



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: TRANSFORMATION GEOMETRY: TRANSLATION (Lesson 1)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to recognise, describe and perform transformations with points, line segments and simple geometric figures on a coordinate plane focusing on translation within and across the quadrants.

3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> translating points and triangles within and across quadrants done in grade 8
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Revise the work done in Grade 8 and let learners do the following activity:</p> <p>Activity (translating a point)</p> <p>Follow the steps below to translate a given point</p> <p>Step 1: Draw a Cartesian plane on the grid provided and label the axes</p> <p>Step 2: Plot the point A(3;4) on a Cartesian plane</p> <p>Step 3: Translate the point A, 2 units to the right and 3 units upwards</p> <p>Step 4: Name the image A'</p> <p>Step 5: Write down the coordinates of A'</p>	

7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)
<p>Guide learners in doing activity 1</p> <p>ACTIVITY 1</p> <p>Follow the steps below to translate a triangle</p> <p>Step 1: Draw a Cartesian plane on the grid provided and label the axes</p> <p>Step 2: Draw $\triangle MNP$ with vertices M(3;2), N(6;4) and P(4;5)</p> <p>Step 3: Translate the triangle 3 units to the right and 2 units upwards</p> <p>Step 4: Name the image M'N'P'</p> <p>Step 5: Write down the coordinates of M', N' and P'</p> <p>Step 6: What is the relationship between the coordinates of the object and the coordinates of the image</p> <p>NB: Guide the learners to discover that the value of the coordinate of the image will be the value of the coordinate of the object + the number of units moved. Furthermore the direction will indicate whether the sign of the coordinate is + or -.</p>	<ul style="list-style-type: none"> do activity 1

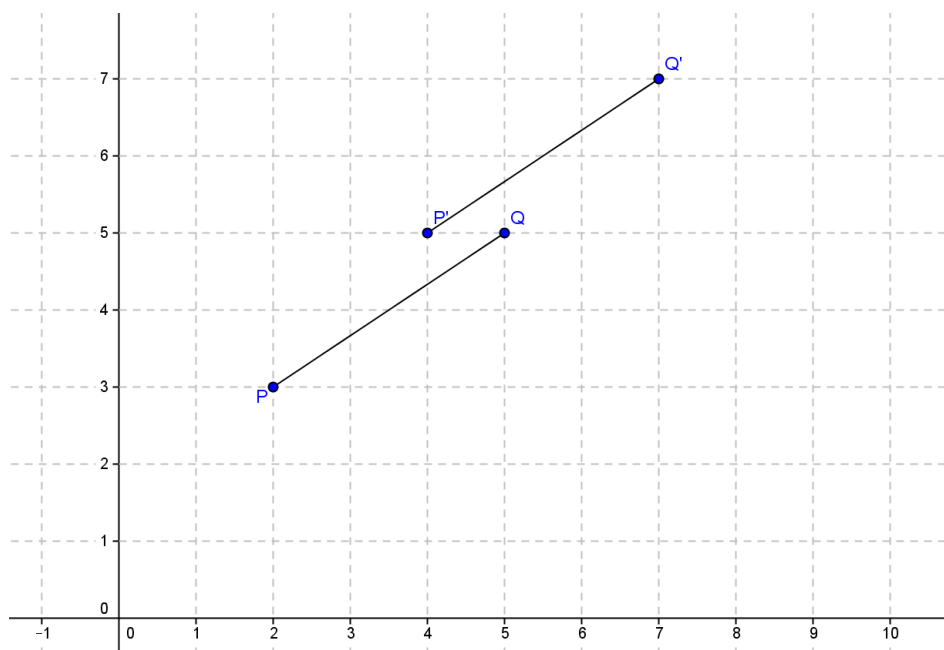


ACTIVITY 2

Through guided instructions, let learners:

1. Draw line segment PQ with P (2;3) and Q(5;5) on a Cartesian plane
2. Translate line PQ 2 units to the right and 2 units upwards and label the image P'Q'
3. Write down the coordinates of P' and Q'
4. Translate PQ 3 units to the right and 1 unit to the left.
5. Label the image P''Q''
6. Write down the coordinates of P'' and Q''

Solution



NB: Ensure that learners are able to formalise translation using the following notation: $(x; y) \rightarrow (x + p; y + q)$.

Example $P(2,3) \rightarrow (2 + 2; 3 + 2) = (4; 5)$

ACTIVITY 3

Describe the following translations in words

- a) $A(x; y) \rightarrow A'(x + 3; y - 4)$
- b) $B(x; y) \rightarrow B'(x - 6; y + 7)$

Solutions

- A. Translation 2 units to the right and 1 unit down.
- B. Translation 5 units to the left and 3 units up.

- do the activity as per guided instructions



ACTIVITY 4

1. Given that:

- a) Point $T(5; 3)$ is translated 3 units horizontally to the right. What will the coordinates of the image be?
- b) Point $T(5; 3)$ is translated 3 units horizontally to the right and 3 units vertically upwards. What will the coordinates of the image be?
- c) Point $T(5; 3)$ is translated p - units horizontally to the right and q units vertically upwards. What will the new coordinates of the image be?

2. If point $R(4; 3)$ is to be translated to the position of point $Q(6; -1)$ by horizontal and vertical movements, describe how you will do this.

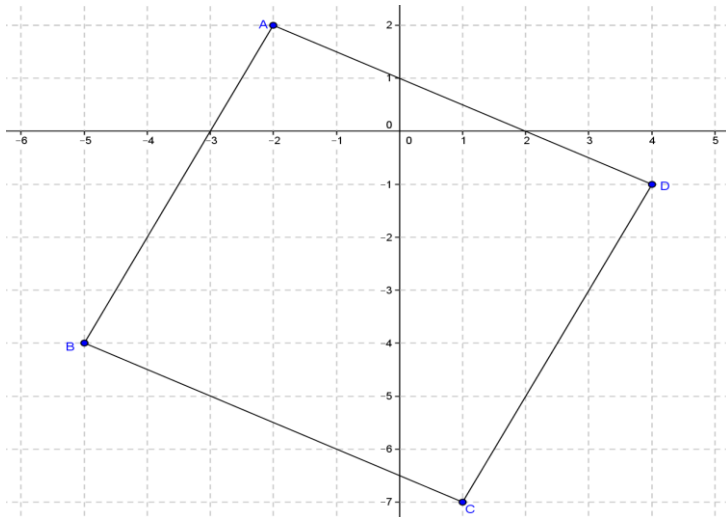
- do activity 4



8. CLASSWORK (Suggested time: 15 minutes)

ACTIVITY 1

Use the sketch given below to answer the following questions

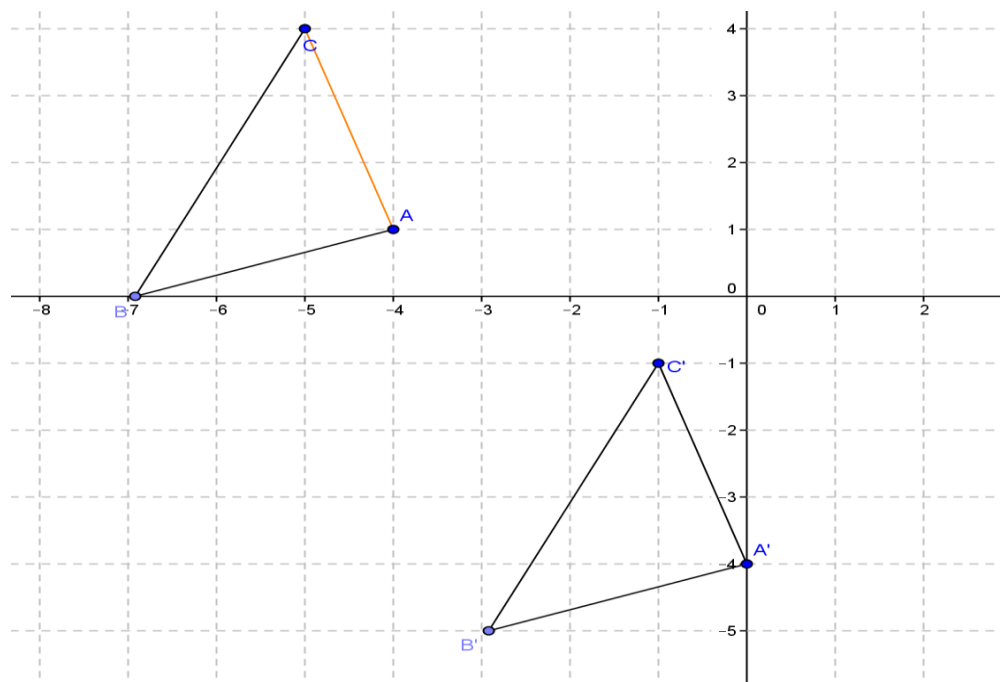


- Redraw the figure on the grid provided
- Write down the coordinates of A, B, C and D
- Translate the figure 2 units vertically down and 2 units horizontally to the right.
- Label the image $A'B'C'D'$
- Write down the co-ordinates of A' , B' , C' and D'
- Did the size of the shape change? Justify your answer.

NB: Emphasise the aspect of congruency when dealing with translations.

ACTIVITY 2

Consider the sketch below to answer the questions that follow:



1. Write the coordinates of A, A', B', C, and C'
2. Describe the translation in words.
3. Write down a rule of the translation in the form $(x; y) \rightarrow (x + p; y + q)$
4. Translate $\triangle A'B'C'$ 8 units to the right and 3 units down and label the translated points A''B''C''

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a) **Emphasise that:**

CONCLUSION AND EMPHASIS (CONSOLIDATION)			
<p>For translation horizontally to the right, the value of the x-coordinate of the image will be the value of the coordinate of the object + the number of units moved.</p> <p>(Example: If the x-value of a figure is 9 and the point is translated 8 units to the right and the x-value of the image will be $17 = 9 + 8$</p>	<p>For translation horizontally to the left, the value of the x-coordinate of the image will be the value of the coordinate of the object - the number of units moved.</p> <p>(Example: If the x-value of a figure is 5 and the point is translated four 2 units to the left, the x-value of the image will $-3 = 5 - 2$</p>	<p>For translation vertically up, the value of the y – coordinate of the image will be the value of the coordinate of the object +the number of units moved.</p> <p>(Example: If the y-value of a figure is 7 and the point is translated 3 units up, the y value of the image will be $10 = 7 + 3$</p>	<p>For translation vertically down, the value of the y – coordinate of the image will be the value of the coordinate of the object - the number of units moved.</p> <p>(Example: If the y-value of a figure is 4 and the point is translated 5 units down the y-value of the image become - $1 = 4 - 5$</p>
<p>The general rule on translating figures</p>	<p>When the point or a figure with the coordinates(x ; y) is translated p units horizontally and q units vertically, the rule for translation can be formalized with the following notation: $(x; y) \rightarrow (x + p ; y + q)$</p>		
<ul style="list-style-type: none">• translation is a transformation that moves each point of a figure the same direction and the same distance. Every point moves a distance in the same direction. Moves a shape in a straight line• the shape is repeated in the same orientation• the object and the image have the same size, area, angles and line lengths.• translation produces congruent figures.			

