

Name: Maths Class:

SYDNEY TECHNICAL HIGH SCHOOL



YEAR 10 YEARLY EXAMINATION

Mathematics

OCTOBER 2011

TIME ALLOWED: 70 minutes

Instructions:

- Write your name and class at the top of this page, and on the front page of your answer booklet
- All necessary working must be shown. Marks may not be awarded for careless or badly arranged work.
- Calculators may be used
- ALL questions are worth 12 marks, and part marks are shown.

(FOR MARKERS USE ONLY)

| Q1 | Q2 | Q3 | Q4 | Q5 | TOTAL |
|-----|-----|-----|-----|-----|-------|
| /12 | /12 | /12 | /12 | /12 | /60 |

QUESTION 1: (12 Marks)**Marks**

(a) Fully factorise $x^2 - 25$ 1

(b) Find the fraction halfway between $\frac{2}{3}$ and $\frac{3}{4}$ 1

(c) The marks for all students in a test in Aaron's maths class have a mean of 52 and a standard deviation of 5.25. Aaron does his test late, and gains a mark of 54. 2

Indicate whether the following get higher, lower or remain the same.

(i) THE MEAN

(ii) THE STANDARD DEVIATION

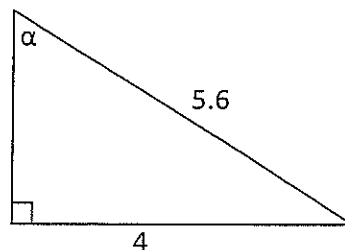
(d) Solve the following pair of simultaneous equations: 3

$$\begin{aligned} 3x - 4y &= 10 \\ y &= 2x - 5 \end{aligned}$$

(e) Simplify $\frac{3x-1}{2} - \frac{5+6x}{4}$ 2

(f) Find the value of $\cos 112^\circ 15'$ to 1 decimal place. 1

(g) Find the size of the angle marked α , to the nearest minute: 2



QUESTION 2: (12 Marks) Start a new page**Marks**

- (a) Peter works for an hourly wage of \$42 over a 38 hour week. After this, he is employed at a rate of time and a half for all extra hours. This week he worked 42 hours. How much did he earn for the week? **2**
- (b) Bert takes out a loan of \$50 000 and repays it over 10 years with monthly instalments of \$750.
- (i) How much interest has he paid at the end of his repayments? **1**
- (ii) Express this interest as simple interest per annum. **2**
- (c) Solve $(x - 1)^2 = 3$, leaving your answer in exact form. **2**
- (d) In a class of 30 boys, all boys must do a language, either French or German or both. 20 boys do French and 18 boys do German.
- (i) How many boys do both languages? **1**
- (ii) If a boy is chosen at random, what is the chance that he does German only (ie does not do French) **1**
- (e) For the following stem and leaf plot, find
- (i) the median **1**
- (ii) the inter-quartile range **2**

| <i>Stem</i> | <i>leaf</i> |
|-------------|-------------|
| 2 | 1 1 4 5 |
| 3 | 2 3 6 |
| 4 | 5 6 7 |
| 5 | 2 |

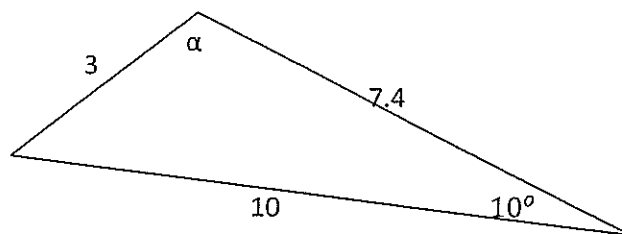
QUESTION 3: (12 Marks) Start a new page**Marks**

- (a) Solve the following, giving your answer to 2 decimal places, if necessary **2**

$$2x^2 + 3x - 5 = 0$$

- (b) In the following triangle, using the sine rule to find α gives two answers: **1**

$$35^\circ 23' \quad \text{and} \quad 144^\circ 37'$$



Which answer is correct? Justify your answer.

- (c) For the parabola $y = x^2 - 6x + 8$
- (i) Find the y -intercept **1**
 - (ii) Give the points where the curve cuts the x -axis **2**
 - (iii) Find the equation of the axis of symmetry **1**
 - (iv) Find the coordinates of the vertex **1**
 - (v) Draw the parabola on your answer sheet, showing all the keypoints you have just found. **2**
- (d) Solve the equation $x = 2 + \frac{8}{x}$ **2**

QUESTION 4: (12 Marks) Start a new page

Marks

(a) Copy and complete this table:

