

# Carlingford High School



## Mathematics

### Year 10 Term 3 Examination

### 5.1 Course

### 2016

Name: \_\_\_\_\_

Class: 10M1

Teacher: \_\_\_\_\_

*Time allowed: 55 minutes*

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Complete the examination in blue or black pen.
- All diagrams are **NOT** drawn to scale

Topic	Algebra	Equations & Inequations	Probability	Interest	Data	Trigonometry	Total
Mark	/17	/18	/8	/10	/17	/14	/84

## Algebra (17 marks)

1. Simplify

(a)  $2x + 3x - x + 7 =$

(b)  $7a - 5b - 8a =$

(c)  $9m \times 2mn =$

(d)  $x^2 \times x^2 \times x^3 =$

(e)  $6x^5 \div 2x^2 =$

(f)  $n^0 - m^0 =$

2. Write  $x^{-3}$  with a positive index.

3. Expand and simplify if possible:

(a)  $2(x + 5) =$

(b)  $3(2x - 1) + 7 =$

$=$

4. (a) What is the highest common factor of  $8ab$  and  $12a$ ?

(b) Factorise  $10 + 15x$

$10 + 15x = ( \quad + \quad )$

5. (a) Write 630 000 in scientific notation.

(b) Write 0.000007 in scientific notation.

(c) Express  $2.5 \times 10^3$  as a basic numeral.

(d) Write 40.281 to 3 significant figures.

(e) Circle the bigger number.

$8.9 \times 10^{-4}$  ,  $1.3 \times 10^2$

## Equations and Inequations (18 marks)

1. State the value of  $x$  in  $2x = 8$

A. 3    B. 8    C. 16    D. 4

2. What is the value of  $x$  in the equation  $\frac{x+6}{2} = 4$

A. 14    B. 2    C. 4    D. -20

3. A certain number is divided by three and then subtracted from eight. The result is four. Choose the correct equation.

A.  $\frac{x}{3} - 8 = 4$

B.  $\frac{8-x}{3} = 4$

C.  $8 - \frac{x}{3} = 4$

D.  $8 - x = \frac{4}{3}$

4. Solve the following equations

(a)  $x - 6 = 10$

(b)  $3x = -5$

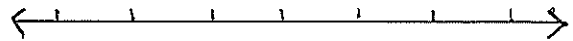
(c)  $7x + 21 = 2x + 16$

(d)  $3x^2 = 12$

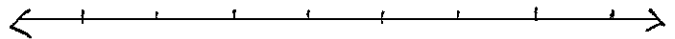
(e)  $8(2x - 1) = 5 + x$

5. Graph on the number line provided.

(a)  $x > 1$



(b)  $x \leq -3$



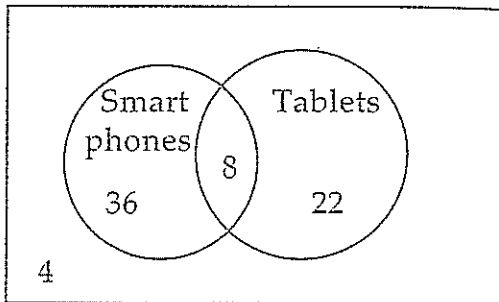
6. Solve the following inequations

(a)  $2x + 5 \geq 11$

(b)  $6 - x < 9$

## Probability (8 marks)

1. The Venn diagram shows how many students have smartphones and tablets.



- (a) How many students were surveyed?
- (b) How many have both a smartphone and a tablet?
- (c) How many students have a tablet?
- (d) How many students have one device only?
- (e) What is the probability that a student does not have a device?

2. Complete the table below using the information from Question 1 above.

	Smartphone	No smartphone	Total
Tablet			
No tablet			
Total			

## Simple and Compound Interest

### (10 marks)

1. Using the formula  $I = P \times R \times T$

Find the simple interest on:

(a) \$2500 at 4% for 7 years

(b) \$300 at 2% for 6 months

2. Mary invested \$1000 at 2%pa compounded annually for 9 years.

Using the Compound Interest Formula

$$A = P \times (1 + R)^n$$

answer the following questions:

- (a) What is the principal?
- (b) What is the  $R$  ?
- (c) Calculate the amount earned ( $A$ ) after 9 years.

- (d) Calculate the interest earned after 9 years.

