Class	Register Number

Name ______________________________

MATHEMATICS **10/1SA2/EM**

Tuesday **12 October 2010** **2 hours 30 minutes**

VICTORIA SCHOOL

SEMESTRAL ASSESSMENT TWO
SECONDARY ONE

Part 1 (40 marks)
Candidates answer on the Question Paper

Part 2 (60 marks)
Additional Materials: Answer Paper

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.
If working is needed for any question it must be shown with the answer.
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 either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, submit Part 1 and Part 2 separately.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 100.

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This paper consists of <u>10</u> printed pages, including the cover page.

[Turn over

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Part 1 (40 marks)

1 Arrange the following numbers in ascending order.

$$-\frac{3}{25}, \quad -0.1, \quad -\frac{1}{8}, \quad -0.\dot{1}\dot{2}, \quad \sqrt[3]{-\frac{1}{64}}$$

Answer ..... [2]

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2 The foot of a mountain is at sea level. At a particular time, the temperatures at the foot and at the summit of the mountain are 15°C and −8°C respectively. The temperature drops by 6.4°C for every 1000m above sea level. Find the height of the mountain.

Answer ..... m [2]

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3 Without the use of a calculator, estimate, correct to 1 significant figure, the value of $\dfrac{1.525^2 + 0.749}{\sqrt{898.12}}$.

Answer ..... [2]

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4 It is given that $z = \dfrac{y^3 - 3x}{xz - y}$. Find the value of x when $y = -1$ and $z = \dfrac{1}{2}$.

Answer $x =$ ..... [2]

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5 The lamps at three lighthouses flash continuously at night. The time interval for the lamps to go off completely at the three lighthouses is given.

	Time interval for the lamp to go off completely
Lighthouse A	15 seconds
Lighthouse B	45 seconds
Lighthouse C	1 minute 10 seconds

The lamps at the three lighthouses go off together at a particular time. How long does it take for the three lamps to go off together again? Give your answer in minutes and seconds.

Answer ..... minutes ..... seconds [2]

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6 The first three lines in a sequence of numbers are given.

Line	A	B
1	$1+\frac{1}{3}=\frac{4}{3}$	$4^2+3^2=5^2$
2	$\frac{1}{3}+\frac{1}{5}=\frac{8}{15}$	$8^2+15^2=17^2$
3	$\frac{1}{5}+\frac{1}{7}=\frac{12}{35}$	$12^2+35^2=37^2$
⋮	⋮	⋮
5	.....	.....

Write down the terms for both **A** and **B** for the 5th line of the sequence.

Answer **A** = ..., **B** = ... [2]

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7 A number leaves a remainder of 4 when divided by 6, 7 or 9. Find the smallest possible number.

Answer ..... [2]

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8 **(a)** Subtract $\left[8x(x-2y)-7y^2\right]$ from $\left(-5x^2-16xy-11y^2\right)$.

(b) Solve the equation $\frac{9x-5}{3}-\frac{1}{2}=5x$.

Answer (a) ..... [3]

(b) $x=$ ..... [3]

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9 **(a)** The exterior angle of a regular polygon is $\frac{1}{4}$ of its interior angle. Find the number of sides of the polygon.

(b) Two of the interior angles of an octagon are 130° and 125°. The remaining interior angles are $x°$ each. Find the value of x.

Answer (a) ..... [3]

