TRANSFORMATION GEOMETRY OF GET IS A PRE-REQUISITE FOR UNDERSTANDING FET TRANSFORMATIONS

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TARGET AUDIENCE: 40 grade 9 teachers

DURATION: 1hour

RESOURCES: Cartridge papers, kokkie pens, lead pencils and grid paper, laptop and projector

TIME ANALYSIS

Introduction: 5 minutes

Presentation : 30minutes

Discussion : 15 minutes

Consolidation and conclusion : 5minutes

ABSTRACT

The workshop is intended to deal with different types of transformations. The types of transformations will be juxtaposed to enhance conceptual understanding of grade 9 teachers to share experience and to work with teachers from various places .The understanding of three transformations will be enhanced through verbal, symbolic and diagrammatical representations of transformations. This is intended to enable those teachers who come from districts where developmental needs of teachers are not attended to due to the lack of supportive subject advisory services .The transformations which will be discussed are translation, reflection and dilation.

Translation means changing the position of the object without changing the size of the object. The co-ordinates of the vertices of the translated object are referred to as prime vertices denoted by super scripts on the right of each vertex.

Translating an object by $(x;y)$ means move it x steps to the right and then move it y steps upward. Positive x value implies moving to the right and negative x value implies movement to the left. Negative y value implies downward movement which is preceded by x movements.

Flash cards of shapes to be translated will be used to enhance conceptual understanding of the participants. Specific translation co-ordinates will be used to translate various shapes.

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Emphasis will be on actual movements of shapes on plane than theoretical transformations.

Reflection is the formation of the mirror image on the other side of the reflection line which can be y-axis, x-axis. When reflection is about the x-axis the y co-ordinates of the image become the additive inverses of the co-ordinates of the vertices of the original shape and vice versa. When reflection is about the y-axis the x co-ordinates of the image become the additive inverses of the co-ordinates of the object.

MOTIVATION

The workshop will help the participants to have conceptual understanding of transformations as the presenter is going to represent transformations verbally , symbolically and diagrammatically. The transformations are frequently asked in grade 9 common tests and some teachers have been complaining about difficulty of teaching transformations and I am prepared to juxtapose transformations. Although transformation as a topic has been removed from the grade 10 curriculum statement mathematics transformations in graphs will be done in grade10. Thus this workshop will lay a strong foundation for translations of graphs

INTRODUCTION

What does transforming the object by $(x + 2 ; y - 4)$ mean?

What does translation of an object mean?

If an object has vertex A(2; 2) and is reflected about x- axis , what will the co-ordinates of A1 be ?

If quadrilateral ABCD has vertices A(-4 ; 0) , B(0 ; -4) , C(4 ; 0) and D(0; 4) and is transformed by $(2x ; 2y)$, what will the co –ordinates of the newly formed quadrilateral be?

PRESENTATION

Activity 1

In your groups of 5, brainstorm what do you understand by

- Translations of objects
- Reflecting objects
- Enlarging objects
- And prepare presentations to be presented by your groups.

Activity 2 (Practical transformations)

Use the supplied grid papers and shapes to transform them

- By $(x – 5 ; y + 2)$
- By (-5 ; 2)

Name the type of transformation you have used in bullet one and bullet two above.

What have you noticed about the positions of the transformed object?

Activity 3

Use the supplied Cartesian planes to reflect the given shapes about

- *Y*- axis
- *X*- axis

What do you notice about the co- ordinates of the vertices of the image in bullet one and in bullet two above ?

Activity4(Symbolic representation of transformations)

Find the co-ordinates of the vertices of triangle $A^1B^1C^1$ when triangle ABC has been translated by (-3 ; 3).

Write down the co-ordinates of the vertices of the image when ABCD has vertices A(-3 ;7) , B (-3 ; 3), C (0 ; 3) & D(0 ; 7) and is reflected about the *x*-axis.

Find the co-ordinates $A^1B^1C^1D^1E^1F^1$when ABCDEF whose co –ordinates are A(0; 2) , B(-2 ; 0), C (0 ; -2), D(2 ; -2), E (3 ; 0) and F (2 ; 2) respectively is enlarged by ($3x$; $3y$) or a scale factor of 3.

Consolidation

Transformations which we have looked at are

- Translations (sliding)
- Reflections (formation of images about lines)
- Dilations (enlargement& reduction)

We translate both practically and symbolically. We need to expose learners to both representations for enhancing their conceptual understanding. Conceptual understanding is a functional grasp of a mathematical idea (Kilpatrick et al., 2001:116).

DISCUSSION

Can we differentiate between enlargement and reduction?

Give an example of enlargement and reduction to show that you know the difference between these two types of dilations.

Give examples of translations to show that you understand the concept of translations of transformation geometry.

CONCLUSION

When we use multiple representations of concepts our learners gain insight and understanding. Teaching mathematics by investigation/ practical activities helps learners to discover or notice the relationships. Practical translations of shapes reinforce

symbolic translations of shapes and symbolic translations of shapes also reinforce practical translations. When both representations have been understood one representation will help learners to check the other representation and vice versa.

REFERENCES

Nkungu, M.T., Nxiweni .A .L., Qwele .B .N & Xozwa, M. (2001). Mathematics for the New Nation. Cape Town : Afro Publishers.