

MATHEMATICS

RESOURCE PACK
GRADE 10 TERM 1

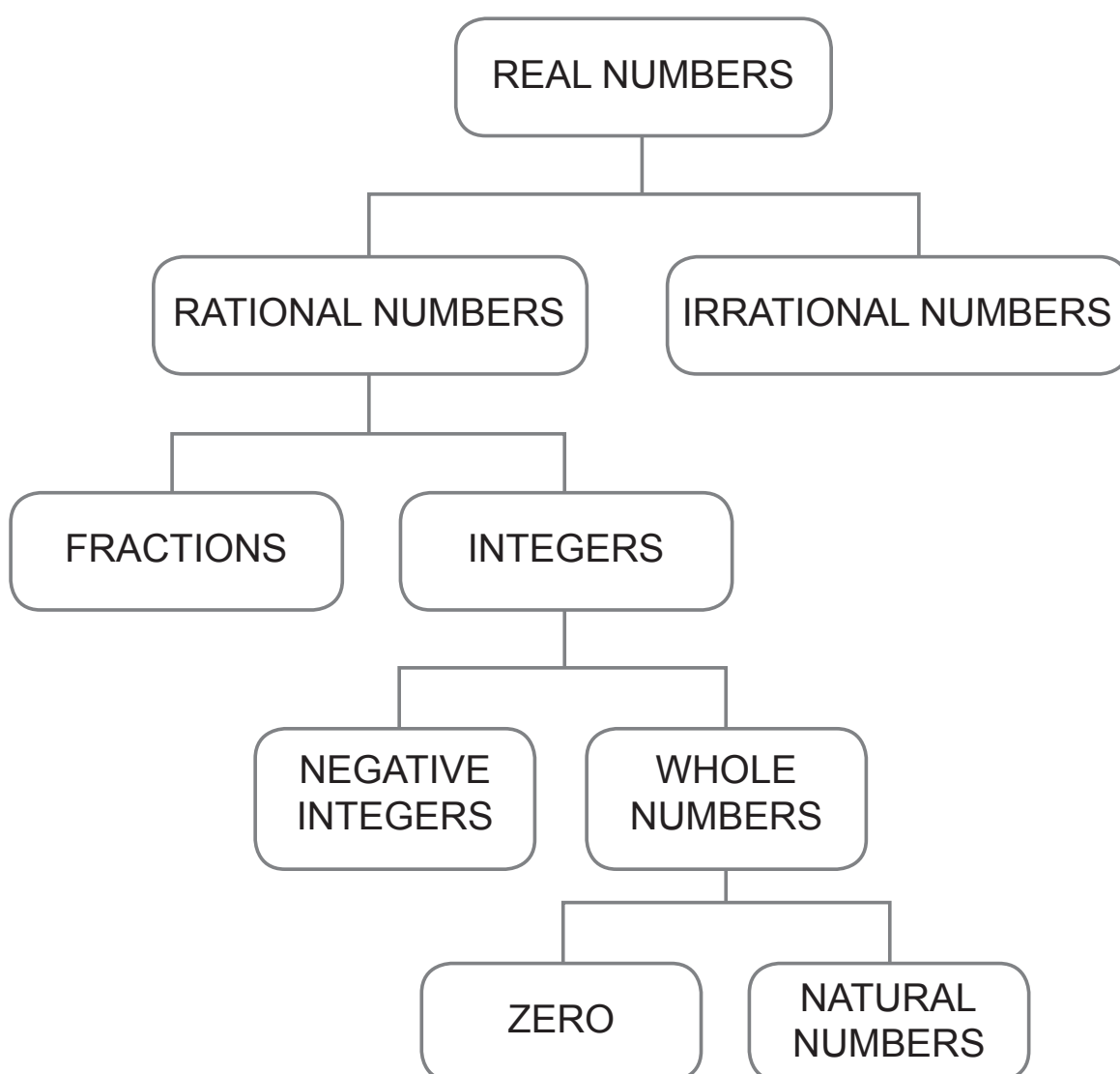


ALGEBRAIC EXPRESSIONS

RESOURCE 1

LESSON 1

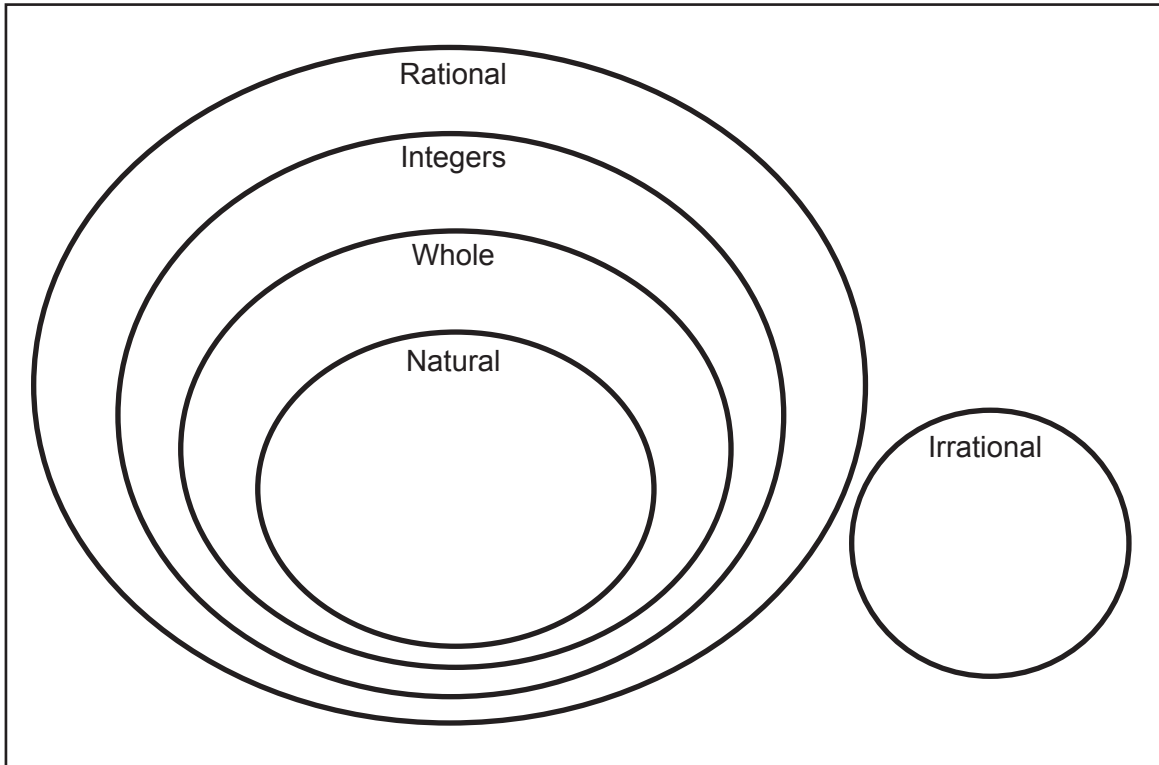
The Real Number system



RESOURCE 2

LESSON 1

REAL NUMBER SYSTEM



RESOURCE 3

LESSON 4 INVESTIGATION, RUBRIC AND MARKING GUIDE

ALGEBRA INVESTIGATION – GRADE 10

<p>A square with length a is drawn on the following page. Work with a partner and follow the steps below:</p> <p>PART A</p> <ol style="list-style-type: none"> 1. Write an expression representing the area of the square in terms of a. 2. Draw a square in the bottom left corner of the large square and call the length b. 3. Write an expression representing the area of the new square in terms of b. 4. Shade everything except the new square with length b. 5. Write an expression representing the area of the shaded part. (Hint: use your answers from 1 and 3) 	<p>PART B</p> <ol style="list-style-type: none"> 1. Extend the line formed for the top of the small square (length b) to the right until it meets the side of the original square. There should now be a rectangle next to the smaller square. 2. What is the rectangle's length and breadth in terms of a and b? 3. Cut out the small square and set it aside. 4. Cut out the rectangle and lay it alongside the leftover part to form a larger rectangle. Make sure there are two sides that are the same length are next to each other. (The rectangle will need to turn). 5. What is the NEW rectangle's length and breadth in terms of a and b? 6. Write an expression representing the area of the new rectangle in terms of a and b. There is no need to simplify – leave it in its original form. 7. What is the relationship between the area of the shaded region (Part A step 5) and the area of new rectangle? 8. What algebraic concept has been proven by this investigation?
---	---

