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

SYDNEY TECHNICAL HIGH SCHOOL

Year 9
Mathematics

Common Test

Assessment 3

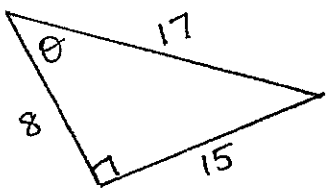
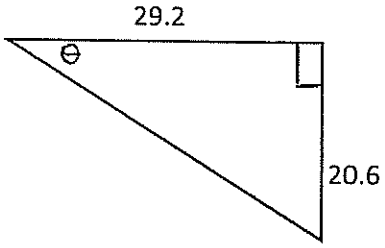
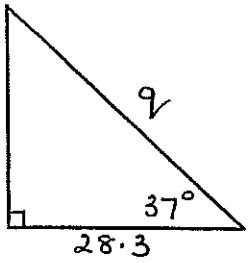
October, 2016

Time allowed: 70 minutes

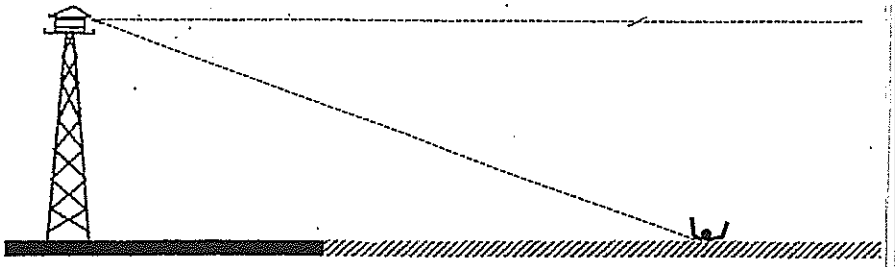
General Instructions:

- Marks for each question are indicated on the question.
- Approved calculators may be used
- All necessary working should be shown
- Full marks may not be awarded for careless work or illegible writing
- Write using black or blue pen
- Write your answers in the space provided

Question 1	/15
Question 2	/15
Question 3	/15
Question 4	/15
Question 5	/15
TOTAL	/75

QUESTION 1 (15 marks)		ANSWERS
1.	Find the value of $\sin\theta$  (1 mrk)	
2.	If $\tan\theta = 1.532$, find the value of θ to the nearest minute. (1 mrk)	
3.	Find the value of θ correct to the nearest degree.  (2 mrks)	
4.	Find the value of q correct to 1 decimal place.  (2 mrks)	
5.	A ladder of length 6 metres leans against a wall. The top of the ladder is 5.5m above the base of the wall. Find the angle (to the nearest degree) formed between the ladder and the ground. (2 mrks)	

6. A lifeguard spots a swimmer in distress from a lifeguard station 2.5m high.

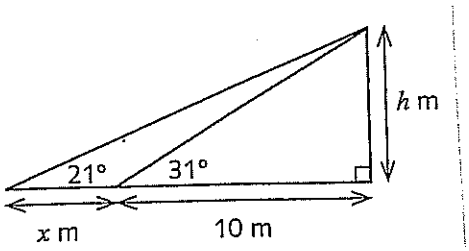


The angle of depression from the lifeguard to the swimmer is 4^0

Find the distance to the swimmer from the base of tower, correct to one decimal place.

(2 mrks)

7.

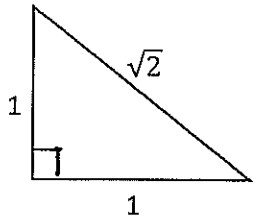
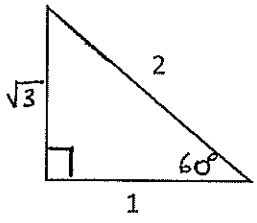


(a) Find the height h, correct to the nearest metre (1 mrk)

(a)