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

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10 Simplify

(a) $(-3a)\times 4ab$,

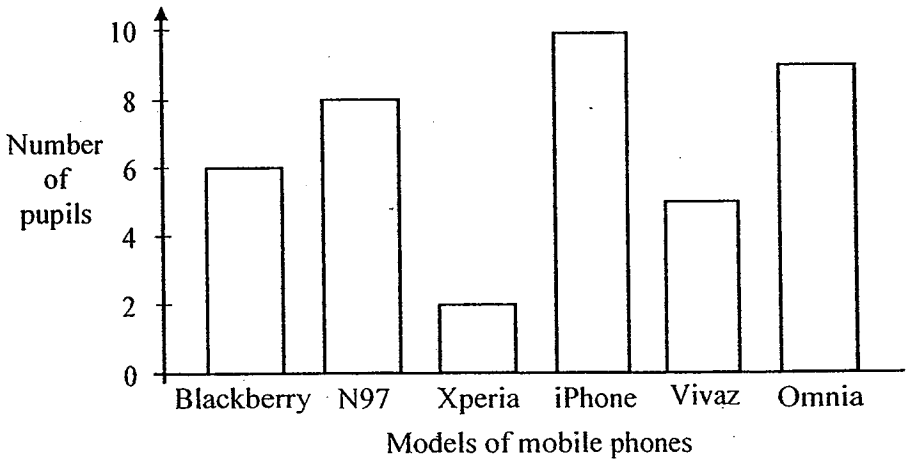
(b) $\dfrac{56x^3}{y^2}\div\dfrac{8x^2}{y}$.

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

(b) ..... [2]

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11 The bar graph shows the different models of mobile phones used by a class of pupils. It is given that none of them owns more than one mobile phone.



(a) Find the total number of pupils with a mobile phone.

(b) Find the fraction of pupils using either the N97 or Omnia.

(c) It is given that $\dfrac{3}{5}$ of the pupils are girls and 6 of these girls owns a Blackberry. Calculate the percentage of girls who are not using a Blackberry.

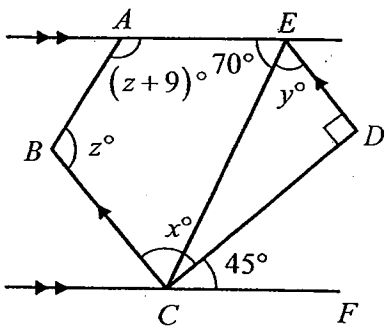
Answer (a) ..... pupils [1]

(b) ..... [1]

(c) .....% [3]

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12 In the diagram. $\angle DCF = 45°$. $\angle AEC = 70°$, $\angle BCD = x°$, $\angle CED = y°$, $\angle ABC = z°$, $\angle BAE = (z+9)°$ and $\angle CDE$ is a right angle. It is given that $CB//DE$ and $CF//AE$. Stating your reasons clearly, find



(a) x,

(b) y,

(c) z.

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

(b) $y =$ ..... [3]

(b) $z =$ ..... [3]

End of Part 1

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Part 2 (60 marks)

1 A motorist took t hours to travel from Town P to Town Q with an average speed of x km/h.

(a) Write down an expression, in terms of x and t, for the distance between P and Q. [1]

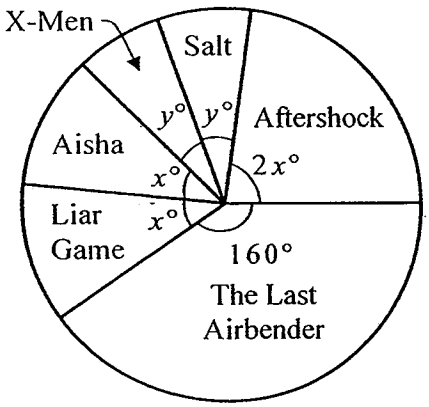
On his return journey from Town Q to Town P, he travelled faster by 15 km/h and his travelling time was shortened by 20%.

(b) Using this information, write down another expression, in terms of x and t, for the distance between P and Q. [1]

(c) Hence, form an equation and solve for x. [2]

(d) Calculate the average speed for the entire journey. [2]

2



The pie chart shows the survey results where students voted for their favourite movies. It is given that 10% of the students voted Salt as their favourite movie.

(a) Calculate the value of y. [1]

(b) Calculate the value of x. [2]

(c) 6 more students took part in the survey and all of them voted Aisha as their favourite movie.

(i) By letting the original number of students who participated in the survey be z, write down an expression, in terms of z, to represent the total number of students who participated in the survey. [1]

(ii) Write down an expression, in terms of z, to represent the final number of students who voted Aisha as their favourite movie. [1]

(iii) As a result, the angle of the sector representing Aisha is $52.5°$. Form an equation in z and hence find the original number of students. [3]

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3 (a) The marked price of a computer is \$4500.

