



# 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 8 pages.**



**INSTRUCTIONS AND INFORMATION**

1. Answer ALL the questions on this WORKSHEET and hand in the completed task.
2. Write the 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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Name of Centre:
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Name of Learner:
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**Activity 1**

Transformation is when the position, or size, of an object is changed. There are four kinds of transformation i.e. translation, reflection, rotation and enlargement.

**Translation**, **rotation** and **reflection** are transformations. Each one changes the position of the object, but leaves the size of the object unchanged. We say that they are *isometric transformations* (iso – the same; metric – measure).

An **enlargement** is a transformation that changes the size of a figure, but does not change its shape or position.

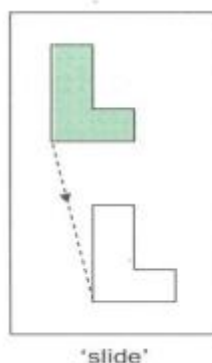
A **translation** is sometimes called a slide or shift. It moves a shape along a straight line and it does not turn or flip over, but moves every point of the shape in the same direction, through the same distance.

**Rotation** which is sometimes called a turn, is a transformation where all the points turn through the same angle about a fixed point. In rotation there is a point that does not change and it is called the centre of a rotation. In Mathematics the angle of rotation is always taken to be anti-clockwise, and every point and its image is the same distance from the centre.

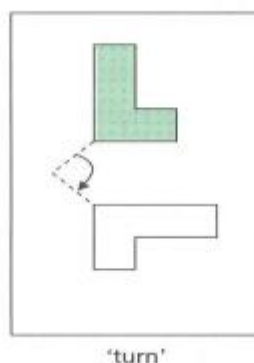
A **reflection** is sometimes called a flip it over. It has an axis of symmetry or a mirror line.

Examples:

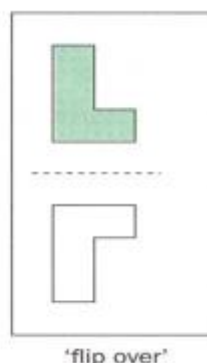
1. Translation



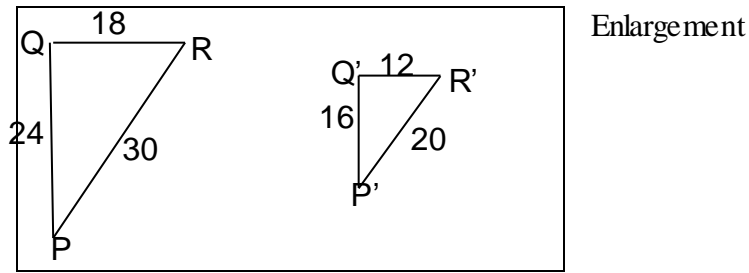
2. Rotation



3. Reflection

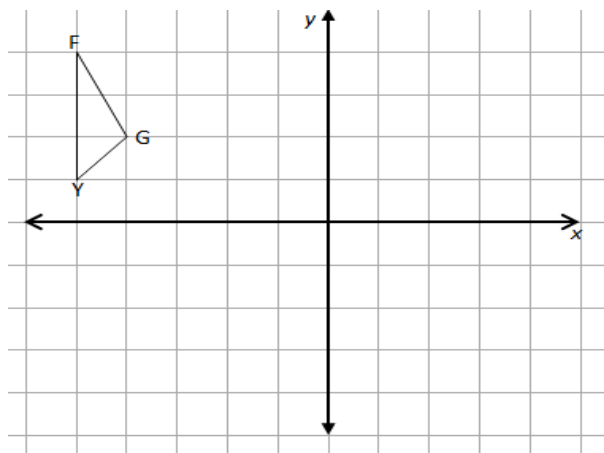






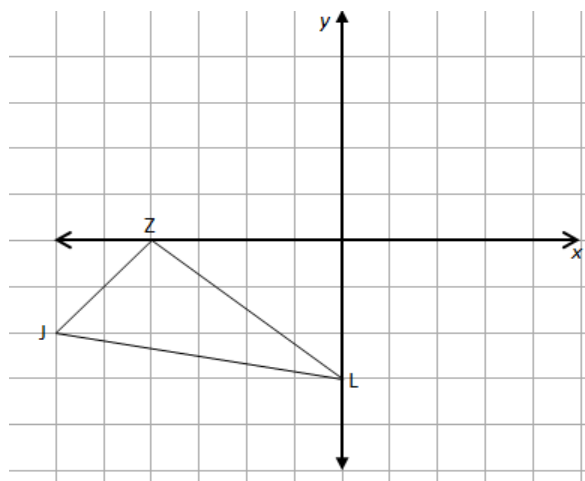
1.1 Graph the image of each of the following figures using the transformation given:

