Candidate Name _____

TANJONG KATONG SECONDARY SCHOOL
End of Year Examination 2010
Secondary Two

MATHEMATICS

Paper 1

Monday   **12 October 2010**   **1 hour 15 minutes**

TIME   0750 – 0905

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on the cover page.
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** the questions.
All answers are to be written on the spaces provided.
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 <u>three significant figures</u>. Give answers in degrees to <u>one decimal place</u>.
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 number of marks for this paper is 50.

Marks	
	50

This question paper consists of **9** printed pages.

<u>Paper 1 (50 marks)</u>
Answer **ALL** questions.

1. (a) Factorise $2x^3 - 13x^2 + 16x$ completely.

    (b) Simplify $9a^2 + 1 - (3a - 1)^2$.

    Answer (a)_____[2]

    (b)_____[2]

[Turn over

2   (a)   Factorise $(a - 2b) - 3c(2b - a)$.

(b)   Solve the simultaneous equations $-5x + 3y = 19$ and $2x - 7y = -25$.

Answer (a)_____ [2]

(b)_____[3]

[Turn over

3

(a) Simplify $\dfrac{2y^2 - 3y - 5}{y^2 - 1}$.

(b) Solve $5t^2 = 12t$.

Answer (a) _____ [3]

(b)_____ [2]

4 A shopping centre organised a free spin on the rewards wheel as shown to its shoppers when they spend a minimum of $100. Given that the rewards wheel is equally divided, find,

a) the probability of getting a voucher of $10,
b) the probability of getting the Grand prize,
c) the probability of not getting a prize.

Thank You !

Grand Prize

$10 Voucher

Thank You !

Thank You !

$10 Voucher

$20 Voucher

Thank You !
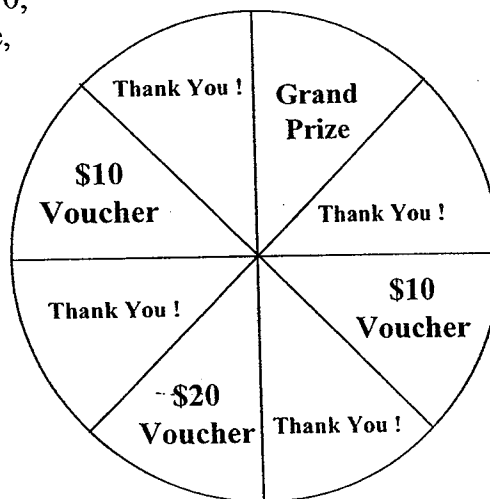
Answer (a) _____ [1]

(b)_____[1]

(c)_____[1]

5 Three bus services stops at a particular bus stop at every 10, 15 and 25 minutes interval. If the three buses leave the bus bay at 10 am. Find the time when the 3 buses stop at the same bus stop together.

Answer _____ [2]

[Turn over

6   It is given that y is inversely proportional to $\sqrt[3]{x}$. When $x = 27, y = 12$.

(a)   Find the equation connecting x and y.

subst

(b)   Find the value of x when $y = 7.2$.

Answer (a) _____ [3]

(b) _____ [1]

[Turn over

7   A regular polygon has n sides. The size of each interior angle is 7 times the size of each exterior angle. Calculate

a)   the size of each exterior angle,

b)   the value of n.

Answer (a) _____° [2]

(b)_____[1]

[Turn over

8

a) Express $\dfrac{1}{m} - \dfrac{1}{n}$ as a single fraction.

b) Hence, find the value of $\dfrac{1}{m} - \dfrac{1}{n}$ when $6mn = -1$ and $6(m-n) = 5$.

Answer (a)_____[1]

(b)_____[2]

[Turn over

9   The number of times that a group of people who trains in a gymnasium during a one-month period is tabulated below.

Number of gymnasium visits	0	1	2	3	4	5	6
Number of people	2	7	6	x	4	2	1

a) Find the minimum value of x if the mode is 3.

b) Using the value of x in (a), find
   i)   the mean,

   ii)   the median.

