



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**GENERAL EDUCATION AND TRAINING CERTIFICATE**

**NQF LEVEL 1**

**AET LEVEL 4 SITE-BASED ASSESSMENT**

**LEARNING AREA : MATHEMATICS AND  
MATHEMATICAL SCIENCES**

**CODE : MMSC4**

**TASK : WORKSHEET**

**DURATION : 2 HOURS**

**MARKS : 50**

**This assessment task consists of 10 pages.**

**INSTRUCTIONS AND INFORMATION**

1. Answer ALL the questions on this WORKSHEET and hand in the completed task.
2. Write the NAME OF CENTRE and your NAME in the spaces provided.
3. Calculators may be used unless otherwise stated.
4. Show ALL calculations.
5. Write legibly and present your work clearly.

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<b>Name of Centre:</b>
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<b>Name of Learner:</b>
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**Activity 1 : Interpreting and investigating of graphs****Topic:** Graphs

Graphs are representation of different relationships.

Graphs are drawn on system of two axes meaning that there are two variables, i.e independent variable on the horizontal axis and dependent variable on the vertical axis.

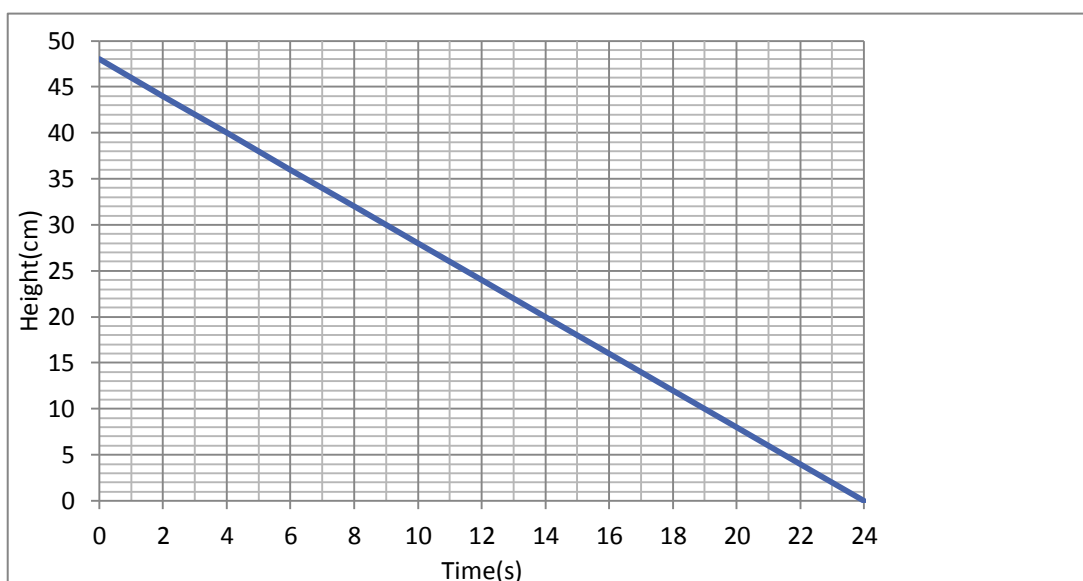
Graphs can be interpreted and investigated.

**Types of graphs:**

A linear graph is a straight line graph.

A graph can be **discrete** or **continuous**. A discrete graph consists of separate points, usually shown as dots. A continuous graph is unbroken.

Graphs are drawn on system of two axes meaning that there are two variables, i.e independent variable on the horizontal axis and dependent variable on the vertical axis.



The graph above shows how the height of water in a cylindrical container decreases when tap is left open. Study the graph and answer the following questions:

- 1.1 Determine the height of water before the tap was open. (1)

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- 1.2 Is the rate at which the water runs out constant? Motivate your answer. (2)

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- 1.3 Determine the rate at which the height of the water is decreasing. (2)

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- 1.4 What aspect about the graph indicates that the height of water in the container is decreasing? (2)

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- 1.5 How long did it take before the container was empty? (1)

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- 1.6 Describe in your words how you would calculate the height of the water in the container at any given time. (1)

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- 1.7 If the time is represented by  $x$  and the height of the water by  $y$ , write a formula in the form  $y = \dots$  to calculate the height of the water in the container. (2)

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- 1.8 Check your formula by calculating:

- 1.8.1 The height of the water just before the tap was opened. (2)

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1.8.2 The time it took for the container to empty. (2)

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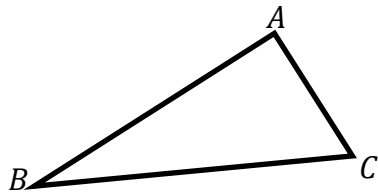
1.9 What type of data is shown in the graph: discrete or continuous? (1)

		[16]
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## Activity 2: Theorem of Pythagoras

### Converse of the Theorem of Pythagoras says:

If the square of the longest side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right-angled triangle.