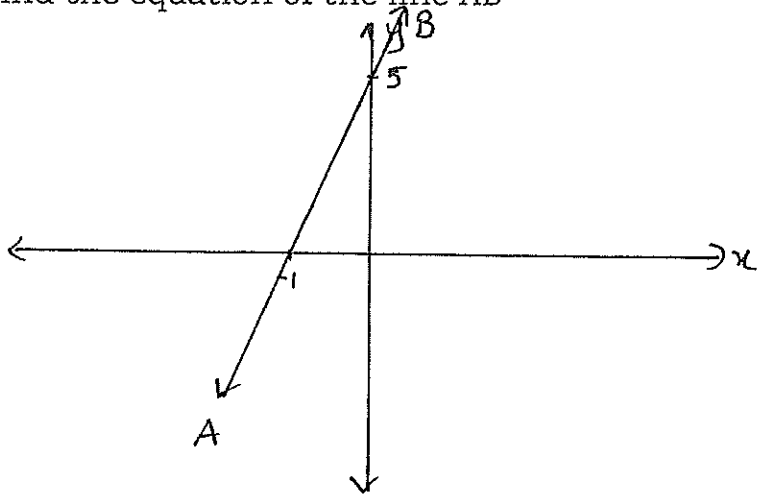
(b) Find the value of x, correct to the nearest metre. (2 mrks)

(b)

8.	Consider the triangles below. What is the exact value of   (i) $\tan 30^0$ (1 mrk) (ii) $\sin 45^0$ (1 mrk)	(i)_____ (ii)_____

QUESTION 2 (15 marks)		**ANSWERS**
1.	Fully factorise the following (a) $12a^3c^2 + 36a^2bc$ (1 mrk)	(a)
	(b) $49y^2 - 100x^2$ (1mrk)	(b)
	(c) $px - 2x + ap - 2a$ (1 mrk)	(c)
	(d) $6a^2 + 5a + 1$ (2 mrks)	(d)
2.	Simplify the following (a) $\frac{m^2-m-6}{m^2-9} \times \frac{m^2}{m^2+2m}$ (2 mrks)	(a)
	(b) $\frac{3}{x+2} + \frac{2}{x+3}$ (2 mrks)	(b)
3.	Make n the subject of $nc = n + 50$ (2 mrks)	
4.	Solve $\frac{2x+1}{5} = \frac{1-2x}{3}$ (2 mrks)	
5.	Make y the subject of $x = \sqrt{\frac{x+y}{z}}$ (2 mrks)	

QUESTION 3 (15 marks)		**ANSWERS**
1.	Write down the gradient of the line $2x - 3y + 7 = 0$ (1 mrk)	
2.	Given $(2, k)$ lies on the line $x + 2y = 8$, find the value of k (2 mrks)	
3.	Calculate the exact distance between the points (5, 4) and (9, -6) (2 mrks)	
4.	Find the gradient of the line joining (-3, 2) to (5, 4) (1 mrk)	
5.	Find the midpoint of the line joining (3, -5) and (-2, 7) (1 mrk)	
6.	Find the equation of the line through (-3, 4) and parallel to the y axis (1mrk)	
7.	Find the co-ordinates of the point where the line $2x + y = 6$ cuts the x axis (1 mrk)	

8.	Find the equation of the line AB  (1mrk)	
9.		

x	-2	-1	0	1	2
y	-5	-2	1	4	7

Circle the correct rule for this table

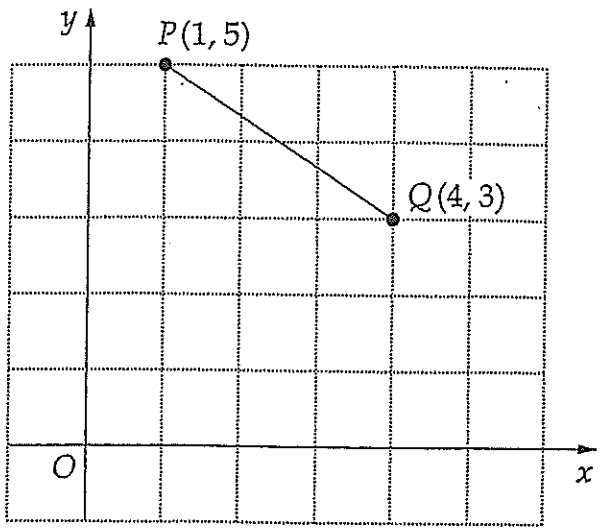
(A) $y = 2x - 1$ (B) $y = 3x + 1$

(C) $y = 4x$ (D) $y = 4x - 1$

(1mrk)

10.	Does the point (-2, 1) lie on the line $x - y = 3$? (1mrk)	
11.	Write down the equation of the line which has a gradient of $\frac{1}{2}$ and a y intercept of -3 and leave in general form (2mrks)	

12.



What is the gradient of the interval PQ?

