Name: ..... Maths Class: .....

SYDNEY TECHNICAL HIGH SCHOOL

Year 8 Yearly

October 2013

Mathematics

Examination

Time allowed: 70 mins

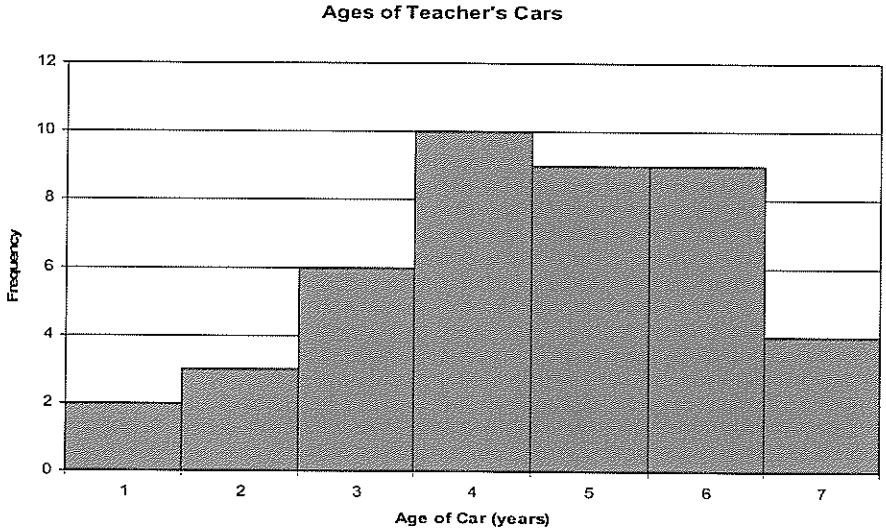
Instructions:

- Write your name and class at the top of this page.
- These questions must be answered in the space provided
- Attempt all questions.
- Calculators may be used

Topic	Question	Topic Total
Statistics and Probability	1	/15
Algebra	2	/15
Rates and Ratios	3	/15
Equations and Inequalities	4	/15
Number Plane	5	/15
	TOTAL	/75

Question 1: Statistics and Probability (show all necessary working)

a) At Tech High the ages of teachers'cars in the car park were recorded. This frequency histogram shows the results of this survey:



i) Use this histogram to complete the frequency distribution table **(3)**

Score (x)	Frequency (f)	Frequency × Score (fx)
Totals		

1 mark each

ii) How many cars were in the car park? ..... **(1)**

iii) How many cars are 4 years old or younger? ..... **(1)**

iv) What is the median age of teachers cars? ..... **(1)**

v) Calculate the mean age of teachers' cars. (1 decimal place) ..... **(1)**

vi) What is the modal age of teachers' cars? ..... **(1)**

b) The results on a quiz for two classes are shown on the back to back stem and leaf plot.

Class A				Stem	Class B					
				0	8					
			3	1	6	7	8			
		5	4	2	4	6	7	8	9	
		5	4	2	3	2	6	7	8	
	3	3	2	0	4	4	4	6		
8	5	4	3	1	5	3	6			
	9	7	5	2	6	7				
		7	4	3	7					

Colour the boxes in part i) and ii) for the correct answer

i) Which is true? **(1)**

- ☐ Class A has 3 more students.
- ☐ Both classes have the same number of students.
- ☐ Class A has 1 more student.
- ☐ Class B has 3 more students.

ii) Which is true? **(1)**

- ☐ Class A has a greater mode and a greater median.
- ☐ Class B has a greater mode and a greater median.
- ☐ Class A has a greater mode, but Class B has a greater median.
- ☐ Class B has a greater mode, but Class A has a greater median.

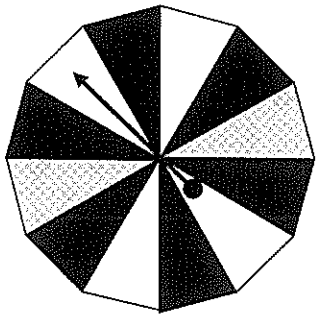
iii) Which class had better results on the quiz? Give reasons for your answer which include statistical measures. **(2)**

.....