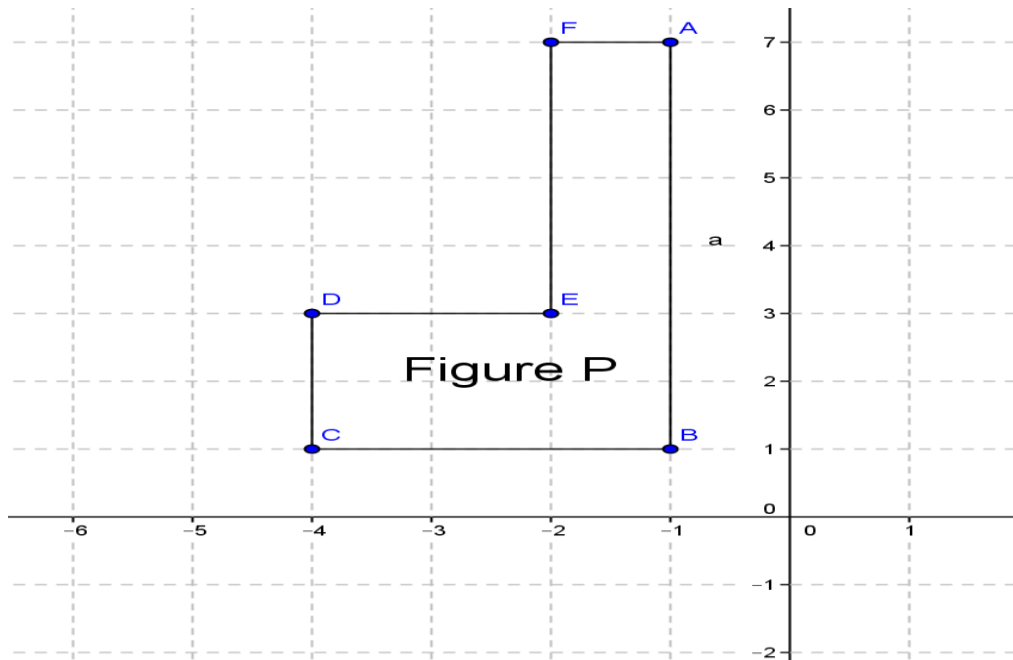
b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.



c) Homework

- Describe translation if the coordinates of the original point and the image are:
 - $M(-2; 3) \rightarrow M'(-2; -5)$
 - $N(4; -7) \rightarrow N'(-6; -0)$
 - $P(3; 11) \rightarrow P'(16; 20)$
 - $Q(-1; -2) \rightarrow Q'(5; -4)$
 - $R(8; -11) \rightarrow R'(-2; -3)$
- Point $F(-2; -4)$ is translated 3 units vertically upwards, what will the coordinates of the image be?
- Translate the point $S(1; 2)$ to the left by 4 units and then vertically downwards by 3 units. What will the coordinates of the translated point be?
- Write down the coordinates of the image of D and E if figure P is translated 3 units to the right and two units downwards.



DBE Book 2: page 116 Worksheet 109

Sasol-Inzalo Book 2: page 99 no. 2



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
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DATE:	
DURATION:	1 Hour

1. TOPIC: TRANSFORMATION GEOMETRY: REFLECTION (Lesson 2)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to recognise, describe and perform transformations with points, line segments and simple geometric figures on a coordinate plane focusing on reflection in the y-axis or x-axis

3. RESOURCES:

Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser



4. PRIOR KNOWLEDGE:

- cartesian plane
- plotting points
- drawing simple geometric figures
- coordinates of points
- translation

5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)

Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.



6. INTRODUCTION (Suggested time: 10 Minutes)

Through guided instructions, let learners do the following two activities

ACTIVITY 1

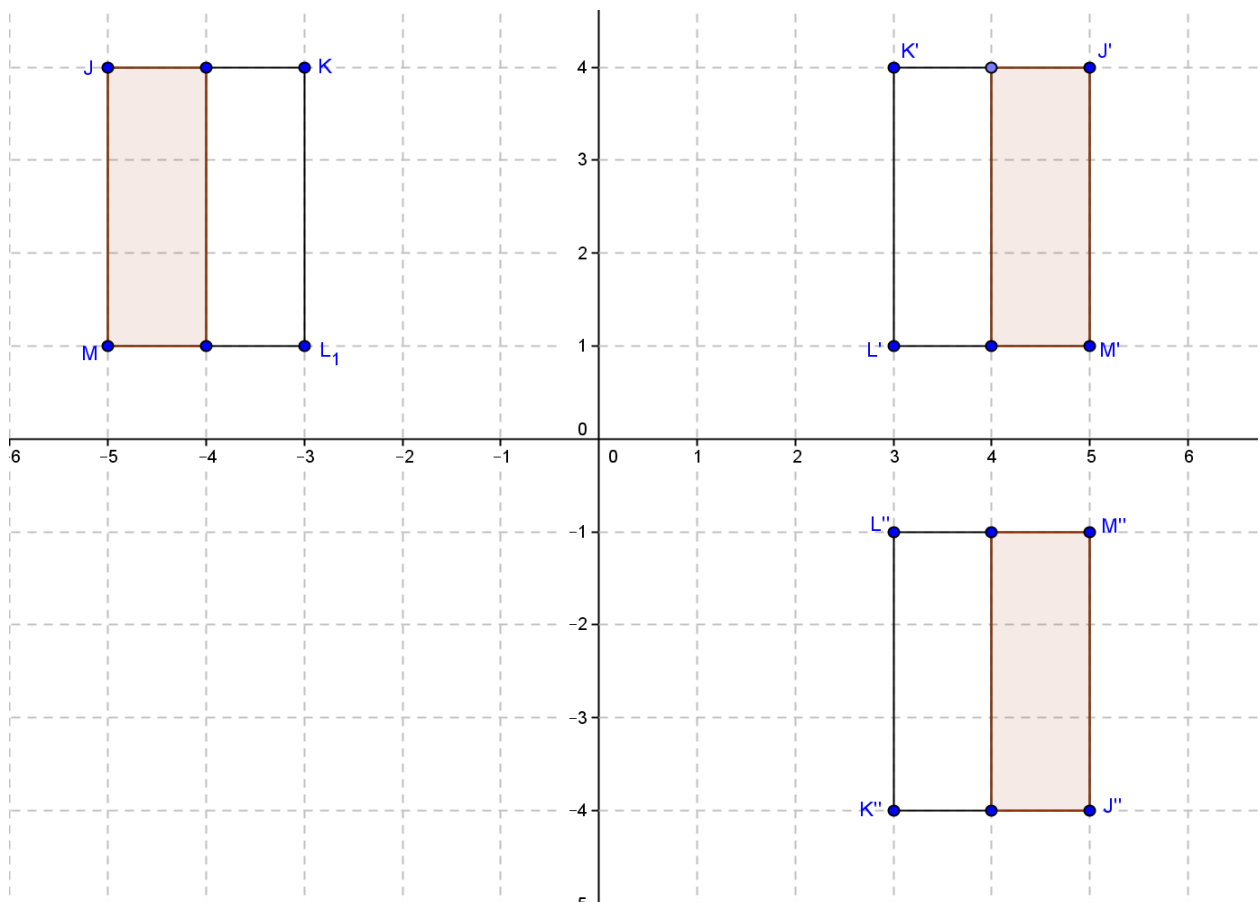
Explain the following aspects:

- Mirror line/line of reflection
- Vertical and horizontal line
- Flipping over

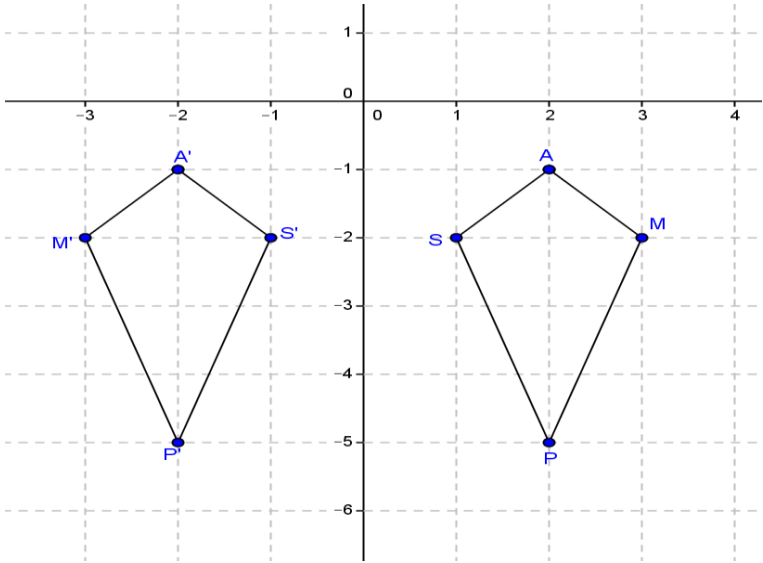
ACTIVITY 2: Ask learners to:

- draw the Cartesian plane
- draw rectangle JKLM with the following coordinates: $J(-5; 4)$, $K(-3; 4)$, $L(-3; 1)$ and $M(-5; 1)$
- shade half of the rectangle
- reflect the rectangle along the y-axis and label the image J', K', L', M' and write down the coordinates of each vertex
- reflect the rectangle J', K', L', M' along the x-axis and label the image J'', K'', L'', M'' and write down the coordinates of each vertex.

Answer



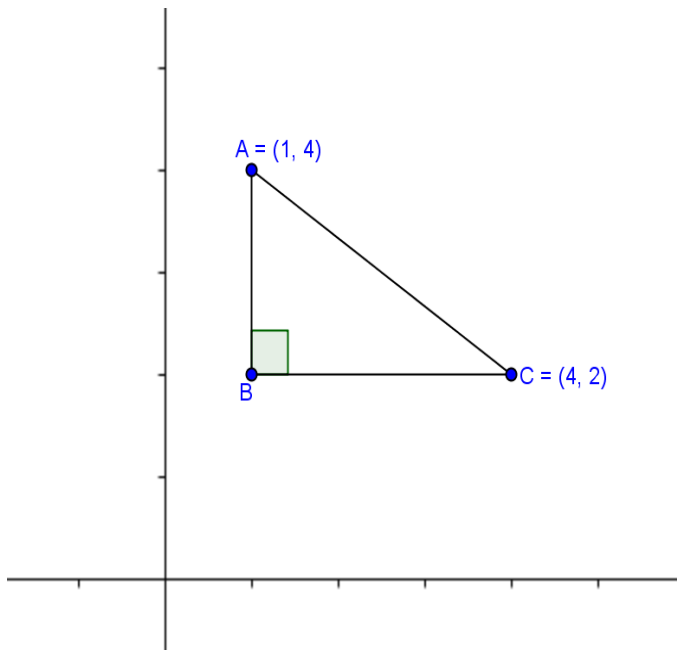
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)
<p>Divide learners into small groups and present the following activities:</p> <p>ACTIVITY 1 Follow the steps below to reflect a figure</p> <p>Step 1: Draw a Cartesian plane on the grid provided and label the axes</p> <p>Step 2: Draw the figure SAMP with vertices $S(1; -2)$, $A(2, -1)$ and $M(3; -2)$ and $P(2, -5)$</p> <p>Step 3: Reflect the figure along the y-axis and label it $S'A'M'P'$</p> <p>Step 4: Write down the coordinates of $S'A'M'P'$</p> <p>Step 5: Compare the coordinates of SAMP and $S'A'M'P'$</p> <p>Step 6: What is the relationship between the coordinates of the object and the coordinates of the image?</p> <p>Step 7: Complete: $(x; y) \rightarrow (-; -)$</p> <p>NB: Guide learners to discover that when a point/ a figure is reflected along y axis the rule for reflection along the y axis can be expressed using the following notation $(x; y) \rightarrow (-x; y)$</p> <p>Solution</p>  <p>Observation- For reflections in the:</p> <ul style="list-style-type: none"> • y-axis, the x-value changes the sign and the y-value stays the same • x-axis, the y-value changes sign and the x-value stays the same 	<ul style="list-style-type: none"> • answer questions posed by the teachers • work as a group



ACTIVITY 2

Consider the following diagram to answer the questions that follow:



- If the coordinates of B are d and f [i.e. $B(d; f)$], determine the values of d and f
- If $\triangle ABC$ is transformed to $\triangle A'B'C'$ along the x-axis, write down the coordinates B' and C'
- If $\triangle ABC$ is transformed to $\triangle A''B''C''$ along the y-axis, write down the coordinates A''
- Express the transformation in 1(a) above the form $(x; y) \rightarrow (-; -)$
- Express the transformation in 1(b) above the form $(x; y) \rightarrow (-; -)$

8. CLASSWORK (Suggested time: 15 minutes)

DBE Book 2 :page 118 No. b

Sasol-Inzalo Book 2: page 92 No. 1



9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

d) **Emphasise that:**

For reflections in the y-axis, the x-value changes the sign and the y-value stays the same
For reflections in the x-axis, the y-value changes sign and the x-value stays the same

The general rule on reflecting figures in the y-axis and in the x-axis

When the point or a figure with the coordinates $(x ; y)$ is reflected along the x- axis, the rule for reflection can be formalized with the following notation:

$$(x; y) \rightarrow (x ; -y)$$

When the point or a figure with the coordinates $(x ; y)$ is reflected along the y-axis, the rule for reflection can be formalized with the following notation:

$$(x; y) \rightarrow (-x ; y)$$

- reflection gives an image that looks like a reflection in a mirror
- the line of symmetry always behaves like a mirror
- points on the mirror line are always stationary
- points on the (pre-image)/object and points on the image are equidistant from the mirror line
- the (pre-image)/object and the image have the same area and same shape
- figures on each side of the line of symmetry are congruent
- the line joining the (pre-image)/object and the image is perpendicular to the line of symmetry
- the direction of the image is different from the direction of the of the(pre-image) object(the orientation changes)