Answer (a) _____ [1]

(bi)_____[2]

(bii)_____[1]

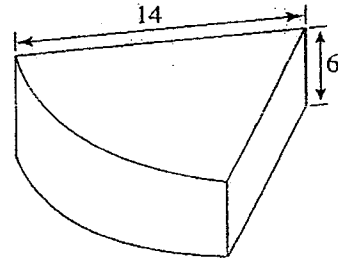**[Turn over**

10 A birthday cake, cylindrical in shape, has a radius of 14 cm and a thickness of 6 cm. The cake is cut into 6 equal pieces. Each piece of cake forms a sector of a circle as shown in the figure. (Take $\pi = \dfrac{22}{7}$).

a) Find the volume of each piece of cake.

b) Find the total surface area of each piece of cake.

Answer (a) _____ cm³ [2]

(b)_____ cm² [3]

[Turn over

11 The diagram shows the graphs of the curve $y = -x^2 + x + z$ and a straight line AC. The curve meets the x-axis at B and C and the y-axis at $A(0, 12)$. Graphs are not drawn to scale.

a) Find the value of z.

b) Find the coordinates of B and C.
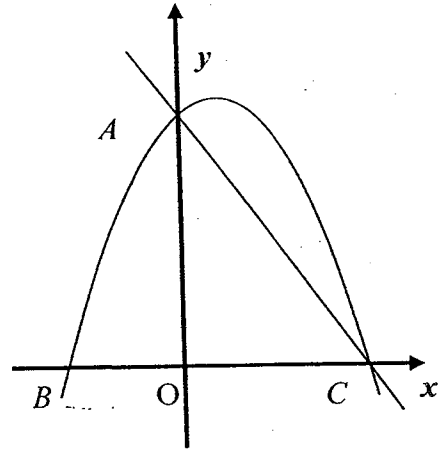
c) Write down the equation of the line of symmetry of $y = -x^2 + x + z$.

Answer (a) _____ [1]

(b) B = (_____,_____)

C = (_____,_____) [3]

(c)_____[1]

[Turn over

12   Shade the required regions in the Venn diagrams.

(a) $A' \cup B'$
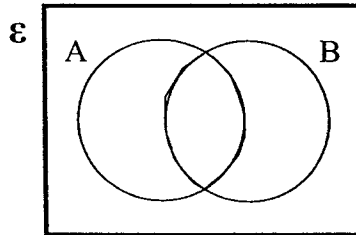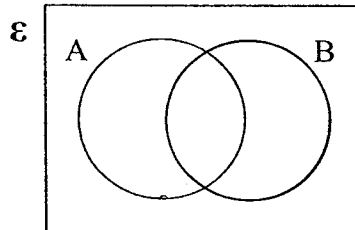
ε A   B

[1]

(b) $(A \cap B)' \cap B$

ε A   B

[1]

[Turn over

13   A vertical flagpole PQ is placed at the top of the hill. R is vertically below Q and $\angle SRQ = 90°$, $SR = 100$m and $SQ = 104$m

a)   Show that $QR = 28.6$m.

P

Q

104 m

S 100 m R
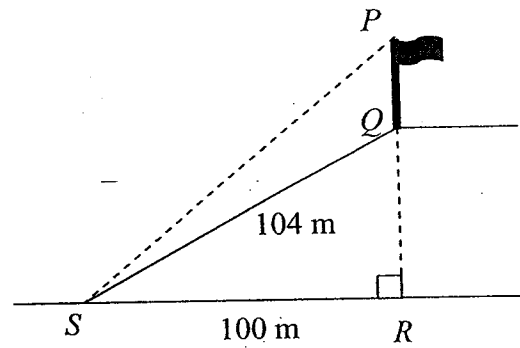
[2]

b)   Given that $\angle PSR = 25°$, find the height of the flagpole.