.....

.....

c) The spinner shown has black, grey and white sectors. What is the probability that the arrow will stop on a white sector. **(1)**



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d) A set of traffic lights is observed for 2 hours and it is found to be red for 45 minutes, green for 60 minutes and amber for the remaining time. What is the probability that at a randomly selected time the light will be red or amber? **(2)**

.....

.....

Question 2: **Algebra** (show all necessary working)

a) Simplify fully

i) $\frac{12fg^2}{6fg}$ **(1)**

ii) $\frac{x}{2}+\frac{2x}{3}$ **(1)**

iii) $\frac{10ab}{3c}\div\frac{5a}{6c}$ **(2)**

b) Expand and simplify

i) $3(2x-4)$ **(1)**

ii) $(a-6)(a+9)$. **(2)**

iii) $4x(3x-3y)-6y(3x+1)$. **(2)**

iv) $(s-5t)^2$ **(2)**

c) Factorise fully

i) $12a^2b-18ab^2$. **(2)**

ii) $12p^2-16pq+8pr$ **(2)**

Question 3: Rates and Ratios (show all necessary working)

a) A radio station divides the air time between music and talk in the ratio 7 : 5. Next week the station will be on air for 168 hours. How many hours of music should it play?	**(1)**
b) Write the ratio 1.4 : 5 in simplest form using whole numbers.	**(1)**
c) Simplify the ratio 2.5 kg : 1500 g.	**(1)**
d) Francis is a pastry chef and makes 300 cup cakes. He ices them with chocolate, vanilla and strawberry icing in the ratio 3 : 2 : 1. How many cupcakes will have vanilla icing?	**(1)**
e) Anna's car uses 21 litres of fuel to travel 350 km. What is it's consumption rate in litres/100km?	**(1)**
f) Write a speed of 8 metres/second in km/h.	**(2)**
g) Mike ploughs a field at a rate of 800m^2/min and Harry ploughs at a rate of 4.5 hectares/hour. Who ploughs the quicker? (Show calculations)	**(2)**
h) Dayna makes 200 dolls for charity. She dresses 25% of them in red, $\frac{1}{3}$ of them in blue and the remainder in white? What is the ratio of red : blue : white dresses?	**(2)**
i) On a certain day, one Australian dollar will buy \$US1.05 in US dollars and will also buy €0.75 Euros. Mark has \$400 Australian dollars and he uses some of this to buy \$US210, and buys Euros with the remainder. How many Euros does he buy?	**(2)**
j) Raymond plays the drums. For a particular song he needs to keep a rhythm of 48 beats/minute. He plays a total of 204 beats during the song. How long does the song lasts for in minutes and seconds.	**(2)**

Question 4: **Equations and Inequalities** (show all necessary working)

a) Solve

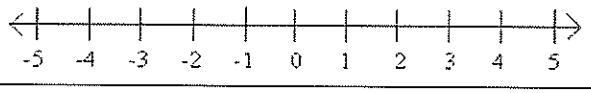
i) $3(5b+1)=18$ **(2)**

ii) $\frac{3a}{4}+2=5$ **(2)**

iii) $10-5(y-2)=-y$ **(2)**

b) Solve the following inequalities and sketch the solution on the number line provided

i) $2x-3<5$ **(3)**



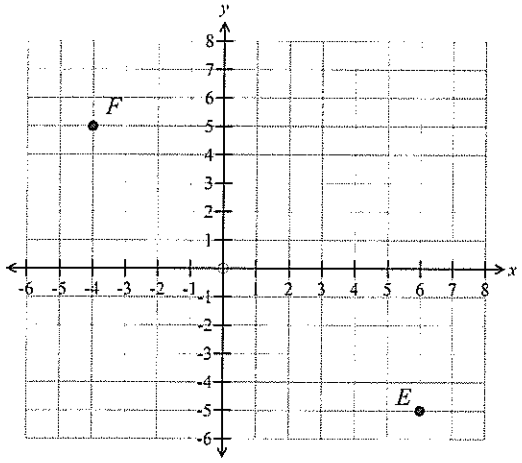
ii) $p+5\geq 5p-5$ **(3)**

c) Solve leaving your answer in simplest form.