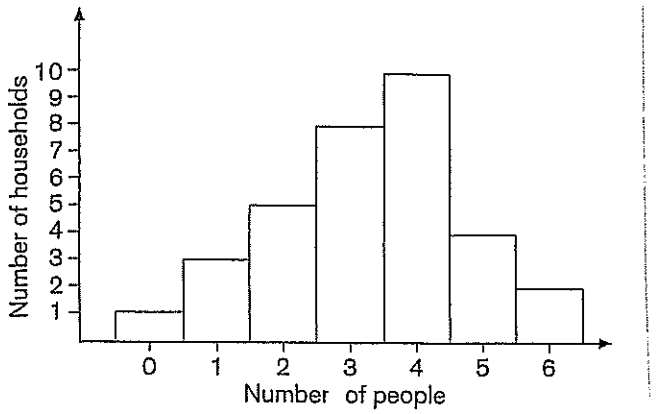
(A) $-\frac{2}{3}$ (B) $-\frac{3}{2}$ (c) $\frac{2}{3}$ (D) $\frac{3}{2}$

(1 mrk)

QUESTION 4 (15 marks)

ANSWERS

1. The graph below represents the results of a survey of the people living in the households in Mooney Street.



(a) How many households in Mooney Street (1 mrk)

(a) _____

(b) If a household was chosen at random what is the probability that it contains

(b)

(i) 3 people (1mrk)

(i) _____

(ii) less than 2 people (1mrk)

(ii) _____

(iii) at least 4 people (1mrk)

(iii) _____

2. (a) Complete the following table

Class	Class Centre (cc)	Frequency (f)	Cumulative Frequency	f x cc
72-76	74	5	5	370
77-81	79	10	15	790
82-86	84	14	29	1176
87-91		8	37	
92-96	94	3	40	282
			$\sum fxcc =$	

(1 mrk)

(b) Using the table above calculate an estimate for the mean _____ (1 mrk)

(c) What is the modal class? _____ (1 mrk)

(d) What is the median class? _____ (1 mrk)

3. A two-way table has been drawn up showing the results of a lie-detector test.

	Detected True	**Detected False**
True Statement	84	16
False Statement	36	124

What is the probability that a statement was correctly detected?

(A) $\frac{21}{65}$

(B) $\frac{31}{65}$

(C) $\frac{4}{5}$

(D) $\frac{6}{13}$

(1mrk)

4.

Score	Frequency
2	2
3	3
4	1
5	4
6	7
7	3
	20

The mean of this set of scores is 5. If another score of 5 is added to the set, which of these measures will change?

(A) mean

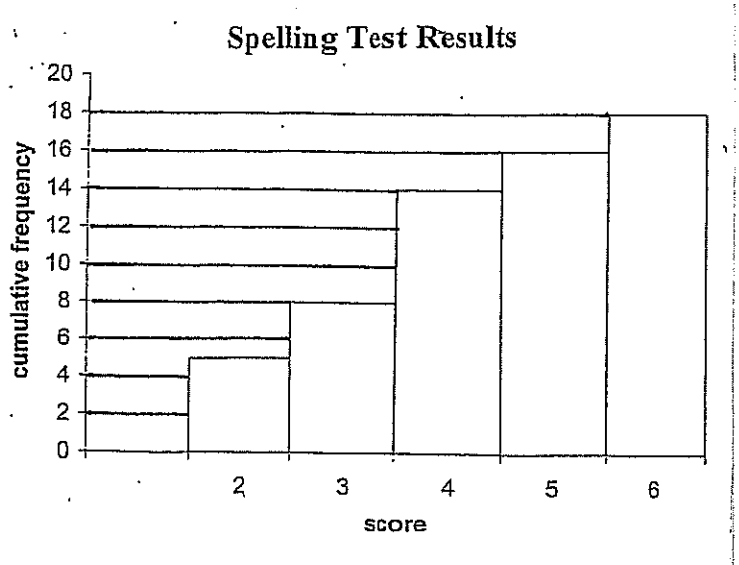
(B) median

(C) mode

(D) range (1mrk)

5. Find the value of $\sqrt[4]{1.5 \times 10^{-5}}$ correct to 3 significant figures (1mrk)

6.



A class did a spelling test out of 6 marks and the results are recorded in the above cumulative frequency histogram. The lowest score was 2.