Answer (b)_____m   [3]

End of Paper
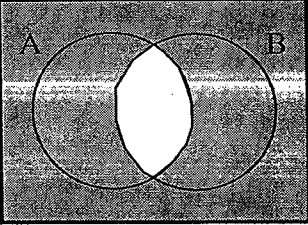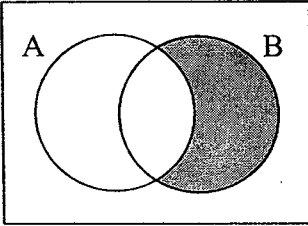
TKSS 2010 Sec 2 Mathematics Marking Scheme Paper 1
End of Year Examinations

Qns No.	Details Answers
1a)	$x(2x^2 - 13x + 16)$
1b)	$9a^2 + 1 - (9a^2 - 6a + 1)$ $6a$
2a)	$(a - 2b) + 3c(-2b + a)$ $(a - 2b)(1 + 3c)$
2b)	$y = 3$ $x = -2$
3a)	$(2y - 5)(y + 1)$ $(y + 1)(y - 1)$ $\dfrac{(2y - 5)}{(y - 1)}$
3b)	$5t^2 - 12t = 0$ $t(5t - 12) = 0$ $t = 0$ $t = 2\dfrac{2}{5}$
4a)	$P(\$10 \text{ Voucher}) = \dfrac{1}{4}$
4b)	$P(\text{Grand Prize}) = \dfrac{1}{8}$
4c)	$P(\text{No Prize}) = \dfrac{1}{2}$
5)	LCM = 2 hours 30 mins 12:30 pm
6a)	$y \alpha \dfrac{1}{\sqrt[3]{x}}$ or $y = \dfrac{k}{\sqrt[3]{x}}$ $12 = \dfrac{k}{\sqrt[3]{27}}$ $k = 36$ $y = \dfrac{36}{\sqrt[3]{x}}$
6b)	$x = 125$
7a)	1 int. $\angle$ = 7 ext. $\angle$s 7 ext. $\angle$s + 1 ext. $\angle$ = 180° 22.5°

Qns No.	Details Answers
7b)	$n = 16$
8a)	$\dfrac{n - m}{mn}$
8b)	$mn = \dfrac{-1}{6}$ $(n - m) = -\dfrac{5}{6}$ 5
9a)	$x = 8$
9bi)	mean $= \dfrac{0(2) + 1(7) + 2(6) + 3(8) + 4(4) + 5(2) + 6(1)}{2 + 7 + 6 + 8 + 4 + 2 + 1}$ 2.5
9bii)	Median = 2.5
10a)	$\dfrac{1}{6}$ $\pi r^2 h$ 616
10b)	Area of 2 sectors $= \dfrac{616}{3}$ Area of 2 straight edges = 168 cm² Area of curved edge = 88 cm² Total Surface Area $= \dfrac{616}{3} + 168 + 88$ $= 461\dfrac{1}{3}$
11a)	$y = 12$
11b)	$(x - 4)(x + 3) = 0$ B(-3, 0) C(4, 0)
11c)	$x = \dfrac{1}{2}$

Qns No.	Details Answers
12a)	
12b)	
13a)	$QR = \pm\sqrt{104^2 - 100^2}$ $= 28.6$ m (3 s.f.)
13b)	$\tan 25° = \dfrac{PR}{100}$ $PR = 46.6308$ m $PQ = 46.6308 - 28.5657$ $= 18.1$ m (3 s.f.)

TANJONG KATONG SECONDARY SCHOOL
End of Year Examination
Secondary Two

MATHEMATICS
PAPER 2

0750 – 0905
Thursday   **7 October 2010**   **1hour 15 minutes**

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 staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in this paper.
Write your answers on the writing papers provided.

If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.
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, 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 of the marks for this paper is 50.

You are reminded of the need for clear presentation of your answers.

**This question paper consists of 5 printed pages.**

[Turn over

Answer **all** the questions in this paper.

1   (a) (i) Factorise $x^2 - 121$.   [1]

   (ii) Simplify $\dfrac{x^2 - 121}{44 - 4x}$.   [2]

   (b) It is given that $s = \dfrac{v^2 - u^2}{2a}$.