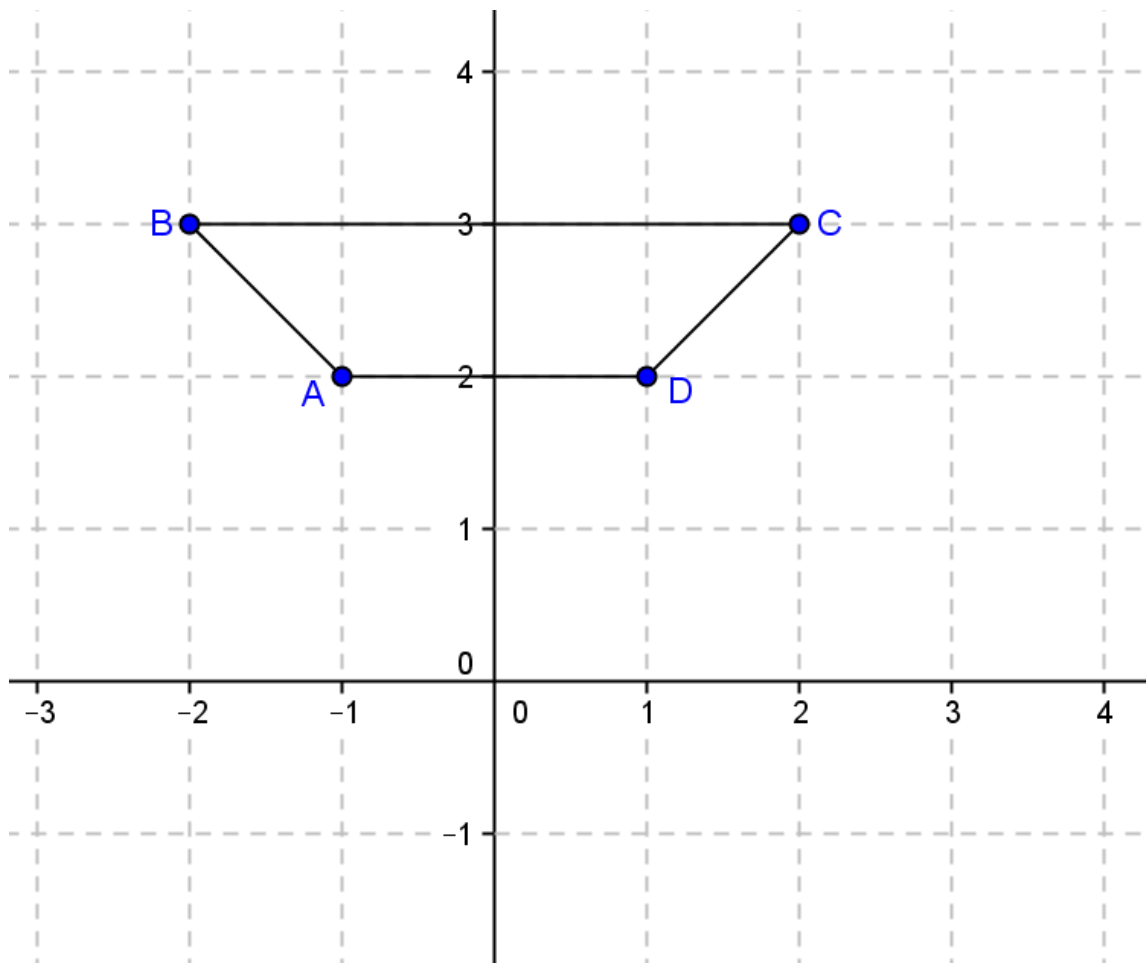
Construction of a mirror line

- Join a point and its image with a straight line
- Construct the perpendicular bisector of the straight line drawn



- e) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework



1. What is the name of the quadrilateral
2. Write down the coordinates of A, B, C and D
3. Translate quadrilateral ABCD 3 units to the left and 1 unit down and label the image $A'B'C'; D'$
4. Reflect the image along the x-axis label the figure $A''B''C''; D''$
5. Write down the coordinates of C''

MATHEMATICS LESSON PLAN

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PROVINCE:	
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TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: TRANSFORMATION GEOMETRY: REFLECTION (Lesson3)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to:

- recognise, describe and perform transformation with points, line segments and simple geometric figures on a coordinate plane, focusing on reflection in the line $y = x$
- identify what transformation of a point is, given the coordinates of the image



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • reflection
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6. INTRODUCTION (Suggested time: 10 Minutes) Revise with learners by asking the following questions: Activity 1. Write the coordinates of the images of the following points reflected along: <ul style="list-style-type: none"> i. x-axis ii. y-axis <p style="margin-left: 40px;">P(2;7) , A(-5; 6) and M(-3 ; -9)</p> 2. State the rule of the reflection about: <ul style="list-style-type: none"> a) $y = 0$ b) $x = 0$ 	



7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)												
<p>Do the following activity with the learners:</p> <p>ACTIVITY 1</p> <ol style="list-style-type: none"> Plot the points $E(2; 1)$, $F(3; 5)$ and $G(-1; 4)$ Draw the line $y = x$ on the Cartesian plane Draw a line from point E perpendicular to the line $y = x$ Draw a line from point F perpendicular to the line $y = x$ Draw a line from point G perpendicular to the line $y = x$ Measure the distance from point E to the line $y = x$ The distance from E to the line of reflection should be the same as the distance from the line of reflection to the image(E') Repeat steps 6 and 7 for point F and G What is the relationship between the coordinates of the object(pre-image) and the image Formalise the rule for reflection about the line $y = x$ with the following notation $(x; y) \rightarrow (-; -)$ <p>NB: Assist learners to draw the line $y = x$ by first plotting the points in the drawn Cartesian plane</p> <p>The observation is that when an object is reflected along the line $y = x$, the coordinates of the object are interchanged to become the coordinates of the image. In a formalised form it will be $(x; y) \rightarrow (y; x)$</p>	<ul style="list-style-type: none"> follow the steps to discover the rule for reflecting along the line $y = x$ 												
<p>ACTIVITY 2</p> <p>2.1 Copy and complete the table:</p> <table border="1"> <thead> <tr> <th>Object</th><th>Image</th></tr> </thead> <tbody> <tr> <td>1. $F(3; 7)$</td><td></td></tr> <tr> <td>2. $G(-7; 17)$</td><td></td></tr> <tr> <td>3.</td><td>$K'(-12; 6)$</td></tr> <tr> <td>4.</td><td>$L'(-9; -3)$</td></tr> <tr> <td>5.</td><td>$P'(a; b)$</td></tr> </tbody> </table> <p>2.2 Describe the transformation that maps $Q(-8; 2) \rightarrow Q'(2; -8)$ in words</p> <p>2.3 State the rule for this transformation in the form: $(x; y) \rightarrow (-; -)$</p>	Object	Image	1. $F(3; 7)$		2. $G(-7; 17)$		3.	$K'(-12; 6)$	4.	$L'(-9; -3)$	5.	$P'(a; b)$	<ul style="list-style-type: none"> complete the table describe the rule for the mapping
Object	Image												
1. $F(3; 7)$													
2. $G(-7; 17)$													
3.	$K'(-12; 6)$												
4.	$L'(-9; -3)$												
5.	$P'(a; b)$												



8. CLASSWORK (Suggested time: 15 minutes)

- Determine the coordinates of M' if the point $M(-3; 6)$ is:
 - Reflected in the line $x = 0$
 - Reflected in the line $y = 0$
 - Translated 4 units horizontally to the left
- The points of the image of a triangle are given as follows:
 $C'(4; -3)$, $D'(2; -4)$ and $E'(1; 2)$. Write down the coordinates of the vertices of a triangle(object)
- Describe the transformation that maps $B(15;-11)$ to $(-11;15)$ in words and in the form:
 $(x; y) \rightarrow (-; -)$

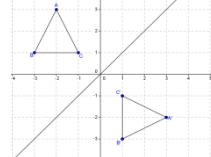
9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a) Emphasise that:

- when an object is reflected along the line $y = x$, the coordinates of the object are interchanged to become the coordinates of the image.

- The general rule on reflecting figures along the line $y = x$

In a formalised form the transformation will be
 $(x; y) \rightarrow (y; x)$



- Construction of a mirror line**

- join a point and its image with a straight line
- construct the perpendicular bisector of the straight line drawn

- b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

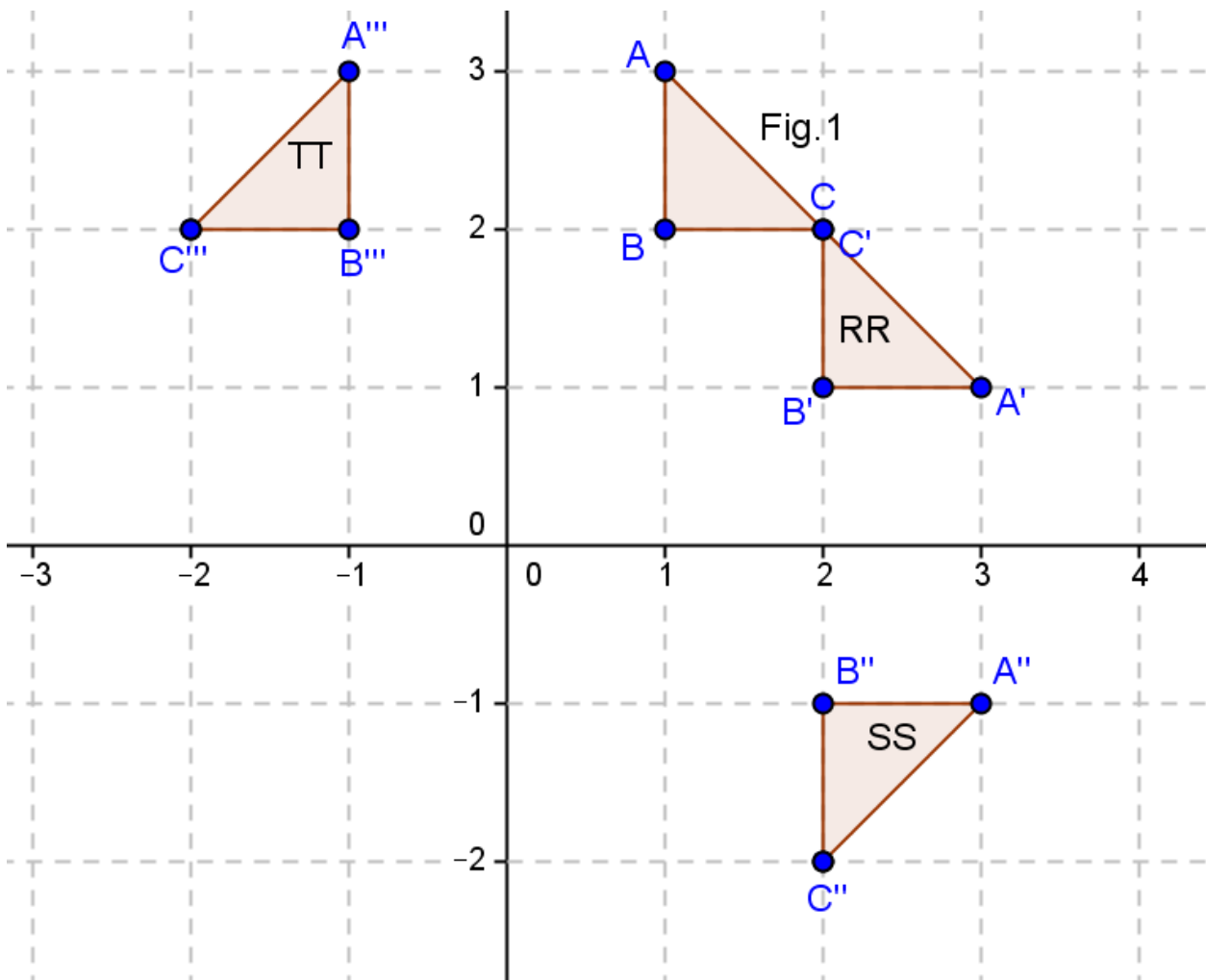


Homework

1.1 Given that $P(1; 4)$, $Q(3; 4)$ and $R(1; 2)$ are vertices of $\triangle PQR$

- Sketch $\triangle PQR$
- Draw $\triangle P'Q'R'$ if reflected along the line $y = x$
- Write down the coordinates of P' , Q' and R'