NAMES:

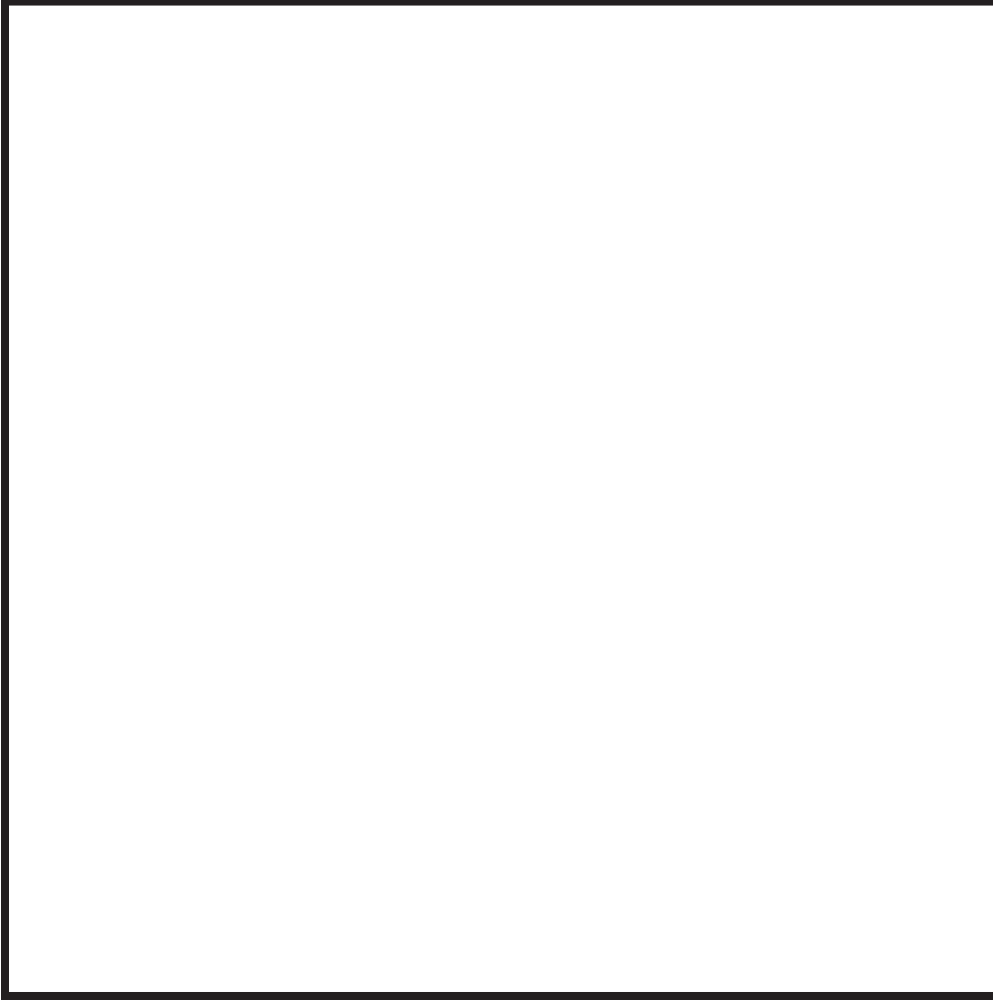
PART A

1	
3	
4	

PART B

2	Length:	
	Breadth:	
5	Length:	
	Breadth:	
6		
7		
8		

a

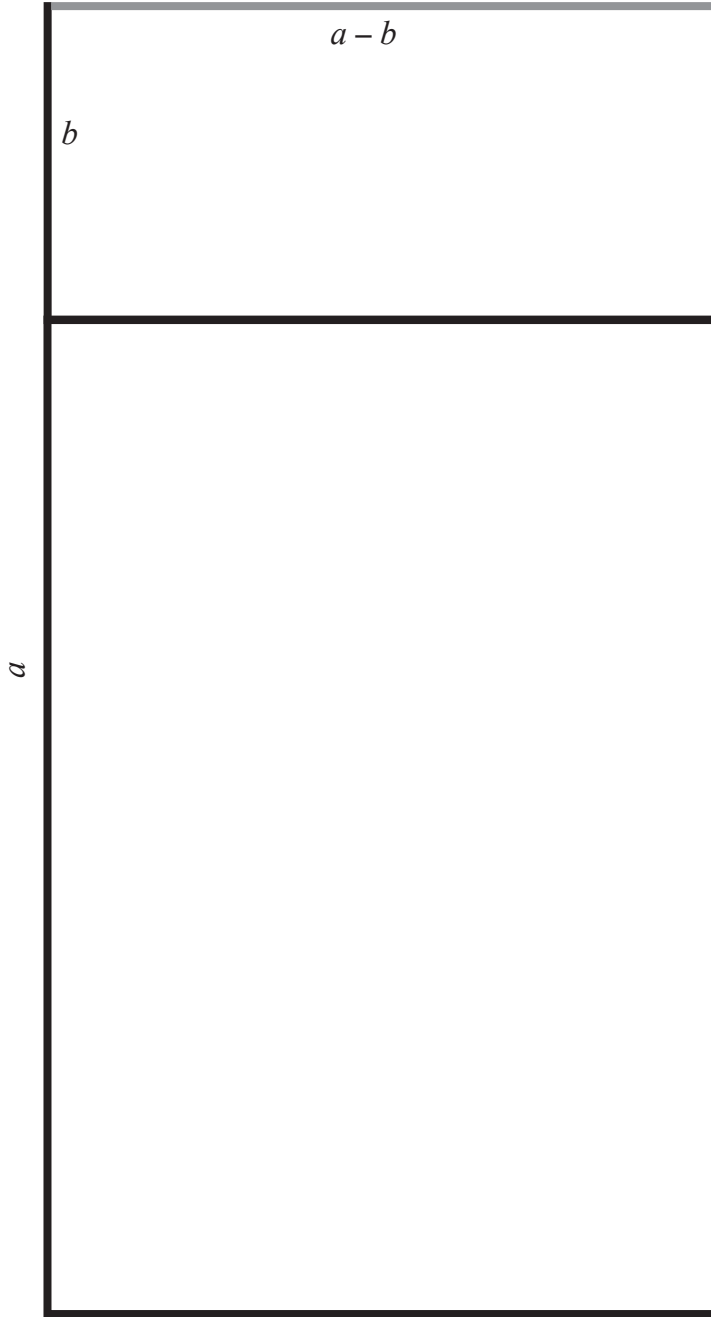


	3	2	1	0
PART A				
Evidence that instructions were followed methodically	Learners had written measurements on their square as they proceeded through the steps correctly.	Learners seemed to proceed through the steps easily.	Learners needed some assistance	No attempt made to follow the instructions
Correct use of mathematical symbols and language	All mathematics written with no errors	An error made in the use of exponents OR the use of subtraction for step 4.	An error made in the use of exponents AND the use of subtraction in step 4.	No solutions
Demonstrates a clear understanding of relationships in Algebra	No errors in any of the steps, particularly step 4.	Steps 1 and 3 correct but step 4 incorrect	At least two steps incorrect	No solutions
PART B				
Evidence that instructions were followed methodically	It was clear that the learners had followed each step carefully and used knowledge gained as they proceeded.	Learners seemed to proceed through the steps with ease	Learners needed some assistance	No attempt made to follow the instructions
Correct use of mathematical symbols and language	All mathematics written with no errors			No solutions
Demonstrates a clear understanding of relationships in Algebra	No errors in any of the steps. A clear answer in step 8.	No errors in any of the steps but step 8 was left out or vague and incorrect.	Errors made in 2 or more steps.	Errors made in 4 or more steps.

