turn over

1 Write down the next two terms in each of the sequence.

(a) $-128,\ 64,\ -32,\ 16,\ \ldots\ldots$

(b) $\frac{2}{7},\ \frac{3}{11},\ \frac{4}{19},\ \frac{5}{31},\ \ldots\ldots$

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

(b) ..... , ... [1]

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2 Given x and y are integers such that $-4 < x < 9$ and $3 \le y \le 8$, find

(a) the smallest possible value of $x^2 + y^2$.

(b) the largest possible value of $\frac{x+y}{y}$.

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

(b) ..... [1]

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3 Given that $A : B = \frac{1}{3} : \frac{1}{7}$ and $B : C = 2 : 3$, find the ratio of $A : C$ in the form $x : y$ where x and y are integers.

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Answer ..... : ..... [2]

4 A man bought 8 books at \$7.50 per book. He sold 3 books at \$9.80 each and the remaining at \$10.60 each. Find his percentage profit.

Answer ..... % [3]

5 Given that $a = \sqrt[3]{\frac{b^4}{5b-3c}}$, find the value of c when $a = b = 3$.

Answer $c =$ ..... [3]

6 Solve $\frac{3-5x}{2} < \frac{7+3x}{5}$, illustrating your answer with a number line.

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Answer ..... [3]

7 **(a)** Arrange the following numbers in ascending order.

$$\frac{1}{3}\ ,\ 0.313\ ,\ 0.3\dot{1}\ ,\ 0.31\ ,\ 0.3^2\ .$$

(b) Estimate the value of $\dfrac{349.689\times\sqrt{48.6}}{4.997^3}$, giving your answer correct to 1 significant figure.

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

(b) ..... [2]

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8 **(a)** Subtract $\frac{1}{2}[12y^2+\frac{1}{4}x(16x-8y)]$ from $12y^2+7xy+5x^2$.

(b) Factorise $5ma+15mb-na-3nb$ completely.

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

(b) ..... [2]

9 A car travels on a country road for 105 minutes for the first $\frac{1}{3}$ of its journey at an average speed of 40 km/h. It then travels for the rest of its journey on an expressway at 120 km/h. Find the average speed for the whole journey.

Answer ..... km/h [4]

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10 Evaluate

(a) $\frac{1}{\sqrt{64}} - \frac{1}{\sqrt[3]{-8}} - \left(-\frac{1}{8}\right)^2$,

(b) $\{[(-24\times 2)\div 6+3]-27\div 3\}-(-5)$.

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

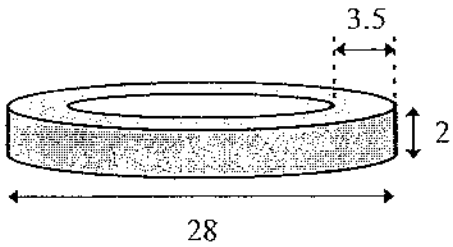
(b) ..... [3]

11 **[Take the value of π to be $\frac{22}{7}$]**

A metal ring has a diameter of 28 cm, height of 2 cm and thickness of 3.5 cm as shown in the diagram. The density of the ring is 2 g/cm^3. Find the

(a) volume of the metal used to make the ring,

(b) mass of the ring.



Answer *(a)* ..... cm^3 [3]

(b) ..... g [2]

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12 **(a)** Express each of the following numbers as a product of its prime factors using index notation.

(i) 616

(ii) 3234

(b) Write down the highest common factor (HCF) and lowest common multiple (LCM) of 3234 and 616 in index notation.

(c) Find the smallest integer value of p such that $3234p$ is a perfect square.

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

(ii) ..... [2]

(b) HCF = ...

LCM = ... [2]

(c) p = ... [1]

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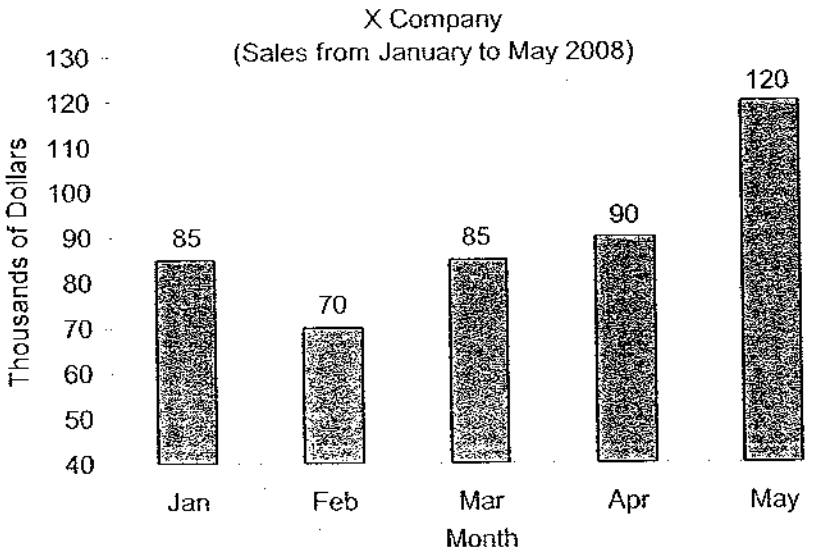
13 The bar chart was used by a salesperson from X Company to illustrate the sales of his company for the first five months of 2008.



