1T

Class | Register No.

Candidate Name .....

TANJONG KATONG GIRLS' SCHOOL

MID YEAR EXAMINATION 2016
SECONDARY TWO

4048 **MATHEMATICS**

FRIDAY **29 April 2016** **1 h 15 min**

Additional Materials: Writing Paper
Graph Paper (1 sheet)

INSTRUCTIONS TO CANDIDATES

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

Write all your answers on the writing papers provided.
Leave two lines after each part question.
Start every question on a fresh page.
For the last question, write your answers on the graph paper 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.
The use of an approved scientific calculator is **allowed**.
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.

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

The total marks for this paper is **50**.

For Examiners Use	
Total	50
Parents' Signature	

Setter : Mdm Jenny Lim
Markers : Mdm Jenny Lim, Ms Koo Ching Ching, and Mrs Serena Chen

This Question Paper consists of 4 printed pages, including this page.

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Answer **all** the questions.

1. **(a)** Expand and simplify the following expressions.

$4s^2 - (s-t)^2$ **[2]**

(b) Factorize the following expressions completely.

(i) $9p^2 + 24pq + 16q^2$ **[2]**

(ii) $t^2 - 4st + 4s^2 - 1$ **[2]**

2. Natasha's original weight was $\frac{120}{x-1}$ kg. She went jogging for a month and her weight dropped by $\frac{18}{(x-1)^2}$ kg.

(a) Show that her present weight in terms of x, as a single fraction in its simplest form is $\frac{120x-138}{(x-1)^2}$. **[2]**

(b) Find her present weight when $x = 3$. **[1]**

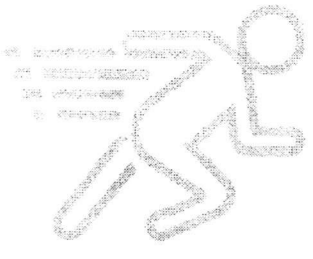
3. **(a)** Solve the equation $y(2y+1) = y(3y-5)$. **[4]**

(b) Hence, solve the equation $(3-a)(7-2a) = (3-a)(4-3a)$. **[2]**

4. If $x = 1$, $y = a - 2$ is a solution of the simultaneous equations $x + y = 5$ and $2x - y = b$.

Find the value of a and of b. **[4]**

5. If it takes 5 people to consume 10 kg of rice in 2 weeks, how much rice (in kg) would 12 people consume in 6 weeks. State an appropriate assumption you made. **[3]**



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6. Danielle was asked to factorise $t^2k^2+36-4t^2-9k^2$ completely. She tried some ways of grouping terms as shown in the box below.

Ways of grouping	
(*I*)	$t^2k^2+36-4t^2-9k^2=(t^2k^2+36)-(4t^2-9k^2)$
(*II*)	$t^2k^2+36-4t^2-9k^2=t^2(k^2-4)-9(k^2+4)$

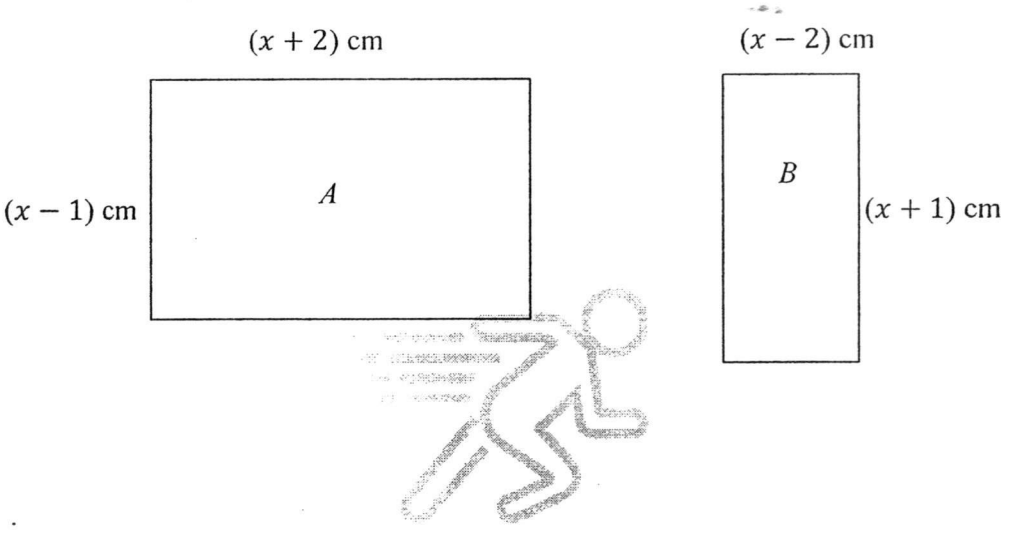
For each way (I) and (II), identify the error(s) by stating what it should be. Help Danielle to factorize $t^2k^2+36-4t^2-9k^2$ completely. **[5]**