MARKING GUIDE

PART A		
1	a^2	
3	b^2	
4	$a^2 - b^2$	
PART B		
2	Length: $a - b$ Breadth: b	
5	Length: $a + b$ Breadth: $a - b$	
6	$(a + b)(a - b)$	
7	They are equal	
8	Factorising a difference of two squares $a^2 - b^2 = (a + b)(a - b)$	





Part B point 4:



ALGEBRAIC EQUATIONS

RESOURCE 4

LESSON 5

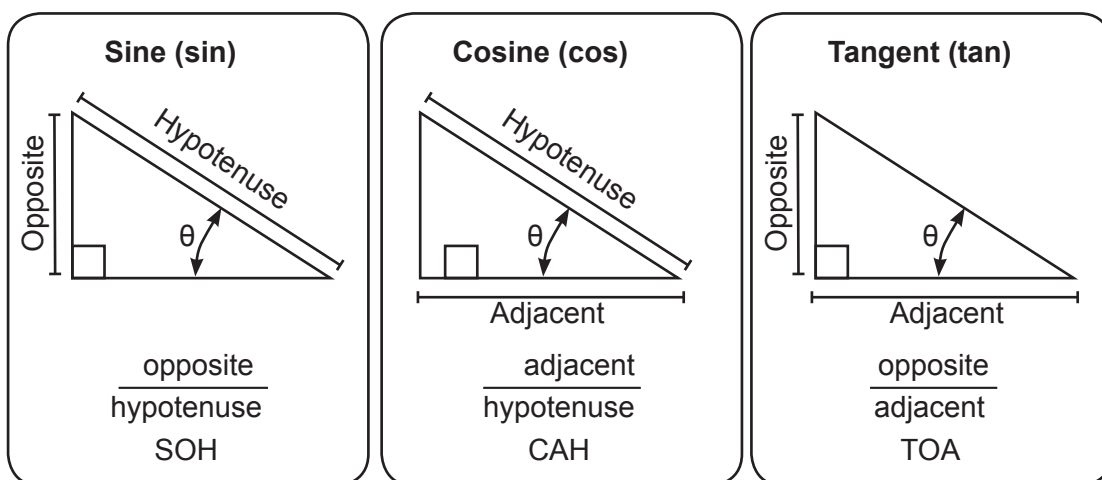
Inequality sign	words	Open/closed dot	Arrow points to the
$>$	Greater than	Open 	right
\geq	Greater than or equal to	Closed 	right
$<$	Less than	Open 	left
\leq	Less than or equal to	Closed 	left

TRIGONOMETRY

RESOURCE 5

LESSONS 1 & 3

LESSON 1

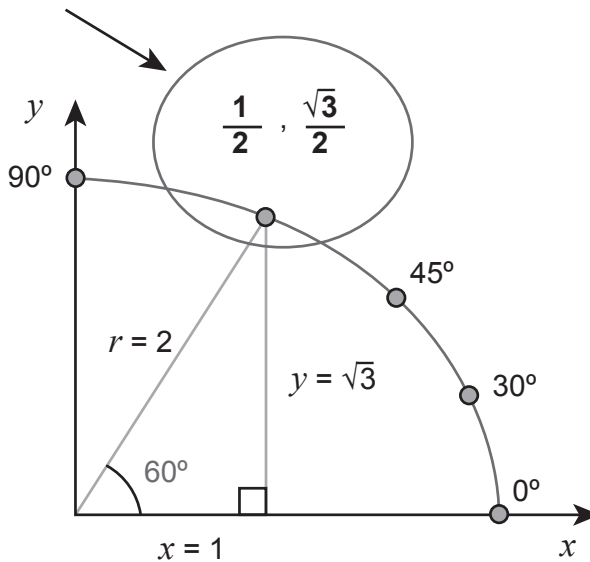
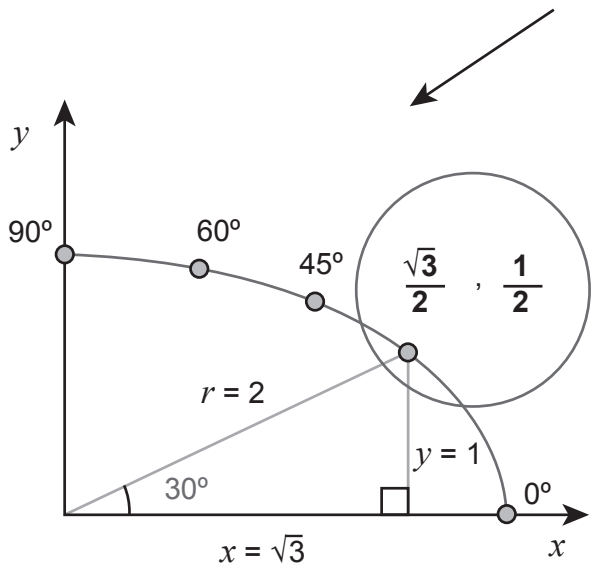