1.2 Consider the following sketch to answer the question that follows:



Which figure is a reflection of Fig. 1 about the line $y = x$. Justify your answer

DBE Book 2: page 120 No. 1(a) and (b)

Sasol-inzalo Book 2: page 94 No 1(a) and 1(b)

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DURATION:	1 Hour

1. **TOPIC:** TRANSFORMATION GEOMETRY: ROTATION (Lesson 4)

2 **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to rotate the triangle around the origin



3 RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • translation • reflection
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)	<p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>
6 INTRODUCTION (Suggested time: 10 Minutes)	<p>Through guided instructions let learners do the following activity:</p> <p>ACTIVITY</p> <ol style="list-style-type: none"> 1. Plot the point $R(4; 2)$ on the Cartesian plane 2. Rotate point R at: <ol style="list-style-type: none"> a) 90° clockwise and label the image R' and write down the coordinates of the image b) 90° anticlockwise and label the image R'' and write down the coordinates of the image c) 180° clockwise and label the image R''' and write down the coordinates of the image (The centre of rotation is $(0; 0)$) 3. What is the relationship between the coordinates of the pre-image(object) and the image in each case



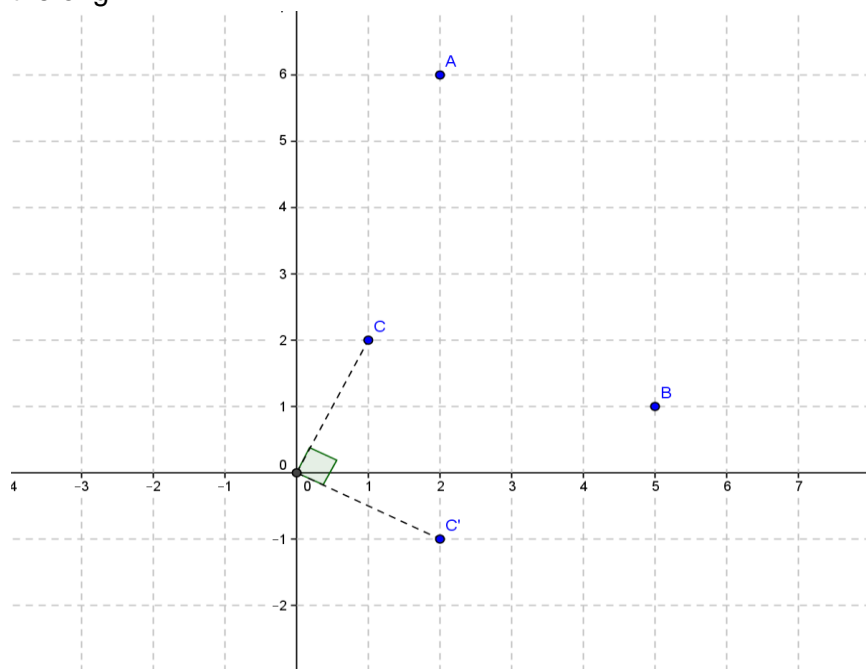
7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

ACTIVITY 1

Do the following activities with the learners

In the following diagram, point C has been rotated 90° clockwise about the origin.



- Rotate points A and B 90° clockwise about the origin.
- Write down the coordinates of points A' and B'
- Join points A, B and C to form a triangle.
- Join points A' , B' and C'
- Is the triangle and its image congruent?
- Compare the coordinates of points A, B and C with the coordinates of their images. What do you notice

NB: Guide learners to discover that when a point/ a figure is rotated at an angle of 90° about the origin in a clockwise direction, the rule for rotation can be formalised/expressed using the following notation $(x; y) \rightarrow (y; -x)$

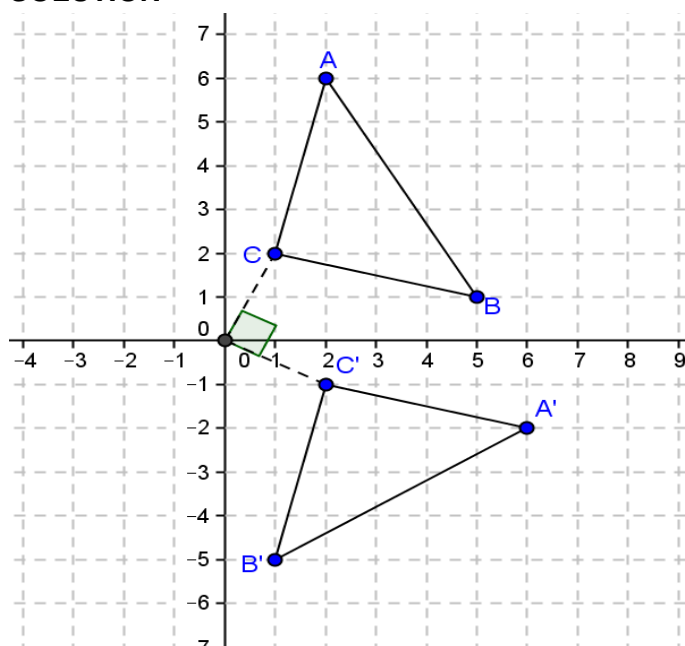
Learning activities

(Learners are expected to :)

- do the activities step-by- step to discover the formal rules in rotating figures



SOLUTION



Guide learners and let them do the following activity:

ACTIVITY 2

- Draw $\triangle ABC$ of any reasonable size in the third quadrant
- Rotate $\triangle ABC$ 90° anti-clockwise about the origin
- Label the image $A'B'C'$
- Write down the coordinates of the vertices of the image
- Compare the coordinates of points A, B and C with the coordinates of the image.
- What do you notice?

NB: Guide learners to discover that when a point/ a figure is rotated at an angle of 90° about the origin in an anti-clockwise direction, the rule for rotation can be formalised/expressed using the following notation $(x; y) \rightarrow (-y; x)$

- do the activities step-by- step to discover the formal rules in rotating figures

8 CLASSWORK (Suggested time: 15 minutes)

Write down the coordinates of each image point after these transformations.

- Rotation 90° clockwise about the origin: L(1;3); Z(5;5) and F(4;2)
- Rotation 90° anticlockwise about the origin: S(1;-4); W(1;0) and J(3; -4)
- Rotation 180° about the origin: V(-5;3); A(-3;1) and G(0;-3)



9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time:5 minutes)

a) Emphasise that:

- the centre of rotation should be fixed
- points on the object and on the image are equidistant from the centre of rotation
- the object and the image have the same area and shape

- **For enrichment purposes**

In constructing the centre of rotation:

- ✓ join the first point to its image
- ✓ join the second point to its image
- ✓ draw the perpendicular bisectors of the two lines
- ✓ the point of intersection of the two perpendicular bisectors is the centre of rotation

b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

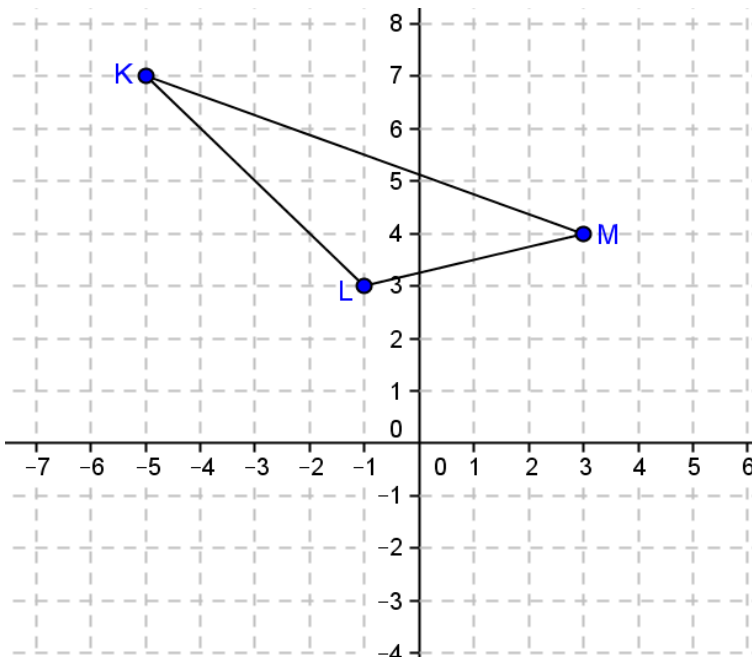


Homework

Consider the diagram below to answer the questions that follow:

NB: Let learners:

- use the same system of axes to answer all the questions
- use different colours to draw the images



- Write down the coordinates of points K, L and M
- Rotate $\triangle KLM$ 180° anticlockwise about the origin
- Label the image $K'L'M'$
- Write down the coordinates of the image
- Compare the coordinates of the points K, L and M with the coordinates of the image.
- What do you notice?
- Rotate $\triangle KLM$ 180° clockwise about the origin
- Label the image $K''M''L''$
- Write down the coordinates of the image
- Compare the coordinates of the points K, L and M with the coordinates of the image.
- Is there any need to indicate the direction of rotation ("clockwise or anti-clockwise") when you rotate an object at an angle of 180° . Motivate your answer

MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1 TOPIC: TRANSFORMATION GEOMETRY: ENLARGEMENT (Lesson 5)

2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to:

- use proportion to describe the effect of enlargement on area
- use proportion to describe the effect of enlargement on perimeter



3 RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser, oxford mathematics dictionary.
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • perimeter and area • similarity • enlargements and reductions done in grade 8
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6 INTRODUCTION (Suggested time: 10 Minutes) Revise with learners the following work done in Grade 8 by asking them to: ACTIVITY <ol style="list-style-type: none"> Define the following: <ul style="list-style-type: none"> ➤ Enlargement: It is a transformation in which the distances between every pair of points in the object are multiplied by the same amount to produce the image. The multiplier can take any value- a whole number or a fraction ➤ Perimeter of a polygon: the total distance around the polygon defining the outline of the shape. ➤ Area of a polygon: The amount of space covered by the polygon or the size of the flat surface enclosed by the polygon. Calculate the perimeter and area of square with a length of 8 cm. Answer: Perimeter = $4s = 4 \times 8 \text{ cm} = 32$ and Area = $s^2 = (8 \text{ cm})^2 = 64 \text{ cm}^2$ Given that the perimeter of a square ABCD= 48cm. Write down the perimeter of the square if the length of each side is doubled. <p>NB: Learners should have recognised that two or more figures are similar if they have corresponding angles equal and their sides are proportionally longer or shorter.</p>	

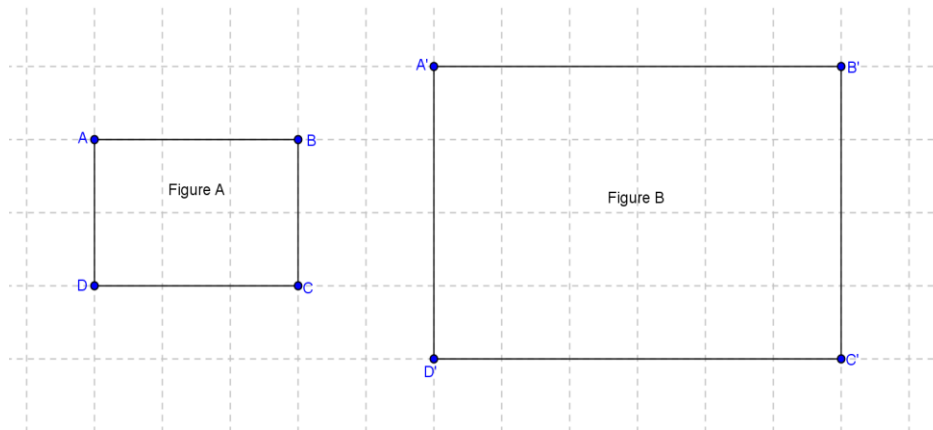


7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

ACTIVITY 1

Use the figures to answer activities 1 to 3.



Complete the following

- a) $AB = 3\text{cm}$ $A'B' = 6\text{cm}$ therefore $A'B' = \text{-----} \times AB$
 b) $BC = 2\text{cm}$ $B'C' = 4\text{cm}$ therefore $B'C' = \text{-----} \times BC$
 c) $CD = 3\text{cm}$ $C'D' = 6\text{cm}$ therefore $C'D' = \text{-----} \times CD$
 d) $AD = 2\text{cm}$ $A'D' = 4\text{cm}$ therefore $A'D' = \text{-----} \times AD$

NB: The value of the multiplier used to make an enlargement is called a scale factor.