i) $9-\frac{4x}{5}=2x-1.$ **(3)**

Question 5: Number Plane (show all necessary working)

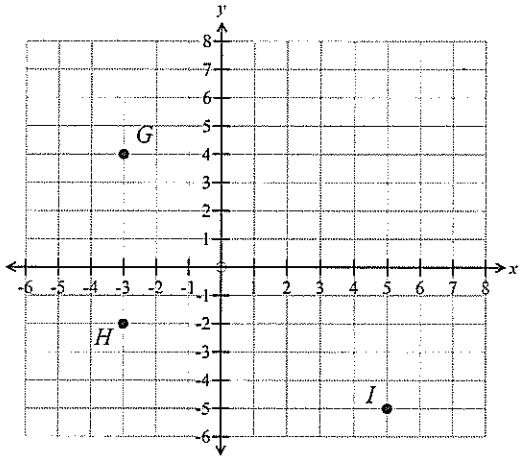
a) Find the distance of the interval joining $E(6, -5)$ and $F(-4, 5)$ in exact form. **(2)**



Distance: .....

b) The points $G(-3,4)$, $H(-3,-2)$ and $I(5,-5)$ are three vertices of a parallelogram. **(1)**

If J is the fourth point of the parallelogram, and lies in the first quadrant, What are the coordinates of the fourth vertex J?



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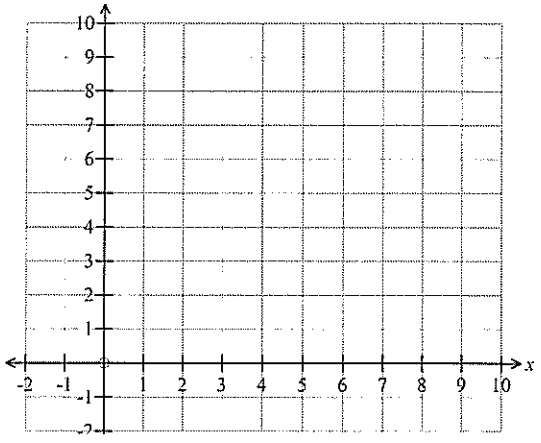
c) The points A(2, 5), B(4, 9) and C(4, 4) are joined to form a triangle.



i) Draw the triangle ABC on the number plane. **(1)**

ii) If BC is the base of ΔABC and AM is the height, Draw AM clearly labeling M. **(2)**

iii) Find the length of the intervals BC and AM **.(2)**

BC = ...

AM = ...

iv) Find the area of the triangle ABC. **(1)**

.....

c)

i) On the same set of axes, graph $y = x + 1$ and $y = 2x - 2$. **(2)**

ii) What is the point of intersection? **(2)**

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iii) Show that the point of insersection satisfies both lines drawn. **(2)**

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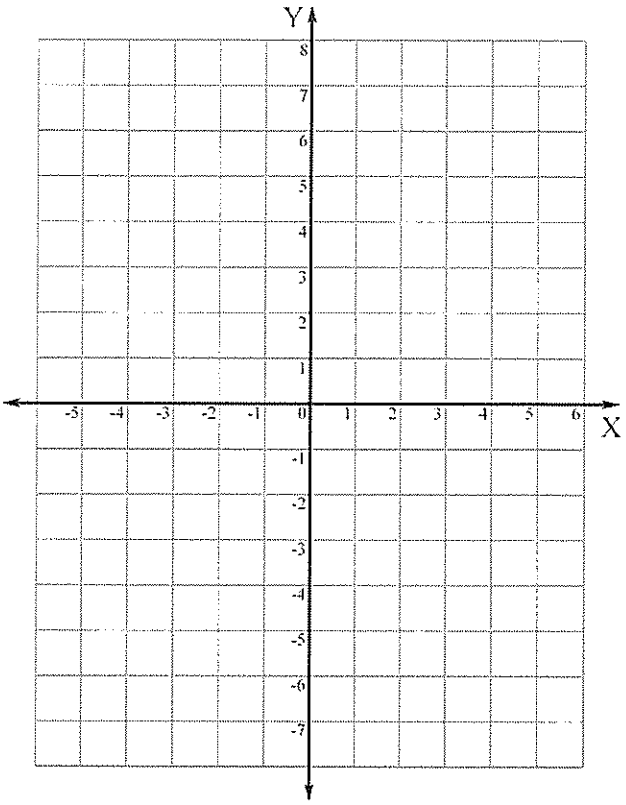