LESSON 3

The six trigonometric functions		
basic		reciprocal
$\sin(\theta) = \frac{o}{h}$	cosecant	$\csc(\theta) = \frac{1}{\sin(\theta)} = \frac{h}{o}$
$\cos(\theta) = \frac{a}{h}$	secant	$\sec(\theta) = \frac{1}{\cos(\theta)} = \frac{h}{a}$
$\tan(\theta) = \frac{o}{a}$	cotangent	$\cot(\theta) = \frac{1}{\tan(\theta)} = \frac{a}{o}$

RESOURCE 6

LESSONS 1 & 3



RESOURCE 7

Test Term 1

QUESTION	DESCRIPTION	MAXIMUM MARK	ACTUAL MARK
1	Algebra	28	
2	Number Patterns	6	
3	Trigonometry	16	
	TOTAL	50	

QUESTION 1

28 MARKS

1.1 Match each number with the definition that fits. Each number only has ONE definition that fits BEST. (5)

- | | |
|---------------|----------------------|
| a. 8 | 1. Natural number |
| b. 0,5 | 2. Integer |
| c. -3 | 3. Whole number |
| d. 0 | 4. Rational number |
| e. $\sqrt{2}$ | 5. Irrational number |

1.2 Simplify the following:

1.2.1 $\frac{(x^3 - 8)}{x - 2}$ (2)

1.2.2 $\frac{x^2 + 3x - 4}{x^2 - x} - 1$ (4)

1.2.3 $\frac{6^x \cdot 3^{2x+2}}{27^x \cdot 2^{x-2}}$ (4)

1.3 Solve for x in each of the following:

1.3.1 $2x^2 + 2x = 12$ (4)

1.3.2 $2 - \frac{x+5}{4} = \frac{1-x}{5}$ (4)

1.3.3 $2^x + 3 \cdot 2^{x+1} = 56$ (3)

1.3.4 $4x - 9 < 5x + 4$ (2)

QUESTION 2

6 MARKS

2.1 Consider the sequence: 10; 6; 2; -2; ...

2.1.1 Determine the 5th and 6th terms of the sequence. (2)

2.1.2 Determine the n^{th} term of the sequence. (2)

2.2 Consider the sequence: -1; 0; 1; -1; 0; 1; ...

2.2.1 Determine the value of the 100th term. (2)

QUESTION 3

16 MARKS

3.1 State whether each of the following statements are True or False.

3.1.1 $\sin(x + 2) = \sin x + \sin 2$ (1)

3.1.2 $-\cos x = \cos(-x)$ (1)

3.2 **WITHOUT** using your calculator, answer the following:

3.2.1 Evaluate: $\frac{\sin 30^\circ - \tan 45^\circ}{\sin 90^\circ - \cos 60^\circ}$ (3)

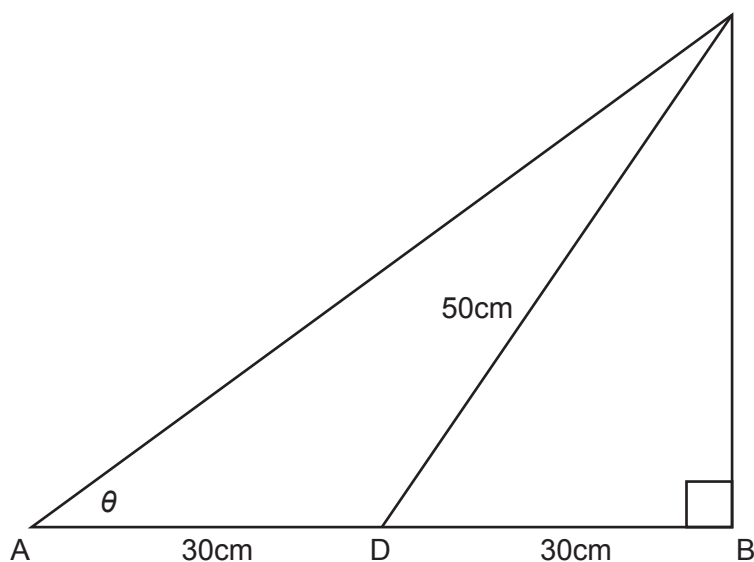
3.2.2 If $13 \sin \theta + 12 = 0$ and $\cos \theta < 0$, calculate the value of $5 \tan \theta$. (4)