(a) How many students scored 4 or more in the spelling test. (1 mrk)

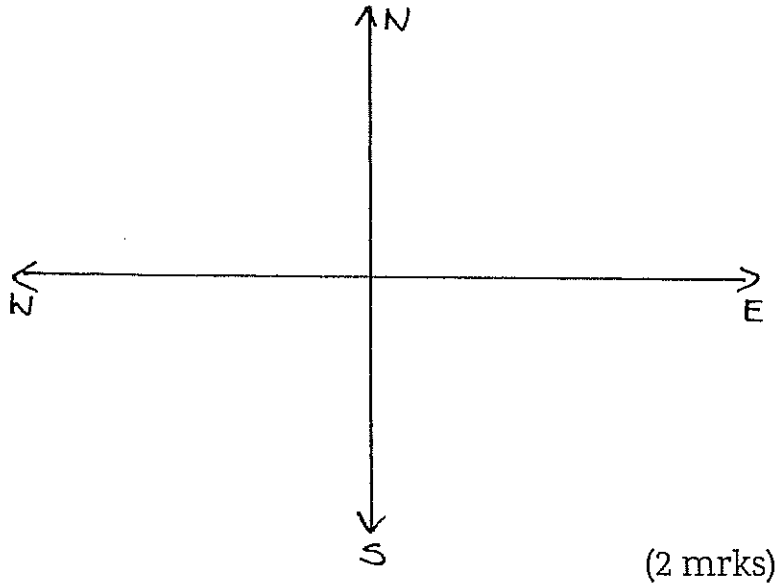
(a)_____

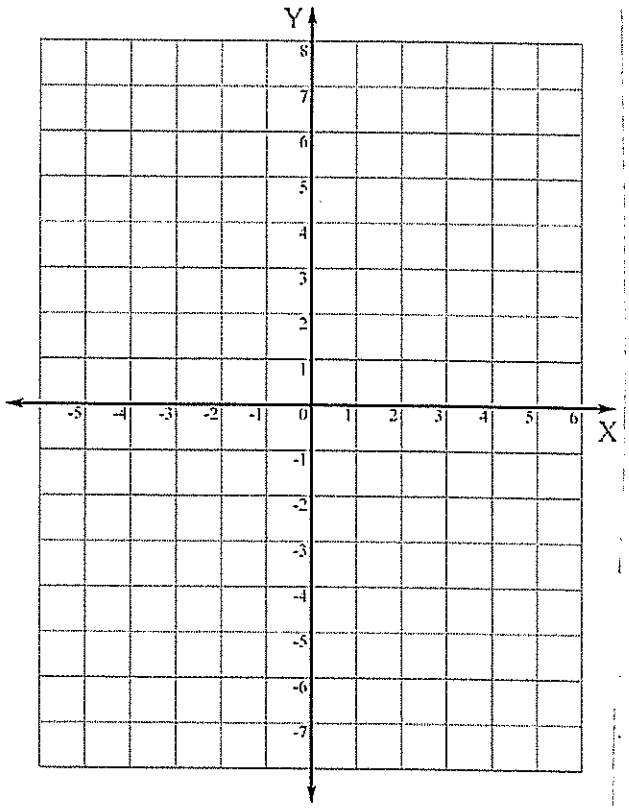
(b) Add a cumulative frequency polygon (ogive) to the graph and use it to find the median (1 mrk)

(b)_____

(c) Find the mean of the scores (1 decimal place if necessary) (2 mrks)

(c)_____

QUESTION 5 (15 marks)		ANSWERS
1.	If $(a + \sqrt{2})^2 = m + 6\sqrt{2}$, where a and m are integers, find the value of a and m (2 mrks)	
2.	After walking due south, turning and walking due east, a man is 500m from his starting point and a bearing 148° from it. How far did he walk southward to the nearest metre?  (2 mrks)	
3.	Express in the simplest form without negative indices $(10a^{-1}c^3)^2 \times \frac{c^{-4}}{4a^{-3}}$ (2 marks)	

4.	A coin is tossed 3 times. (a) Draw a tree diagram to list all the possible outcomes (1 mrk)	
	(b) Find the probability of tossing (i) one head and 2 tails in any order (1 mrk) (ii) at least 1 tail (1 mrk)	(i) _____ (ii) _____
5.	Graph the following pairs of lines $y = 1 - x$ $y = 3 - 2x$ Then write down the co-ordinates of their point of intersection (3 mrks) Point of intersection = _____	