END OF EXAMINATION

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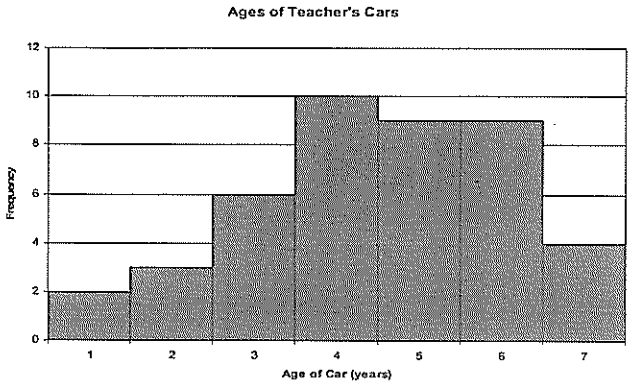

i) Use this histogram to complete the frequency distribution table (3)

Score (x)	Frequency (f)	Frequency × Score (fx)
1	2	2
2	3	6
3	6	18
4	10	40
5	9	45
6	9	54
7	4	28
Totals	43	193

1 mark each

ii) How many cars were in the car park? 43 (1)

iii) How many cars are 4 years old or younger? 21 (1)

iv) What is the median age of teachers cars? 5 (1)

v) Calculate the mean age of teachers' cars. (1 decimal place) $\frac{193}{43} = 4.5$ (1)

vi) What is the modal age of teachers' cars? 4 (1)

b) The results on a quiz for two classes are shown on the back to back stem and leaf plot.

Class A				Stem	Class B				
				0	8				
			3	1	6	7	8		
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i) Which is true? **(1)**

- ■ Class A has 3 more students.
- ☐ Both classes have the same number of students.
- ☐ Class A has 1 more student.
- ☐ Class B has 3 more students.

ii) Which is true? **(1)**

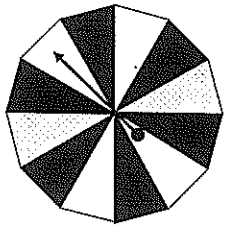
- ☐ Class A has a greater mode and a greater median.
- ☐ Class B has a greater mode and a greater median.
- ☐ Class A has a greater mode, but Class B has a greater median.
- ■ Class B has a greater mode, but Class A has a greater median.

iii) Which class had better results on the quiz? Give reasons for your answer which include statistical measures. **(2)**

Class A

c) The spinner shown has black, grey and white sectors. What is the probability that the arrow will stop on a white sector. **(1)**

$P(\text{white}) = \frac{4}{12} = \frac{1}{3}$



d) A set of traffic lights is observed for 2 hours and it is found to be red for 45 minutes, green for 60 minutes and amber for the remaining time. What is the probability that at a randomly selected time the light will be red or amber? **(2)**