3.3 Using your calculator, determine the value of θ in the following questions:

Note: $0 < \theta < 90$

3.3.1 $3 \cos(\theta + 10^\circ) = 1$ (3)

3.3.2 (4)



RESOURCE 8

Memorandum Test Term 1

QUESTION	DESCRIPTION	MAXIMUM MARK	ACTUAL MARK
1	Algebra ; Exponents; Equations	28	
2	Number Patterns	6	
3	Trigonometry	16	
	TOTAL	50	

QUESTION 1

28 MARKS

1.1 Match each number with the definition that fits. Each number only has ONE definition that fits BEST. (5K)

- | | |
|---------------|------------------------|
| a. 8 | 1. Natural number ✓ |
| b. 0,5 | 2. Integer ✓ |
| c. -3 | 3. Whole number ✓ |
| d. 0 | 4. Rational number ✓ |
| e. $\sqrt{2}$ | 5. Irrational number ✓ |

1.2 Simplify the following:

1.2.1 $\frac{(x^3 - 8)}{x - 2}$ (2R)

$$= \frac{(x - 2)(x^2 + 2x + 4)}{x - 2} \checkmark$$

$$= x^2 + 2x + 4 \checkmark$$

1.2.2 $\frac{x^2 + 3x - 4}{x^2 - x} - 1$ (4C)

$$= \frac{(x + 4)(x - 1)\checkmark}{x(x - 1)\checkmark} - 1$$

$$= \frac{x + 4}{x} - \frac{x}{x} \checkmark$$

$$= \frac{4}{x} \checkmark$$

1.2.3 $\frac{6^x \cdot 3^{2x+2}}{27^x \cdot 2^{x-2}}$ (4R)

$$= \frac{2^x \cdot 3^x \cdot 3^{2x} \cdot 3^2 \checkmark}{3^{3x} \cdot 2^x \cdot 2^{-2} \checkmark}$$

$$= 2^{x-x+2} \cdot 3^{x+2x+2-3x} \checkmark$$

$$= 2^2 \cdot 3^2$$

$$= 36 \checkmark$$

1.3 Solve for x in each of the following:

1.3.1 $2x^2 + 2x = 12$ (4R)

$$2x^2 + 2x - 12 = 0 \quad \checkmark$$

$$x^2 + x - 6 = 0 \quad \checkmark$$

$$(x + 3)(x - 2) = 0 \quad \checkmark$$

$$x = -3 \quad \text{or} \quad x = 2 \quad \checkmark$$

1.3.2 $2 - \frac{x+5}{4} = \frac{1-x}{5}$ (4C)

$$40\checkmark - 5x - 25\checkmark = 4 - 4x \quad \checkmark$$

$$-x = -11$$

$$x = 11 \quad \checkmark$$

1.3.3 $2^x + 3 \cdot 2^{x+1} = 56$ (3C)

$$2^x + 3 \cdot 2^x \cdot 2 = 56$$

$$2^x(1 + 3 \cdot 2) = 56 \quad \checkmark$$

$$2^x \cdot 7 = 56 \quad \checkmark$$

$$2^x = 8$$

$$x = 3 \quad \checkmark$$

1.3.4 $4x - 9 < 5x + 4$ (2R)

$$4x - 5x < 4 + 9 \quad \checkmark$$

$$-x < 13$$

$$x > -13 \quad \checkmark$$

QUESTION 2

6 MARKS

2.1 Consider the sequence: 10; 6; 2; -2; ...

2.1.1 Determine the 5th and 6th terms of the sequence. (2K)

$$-6\checkmark \text{ and } -10\checkmark$$

2.1.2 Determine the n^{th} term of the sequence. (2C)

$$-4n + 14 \quad \checkmark \checkmark$$

2.2 Consider the sequence: $-1; 0; 1; -1; 0; 1; \dots$

2.2.1 Determine the value of the 100th term. (2P)

$$-1 \quad \checkmark \quad \checkmark$$

QUESTION 3

16 MARKS

3.1 State whether each of the following statements are True or False.

3.1.1 $\sin(x + 2) = \sin x + \sin 2$ False \checkmark (1K)