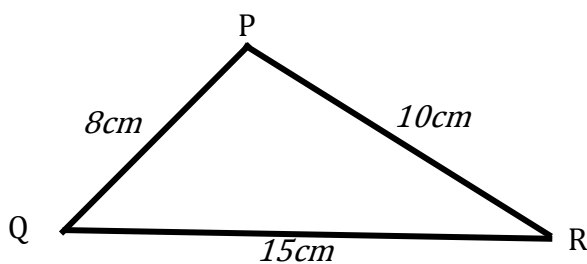
The converse simply means:

$(BC)^2 = (AB)^2 + (AC)^2$ , then  $\hat{A} = 90^\circ$  and thus triangle ABC is a right-angled triangle.

if  $(BC)^2 < (AB)^2 + (AC)^2$ , then  $\hat{A} < 90^\circ$  and thus triangle is acute- angled.

if  $(BC)^2 > (AB)^2 + (AC)^2$ , then  $\hat{A} > 90^\circ$  and thus triangle is obtuse- angled.

2.1 Given below is triangle PQR with  $PQ = 8cm$ ,  $PR = 10cm$  and  $QR = 15cm$ .



2.1.1 Calculate the square of the longest side. (1)

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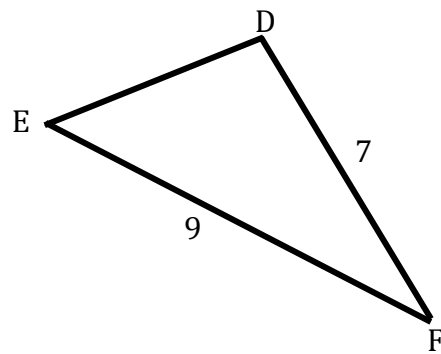
2.1.2 Calculate the sum of the squares of the other two sides.

(2)

2.1.3 James says that  $\triangle PQR$  is right-angled triangle. Is James correct. Support your answer by applying the theorem of Pythagoras.

(2)

2.1.4 If  $\hat{D}$  is to be made a right angle, determine the length of  $DE$ . Show your calculations.



(3)



- 2.2 The most common right-angled triangle has the dimensions 3, 4 and 5. These are called Pythagorean triples. For example, you can use 6:8:10 or 1,5:2:2,5. You can save yourself a lot of time if you can recognise and remember them.

$$\begin{array}{rcl}
 6 & = & 2 \\
 8 & = & 2 \\
 10 & = & 2
 \end{array}
 \begin{array}{c}
 \times 3 \\
 \times 4 \\
 \times 5
 \end{array}
 \quad \text{or} \quad
 \begin{array}{rcl}
 1,5 & \times & 2 \\
 2 & \times & 2 \\
 2,5 & \times & 2
 \end{array}
 \begin{array}{c}
 = 3 \\
 = 4 \\
 = 5
 \end{array}$$

Both examples use the Pythagorean triple 3 : 4 : 5

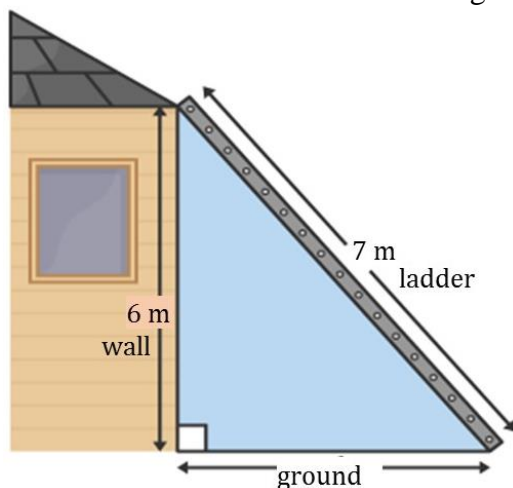
Complete the following table:

$x$	$y$	$r$
3	4	5
9		
	16	
		25

(3)

### Example 3

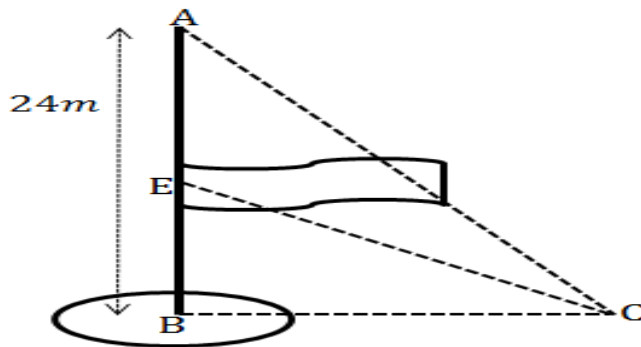
Thuto places the ladder against the wall of the house to climb onto the roof of the house. Calculate the distance on the ground between the ladder and the wall.