$P(\text{red or amber}) = \frac{1}{5}$

Question 2: Algebra (show all necessary working)

a) Simplify fully

i) $\frac{12fg^2}{6fg}$ **(1)**

$= 2g$

ii) $\frac{x}{2} + \frac{2x}{3}$ **(1)**

$= \frac{3x + 4x}{6}$

$= \frac{7x}{6}$

iii) $\frac{10ab}{3c} \div \frac{5a}{6c}$ **(2)**

$= \frac{10ab}{3c} \times \frac{6c}{5a}$

$= 4b$

b) Expand and simplify

i) $3(2x-4)$ **(1)**

$= 6x - 12$

ii) $(a-6)(a+9)$. **(2)**

$= a^2 + 9a - 6a - 54$

$= a^2 + 3a - 54$

iii) $4x(3x-3y) - 6y(3x+1)$. **(2)**

$= 12x^2 - 12xy - 18xy - 6y$

$= 12x^2 - 30xy - 6y$

iv) $(s-5t)^2$ **(2)**

$= s^2 - 10st + 25t^2$

c) Factorise fully

i) $12a^2b - 18ab^2$. **(2)**

$= 6ab(2a - 3b)$

ii) $12p^2 - 16pq + 8pr$ **(2)**

$= 4p(3p - 4q + 2r)$

Question 3: Rates and Ratios (show all necessary working)

a) A radio station divides the air time between music and talk in the ratio 7 : 5. Next week the station will be on air for 168 hours. How many hours of music should it play? (1)

$\frac{7}{12} \times 168 = 98$ hrs

b) Write the ratio 1.4 : 5 in simplest form using whole numbers. (1)

$= 14 : 50$

$= 7 : 25$

c) Simplify the ratio 2.5 kg : 1500 g. (1)

$2500 : 1500$

$= 5 : 3$

d) Francis is a pastry chef and makes 300 cup cakes. He ices them with chocolate, vanilla and strawberry icing in the ratio 3 : 2 : 1. How many cupcakes will have vanilla icing? (1)

$= \frac{2}{6} \times 300$

$= 100$ cupcakes

e) Anna's car uses 21 litres of fuel to travel 350 km. What is it's consumption rate in litres/100km? (1)

21L / 350km

6L / 100km

f) Write a speed of 8 metres/second in km/h. (2)

28.8 km/h

g) Mike ploughs a field at a rate of 800m^2/min and Harry ploughs at a rate of 4.5 hectares/hour. Who ploughs the quicker? (Show calculations) (2)

Mike 4.8 ha/min

∴ Mike

h) Dayna makes 200 dolls for charity. She dresses 25% of them in red, $\frac{1}{3}$ of them in blue and the remainder in white? What is the ratio of red : blue : white dresses? (2)

$50 : 66\frac{2}{3} : \frac{250}{3}$

$= 150 : 200 : 250$

$= 3 : 4 : 5$

i) On a certain day, one Australian dollar will buy \$US1.05 in US dollars and will also buy €0.75 Euros. Mark has \$400 Australian dollars and he uses some of this to buy \$US210, and buys Euros with the remainder. How many Euros does he buy? (2)

\$US210 = \$200 AUD

200 × 0.75 = 150 Euros

j) Raymond plays the drums. For a particular song he needs to keep a rhythm of 48 beats/minute. He plays a total of 204 beats during the song. How long does the song lasts for in minutes and seconds. (2)

204 ÷ 48 = 4.25

4 min 15 secs

Question 4: Equations and Inequalities (show all necessary working)

a) Solve

i) $3(5b+1)=18$ (2)

$15b + 3 = 18$

$15b = 15$

$b = 1$

ii) $\frac{3a}{4} + 2 = 5$ (2)

$\frac{3a}{4} = 3$

$3a = 12$

$a = 4$

iii) $10 - 5(y-2) = -y$ (2)

$10 - 5y + 10 = -y$

$-4y = -20$

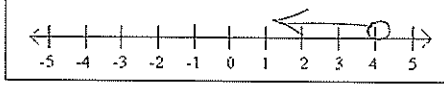
$y = 5$

b) Solve the following inequalities and sketch the solution on the number line provided

i) $2x - 3 < 5$ (3)

$2x < 8$

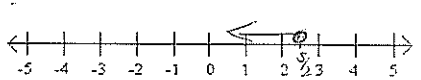
$x < 4$



ii) $p + 5 \geq 5p - 5$ (3)

$-4p \geq -10$

$p \leq \frac{10}{4}$ $\frac{5}{2}$



c) Solve leaving your answer in simplest form.