(i) Shop A offers a 25% discount on the computer. Find the selling price of the computer. [1]

(ii) Shop B offers an ongoing discount of 15%. To compete with Shop A, it offers an additional 10% special discount on top of the initial discounted price. Find the selling price of the computer. [2]

(iii) Shop C will like to offer an attractive one-off discount so that it will sell the computer at a lower price than that of Shop B. Calculate the least percentage discount, correct to the nearest percent, that Shop C should offer. [2]

(b) It is given that $-5\frac{1}{3} \le y \le -0.5$ and $-12 \le x \le 7$, where x and y are integers. Find

(i) the smallest possible value of $\frac{x}{y}$, [1]

(ii) the largest possible value of $y^2 - x^2$. [1]

(c) (i) Solve the inequality $2 - \frac{5x-2}{5} > \frac{3x-2}{3}$. [3]

(ii) Represent your solution on a number line. [1]

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4 **Answer the whole of this question on a sheet of graph paper.**

The table shows the distribution of the amount of pocket money, in dollars, received by 40 students in a week.

Pocket Money (x dollars)	Number of students
$0 \le x \le 10$	2
$10 < x \le 20$	6
$20 < x \le 30$	$3f$
$30 < x \le 40$	$2f$
$40 < x \le 50$	17

(a) Find the value of f. [1]

(b) Using a scale of 2 cm to represent 10 dollars, draw a horizontal axis for $0 \le x \le 50$. Using a scale of 1 cm to represent 1 student, draw a vertical axis. On your axes, draw a histogram to represent the information in the table. [3]

(c) The same information is to be shown on a pie chart. Find the angle of the sector which represents the number of students who received not more than 20 dollars. [2]

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

(a) Construct a triangle ABC in which $AB = 9.2\,\text{cm}$, $AC = 6.7\,\text{cm}$, $BC = 10.5\,\text{cm}$. [3]

(b) Measure and write down the angle BAC. [1]

(c) On the same diagram, construct the angle bisectors of $\angle BAC$ and $\angle ABC$. Label clearly, with the letter O, the point of intersection of the 2 angle bisectors. [3]

(d) Draw a circle, with O as centre, such that it touches the 3 sides of the triangle. [1]

(e) Measure and write down the radius of the circle. [1]

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6 (a) Factorise completely

(i) $20z + 8(2z^2 - 3z^3)$, [2]

(ii) $4pq - 3r^2 + 12pr - rq$. [2]

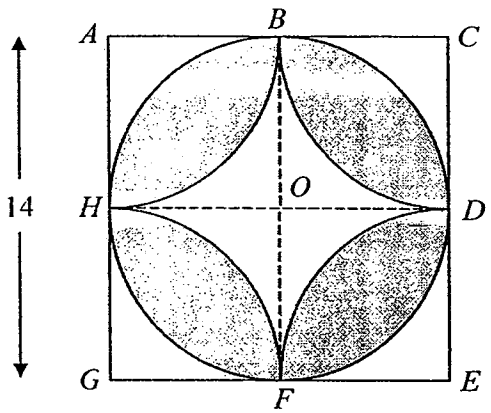
(b) Express the following in its simplest form.

(i) $\dfrac{4z+2}{4} - \dfrac{1-5z}{5}$ [2]

(ii) $\dfrac{2(2p-q)}{3} - \dfrac{3(q+4p)}{2} + \dfrac{1}{4}$ [3]

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7 **(a)**



A circle, *BDFH*, with centre *O*, is inscribed in a square, *ACEG*, with sides 14 cm.
Taking π to be $\frac{22}{7}$, calculate

(i) the area of the circle *BDFH*, [1]

(ii) the area of the shaded region, [3]

(iii) the perimeter of the shaded region. [1]

(b)