6.	A multiple choice test contains 30 questions. Each correct answer is given 5 marks. Each incorrect answer loses 2 marks. Each question not attempted loses 2 marks. A student scored 101 marks on the test. The student answered x questions correctly. (a) Write an equation to represent this information (1 mrk)	
	(b) Solve the equation (2 mrks)	

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

SYDNEY TECHNICAL HIGH SCHOOL

Year 9

Mathematics

Common Test

Assessment 3

October, 2016

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General Instructions:

- Marks for each question are indicated on the question.
- Approved calculators may be used
- All necessary working should be shown
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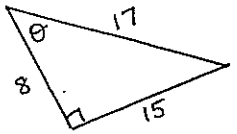
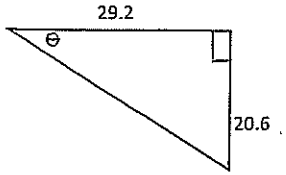
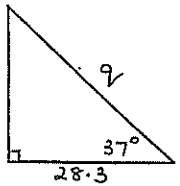
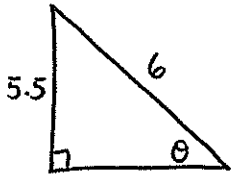
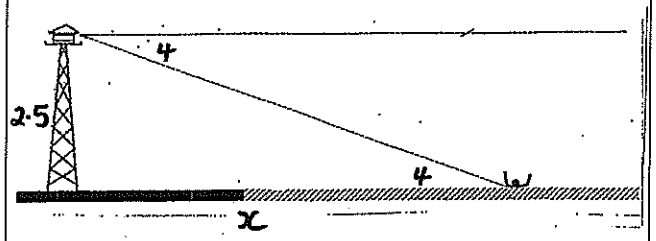
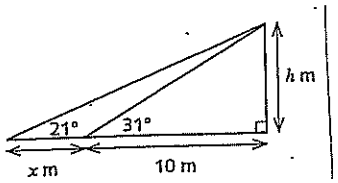
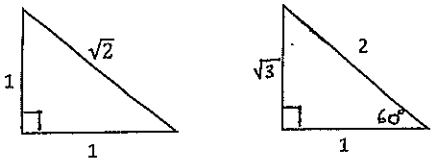
Question 1	/15
Question 2	/15
Question 3	/15
Question 4	/15
Question 5	/15
TOTAL	/75

QUESTION 1 (15 marks)		ANSWERS
1.	Find the value of $\sin\theta$  (1 mrk)	$\frac{15}{17}$
2.	If $\tan\theta = 1.532$, find the value of θ to the nearest minute. (1 mrk)	$56^\circ 52'$
3.	Find the value of θ correct to the nearest degree.  $\tan\theta = \frac{20.6}{29.2}$ (2 mrks)	35°
4.	Find the value of q correct to 1 decimal place.  $\cos 37 = \frac{28.3}{q}$ $q = \frac{28.3}{\cos 37}$ (2 mrks)	$q = 35.4$
5.	A ladder of length 6 metres leans against a wall. The top of the ladder is 5.5m above the base of the wall. Find the angle (to the nearest degree) formed between the ladder and the ground. (2 mrks)  $\sin\theta = \frac{5.5}{6}$	66°

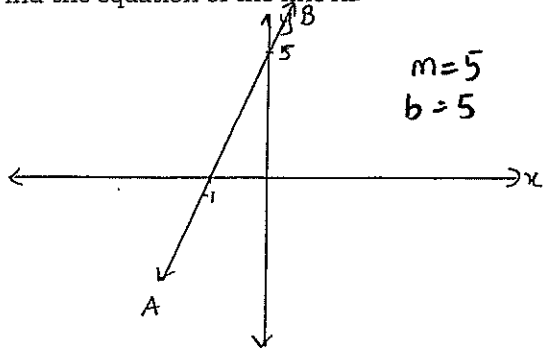
6.	A lifeguard spots a swimmer in distress from a lifeguard station 2.5m high.  The angle of depression from the lifeguard to the swimmer is 4^0 Find the distance to the swimmer from the base of tower, correct to one decimal place. $\tan 4 = \frac{2.5}{x}$ $x = \frac{2.5}{\tan 4}$ (2 mrks)	$35.8m$
7.	 (a) Find the height h, correct to the nearest metre (1 mrk) $\tan 31 = \frac{h}{10}$ (b) Find the value of x, correct to the nearest metre. (2 mrks) $\tan 21 = \frac{6}{y}$ $y = 15.63$	(a) $h = 6m$ (b) $x = 15.63 - 10$ $x = 5.63$ $x = 6m$