i) $9 - \frac{4x}{5} = 2x - 1.$ (3)

$10 - \frac{4x}{5} = 2x$

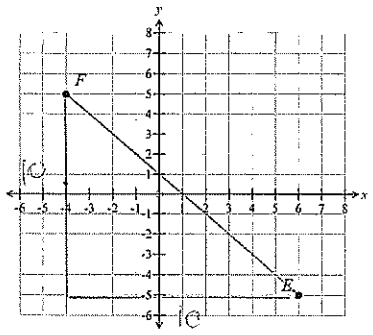
$50 - 4x = 10x$

$-14x = -50$

$x = \frac{50}{14} = \frac{25}{7}$

Question 5: **Number Plane** (show all necessary working)

a) Find the distance of the interval joining $E(6, -5)$ and $F(-4, 5)$ in exact form. **(2)**



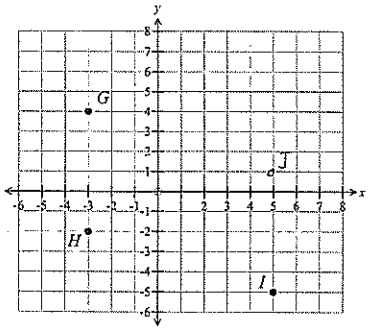
$EF^2 = 10^2 + 10^2$

$EF^2 = 100 + 100$

Distance: $EF = \sqrt{200}$

b) The points $G(-3,4)$, $H(-3,-2)$ and $I(5,-5)$ are three vertices of a parallelogram. **(1)**

If J is the fourth point of the parallelogram, and lies in the first quadrant, What are the coordinates of the fourth vertex J?



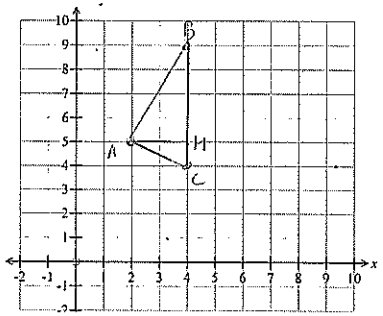
J (5,1)

c) The points A(2, 5), B(4, 9) and C(4, 4) are joined to form a triangle.

i) Draw the triangle ABC on the number plane. **(1)**

ii) If BC is the base of ΔABC and AM is the height, Draw AM clearly labeling M. **(2)**

iii) Find the length of the intervals BC and AM **(2)**



BC = 5

AM = 2

iv) Find the area of the triangle ABC. **(1)**

$A = \frac{1}{2} \times 5 \times 2 = 5u^2$

c)

i) On the same set of axes, graph $y = x + 1$ and $y = 2x - 2$. **(2)**

ii) What is the point of intersection? **(2)**

(3,4)

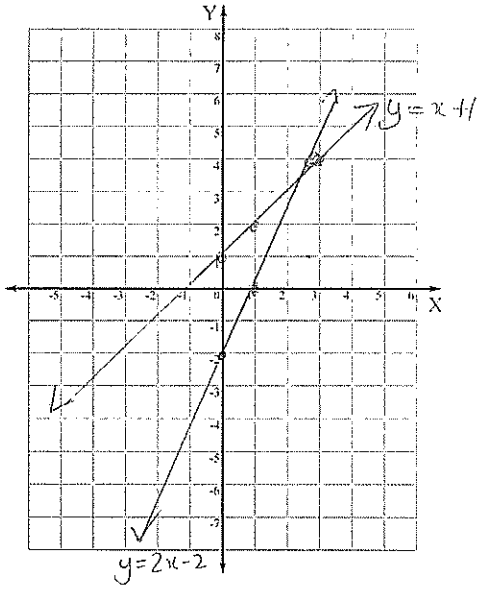
iii) Show that the point of insersection satisfies both lines drawn. **(2)**

$4 = 3 + 1$

$4 = 4$ ✓

$4 = 2 \times 3 - 2$

$4 = 6 - 2$ ✓



END OF EXAMINATION