Learning activities

(Learners are expected to:)

- complete the activity



ACTIVITY 2

2.1 Calculate the ratio of the area of figure B to the area of Figure A

2.2 Simplify the ratio in question 2.1 above

SOLUTION

2.1	2.2
Area of ABCD = 6 cm^2	The ratio in simplest form is:
Area of A'B'C'D' = 24 cm^2	$4 : 1$
Ratio of the area of figure B to the area of figure A = $24 \text{ cm}^2 : 6 \text{ cm}^2$	$2^2 : 1$
Emphasise to learners that the area of the image = 4 times the area of an object	
This means that area of the image = $2^2 \times$ area of the object	
In general, if a shape enlarges by a factor of k, then the area of the image = $k^2 \times$ area of the object	

ACTIVITY 3

Using figure A and figure B in activity 1, let learners answer the following questions:

- Calculate perimeter of the object and the image
- Calculate the ratio of the perimeter of figure B to the area of Figure A

SOLUTION

- Perimeter for figure A is 10cm and the perimeter for figure B is 20cm
- Ratio of the perimeter of figure B to the perimeter of figure A = $20\text{cm} : 10\text{cm} = 2 : 1$

This implies that the perimeter of the image = $2 \times$ perimeter of an object

NB: Learners should realise that if the scale factor or enlargement factor is k, then perimeter of the image = $k \times$ perimeter of the object.

8 CLASSWORK (Suggested time: 15 minutes)

- A quadrilateral has the following vertices: A(-2; 4), B(-4; -2), C(4; -3) and D(2; 1). Determine the coordinates of the enlarged image if the scale factor is 2
- Describe the following transformation: $A(4; -2) \rightarrow A'(8; -4)$



9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

c) Emphasise that:

- if the image is an enlargement of the original figure, then it means that all the sides of the original figure are multiplied by the same number (the scale factor) to produce the image.
- if the scale factor is > 1 , the image is an enlargement
- the original figure and its enlarged image are similar
- perimeter of the image = perimeter of the original figure \times scale factor
- area of the image = area of the original figure \times (scale factor)²

d) Homework

1. Complete the following statements to make sure that you understand enlargements of figures.

Enlarge a figure by a scale factor of 3 means:

- i. Each side of the original figure must be multiplied by _____
- ii. Each side of the image will be _____ than its corresponding side in the original figure.
- iii. The perimeter of the image will be _____ than the perimeter of the original shape
- iv. The area of the image will be _____ than the area of the original figure
- v. $\frac{\text{the side length of the } \underline{\hspace{2cm}}}{\text{length of the corresponding side of } \underline{\hspace{2cm}}} = 3$
- vi. $(x; y) \rightarrow (kx; ky)$ or $(x'; y') = (kx; ky)$ where k is the _____
- vii. If $k > 1$, then the image is an _____

2. Sasol-inzalo Book 2 page 102 No. 2
3. DBE Book 2 page 130 No. 1(d) and page 131 No. 2



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
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DURATION:	1 Hour

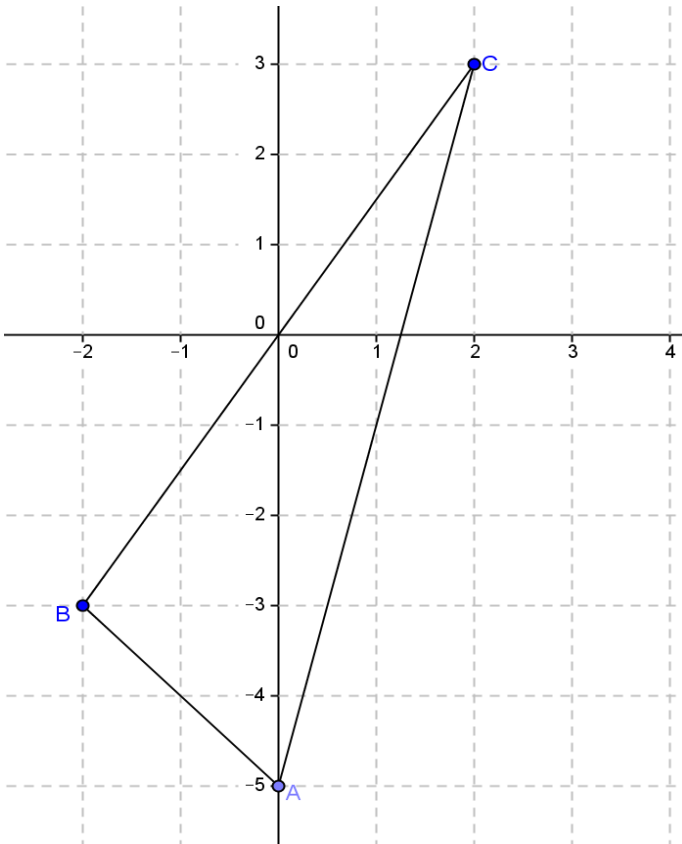
1 **TOPIC:** TRANSFORMATION GEOMETRY: REDUCTION (Lesson 6)

2 **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to:

- use proportion to describe the effect of reduction on area
- use proportion to describe the effect of reduction on perimeter

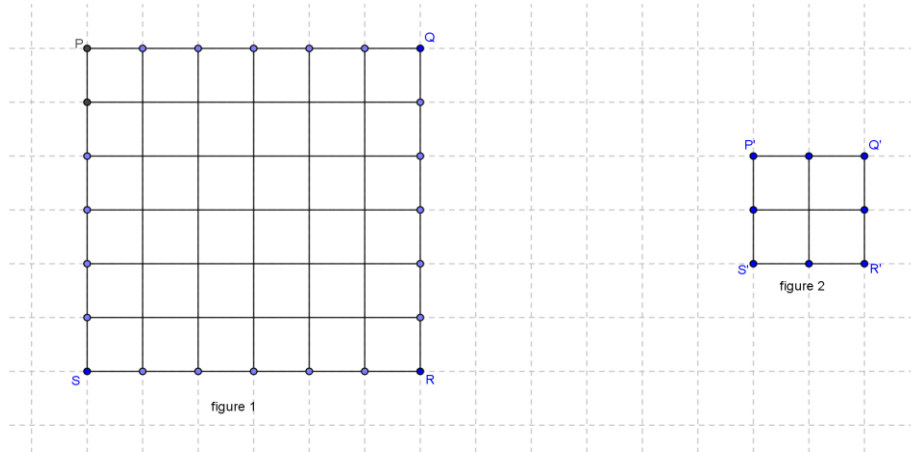


3 RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • perimeter and area • similarity • enlargements done in the previous lesson
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6 INTRODUCTION (Suggested time: 10 Minutes) <p>Activity</p> <p>Revise with learners by asking the following questions</p> <ol style="list-style-type: none"> Draw the enlarged image of the figure drawn below if the scale factor = 2 and the centre of enlargement is (0; 0) Label the vertices of the image, A'B'C' Write down the coordinates of the vertices of the image 	
	

7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

Go through the following activities with learners:



Each box is $1\text{cm} \times 1\text{cm}$

Activity 1

1. Complete the following

- e) $PQ = 6\text{ cm}$ $P'Q' = 6\text{ cm}$ \times
- f) $QR = 6\text{ cm}$ $Q'R' = 6\text{ cm}$ \times
- g) $RS = 6\text{ cm}$ $R'S' = 6\text{ cm}$ \times
- h) $SP = 6\text{ cm}$ $S'P' = 6\text{ cm}$ \times

2. What is the scale factor in question 1?

- c) Calculate perimeter of PQRS and $P'Q'R'S'$
- d) Calculate the ratio of the perimeter of $P'Q'R'S'$ to the perimeter of the PQRS
- e) Express the perimeter of the image in terms of the perimeter of the object
- f) Calculate area of PQRS and $P'Q'R'S'$
- g) Calculate the ratio of the area of $P'Q'R'S'$ to the area of PQRS
- h) Express the area of $P'Q'R'S'$ in terms of the area of PQRS

Learning activities

(Learners are expected to :)

Complete activity 1 and 2



SOLUTION

(a) The perimeter of PQRS is 24cm and the perimeter of the image is 8cm

(b) $8:24 = 1:3$

(c) The perimeter of the image = 8cm

$$= \frac{24}{3} \text{ cm}$$

$$= \frac{1}{3} \times 24 \text{ cm}$$

In general: Perimeter of the image $= \frac{1}{k} \times \text{perimeter of the object}$,
where k is the scale factor

a) Area of PQRS = 36 cm^2 and area of $P'Q'R'S' = 4 \text{ cm}^2$

b) $4 \text{ cm}^2 : 36 \text{ cm}^2$

c) Area of $P'Q'R'S' = 4 \text{ cm}^2$

$$= \frac{36}{9} \text{ cm}^2$$

$$= \frac{1}{9} \times 36 \text{ cm}^2$$

$$= \frac{1}{9} \times \text{area of PQRS}$$

$$= \frac{1}{3^2} \times \text{area of PQRS}$$

Conclude that for reduction by factor k,

the area of the image $= \frac{1}{k^2} \times \text{Area of the object}$

ACTIVITY 2

The perimeter of a quadrilateral PQRS = 30cm and its area is 50 cm^2

a) Find the perimeter of $P'Q'R'S'$ if the scale factor is $\frac{1}{5}$

b) Determine the area of the quadrilateral $P'Q'R'S'$ if the scale factor $\frac{1}{5}$



8 CLASSWORK (Suggested time: 15 minutes)

ACTIVITY 2

A quadrilateral has the following vertices: D (6; -4), E (4; -6), F (-4; 2) and G (-2; -2). Determine the coordinates of the reduced image if the scale factor = $\frac{1}{2}$

9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

e) Emphasise that:

- Reducing a figure by a scale factor of four means

$$\frac{\text{side length of image}}{\text{length of corresponding side of original figure}} = \frac{1}{4}$$

- Each side of the original figure must be multiplied by $\frac{1}{4}$
- Each side of the image will be 4 times shorter than its corresponding side in the original figure
- The perimeter of the image will be 4 times shorter than the perimeter of the original figure
- The area of the image will be 4^2 times ($4 \times 4 = 16$ times) smaller than the area of the original figure. (or area of the image = $\left(\frac{1}{4}\right)^2 = \frac{1}{16}$ of the area of the original figure)

- f) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels

Homework

ACTIVITY 2

The area of $\triangle ABC$ is 20cm^2 and the area of $\triangle A'B'C' = 5\text{cm}^2$

- What is the scale factor of reduction?
- What is the perimeter of the image if the perimeter of $\triangle ABC = 22\text{cm}$

ACTIVITY 3

- Describe the following transformation
- $A(12; -16) \rightarrow A'(3; -4)$

Sasol-inzalo Book 2 page 102 No. 5



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

**1 TOPIC: TRANSFORMATION GEOMETRY: ENLARGEMENT AND REDUCTION
INVESTIGATING COORDINATES (Lesson 7)**

2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to investigate the co-ordinates of the vertices of figures that have been enlarged by a given scale



3 RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • perimeter and area • Similarity • enlargements done in the previous lesson
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)	<p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>
6 INTRODUCTION (Suggested time: 10 Minutes)	<p>ACTIVITY</p> <p>1. The perimeter of $\triangle DEF = 17\text{ cm}$ and the perimeter of $\triangle D'E'F' = 25,5\text{ cm}$.</p> <p>(a) What is the scale factor of enlargement?</p> <p>(b) What is the area of $\triangle D'E'F'$ if the area of $\triangle DEF = 14\text{ cm}^2$?</p> <p>2. The area of $\triangle ABC = 20\text{ cm}^2$ and the area of $\triangle A'B'C' = 5\text{ cm}^2$</p> <p>(a) What is the scale factor of the reduction?</p> <p>(b) What is the perimeter of the image if the perimeter of $\triangle ABC = 22\text{ cm}$?</p>