      (i) Find the values of u when $s = 9$, $v = -5$ and $a = -1$.   [2]

      (ii) Express v in terms of u, a and s.   [2]

2   A swimwear company is interested to conduct an experiment on 2 brands of swimwear,
    namely **Speedo** and **Finis**. For each of the swimwear, the time to complete 50 metres is
    recorded.

   (a) When the swimmer wears **Speedo** swimwear, he can swim 50 metres in x minutes.   [1]
       Write down an expression, in terms of x, for the distance covered by the swimer in
       one minute.

   (b) When the swimmer wears **Finis** swimwear, he took 2 minutes more to swim 50   [1]
       metres than when he was in **Speedo** swimwear. Write down an expression in terms
       of x, for the distance he can cover in one minute when he was wearing **Finis**
       swimwear.

   (c) If the difference in distance covered by Speedo swimwear and Finis swimwear in one   [3]
       minute is 1.25 metres, write down an equation to represent this information and show
       that it reduces to $x^2 + 2x - 80 = 0$.

   (d) Solve the equation $x^2 + 2x - 80 = 0$.   [3]

   (e) Find the time taken to swim 90 metres in **Speedo** swimwear.   [1]

3 This is the score of thirty students in a Mathematics class test. The total score for the test is 100 marks.

48	47	47	53	54	49	55	100	59	61	63	58	51	45	52
51	50	58	55	49	60	47	53	51	51	62	42	50	36	66

(a) Construct a stem–and –leaf diagram from the information given. [2]

(b) Calculate the mean, median and mode score. [3]

(c) Which of the above indicator you **will not use** as a gauge of the class peformance? [2]
Explain your answer.

4 (a) Given that $\varepsilon = \{x : 3 \leq x \leq 20, x \in Z\}$, A= $\{x: x$ is odd$\}$ and B=$\{x: x$ is prime$\}$. [2]
(i) List the elements in A and B.

(ii) Given that C =$\{ x: x \in A$ and $x \in B \}$ and D= $\{ x: x \in A$ or $x \in B \}$, [2]

(a) find n(C),

(b) describe in words the set D.

(iii) Explain why B $\subset$ A? [1]

(b) Let x and y be the dimensions of the rectangle whose perimeter is 36m and which is [5]
such that the square of the length of the diagonal is 170m. Form two equations and
use them to find the value of x and y.

diagonal

x

y
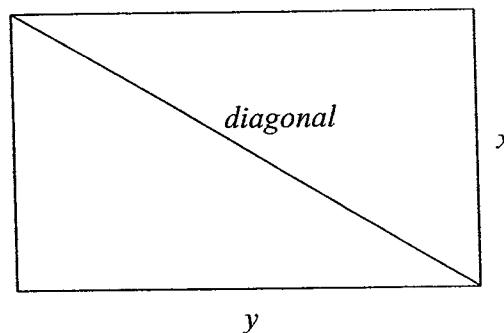
5 [The curved area of a cone $= \pi r l$]

[The volume of a cone $= \frac{1}{3} \times$ base area $\times$ height]

[The curved surface of a sphere $= 4\pi r^2$]

[Round off all you answers in this question correct to 3 significance figures.]
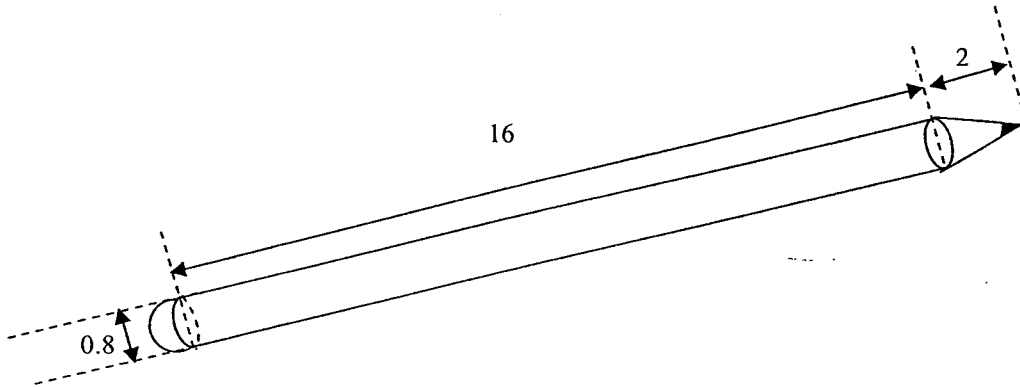
The diagram above shows a pencil. It is made up of a hemisphere, a cylinder and a cone. The cylinder has radius of 0.4 cm and length of 16 cm. The cone has base radius 0.4cm and height 2cm. (Take $\pi = 3.142$)