This time we are calculating the distance on the ground which is also not the longest side, we say:

$$\begin{aligned}
 \text{ground} &= \sqrt{(\text{ladder})^2 - (\text{wall})^2} \\
 &= \sqrt{(7 \text{ m})^2 - (6 \text{ m})^2} \\
 &= \sqrt{49 \text{ m}^2 - 36 \text{ m}^2} \\
 &= \sqrt{13 \text{ m}^2} \\
 &= 3,61 \text{ m}
 \end{aligned}$$

- 2.3 In the diagram below, the flag pole (AB) is 24 meters high. The flag is flying half way down the pole.



- 2.3.1 What is the distance EB? (1)

- 2.3.2 John is standing at point C. He is 16 meters from point B. Calculate the distance from John to the flag (CE). (2)

- 2.3.3 John's friend says that because  $AE = EB$ , therefore  $CE = CA$ . Is John's friend correct? Yes or no. Motivate your answer. (2)

[16]

### Activity 3: Word Sums

Word sums can be tricky. It takes some practice to be able to change the language sentence into a mathematical sentence. Some phrases are explained below:

Phrases	Explanation	Clarification / Examples
A number, a value or unknown	It is often a variable	$x$
Is, was, will, were, etc	Represents the equal sign ( $=$ )	$x$ is 5 becomes $x = 5$
More than, sum, together	Represents addition, usually placed backwards	Three more than a number becomes $x + 3$
Less than, difference, decrease by	Represents subtraction and usually placed backwards	Four less than a certain number become $x - 4$
Times, double, triple, twice	Means multiplication	Is three time a number means $3x$
Per, half, quotient of, divided by	Represents division	Is half of a certain number becomes $\frac{x}{2}$
Twice the sum of, times the sum of, times the difference of	Means there are brackets	Is twice the difference of three less than a number, will be $2(x - 3)$

#### Example 1

If 45 less than 3 times a certain number is 504. What is the number?

Solution:

$$3x - 45$$

Subtraction is placed backwards, multiply the unknown by 5

$$3x - 45 = 504$$

It is equated to 504

$$3x - 45 + 45 = 504 + 45$$

Add 45 to both sides

$$3x = 549$$

The variable  $x$  is multiplied by 3, which must be cleared

$$\frac{3x}{3} = \frac{549}{3}$$

Divide by 3 both sides

$$x = 183$$

The number is 183

- 3.1 When five is added to three more than a certain number, the result is 19. What is the number? (3)

- 3.2 Fifteen more than three times a number is the same as ten less than six times the number. What is the number?

(5)

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### Example 2

Age problems can be complex and you can get lost easily in all the information. To help us organise and solve our problem, we will use a table.

	Age Now	Change
Person 1		
Person 2		

Now let see how it works

Akani is 20 years younger than Leeto. In two years Leeto will be twice as old as Akani. How old are they now?

	Age Now	+2
Akani	$x - 20$	
Leeto	$x$	

“in two years” means change = +2

Leeto’s age is unknown =  $x$

“20 years younger than” =  $x - 20$

	Age Now	+2
Akani	$x - 20$	$x - 20 + 2$
Leeto	$x$	$x + 2$

We add +2 to the current age to make it future age under change column

	Age Now	+2
Akani	$x - 20$	$x - 18$
Leeto	$x$	$x + 2$

After simplifying, we look at “Leeto will be twice as old as Akani”  
i.e. Leeto = 2 (Akani)

$$x + 2 = 2(x - 18)$$

$$x + 2 = 2x - 36$$

$$x + 2 - x = 2x - 36 - x$$

$$2 = x - 36$$

$$2 + 36 = x - 36 + 36$$

$$38 = x$$

	Age Now
Akani	$38 - 20 = 18$
Leeto	38

Set up the equation for Leeto=2(Akani)