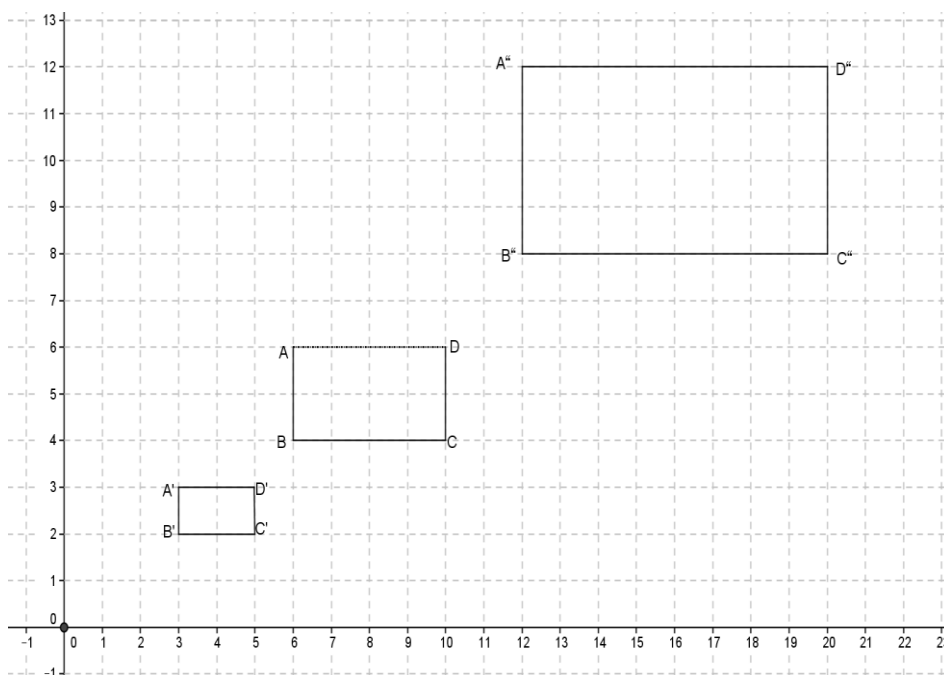


7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

ACTIVITY

Guide learners through the following activity



1. Is rectangle $A''B''C''D''$ an enlargement of rectangle $ABCD$? Explain your answer
2. Is rectangle $A'B'C'D'$ a reduction of rectangle $ABCD$? Explain your answer
3. The origin is the centre of enlargement and reduction.
 - a) Draw four line segments to join the origin with $A''B''C''D''$
 - b) What do you notice about these line segments

4. a) List the coordinates of the images to complete the following table

Vertices of $ABCD$	Vertices of $A'B'C'D'$	Vertices of $A''B''C''D''$

5. What do you notice about the coordinates of the vertices of the original rectangle and the coordinates of the vertices of the image?

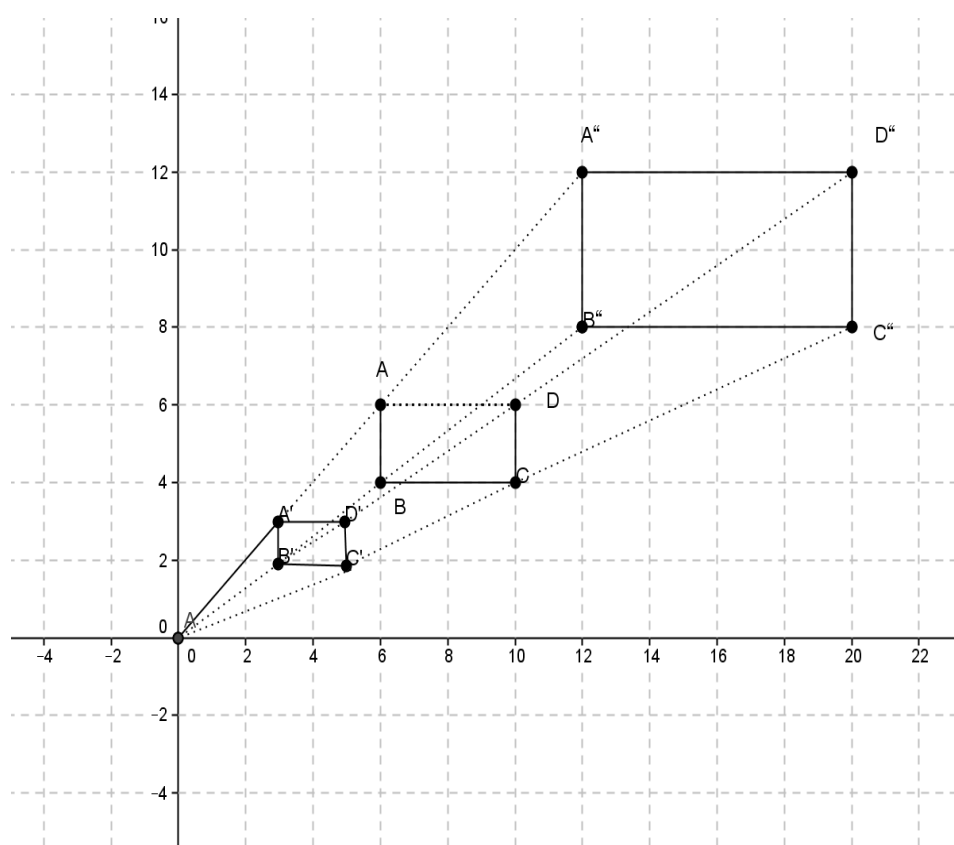
Learning activities

(Learners are expected to :)

- do the activity as per given guidelines



SOLUTION



8 CLASSWORK (Suggested time: 15 minutes)

A quadrilateral has the following vertices: K(8; -2), L(4; -6), M(-8; -4) and N(-6; 10). Determine the coordinates of the reduced image if the scale factor is $\frac{1}{4}$

9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

g) **Emphasise that** the coordinates of a vertex of the enlarged or reduced image are equal to the scale factor times the coordinates of the corresponding vertex of the original figure

h) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework:

Sasol Inzalo Book 2 page 107 no. 3-5

DBE Book 2 page 128 No. 1(c)



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
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1 TOPIC: TRANSFORMATION GEOMETRY: (Consolidation activities)(Lesson 8)

2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to recognise, describe, perform transformations and Investigate the co-ordinates of the vertices of figures that have been transformed



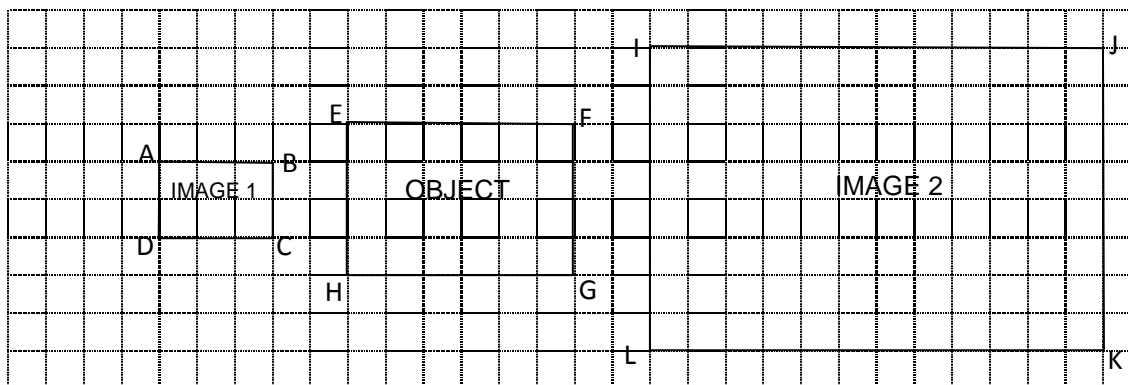
3 RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, rulers, graph/squared paper, pencil, eraser
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> transformations
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore, it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
NOTES AND CONSOLIDATION ACTIVITIES	



NOTES ON ENLARGEMENT AND REDUCTION

To find the lengths of the sides of the new figure, the lengths of the sides of the original figure are all multiplied by the same number. This number (multiplier) is called the **scale factor** of the enlargement or reduction. The scale factor for an **enlargement** is bigger than 1. The scale factor for a **reduction** is smaller than 1. A figure is only called an enlargement or reduction of another figure if the **corresponding angles are equal** and the **ratio between the lengths of the corresponding sides is the same**, for all pairs of corresponding angles and sides in the two figures.

EXAMPLE 1



$$(a) \frac{BC}{FG} = \frac{2}{4} = 2:4 = \frac{1}{2}$$

$$\frac{IL}{EH} = \frac{8}{4} = 8:4 = 2$$

$$(b) \frac{AD}{EH} = \frac{2}{4} = 2:4 = \frac{1}{2}$$

$$\frac{JK}{FG} = \frac{8}{4} = 8:4 = 2$$

$$(c) \frac{AB}{EF} = \frac{3}{6} = 3:6 = \frac{1}{2}$$

$$\frac{IJ}{EF} = \frac{12}{6} = 12:6 = 2$$

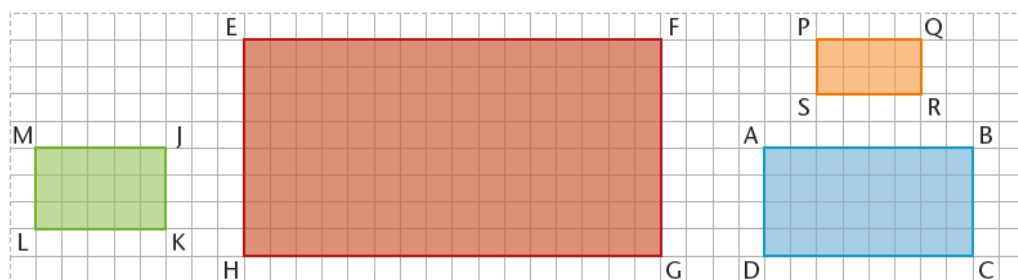
$$(d) \frac{CD}{GH} = \frac{3}{6} = 3:6 = \frac{1}{2}$$

$$\frac{KL}{GH} = \frac{12}{6} = 12:6 = 2$$

NB: The ratio between the lengths of the corresponding sides is the same, for all pairs of corresponding angles and sides in the two figures in each case. We therefore say that, the **scale factor** of a reduction from EFGH to ABCD is $\frac{1}{2}$ and the **scale factor** of the enlargement from EFGH to IJKL is 2.

Hint: When forming ratios, start with the dimensions of the image first.

EXAMPLE 2



1) Refer to rectangles **EFGH** and **PQRS** to answer the following questions.

a) Calculate : $\frac{EF}{MJ}$; $\frac{FG}{JK}$; $\frac{GH}{KL}$ and $\frac{HE}{LM}$

Solution : $\frac{EF}{MJ} = \frac{16}{5} = 3\frac{1}{5}$; $\frac{FG}{JK} = \frac{8}{3} = 2\frac{2}{3}$; $\frac{GH}{KL} = 3\frac{1}{5}$ and $\frac{HE}{LM} = 2\frac{2}{3}$

b) Is rectangle EFGH an enlargement of rectangle MJKL?

Solution: No, the ratio between the corresponding sides is not the same

2) Refer to rectangles **PQRS** and **EFGH** to answer the following questions

a) Calculate $\frac{PQ}{EF}$, $\frac{QR}{FG}$, $\frac{RS}{GH}$ and $\frac{SP}{HE}$

Solution $\frac{PQ}{EF} = \frac{4}{16} = \frac{1}{4}$; $\frac{QR}{FG} = \frac{2}{8} = \frac{1}{4}$; $\frac{RS}{GH} = \frac{1}{4}$ and $\frac{SP}{HE} = \frac{1}{4}$

\Rightarrow PQRS is a reduction of EFGH, because it has a scale factor of $\frac{1}{4}$

3) Refer to rectangles **ABCD** and **EFGH** to answer the following questions:

a) Is rectangle ABCD a reduction of rectangle EFGH?

Solution: Yes, scale factor is less than 1, which is $\frac{1}{2}$, and

The sides are in proportion (i.e. the ratio between the corresponding sides is the same)



- b) What is the perimeter and area of rectangles EFGH and ABCD?

$$\text{Perimeter of ABCD} = 2(8+4)\text{units} = 24 \text{ units}$$

$$\text{Perimeter of EFGH} = 2(16+8)\text{units} = 48 \text{ units}$$

$$\text{Area of ABCD} = (8 \times 4) \text{ units} = 32 \text{ units}^2$$

$$\text{Area of EFGH} = (16 \times 8) \text{ units} = 128 \text{ units}^2$$

- c) What is the ratio of the perimeter of rectangle ABCD to the perimeter of rectangle EFGH?

Solution: $24 : 48 = 1 : 2$

\Rightarrow The perimeter of ABCD is 2 times smaller than the perimeter of EFGH

\Rightarrow The perimeter of ABCD is $\frac{1}{2}$ times the perimeter of EFGH

As an equation this could be written as:

$$\text{The perimeter of ABCD} = \frac{1}{2} \times \text{the perimeter of EFGH}$$

In general, the perimeter of image = scale factor \times perimeter of the original figure

- d) What is the ratio of the area of ABCD to the area of EFGH?