1.1.1 Translation: 4 units right and 1 units down



(3)

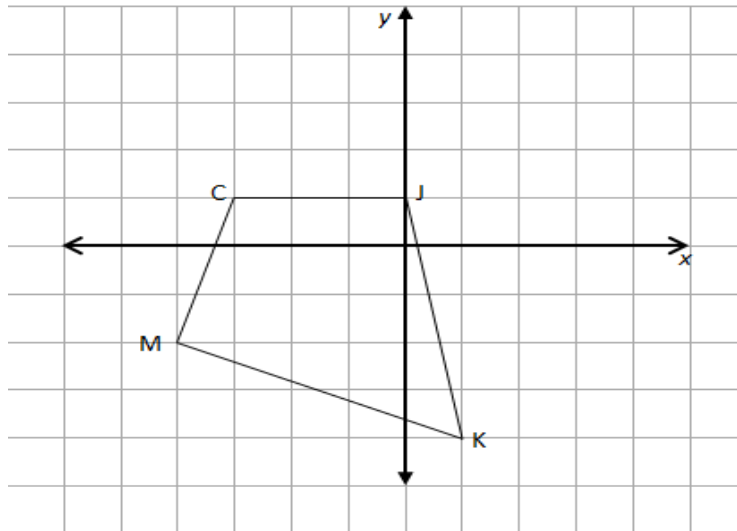
1.1.2 Rotation:  $90^\circ$  anticlockwise about the origin.



(3)



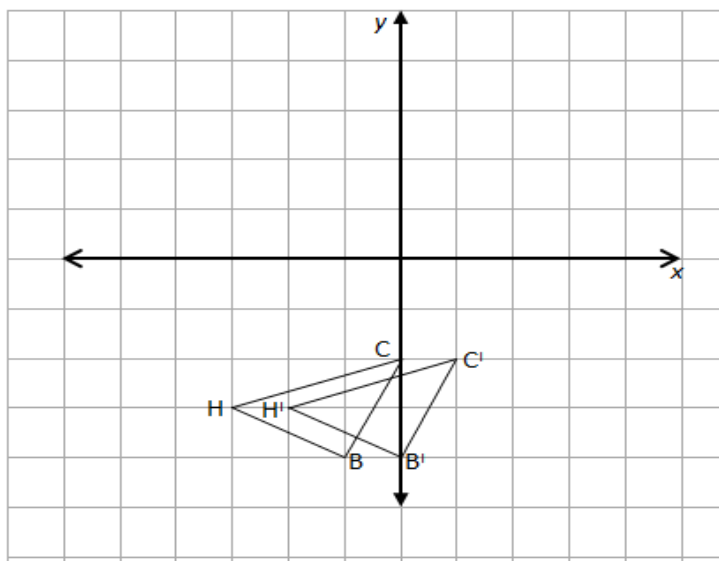
## 1.1.3 Reflection along the x-axis



(3)

## 1.2 Write a rule to describe each transformation.

## 1.2.1

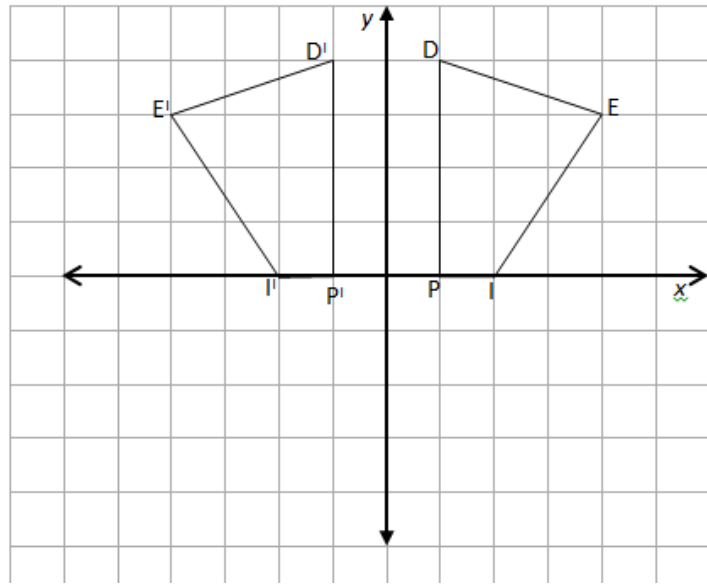


(2)