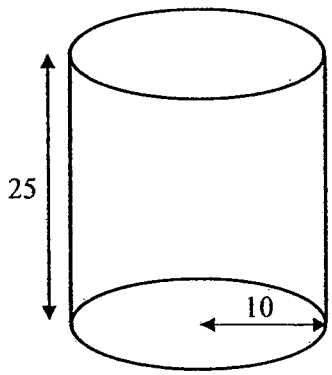


Diagram I

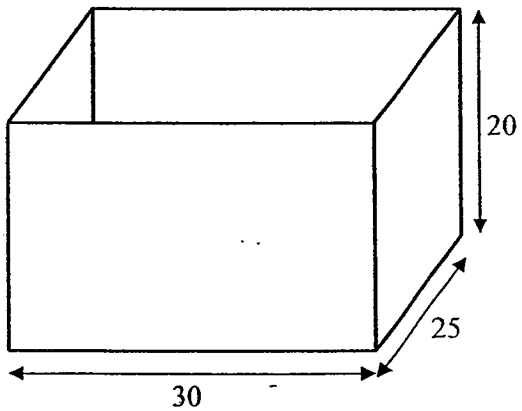


Diagram II

[The value of π is 3.14 correct to two decimal places]

Diagram I shows a solid steel cylinder of base radius 10 cm and height 25 cm.
Diagram II shows an open rectangular container with dimensions 30 cm by 25 cm by 20 cm.
5 550 cm^3 of water is poured into the rectangle container.

(i) Calculate the height of the water in the rectangular container. [1]

(ii) Calculate the difference in the base area of the container and the cylinder. [2]

(iii) The steel cylinder is then placed into the rectangular container in its upright position until its base touches the bottom of the container. Find the increase in the water level. [3]

End of Part 2

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2010 VICTORIA SCHOOL SEC 1 SA2 Answer Key
Part 1

1	$\sqrt[3]{-\frac{1}{64}}, -\frac{1}{8}, -0.1\dot{2}, -\frac{3}{25}, -0.1$	12a	$x = 90^\circ$
2	3593.75m	12b	$y = 65^\circ$
3	0.1	12c	$z = 108^\circ$
4	$x = -\frac{6}{13}$		
5	10 minutes 30 seconds		
6	A $= \frac{1}{9} + \frac{1}{11} = \frac{20}{99}$, B $= 20^2 + 99^2 = 101^2$		
7	130		
8a	$-13x^2 - 4y^2$		
8b	$x = -1\frac{1}{12}$		
9a	10		
9b	$x = 137.5^\circ$		
10a	$-12a^2b$		
10b	$\frac{7x}{y}$		
11a	40 pupils		
11b	$\frac{17}{40}$		
11c	75%		

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2010 VICTORIA SCHOOL SEC 1 SA2 Answer Key
Part 2

1a	(xt) km	5a	On diagram
1b	$(0.8x+12)t$ km	5b	$\angle BAC = 82^\circ$
1c	$x = 60$	5c,d, e	On diagram
1d	average speed = $66\frac{2}{3}$ km/h	5f	Radius = 2.3cm
2a	y = 36	6a(i)	$4z(5+4z-6z^2)$
2c(i)	Total no of students = $z+6$	6a(ii)	$(4p-r)(3r+q)$
2c(ii)	Final no of students = $z\left(\frac{32}{250}\right)+6$	6b(i)	$\frac{20z+3}{10}$
2c(iii)	Total no of students = 96	6b(ii)	$\frac{-56p-26q+3}{12}$
3a(i)	Selling price = \$3375	7a(i)	Area of circle = 154 cm^2
3a(ii)	Selling price = \$3442.50	7a(ii)	Area of shaded region = 112 cm^2
3a(iii)	Least amount of discount = 24%	7a(iii)	Perimeter = 88 cm
3b(i)	Smallest possible value of $\frac{x}{y} = -7$	7b(i)	Height of water = 7.4 cm
3b(ii)	largest possible value of $y^2 - x^2 = 25$	7b(ii)	Difference in base area = 436 cm^2
3c(i)	$x < 1\frac{8}{15}$	7b(iii)	Increase in water level = 5.33 cm
4a	f = 3		
4b	On graph paper		
4c	angle of sector = 72°		

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