3. If \$5000 is invested for 3 years at 12%pa compounded monthly calculate the amount earned at the end of 3 years.

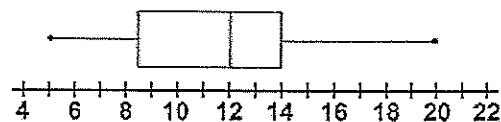
## Analysing Data (17 marks)

1. The following display shows the age of concert goers in the front and back rows.

Back row		Front row
Leaf	Stem	Leaf
	0	8
8 6 5 5 5 2	1	3 6 9 9
7 3 2 2 1 0 0 0	2	0 0 1 2 2 3 7 7
9 4 2	3	1 2 2 2 5 8
4 5	4	6
1	5	

- (a) What is the name of this graph?
- (b) How many scores (ages) are there in total?
- (c) What is the oldest age in the back row?
- (d) What is the median age of the front row?
- (e) What is the mode of the back row?

2.



- a) For the box and whisker plot above, complete the 5 point summary:

Lowest score =  
 Lower quartile =  
 Median =  
 Upper quartile =  
 Highest score =

- b) Find the range.

\_\_\_\_\_

- c) Calculate the interquartile range.

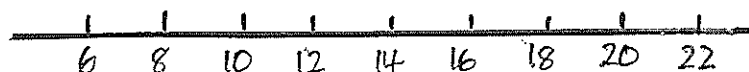
\_\_\_\_\_

\_\_\_\_\_

3. a) Complete the five point summary for the following data:  
 6 6 7 8 10 11 13  
 14 16 18 19 21 21 21

Lowest score = 6  
 Lower quartile = 8  
 Median =  
 Upper quartile =  
 Highest score = 21

- b) Draw a box and whisker plot for the data above.

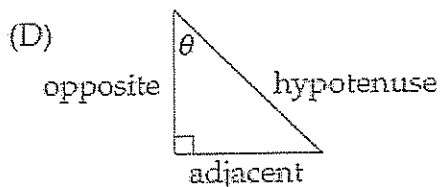
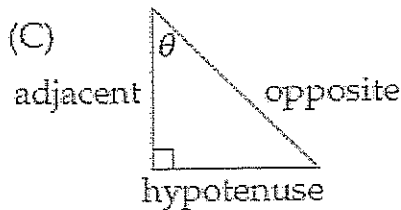
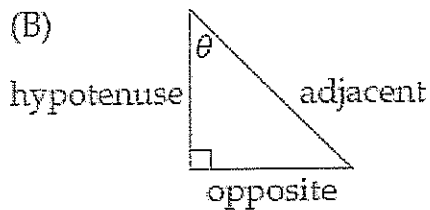
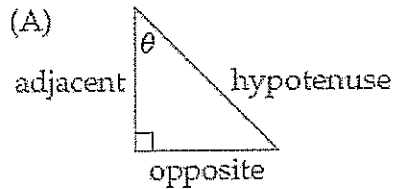


- (c) What percentage of scores lie between 8 and 19?

## Trigonometry (14 marks)

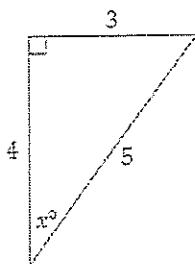
1. Which diagram correctly labels the sides of the triangle in relation to angle  $\theta$ ?

Circle your answer.



2. The value of  $\sin x$  is:

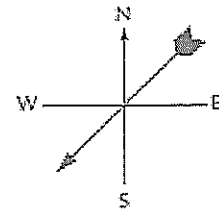
Circle your answer.



- (A)  $\frac{3}{5}$       (B)  $\frac{4}{5}$   
(C)  $\frac{3}{4}$       (D)  $\frac{5}{4}$

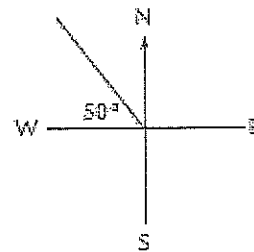
3. The wind vane below is pointing in the direction of:

Circle your answer.



- (A) North-East      (B) South-East  
(C) North-West      (D) South-West

4. The bearing in the direction diagram below is:



- (A) 050°T      (B) 130°T  
(C) 040°T      (D) 320°T

5. a) Write  $87.3^\circ$  in degrees and minutes.