(a) Calculate (i) the slant height of the cone,   [2]

(ii) the total surface area of the pencil.   [3]
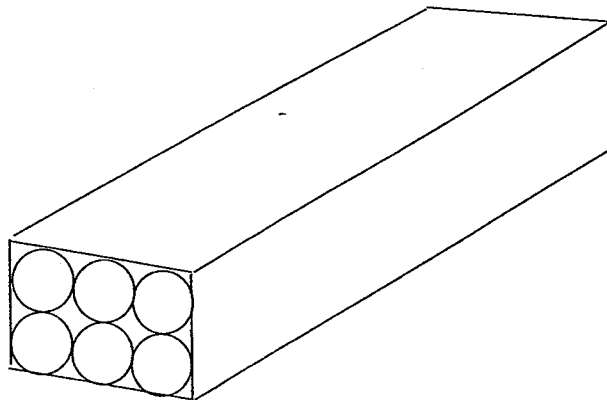
(b) If the 6 such pencils are to be packed into a rectanglular box as shown above, show that the volume of the box is 70.656 cm³.   [2]

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

6   A cake company make \$$y$ of profit when it makes x number of cakes, where y is given by the formula $y = \dfrac{1}{10}(3x - 20)(100 - x)$, for $0 \le x \le 80$.

Number of cakes (x)	0	10	20	30	40	50	60	70	80
Profit (\$$y$)	− 200	90	320	490	600	650	640	570	k

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

(b) Using a scale of 2 cm to represent 10 cakes, draw a horizontal axis for $0 \le x \le 80$.   [3]
    Using a scale of 2 cm to represent \$100, draw a vertical axis for $-200 \le y \le 700$.
    On your axes, draw the graph of $y = \dfrac{1}{10}(3x - 20)(100 - x)$.

(c) Use your graph to find
    (i) the profit when 25 cakes are sold.   [1]

    (ii) the maximun number of cakes to sell in order to gain maximum profit.   [1]

(d) Explain the significance of your answer for y when $x = 5$.   [1]

(e) (i) On the same axes, draw the line $y = 9x$.   [1]

    (ii) Hence find the two values of x when the profit is \$9 per cake.   [2]

End of Paper

<u>Numeric Answer</u>

1ai) $(x - 11)(x + 11)$ ii) $\dfrac{x + 11}{-4}$

bi) $u = \pm\sqrt{43}$ ii) $v = \pm\sqrt{2as + u^2}$

2a) $\dfrac{50}{x}$ metres   b) $\dfrac{50}{x + 2}$ metres   d) $x = 8$ or -10 (rej)   e) 14.4 mins

3a)

Stem	Leaves
3	6
4	2 5 7 7 7 8 9 9
5	0 0 1 1 1 1 2 3 3 4 5 5 8 8 9
6	0 1 2 3 6
7	
8	
9	
10	0

b) Mean= 1623/30 =54.1
Median =51.5
Mode = 51

c) I will not use the mean because there is an extreme data/ outlier.

4ai) A={3,5,7,11,13,15,17,19}   B={ 3,5,7,11,13,17,19}
   ii) a) n(C)=7   b) D consists of elements from A or B.
   iii) All elements in B are also in A and n(B)< n(A).

4b) x =7 , y= 11

5ai) 2.04cm   ii) 43.8cm^2

6a) k = 440   ci) y= $410 (accept 400- 420) cii) maxi cakes = 53 (accept 51- 55)
   d) y is negative means that the company is making a loss.
   eii) x =10 or x =66.5 (accept 65- 68)