1.2.2



(2)

1.3 Find the coordinates of the vertices of each figure after the given transformation

1.3.1 Enlargement by scale factor 3  
 $J(1; 3), U(0; 5), R(1; 5),$   
 $J'(\dots; \dots), U'(\dots; \dots), R'(\dots; \dots)$

(3)

1.3.2 Reflection along the x-axis  
 $P(-5; 5), Q(-1; 7), R(-3; 2)$   
 $P'(\dots; \dots), Q'(\dots; \dots), R'(\dots; \dots)$

(3)  
[19]

## Activity 2

A factor is a number or an expression which can be divided into another number or an expression without a remainder. E.g. factors of 6 are 1; 2; 3 and 6 .

$\therefore$  Factorisation is the converse of product/multiplication. Once an expression is factorised it will be written as a single term i.e. as a product of factors. In factorization always take out the highest common factor first, and then factorise further.

### Example:

$$x^2 + 2x = x(x + 2)$$

2.1 Factorize the following expressions by taking out *the highest common factor*.

2.1.1  $16a^2b - 24ab^2$

.....(.....-.....)

(2)

2.1.2  $3m^2n - 3mn^2 + 3mn$

.....(.....-.....+.....)

(2)



2.1.3  $5(3p + q) - r(3p + q)$

(.....)(.....)

(2)

The factors or factorising of the *difference of two squares* are the sum of the square roots of the given terms and the difference of the same square roots. Example:

$$a^2 - b^2 = (a - b)(a + b).$$

2.2 Factorize completely using the difference of two squares.

2.2.1  $4x^2 - y^2$

(.....)(.....)

(2)

2.2.2  $27a^3 - 3ab^2$

$3a(.....)$   
 $3a(.....)(.....)$

(3)

Trinomial is an expression with only three terms. Example:  $x^2 + x - 12$

**To factorise a trinomial:**

Step1: **Multiplication step:** write all the factors of 12:  $1 \times 12$

$$2 \times 6$$

$$3 \times 4$$

Step 2: **Addition or Subtraction step:** Add or subtract factors to find the middle term, +1:

$$+4 - 3 = 1$$

Step 3: **Control step:** multiply the signs of the two factors in step 2 to find the sign of the third term (-1). Fill in the signs in the brackets first(+) and then the(-)

Answer:  $(x + 4)(x - 3)$

2.3 Consider this trinomial:  $a^2 - 3a - 18$

2.3.1 Step 1: factors of 18

.....  
 .....  
 .....

(3)

2.3.2 Step 2: addition and subtraction of the factors to get (-3)

.....

(1)



## 2.3.3 Step 3: Answer

(.....)(.....)

(1)

2.4 Now factorise this trinomial:  $x^2 + 9x + 20$ 

Answer:

(.....)(.....)

(2)

Factorisation by grouping should be done if there is more than three terms in an expression. The terms are grouped in such a way that the common factor /difference of two squares/perfect square trinomial can be used to factorize the expressions.

Example: factorise by grouping  $ab + 2b + 3a + 6$

step1: Group the terms  $ab + 2b$  and  $+ 3a + 6$

step 2: Take out the HCF:  $b(a + 2) + 3(a + 2)$

answer:  $(a + 2)(b + 3)$

2.5 Factorise this expression by grouping:  $4a + 6c - 2ab - 3bc$ .

$4a + 6c - 2ab - 3bc$

.....

.....

.....

(3)

Terms with the same powers of the variable are called like terms e.g.  $x$  and  $-2x$  are like terms.  $2a^2b$  and  $10ba^2$  are like terms while  $5x^2y$  and  $x^3y$  are unlike terms.

An expression is simplified by adding or subtracting like terms. Unlike terms cannot be added or subtracted from each other.

However when we multiply out more complex expressions, remember that all the terms within second bracket must be multiplied by each of the terms in the first bracket (or vice-versa)

e.g.  $(a + 1)(a - 2)$

$= a(a - 2) + 1(a - 2)$

$= a^2 - 2a + a - 2$

$= a^2 - a - 2$



2.6 Simplify the following expressions.

2.6.1  $ab + 3 - 2b + 4ab + 10b$

.....

.....

(2)

2.6.2  $3x^2 + 2x + 2x^2 - (x^2 - x)$

.....

.....

(2)

2.6.3  $(x - 3)(x - 4)$

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(3)

2.6.4  $(2a - 3)(3a + 4)$

.....

.....

.....

(3)

**[31]**

**TOTAL: 50**