\_\_\_\_\_

- b) Simplify  $76^\circ 14' + 18^\circ 53'$

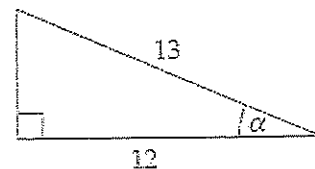
\_\_\_\_\_

6. Find  $\theta$  to the nearest minute given  $\sin \theta = 0.568$

\_\_\_\_\_

\_\_\_\_\_

7. Find the angle  $\alpha$  to the nearest minute.

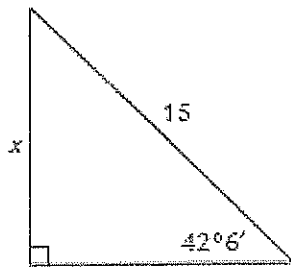


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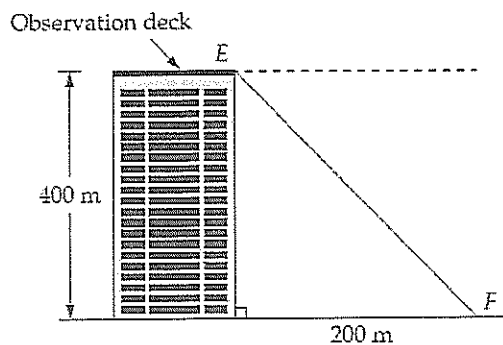
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8. Find  $x$  to the nearest whole number



9. A tower's observation deck is 400m above the ground. Erin (E) is standing at one end of the observation deck and her father (F) is standing on the ground, 200m from the base of the tower.



- a) Label the angle of depression on the diagram above.
- b) What is the angle of depression from Erin to her father to the nearest degree?

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# Carlingford High School



## Mathematics

### Year 10 Term 3 Examination

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### 2016

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Class: 10M1

Teacher: \_\_\_\_\_

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Topic	Algebra	Equations & Inequations	Probability	Interest	Data	Trigonometry	Total
Mark	/17	/18	/8	/10	/17	/14	/84

Mr Cheng

Mrs Lobejko



## Algebra (17 marks)

1. Simplify

(a)  $2x + 3x - x + 7 = 4x + 7$

(b)  $7a - 5b - 8a = -a - 5b$

(c)  $9m \times 2mn = 18m^2n$

(d)  $x^2 \times x^2 \times x^3 = x^7$

(e)  $6x^5 \div 2x^2 = 3x^3$

(f)  $n^0 - m^0 = 1 - 1 = 0$

2. Write  $x^{-3}$  with a positive index.

$$\frac{1}{x^3}$$

3. Expand and simplify if possible:

(a)  $2(x + 5) = 2x + 10$

(b)  $3(2x - 1) + 7 = 6x - 3 + 7$   
 $= 6x + 4$

4. (a) What is the highest common factor of  $8ab$  and  $12a$ ?

$$4a$$

(b) Factorise  $10 + 15x$

$$10 + 15x = 5(2 + 3x)$$

5. (a) Write 630 000 in scientific notation.

$$6.3 \times 10^5$$

(b) Write 0.000007 in scientific notation.

$$7 \times 10^{-6}$$

(c) Express  $2.5 \times 10^3$  as a basic numeral.

$$2500$$

(d) Write 40.281 to 3 significant figures.

$$40.3$$

(e) Circle the bigger number.

$$8.9 \times 10^{-4}, 1.3 \times 10^2$$

## Equations and Inequations

(18 marks)