7. **(a)** Simplify

$$\frac{(-zy)^3}{x^2}\times\frac{x^6}{(-y)^2z^4}\div\frac{3xy}{z}$$ **[3]**

(b) It is given that $y=\sqrt{\frac{a^2+3b}{c}}$. Express a in terms of c, y and b. **[3]**

8. Given that the ratio of the area of rectangle A to area of rectangle B is $1\frac{3}{7}:1$, write down an equation to represent the ratio of the area of rectangle A to area of rectangle B and show that it reduces to $3x^2-17x-6=0$. Find the value of x and hence write down the ratio of the perimeter A to that of B. **[7]**



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

Faith saw a squirrel resting on a branch of a tree. The squirrel jumped from the tree's branch and landed on the ground. The motion path taken by the squirrel with its height, h metres, from the ground at time t seconds is $h = -t^2 + 2t + 8$.

Some corresponding values of t and h are given in the following table.

t	0	1	2	3	4
h	8	9	p	5	0

(a) Calculate the value of p. **[1]**

(b) Using a scale of 4 cm to represent 1 unit, draw a horizontal t-axis for $0 \le t \le 4$.
Using a scale of 2 cm to represent 1 unit, draw a vertical h-axis for $0 \le h \le 9$.

On your axes, plot the points given in the table and join them with a smooth curve.

[3]

On the graph,

(c) draw the line of symmetry of the graph and write down the equation of the line of symmetry of the graph. **[2]**

From the graph,

(d) find

(i) the time taken, in seconds, by the squirrel to jump from the tree to the ground. **[1]**

(ii) the maximum height of the squirrel from the ground. **[1]**

(e) How long will the squirrel take to reach a height of 2 metres from the ground? **[1]**

(f) Describe the motion of the squirrel during the first second. **[1]**

END OF PAPER

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Answer Key for Sec 2 Maths MYE

Question No	Solution
1(a)	$4s^2-(s-t)^2$ $=4s^2-(s^2-2st+t^2)$ $=3s^2+2st-t^2$
(b)(i)	$9p^2+24pq+16q^2$ $=(3p+4q)^2$
(ii)	$t^2-4st+4s^2-1$ $=(t-2s)^2-1$ $=(t-2s+1)(t-2s-1)$
2(a)	$\frac{120}{x-1}-\frac{18}{(x-1)^2}$ $=\frac{120(x-1)-18}{(x-1)^2}$ $=\frac{120x-138}{(x-1)^2}$ (shown)
(b)	When $x=3$ Weight $=\frac{120x-138}{(x-1)^2}$ $=\frac{120(3)-138}{(3-1)^2}=\frac{222}{4}=55.5kg$
3(a)	$y(2y+1)=y(3y-5)$. $2y^2+y=3y^2-5y$ $y^2-6y=0$ $y(y-6)=0$ $y=0$ or $y-6=0$ $y=6$
(b)	Observe that $y=3-a$, When $y=0$, $y=3-a$, $a=3$ When $y=6$, $y=3-a$, $a=-3$

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4	$x + y = 5$ ------ (1) $2x - y = b$ ------(2) Given $x = 1, y = a - 2$ From (1), $x + y = 5$ $1 + a - 2 = 5$ $a = 6$ From (2), $2x - y = b$ $2 - (a - 2) = b$ $b = -2$
5	Since 5 people will consume 10 kg of rice in 2 weeks 5 people will consume 5 kg of rice in 1 weeks 5 people will consume 30 kg of rice in 6 weeks 1 person will consume 6 kg of rice in 6 weeks 12 people will consume 6 x12=<u>72</u> kg of rice in 6 weeks *Assume each person consumes the same amount of rice each day.*
6	$(I) t^2k^2 + 36 - 4t^2 - 9k^2 = (t^2k^2 + 36) - (4t^2 - 9k^2)$ $(II) t^2k^2 + 36 - 4t^2 - 9k^2 = t^2(k^2 - 4) - 9(k^2 + 4)$ $t^2k^2 + 36 - 4t^2 - 9k^2$ $= t^2k^2 - 4t^2 + 36 - 9k^2$ $= t^2(k - 2)(k + 2) + 9(2 - k)(2 + k)$ $= t^2(k - 2)(k + 2) - 9(k - 2)(2 + k)$ $= (t^2 - 9)(k - 2)(k + 2)$ $= (t - 3)(t + 3)(k - 2)(k + 2)$

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7(a)	$\frac{(-zy)^3}{x^2} \times \frac{x^6}{(-y)^2 z^4} \div \frac{3xy}{z}$ $= \frac{-z^3y^3}{x^2} \times \frac{x^6}{y^2z^4} \times \frac{z}{3xy}$ $= -\frac{x^3}{3}$
(b)	$y = \sqrt{\frac{a^2+3b}{c}}$ $y^2 = \frac{a^2+3b}{c}$ $cy^2 = a^2 + 3b$ $a = \pm\sqrt{cy^2 - 3b}$
8	$\frac{(x+2)(x-1)}{(x-2)(x+1)} = \frac{1\frac{3}{7}}{1}$ $\frac{(x^2+x-2)}{(x^2-x-2)} = \frac{10}{7}$ $7(x^2+x-2) = 10(x^2-x-2)$ $7x^2+7x-14 = 10x^2-10x-20$ $3x^2-17x-6 = 0 (shown)$ $(3x+1)(x-6) = 0$ $x = -\frac{1}{3} or 6$
	$x = 6$ since length is positive. Ratio of Perimeter of Rectangle A to B $= \frac{2[(6+2)+(6-1)}{2[(6-2)+(6+1)]}$ $= \frac{13}{11} = 13:11$