Solution 32: $128 = 1 : 4$

\Rightarrow The area of ABCD is 4 times smaller than the area of EFGH

\Rightarrow The area of ABCD is $\frac{1}{4}$ times the area of EFGH

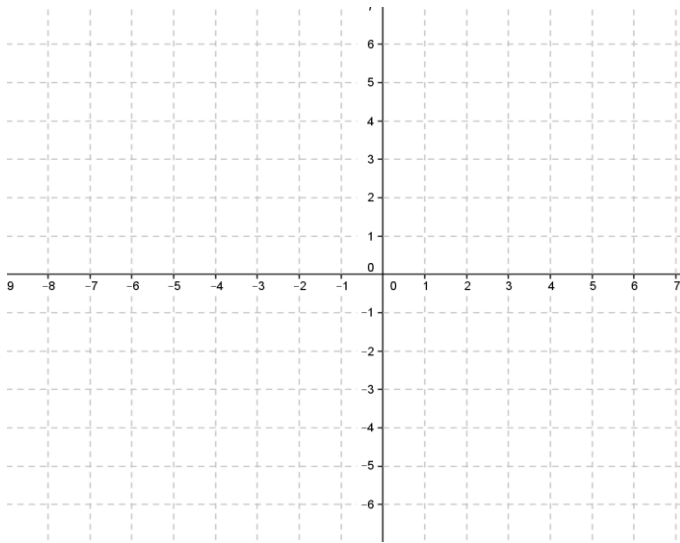
\Rightarrow The area of ABCD is $\left(\frac{1}{2}\right)^2$ times the area of EFGH

As an equation this could be written as:

$$\text{The area of ABCD} = \left(\frac{1}{2}\right)^2 \times \text{the area of EFGH}$$

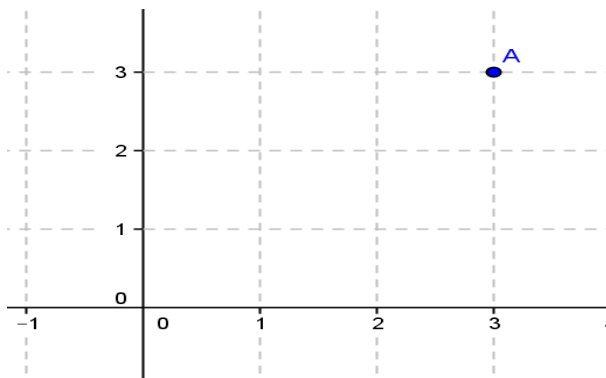
In general, the area of image = (scale factor)² \times area of the original figure.

ACTIVITY 1



- a) Mark the following points on the coordinate system
A(5;2) B(2;-3) C(-6; -2) D(-7;-2) E(5;-2) F(4 ;-1)
- b) Which points are in the:
- 2nd quadrant
 - 4th quadrant?
- c) In which quadrant is only the y-coordinate negative?
- d) In which quadrant are both coordinates positive?

ACTIVITY 2



- 2.1 Write down the coordinates of A
- 2.2 Translate point A two units to the right and four units downwards and label the image Q
- 2.3 Reflect point Q about the y-axis and label the image R
- 2.4 Rotate point R 90° anticlockwise about the origin and label the image S
- 2.5 Reflect point S along the line $y = x$



Activity 3

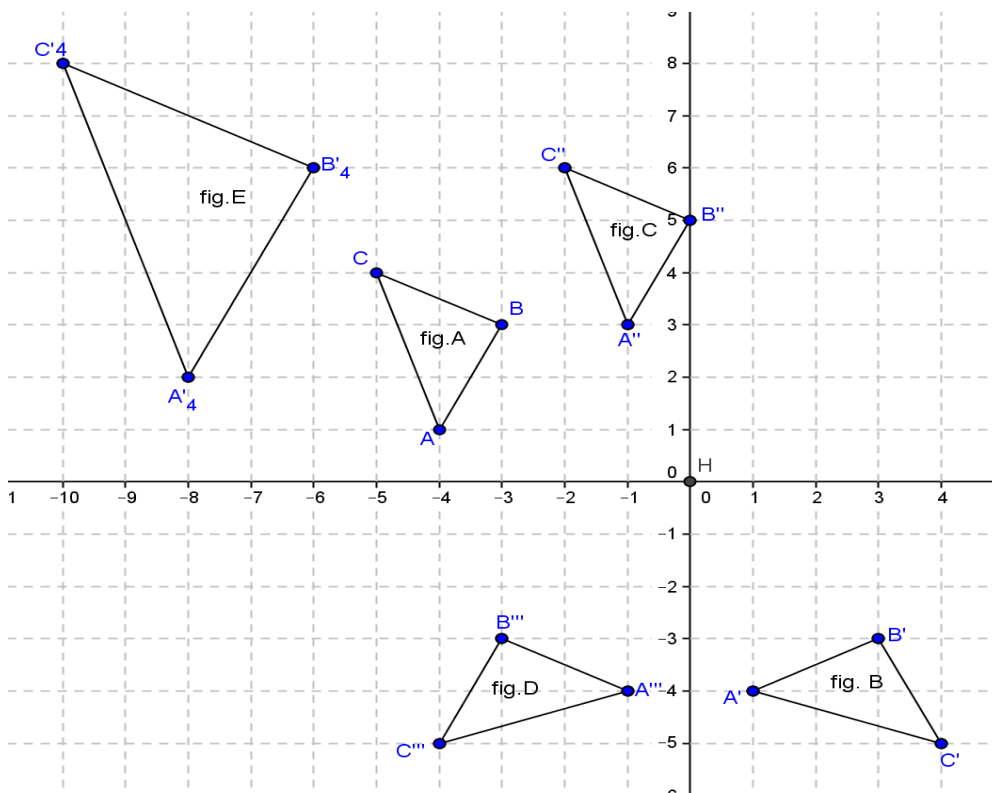
Describe in words the transformation that occurred and state the rule in the form: $(x; y) \rightarrow (-; -)$

a. $C(-459; 795) \rightarrow C'(459; -795)$	b. $A(5; 4) \rightarrow A'(5; -4)$	c. $F(x; y) \rightarrow F'(x + 3; y)$
d. $D(21; 67) \rightarrow D'(67; 21)$	e. $B(-3; -2) \rightarrow B'(3; -2)$	f. $H(10; 4) \rightarrow H'(5; 2)$
g. $E(-13; 42) \rightarrow E'(10; 42)$	h. $G(4; 2) \rightarrow G'(5; -3)$	i. $I(6; 4) \rightarrow I'(12; 8)$
j. $J(0; 6) \rightarrow J'(0; 3)$		

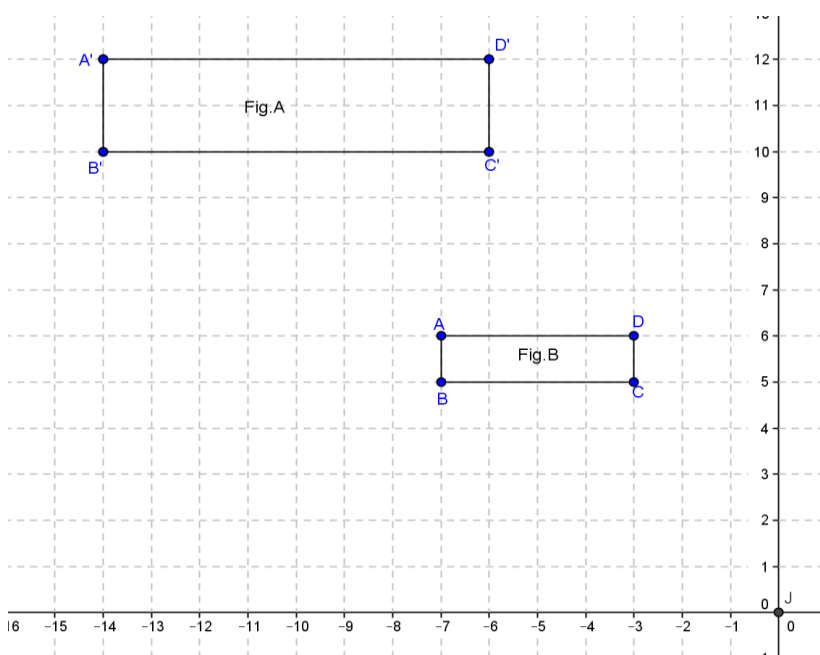
Activity 4

Describe the following transformations by using:

- words
- the notation $(x; y) \rightarrow (-; -)$
 - fig. A \rightarrow fig. B
 - fig. A \rightarrow fig. C
 - fig. A \rightarrow fig. D
 - fig. A \rightarrow fig. E

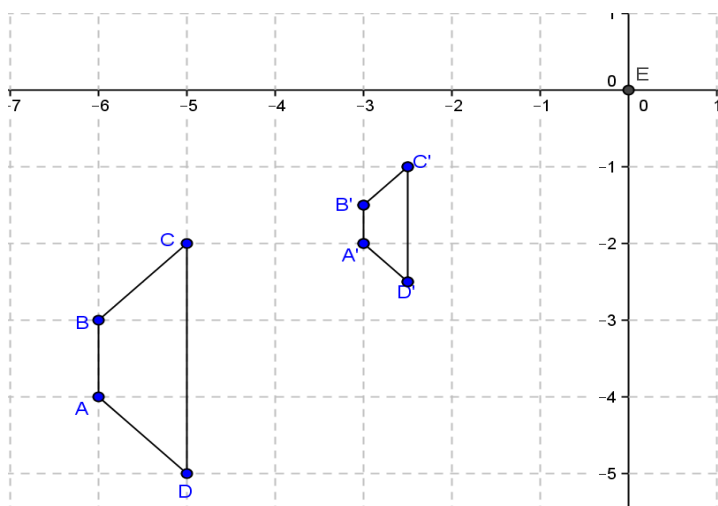


Activity 5



- Write down the coordinates of the vertices of Fig. A and Fig. B
- Write down the length of BC; B'C'; CD and C'D'
- Simplify: C'D' : CD
- What is the factor of enlargement/scale factor?
- Simplify: Perimeter of A'B'C'D' : perimeter of ABCD
- Simplify: Area of A'B'C'D' : Area of ABCD

Activity 6



- If BC is $\sqrt{2}cm$ and $B'C' = \frac{\sqrt{2}}{2} cm$, prove that ABCD and A'B'C'D' are similar.
- What is the scale factor of enlargement ABCD to A'B'C'D'?
- Calculate the perimeter of the image.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1 TOPIC: GEOMETRY OF 3D OBJECTS: CLASSIFYING 3D OBJECTS (Lesson 1)

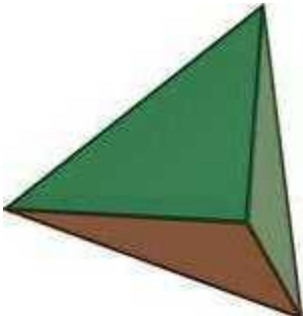
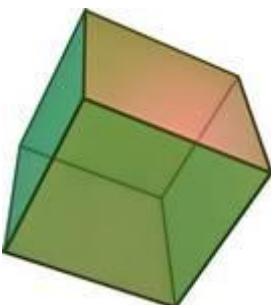
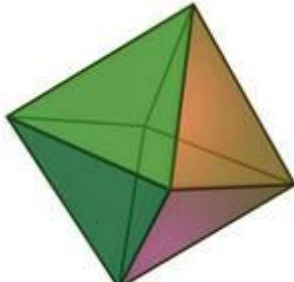
2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to list properties and definitions of the 5 platonic solids in terms of the shape and number of faces, the number of vertices and the number of edges.