(a) Express the sales in April as a fraction of the total sales for the first five months of 2008.

(b) What was the percentage increase in sales from April to May?

(c) Calculate the average monthly sales, giving your answers in dollars.

(d) The salesperson decided to represent the information in a pie chart. Calculate the angle of the sector representing the sales in March.

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

(b) ..... % [2]

(c) $ ..... [1]

(d) ..... ° [2]

End of Part 1

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Victoria School
Mathematics
Secondary One End of Year Exam 2008
Answer Key

1(a) -8, 4 (b) $\frac{6}{47}, \frac{7}{67}$
2(a) 9 (b) $3\frac{2}{3}$
3 14 : 9
4 $37\frac{1}{3}\%$
5 4
6 $x > \frac{1}{31}$
7(a) $0.3^2, 0.31, 0.313, 0.\overline{31}, \frac{1}{3}$ (b) 20
8(a) $6y^2 + 8y + 3x^2$ (b) $(5m - n)(a + 3b)$
9 72 km/h
10(a) $\frac{39}{64}$ (b) -9
11(a) 539 cm^2 (b) 1078 g
12(a) (i) $2^3 \times 7 \times 11$ (ii) $2 \times 3 \times 7^2 \times 11$ (b) $2 \times 7 \times 11$ $2^3 \times 3 \times 7^2 \times 11$ (c) 66
13(a) $\frac{1}{5}$ (b) $33\frac{1}{3}\%$ (c) \$ 90,000 (d) 68

Name ______________________ Class [ ] Register Number [ ]

08/1F/EM/2

MATHEMATICS **PART 2**

Thursday **09 October 2008** **1 hour 30 minutes**

NIL SINE LABORE

VICTORIA SCHOOL

END OF YEAR EXAMINATION
SECONDARY ONE

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number 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 paper clips, highlighters, glue or correction fluid.

Answer **ALL** the questions.
Omission of essential working will result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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 your calculator value, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this part is 50.

1 The lengths of three wooden planks are 78 cm, 90 cm and 126 cm respectively. The three planks are to be cut into a number of pieces of identical length without any leftover. Find the

(a) greatest possible length of each piece, [2]

(b) total number of pieces cut from the three planks. [1]

2 A girl walks 500 metres from A to B at 3 km/h. She walks a further x km to C at a speed of 6 km/h. She walks the remaining distance to D at a speed of 8 km/h. The total distance from A to D is 10 km and the total time taken is 90 minutes.

(a) Express, in terms of x, the distance traveled from C to D. [1]

(b) Form an equation in x and hence, solve for x. [2]

(c) Find the time, in minutes, taken by her to walk from B to C. [1]

3 The terms of a sequence are given as follows:

$$\begin{aligned} L_1 &= 1 = 1 \\ L_2 &= 4 = 1+2+1 \\ L_3 &= 9 = 1+2+3+2+1 \\ L_4 &= 16 = 1+2+3+4+3+2+1 \end{aligned}$$

(a) Write down the 9^{th} line in the sequence. [1]

(b) Write down an expression, in terms of n, for L_n. [1]

(c) Hence, find $L_{200} - L_{199}$. [1]

(d) It is given that $1+2+\ldots+(k-1)+k+(k-1)+\ldots+2+1=361$. Find the value of k. [2]

4 **(a)** Express $\frac{1-y}{2y}+2-\frac{y}{3}$ as a single fraction. [2]

(b) Simplify $\frac{2p^2}{3} \times \frac{21q^2r}{2} \div \frac{7p^2q^3r^2}{5}$. [2]

(c) Solve the equation $\frac{\frac{5x-2}{3}-1}{x}=2\frac{1}{3}$. [3]

5 **Answer the whole of this question on a sheet of plain paper.**

A concert stadium is made up of a stage and a standing area for the audience. The stage is a square, $QRST$, with length 30 m. The standing area for the audience is a trapezium, $PQTU$, where angle $QTP = 40°$, $PT = 110\,\text{m}$ and $PU = 130\,\text{m}$. QT and PU are parallel.