3.1.2 $-\cos x = \cos(-x)$ False \checkmark (1K)

3.2 **WITHOUT** using your calculator, answer the following:

3.2.1 Evaluate: $\frac{\sin 30^\circ - \tan 45^\circ}{\sin 90^\circ - \cos 60^\circ}$ (3R)

$$= \frac{\frac{1}{2} - 1}{1 - \frac{1}{2}}$$

$$= -1 \quad \checkmark$$

3.2.2 If $13 \sin \theta + 12 = 0$ and $\cos \theta < 0$, calculate the value of $5 \tan \theta$. (4R)

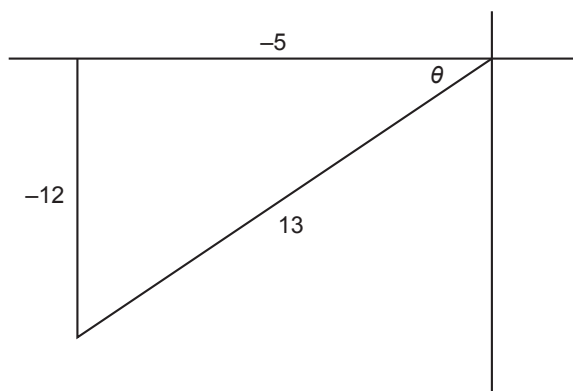
$$\sin \theta = -\frac{12}{13} \quad \checkmark$$

$$x^2 + (-12)^2 = 13^2 \quad \checkmark$$

$$x^2 = 25$$

$$x = 5 \quad \checkmark$$

$$5 \tan \theta = 5 \left(\frac{-12}{-5} \right) \quad \checkmark = 12$$



3.3 Using your calculator, determine the value of θ in the following questions:

Note: $0 < \theta < 90$

3.3.1 $3 \cos(\theta + 10^\circ) = 1$ (3C)

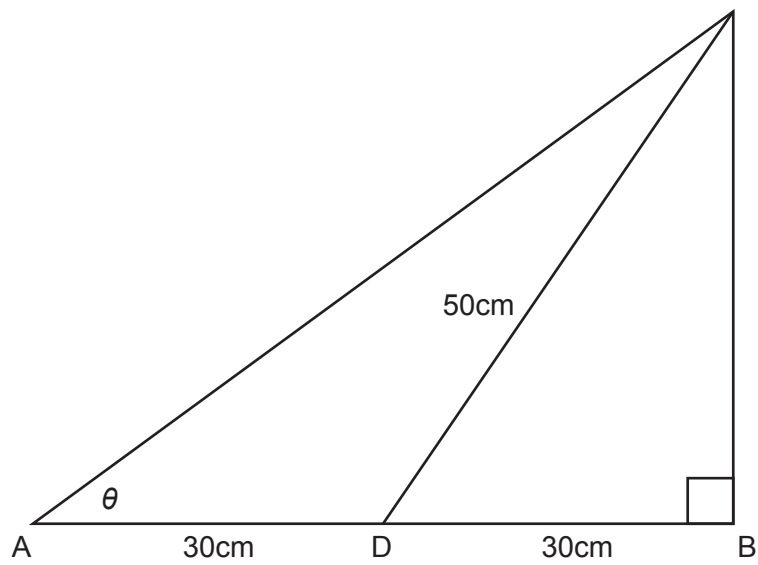
$$\cos(\theta + 10^\circ) = \frac{1}{3} \quad \checkmark$$

$$\theta + 10^\circ = 70,53^\circ \quad \checkmark$$

$$\theta = 60,53^\circ \quad \checkmark$$

3.3.2

(4P)



$$CB^2 = 50^2 - 30^2 \quad \checkmark$$

$$CB^2 = 1600$$

$$CB = 40\text{cm} \quad \checkmark$$

$$\tan \theta = \frac{40}{60} \quad \checkmark$$

$$\theta = 33,69^\circ \quad \checkmark$$