1. State the value of  $x$  in  $2x = 8$

A. 3    B. 8    C. 16    D. 4

2. What is the value of  $x$  in the equation

$$\frac{x+6}{2} = 4$$

A. 14    B. 2    C. 4    D. -20

3. A certain number is divided by three and then subtracted from eight. The result is four. Choose the correct equation.

A.  $\frac{x}{3} - 8 = 4$

B.  $\frac{8-x}{3} = 4$

C.  $8 - \frac{x}{3} = 4$

D.  $8 - x = \frac{4}{3}$

4. Solve the following equations

(a)  $x - 6 = 10$

$$x = 16$$

(b)  $3x = -5$

$$x = -\frac{5}{3}$$

(c)  $7x + 21 = 2x + 16$

$$5x = -5$$

$$x = -1$$

(d)  $3x^2 = 12$

$$x^2 = 4$$

$$x = \pm 2$$

(e)  $8(2x - 1) = 5 + x$

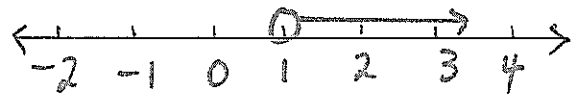
$$16x - 8 = 5 + x$$

$$15x = 13$$

$$x = \frac{13}{15}$$

5. Graph on the number line provided.

(a)  $x > 1$



(b)  $x \leq -3$



6. Solve the following inequations

(a)  $2x + 5 \geq 11$

$$2x \geq 6$$

$$x \geq 3$$

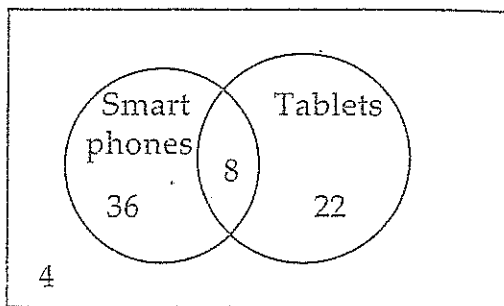
(b)  $6 - x < 9$

$$-x < 3$$

$$x > -3$$

## Probability (8 marks)

1. The Venn diagram shows how many students have smartphones and tablets.



- (a) How many students were surveyed?

70

- (b) How many have both a smartphone and a tablet?

8

- (c) How many students have a tablet?

30

- (d) How many students have one device only?

58

- (e) What is the probability that a student does not have a device?

$\frac{4}{70}$

2. Complete the table below using the information from Question 1 above.

	Smartphone	No smartphone	Total
Tablet	8	22	30
No tablet	36	4	40
Total	44	26	70

## Simple and Compound Interest

### (10 marks)

1. Using the formula  $I = P \times R \times T$

Find the simple interest on:

- (a) \$2500 at 4% for 7 years

$$I = 2500 \times \frac{4}{100} \times 7$$

$$= \$700$$

- (b) \$300 at 2% for 6 months

$$I = 300 \times \frac{2}{100} \times \frac{1}{2}$$

$$= \$3$$

2. Mary invested \$1000 at 2%pa compounded annually for 9 years.

Using the Compound Interest Formula

$$A = P \times (1 + R)^n$$

answer the following questions:

- (a) What is the principal? \$1000

- (b) What is the R? 2%

- (c) Calculate the amount earned (A) after 9 years.

$$A = 1000(1 + 0.02)^9$$

$$= \$1195.09$$

- (d) Calculate the interest earned after 9 years.

$$I = A - P$$

$$= 1195.09 - 1000$$

$$= \$195.09$$

3. If \$5000 is invested for 3 years at 12%pa compounded monthly calculate the amount earned at the end of 3 years.

$$A = 5000(1 + 0.01)^{36}$$

$$= \$7153.84$$

### Analysing Data (17 marks)

1. The following display shows the age of concert goers in the front and back rows.

Back row		Front row
Leaf	Stem	Leaf
	0	8
8 6 5 5 5 2	1	3 6 9 9
7 3 2 2 1 0 0 0	2	0 0 1 2 2 3 7 7
9 4 2	3	1 2 2 2 5 8
4 5	4	6
1	5	

- (a) What is the name of this graph?

stem and leaf plot

- (b) How many scores (ages) are there in total?

40

- (c) What is the oldest age in the back row?

51

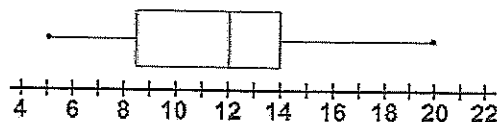
- (d) What is the median age of the front row?

22½

- (e) What is the mode of the back row?

15 & 20

2.



- a) For the box and whisker plot above, complete the 5 point summary:

Lowest score = 5  
 Lower quartile = 8.5  
 Median = 12  
 Upper quartile = 14  
 Highest score = 20

- b) Find the range.

$$20 - 5 = 15$$

- c) Calculate the interquartile range.

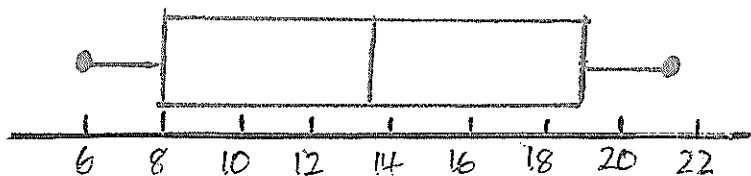
$$14 - 8.5 = 5.5$$

3. a) Complete the five point summary for the following data:

6 6 7 8 10 11 13  
 14 16 18 19 21 21 21

Lowest score = 6  
 Lower quartile = 8  
 Median = 13½  
 Upper quartile = 19  
 Highest score = 21

- b) Draw a box and whisker plot for the data above.