8.	Consider the triangles below. What is the exact value of  (i) $\tan 30^0$ (1 mrk) (ii) $\sin 45^0$ (1 mrk)	(i) $\frac{1}{\sqrt{3}}$ (ii) $\frac{1}{\sqrt{2}}$

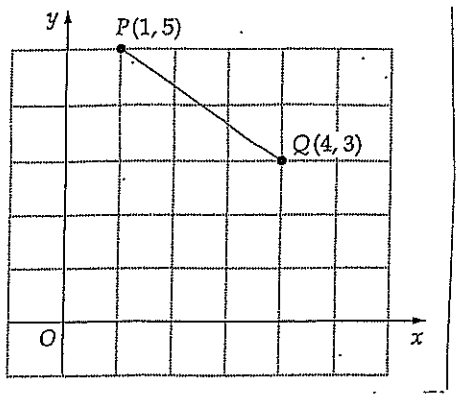
QUESTION 2 (15 marks)		ANSWERS
1.	Fully factorise the following (a) $12a^3c^2 + 36a^2bc$ (1 mrk)	(a) $12a^2c(ac+3b)$
	(b) $49y^2 - 100x^2$ (1mrk)	(b) $(7y-10x)(7y+10x)$
	(c) $px - 2x + ap - 2a$ (1 mrk) $x(p-2)+a(p-2)$	(c) $(x+a)(p-2)$
	(d) $6a^2 + 5a + 1$ (2 mrks) $= 6a^2+3a+2a+1$ $= 3a(2a+1)+1(2a+1)$	(d) $(3a+1)(2a+1)$
2.	Simplify the following (a) $\frac{m^2-m-6}{m^2-9} \times \frac{m^2}{m^2+2m}$ (2 mrks) $\frac{(m-3)(m+2)}{(m-3)(m+3)} \times \frac{m^2}{m(m+2)}$	(a) $\frac{m}{m+3}$
	(b) $\frac{3}{x+2} + \frac{2}{x+3}$ (2 mrks) $= \frac{3(x+3)+2(x+2)}{(x+2)(x+3)}$ $= \frac{3x+9+2x+4}{(x+2)(x+3)}$	(b) $\frac{5x+13}{(x+2)(x+3)}$
3.	Make n the subject of $nc = n + 50$ (2 mrks) $nc - n = 50$ $n(c-1) = 50$	$n = \frac{50}{c-1}$
4.	Solve $\frac{2x+1}{5} = \frac{1-2x}{3}$ $6x+3 = 5-10x$ $16x = 2$ $x = 1/8$ (2 mrks)	$x = \frac{1}{8}$
5.	Make y the subject of $x = \sqrt{\frac{x+y}{z}}$ $x^2 = \frac{x+y}{z}$ $x^2z = x+y$ (2 mrks)	$y = x^2z - x$ or $y = x(xz-1)$

QUESTION 3 (15 marks)

		ANSWERS
1.	Write down the gradient of the line $2x - 3y + 7 = 0$ $3y = 2x + 7$ $y = \frac{2}{3}x + \frac{7}{3}$ (1 mrk)	$m = \frac{2}{3}$
2.	Given $(2, k)$ lies on the line $x + 2y = 8$, find the value of k (2 mrks) $2 + 2k = 8$ $2k = 6$	$k = 3$
3.	Calculate the exact distance between the points (5, 4) and (9, -6) $d = \sqrt{(5-9)^2 + (4--6)^2}$ $d = \sqrt{16+100}$ (2 mrks)	$d = \sqrt{116}$ or $2\sqrt{29}$
4.	Find the gradient of the line joining (-3, 2) to (5, 4) $m = \frac{4-2}{5--3} = \frac{2}{8}$ (1 mrk)	$m = \frac{1}{4}$
5.	Find the midpoint of the line joining (3, -5) and (-2, 7) (1 mrk) Mdpt $= \left(\frac{3+-2}{2}, \frac{7+-5}{2}\right)$	$(\frac{1}{2}, 1)$
6.	Find the equation of the line through (-3, 4) and parallel to the y axis (1mrk)	$x = -3$
7.	Find the co-ordinates of the point where the line $2x + y = 6$ cuts the x axis (1 mrk) When $y = 0$ $2x = 6$ $x = 3$	$(3, 0)$