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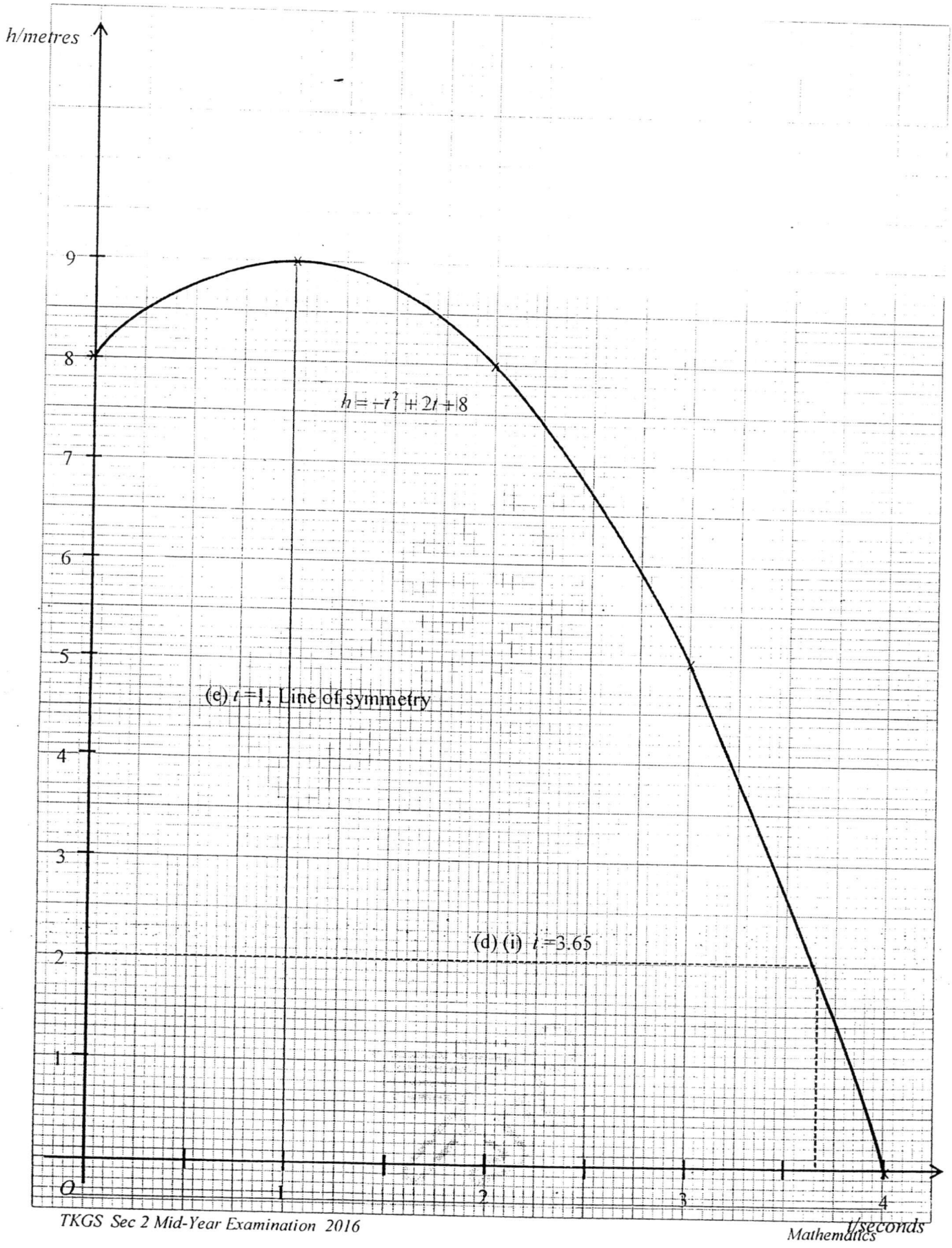
9(a)	$p = 8$
(b)	**Refer to graph paper**: Correct graph joining all points, within the range of $(0 \le t \le 4, 0 \le h \le 9)$ and correct scales, Label the graph, $h = -t^2 + 2t + 8$ and axis, Smooth curve
(c)	**Refer to graph paper** $t = 1$
(d)(i)	$t = 4$
(ii)	$h = 9$
(e)	$t = 3.65$
(f)	The squirrel was at 8m above the ground on the tree's branch when $t = 0$ and reached a maximum height of 9m from the ground when $t = 1$,

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Q8



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