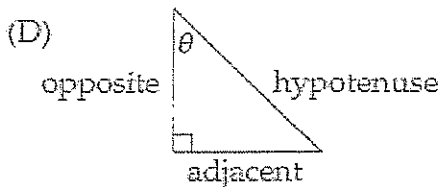
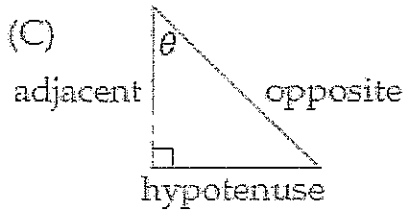
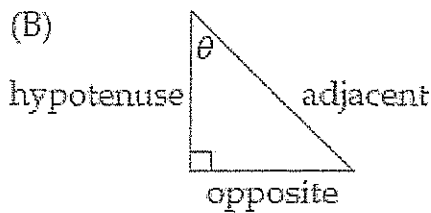
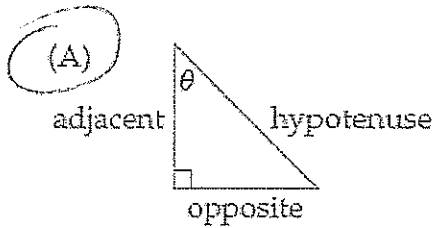
- (c) What percentage of scores lie between 8 and 19?

50%

## Trigonometry (14 marks)

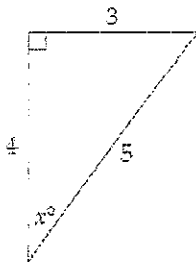
1. Which diagram correctly labels the sides of the triangle in relation to angle  $\theta$ ?

Circle your answer.



2. The value of  $\sin x$  is:

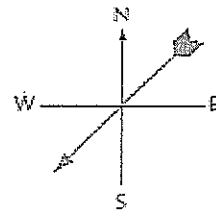
Circle your answer.



- (A)  $\frac{3}{5}$  (B)  $\frac{4}{5}$   
(C)  $\frac{3}{4}$  (D)  $\frac{5}{4}$

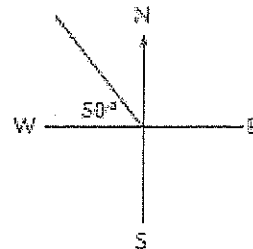
3. The wind vane below is pointing in the direction of:

Circle your answer.



- (A) North-East (B) South-East  
(C) North-West (D) South-West

4. The bearing in the direction diagram below is:



- (A) 050°T (B) 130°T  
(C) 040°T (D) 320°T

5. a) Write  $87.3^\circ$  in degrees and minutes.

$87^\circ 18'$

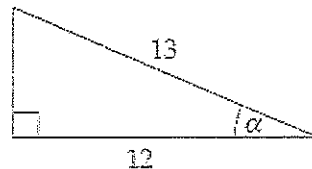
- b) Simplify  $76^\circ 14' + 18^\circ 53'$

$95^\circ 7'$

6. Find  $\theta$  to the nearest minute given  $\sin \theta = 0.568$

$\theta = 34^\circ 37'$

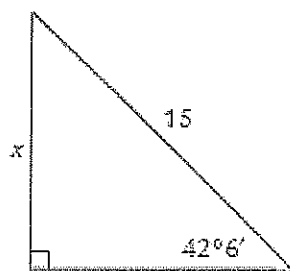
7. Find the angle  $\alpha$  to the nearest minute.



$\cos \alpha = \frac{12}{13}$

$\alpha = 22^\circ 37'$

8. Find  $x$  to the nearest whole number

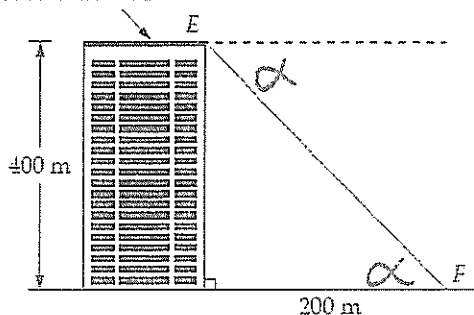


$$\sin 42^{\circ}6' = \frac{x}{15}$$

$$x = 15 \times \sin 42^{\circ}6' = 10.056 \dots = 10$$

9. A tower's observation deck is 400m above the ground. Erin (E) is standing at one end of the observation deck and her father (F) is standing on the ground, 200m from the base of the tower.

Observation deck



- a) Label the angle of depression on the diagram above.
- b) What is the angle of depression from Erin to her father to the nearest degree?

$$\tan \alpha = \frac{400}{200}$$

$$\alpha = 63^{\circ}26'$$