Distribute 2 into the brackets

Subtract  $x$  from both sides

Need to separate numbers from variables

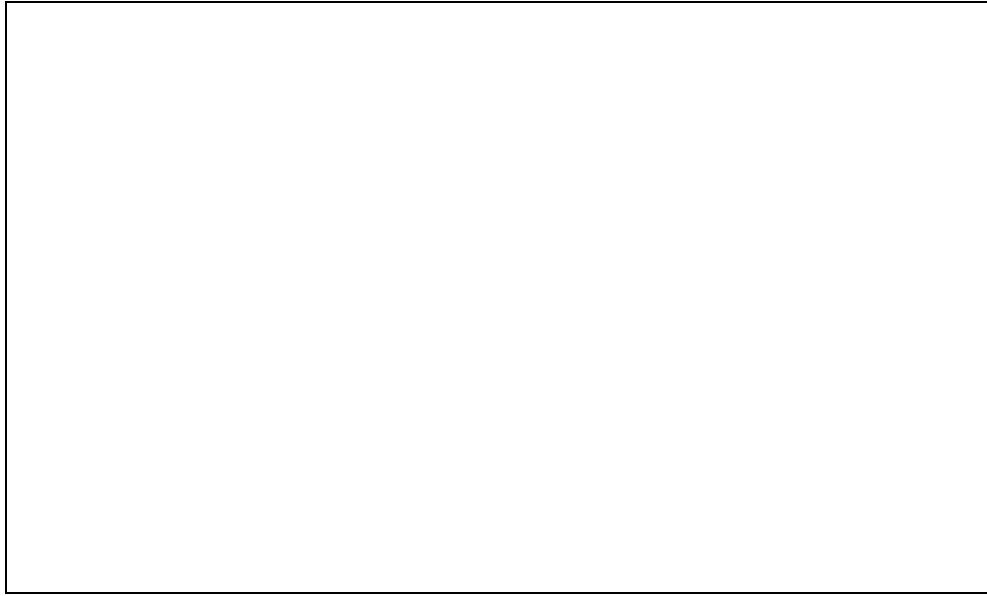
Add 36 on both sides

Our solution is for  $x$

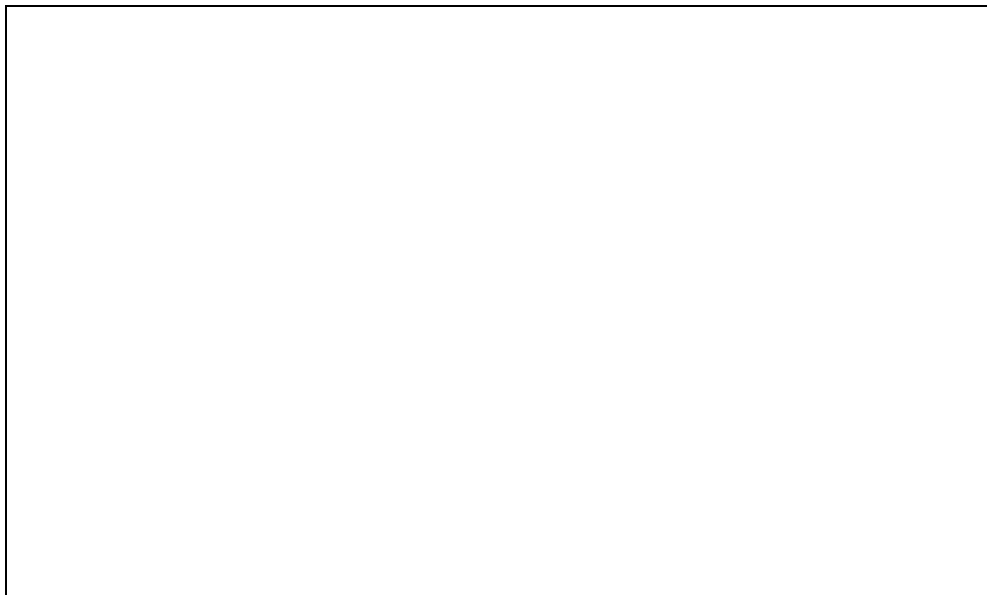
replace  $x$  by 38 in Age Now

Akani is 18 and Leeto is 38

- 3.3 Paul is 23 years older than his daughter Sihle. In 6 years' time Paul will be twice as old as Sihle. Determine their current ages. (5)



- 3.4 The sum of the ages of a father and son is 56 years. Four years ago, the father was 3 times as old as the son. Calculate the present age of the father and the son. (5)



[18]

**TOTAL: 50**