8.	Find the equation of the line AB  (1mrk)	$y = 5x + 5$
9.	x: -2, -1, 0, 1, 2 y: -5, -2, 1, 4, 7 Circle the correct rule for this table (A) $y = 2x - 1$ (B) $y = 3x + 1$ (C) $y = 4x$ (D) $y = 4x - 1$ (1mrk)	B
10.	Does the point (-2, 1) lie on the line $x - y = 3$? LHS $= -2 - 1 = -3$ RHS $= 3$ (1mrk)	No
11.	Write down the equation of the line which has a gradient of $\frac{1}{2}$ and a y intercept of -3 and leave in general form (2mrks) $y = \frac{1}{2}x - 3$ $2y = x - 6$	$x - 2y - 6 = 0$

12.



What is the gradient of the interval PQ?

(A) $-\frac{2}{3}$ (B) $-\frac{3}{2}$ (c) $\frac{2}{3}$ (D) $\frac{3}{2}$

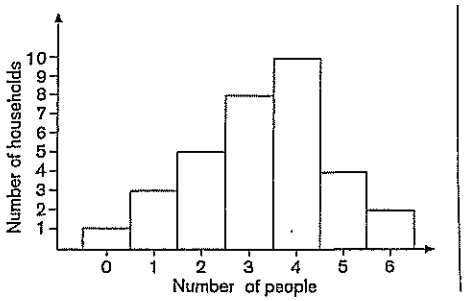
(1 mrk)

A

QUESTION 4 (15 marks)

ANSWERS

1. The graph below represents the results of a survey of the people living in the households in Mooney Street.



(a) How many households in Mooney Street (1 mrk)

(a) 33

(b) If a household was chosen at random what is the probability that it contains

(b)

(i) 3 people (1mrk) (i) $\frac{8}{33}$

(ii) less than 2 people (1mrk) (ii) $\frac{4}{33}$

(iii) at least 4 people (1mrk) (iii) $\frac{16}{33}$

2. (a) Complete the following table

Class	Class Centre (cc)	Frequency (f)	Cumulative Frequency	$f \times cc$
72-76	74	5	5	370
77-81	79	10	15	790
82-86	84	14	29	1176
87-91	89	8	37	712
92-96	94	3	40	282
		$\Sigma f = 40$	$\sum fxcc =$	3330

(1 mrk)

(b) Using the table above calculate an estimate for the mean $\frac{3330}{40} = 83.25$ (1 mrk)

(c) What is the modal class? 82-86 (1 mrk)

(d) What is the median class? 82-86 (1 mrk)

3. A two-way table has been drawn up showing the results of a lie-detector test.

	Detected True	Detected False
True Statement	84	16
False Statement	36	124

What is the probability that a statement was correctly detected?

(A) $\frac{21}{65}$

(B) $\frac{31}{65}$

(C) $\frac{4}{5}$

(D) $\frac{6}{13}$

(1mrk)

C

4.

Score	Frequency
2	2
3	3
4	1
5	4
6	7
7	3
	20

The mean of this set of scores is 5. If another score of 5 is added to the set, which of these measures will change?

(A) mean

(B) median

(C) mode

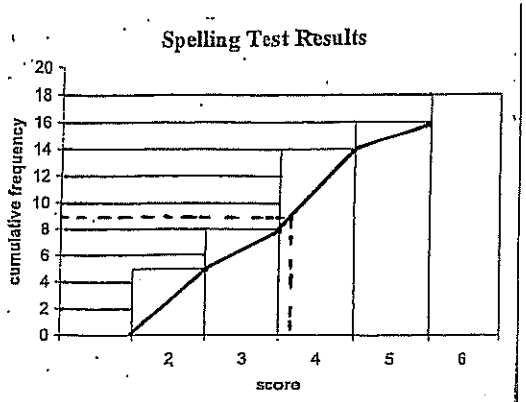
(D) range (1mrk)

B

5. Find the value of $\sqrt[4]{1.5 \times 10^{-5}}$ correct to 3 significant figures (1mrk)

0.0622

6.



A class did a spelling test out of 6 marks and the results are recorded in the above cumulative frequency histogram. The lowest score was 2.