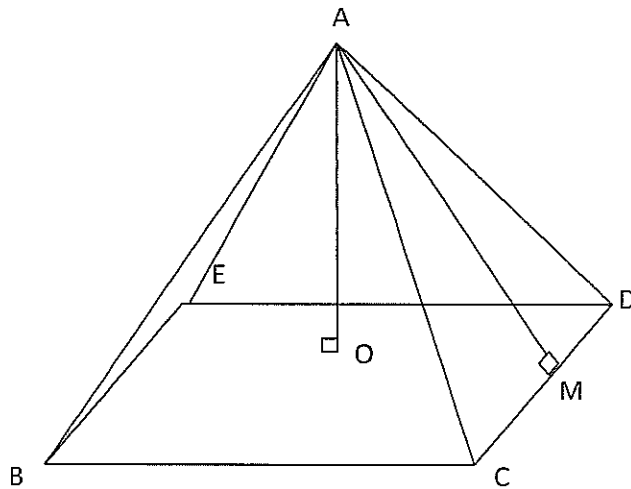
| <i>Score</i> | <i>f</i> | <i>fx</i> | <i>c.f.</i> |
|--------------|------------|------------|-------------|
| 22 | 3 | | |
| 27 | 2 | | |
| 32 | 6 | | |
| 37 | 5 | | |
| 42 | 2 | | |
| 47 | 2 | | |
| | $\Sigma =$ | $\Sigma =$ | |

2

Use the table to find

- (i) The mean 1
- (ii) The median 1
- (iii) The mode 1

(b) The square pyramid below has a base of 10 cm by 10cm and perpendicular height AO of 12 cm.



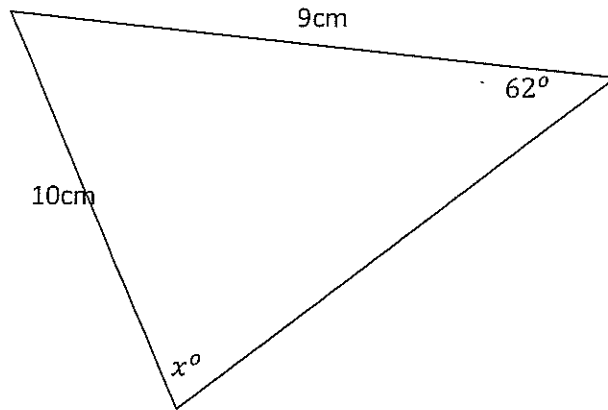
- (i) Find the slant height AM, correct to 1 dec place (if necessary) 1
- (ii) Find the Volume of the pyramid 1
- (iii) Find the Surface Area of the pyramid 2

QUESTION 4 continues over the page....

QUESTION 4 continued.....

- (c) Arthur plays a game where he throws a coin and tosses a 6-faced die. If he gets a tail and a six, he "wins". What is the chance of his "winning". **1**

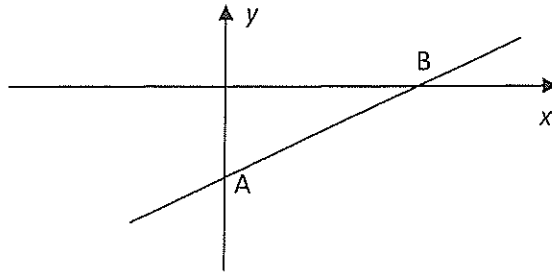
- (d) Find the size of the angle marked x° to the nearest degree, in the following: **2**



QUESTION 5: (12 Marks) Start a new page

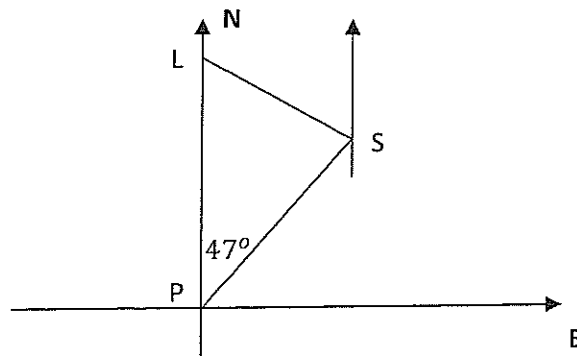
Marks

- (a) The diagram below shows the line $3x - 4y = 12$



- | | | |
|-------|---|---|
| (i) | Give the co-ordinates of A and B , the points where the line cuts the axes. | 2 |
| (ii) | Find the coordinates of M, the midpoint of the line A B | 1 |
| (iii) | Find the slope of the line AB | 1 |
| (iv) | Find the equation of the perpendicular bisector of the interval AB. | 2 |

- (b) A ship leaves a port P and travels on a bearing of $N47^\circ E$ for a distance of 30 km until it is at S.



At S it sights a lighthouse L, bearing $N55^\circ W$ from its present position, and it is known that the lighthouse is due north of P.

- | | | |
|------|--|---|
| (i) | Redraw the diagram above on your answer page and complete all of the missing details and find the size of the angle PLS. | 1 |
| (ii) | How far north of P is L in a straight line? (to the nearest km) | 2 |

QUESTION 5 continues over the page....

QUESTION 5 cont....

- (c) In James' English and Maths classes, the mean and standard deviation for all students in the class for their yearly examination are given as below:

| | Mean | Standard deviation |
|--------------------|------|--------------------|
| ENGLISH | 80 | 10.3 |
| MATHEMATICS | 68 | 3.1 |

- (i) Which subject had the greatest spread of scores? **1**
- (ii) James scored 82 in English and 75 in Mathematics. His mother was very unhappy with his Maths mark and gave James a hard time. James tried to explain to his mother why his Maths result was actually better than his English. In a few sentences, write a good argument for James to use to convince his mother. **2**

END OF PAPER