(a) Construct the layout of the stadium, using 1 cm to represent 10 m on the actual ground. Measure and write down the actual length of TU. [4]

(b) Construct the perpendicular bisector of QT. [1]

(c) An audience is standing on the perpendicular bisector of QT and is furthest away from the stage. Find the distance of the audience from the front of the stage. [1]

6 The following data shows the length of 25 sticks in metres.

1.5	0.5	0.6	0.7	0.6
2.4	2.3	2.3	2.1	1.2
0.3	0.3	0.2	2.2	2.2
2.0	1.6	1.7	2.3	0.9
1.9	1.8	1.6	0.5	0.8

(a) **Copy and complete** the frequency table for the above data.

Length of sticks (m)	Frequency
$0 < x \leq 0.5$	
$0.5 < x \leq 1.0$	
$1.0 < x \leq 1.5$	
$1.5 < x \leq 2.0$	
$2.0 < x \leq 2.5$	
Total	

[2]

(b) Draw a histogram to represent the above distribution, using 2 cm to represent the width of each bar. [3]

(c) What is the most common range of length of sticks? [1]

(d) Sticks longer than 2 m are required for an experiment. What is the percentage of sticks which cannot be used for the experiment? [2]

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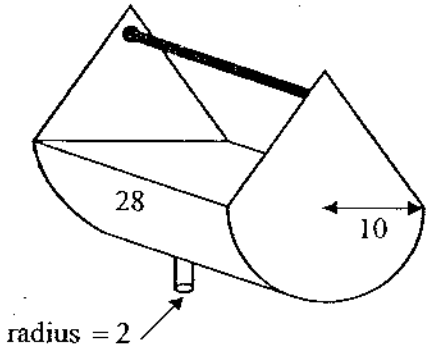


The diagram shows an open plastic container with a cylindrical tube attached to its base. Its cross-sectional area is made up of a semi-circle of radius 10 cm and a triangle. The length of the container is 28 cm.

The container is completely filled with water.

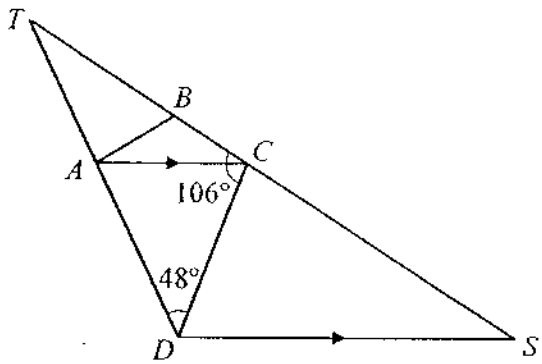
(a) Find the volume of water in the container. [2]

(b) Calculate the surface area of the container that is in contact with the water. [3]

Water is flowing out of the container through the cylindrical tube of radius 2 cm, at a rate of 6 cm per second.

(c) Find the time taken, correct to the nearest second, to empty the container. [3]

8 **(a)**



In the diagram, $ABCD$ is a kite and AC is parallel to DS. TAD and $TBCS$ are straight lines. It is given that $\angle ADC = 48°$ and $\angle BCD = 106°$. Find

(i) angle ATC, [1]

(ii) angle ABC, [2]

(iii) angle CDS, [2]

(iv) reflex angle CSD. [1]

(b) Three interior angles of an n-sided polygon are 154°, 155° and 156°. The remaining angles are 165° each. Find the value of n. [3]

End of Part 2

2008 VS Sec 1 SA2 Part 2 Answer Key

1(a) 6 cm

1(b) 49

2(a) $9\frac{1}{2}-x$

2(b) $\frac{\frac{1}{2}}{3}+\frac{x}{6}+\frac{9\frac{1}{2}-x}{8}=\frac{3}{2}$, $x=3\frac{1}{2}$, 35 min

3(a) L_9: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 81

3(b) $L_n = n^2$

3(c) 399

3(d) 19

4(a) $\frac{3+9y-2y^2}{6y}$

4(b) $\frac{5}{qr}$

4(c) $x=-2\frac{1}{2}$

5(a) TU = 84 m

5(b) Construction

5(c) Distance = 70 m

6(a)

Marks	Frequency
$0 < x \le 0.5$	5
$0.5 < x \le 1.0$	5
$1.0 < x \le 1.5$	2
$1.5 < x \le 2.0$	6
$2.0 < x \le 2.5$	7
Total	**25**

6(b) **Histogram**

6(c) $2.0 < x \le 2.5$ metres.

6(d) 72%

7(a) $4400 cm^3$

7(b) $1190 cm^2$

7(c) 58 sec

8(ai) 26°

8(aii) 100°

8(aiii) 66°

8(aiv) 320°

8(b) $n = 22$