(a) How many students scored 4 or more in the spelling test. (1 mrk)

(a) 10

(b) Add a cumulative frequency polygon (ogive) to the graph and use it to find the median (1 mrk)

(b) 4

(c) Find the mean of the scores (1 decimal place if necessary) (2 mrks)

$\frac{65}{18}$

(c) 3.6

QUESTION 5 (15 marks)

ANSWERS

1. If $(a + \sqrt{2})^2 = m + 6\sqrt{2}$, where a and m are integers, find the value of a and m

$a^2 + 2a\sqrt{2} + 2$

$2a = 6$ $\quad a = 3$

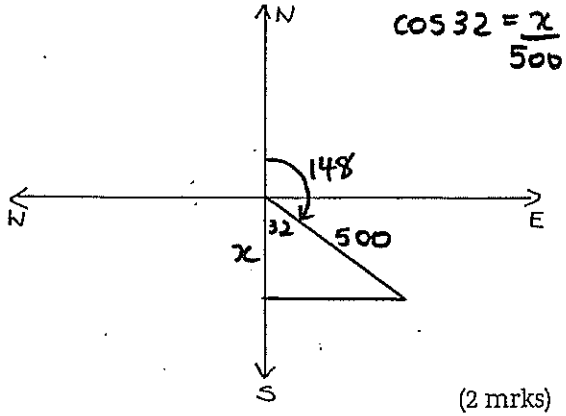
$a^2 + 2 = m$ $\quad m = 11$

(2 mrks)

$a = 3$

$m = 11$

2. After walking due south, turning and walking due east, a man is 500m from his starting point and a bearing 148° from it. How far did he walk southward to the nearest metre?



$\cos 32 = \frac{x}{500}$

(2 mrks)

424.02

= 424m

3. Express in the simplest form without negative indices

$(10a^{-1}c^3)^2 \times \frac{c^{-4}}{4a^{-3}}$

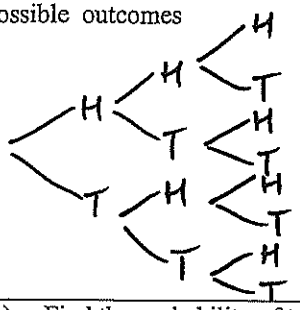
$100a^{-2}c^6 \times \frac{c^{-4}}{4a^{-3}} = \frac{25c^6a^3}{a^2c^4}$

(2 marks)

$25ac^2$

4. A coin is tossed 3 times.

(a) Draw a tree diagram to list all the possible outcomes



(1 mrk)

HHH
HHT
HTH
HTT
THH
THT
TTH
TTT

(b) Find the probability of tossing

(i) one head and 2 tails in any order (1 mrk)

(i) $\frac{3}{8}$

(ii) at least 1 tail (1 mrk)

(ii) $1 - \frac{1}{8} = \frac{7}{8}$

5. Graph the following pairs of lines

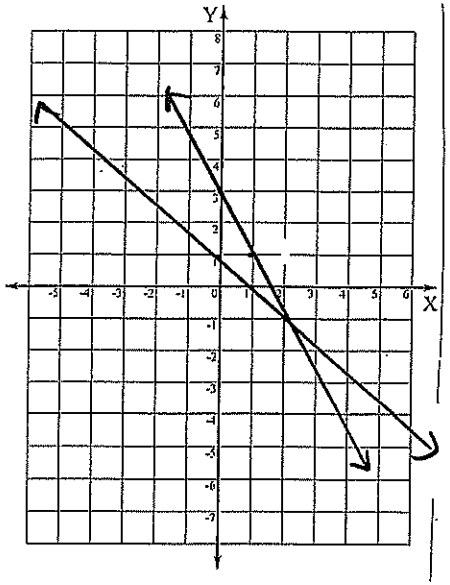
$$y = 1 - x$$
$$y = 3 - 2x$$

Then write down the co-ordinates of their point of intersection (3 mrks)

x	0	1	2
y	1	0	-1

x	0	1	2
y	3	1	-1

Point of intersection = (2, -1)



6. A multiple choice test contains 30 questions. Each correct answer is given 5 marks. Each incorrect answer loses 2 marks. Each question not attempted loses 2 marks. A student scored 101 marks on the test. The student answered x questions correctly.

(a) Write an equation to represent this information (1 mrk)

$5x + -2(30 - x) = 101$

(b) Solve the equation (2 mrks)

$5x - 60 + 2x = 101$

$7x - 60 = 101$

$7x = 161$

$x = 23$