- tetrahedron
- hexahedron
- octahedron



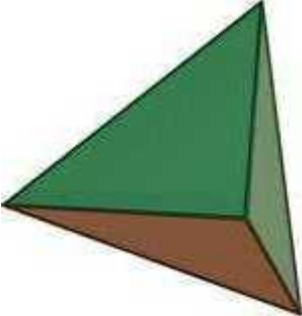
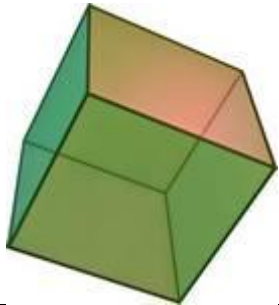
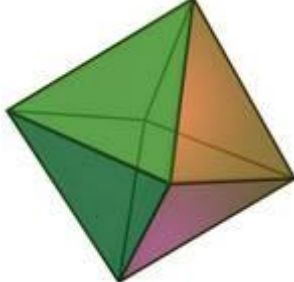


3 RESOURCES:	textbooks, DBE Workbook, Sasol-Inzalo Workbook
4 PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • properties of platonic solids • properties of 2D shapes
5 REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6 INTRODUCTION (Suggested time: 10 Minutes) <p>NB. The lesson is aimed at revising the properties of platonic solids. Ask learners to name the objects below.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A.</p>  </div> <div style="text-align: center;"> <p>B.</p>  </div> <div style="text-align: center;"> <p>C.</p>  </div> </div>	

7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Learning activities
(Learners are expected to:)

1. Ask learners to complete the table below.

OBJECT	Shape of faces	No. of faces	No. of vertices	No. of edges
				
				
				

Work on the activities allocated to them.

2. Complete the Euler's formula for the solids above.

$$E + F - V =$$

3. Sum of angles on a vertex.

NB. Consolidate by summarising the properties of each geometric solid.

8 CLASSWORK (Suggested time: 15 minutes)

Sasol- Inzalo: Page 115, 1-2

9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

f) Emphasise that:

The platonic solids are identified in terms of:

- Faces
- Vertices
- Edges

g) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework: Sasol Inzalo Page 118, 1-3



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1) TOPIC:GEOMETRY OF 3D OBJECTS: CLASSIFYING 3D OBJECTS(Lesson 2)

2) CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to list properties and definitions of the platonic solids in terms of the shape and number of faces, the number of vertices and the number of edges.

- Dodecahedron



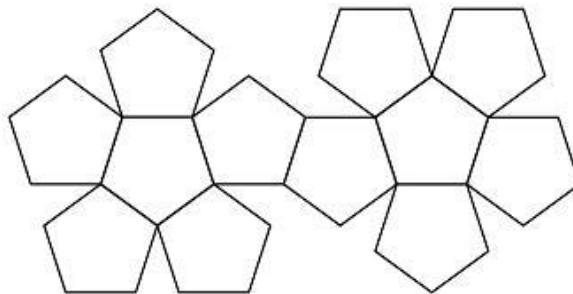
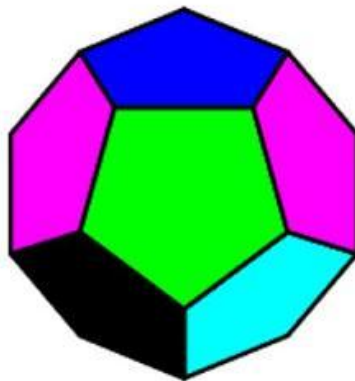
3) RESOURCES:	Textbooks, Sasol-Inzalo Workbook
4) PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • properties of platonic solids • pentagons • .properties of quadrilaterals
5) REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6) INTRODUCTION (Suggested time: 10 Minutes) <p>Ask learners the following questions.</p> <ul style="list-style-type: none"> • How many sides does a regular pentagon have? • What is the size of each angle on a regular pentagon? • What is sum of the interior angles of a pentagon? 	
7) LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)



Present the following activity to the learners.

Activity

1) Use the figure to complete the table below:



Complete the table using the net and Dodecahedron shape

Properties	Description
1. Shape of faces	
2. Number of faces	
3. Number of edges	
4. Number of vertices	
5. $E+F-V=$	
6. Number of angles on a vertex	
7. Sum of angles on a vertex	

2. What is the name of the 3D objects?

8) CLASSWORK (Suggested time: 15 minutes)

Sasol-Inzalo Workbook Page 118 no.4

9) CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a) **Emphasise that:**

There are 12 faces, 20 vertices each with 3 edges meeting and 30 edges on Dodecahedron.

- b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of **mathematics** skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.
- c) Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1 TOPIC: GEOMETRY OF 3D OBJECTS: CLASSIFYING 3D OBJECTS (Lesson 3)

2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to list properties and definitions of the 5 platonic solids in terms of the shape and number of faces, the number of vertices and the number of edges.

- Icosahedron



3	RESOURCES:	textbooks, Sasol-Inzalo Workbook																																																							
4	PRIOR KNOWLEDGE:	<ul style="list-style-type: none">• Properties of Platonic solids• Properties of 2D shapes																																																							
5	REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)																																																								
<p>Homework provides an opportunity for teachers to track learners’ progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>																																																									
6	INTRODUCTION (Suggested time: 10 Minutes)																																																								
<p>Present the following activity to learners.</p> <p>Copy and complete the table below:</p> <table><tr><th>Solid</th><th>Tetrahedron</th><th>Hexahedron</th><th>Octahedron</th><th>Dodecahedron</th></tr><tr><td>1. Number of faces</td><td></td><td></td><td></td><td></td></tr><tr><td>2. Number of faces meeting at each vertex</td><td></td><td></td><td></td><td></td></tr><tr><td>3. Shape of faces</td><td></td><td></td><td></td><td></td></tr><tr><td>4. Number of edges</td><td></td><td></td><td></td><td></td></tr><tr><td>5. Number of vertices</td><td></td><td></td><td></td><td></td></tr><tr><td>6. Sum of angles on a vertex</td><td></td><td></td><td></td><td></td></tr><tr><td>7. $E+F+V$</td><td></td><td></td><td></td><td></td></tr><tr><td>8. $E+F-V$</td><td></td><td></td><td></td><td></td></tr><tr><td>9. $F+V-E$</td><td></td><td></td><td></td><td></td></tr><tr><td>10. $E+V-F$</td><td></td><td></td><td></td><td></td></tr></table>			Solid	Tetrahedron	Hexahedron	Octahedron	Dodecahedron	1. Number of faces					2. Number of faces meeting at each vertex					3. Shape of faces					4. Number of edges					5. Number of vertices					6. Sum of angles on a vertex					7. $E+F+V$					8. $E+F-V$					9. $F+V-E$					10. $E+V-F$				
Solid	Tetrahedron	Hexahedron	Octahedron	Dodecahedron																																																					
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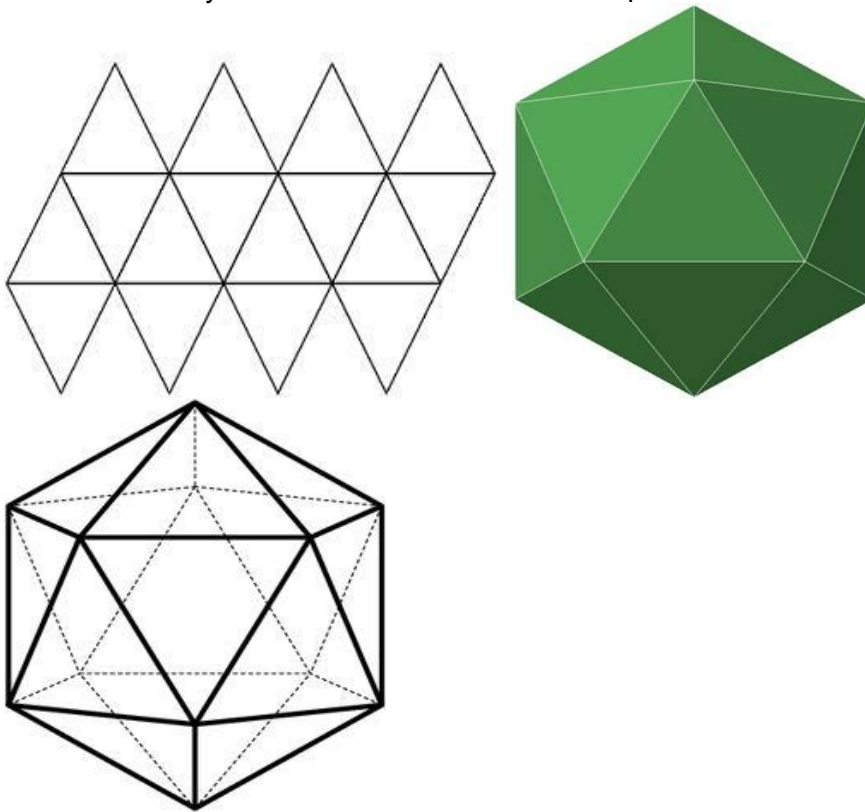
7 LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)



Present the following activity to learners .

Activity

- I. Study the solids and the net and complete the table below.



Properties	Description
1. Shape of faces	
2. Number of faces	
3. Number of edges	
4. Number of vertices	
5. $V - E + F =$ (Euler's formula)	
6. Number of angles on a vertex	
7. Sum of angles on a vertex	

- II. What is the name of the platonic solid.
- III. What is common on the 5 platonic solids?

Learning activities
(Learners are expected to:)
Work on the activity presented to them

8 CLASSWORK (Suggested time: 15 minutes)

Sasol-Inzalo Workbook: no. Page 118 no.5

Sasol-Inzalo Workbook Page 119 no. 1

9 CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a. Emphasise that:

- The name of each platonic solid is derived from its number of faces: **icosa - 20**
- An icosahedron has 20 faces which are regular triangles.
- Faces: 20 triangles
- Vertices: 12, each with 5 edges meeting
- Edges: 30

- b. The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels

Homework:

Sasol-Inzalo Page 121 no. 3



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: OCTOBER – DECEMBER 2015

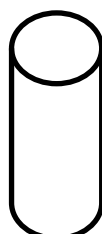
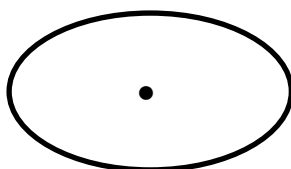
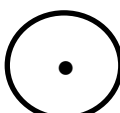
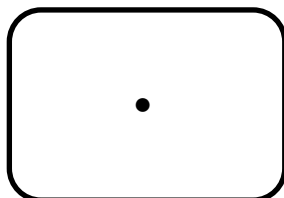
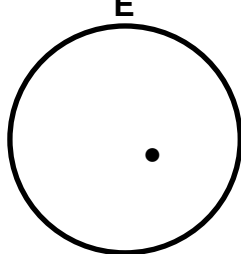
PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC:GEOMETRY OF 3D OBJECTS:CLASSIFYING 3D OBJECTS(Lesson 4)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to recognise and describe the properties of spheres.

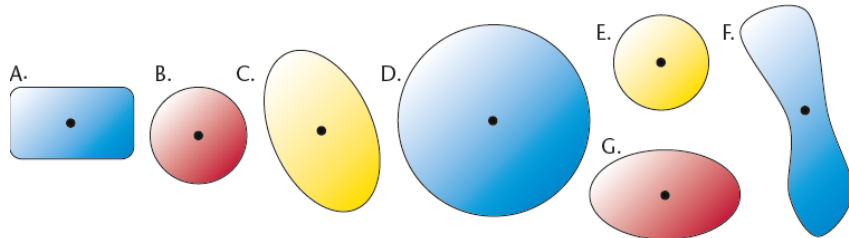


3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none">• properties of the 5 Platonic solids• properties of 2D shapes
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)	
<p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes)	
<p>Present the following activity to learners.</p> <p>Activity</p> <p>1. Which of the following objects are spheres</p> <div><div><p>A</p></div><div><p>B</p></div><div><p>C</p></div><div><p>D</p></div><div><p>E</p></div></div> <p>2. What is the difference between shape B and C</p>	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	Learners are expected to:

Give learners the following activity to do in pairs

Activity

Which of the following 3D objects are spheres?



.....

1. Tick the property or properties below that are true for spheres only and not for the other objects that are shown above..

- | | |
|---|---|
| <input type="checkbox"/> It is a 3D objects | <input type="checkbox"/> It has one curved surface |
| <input type="checkbox"/> It has no base | <input type="checkbox"/> It has no vertices |
| <input type="checkbox"/> It has no edges | <input type="checkbox"/> The distance from its centre to any point on its surface is equal. |

2. Complete the following information for sphere:

3.1 Number and shapes of the face.....

3.2 Number of vertices.....

3.3 Number of edges

3. From your study of spheres above:

4.1 What is a sphere

4.2 Give practical examples of spheres that are used in everyday life.

4.3 Give 2 properties of spheres

Learners discuss activity in pairs and report to the whole class.

8. CLASSWORK – (Suggested time: 15 minutes)

Sasol Inzalo page 125 No. 4-5



9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a. **Emphasise that::**

- the definition is in terms of properties of spheres
- spheres have one curved face and the distance from its centre to any point is always equal and no vertices or edges

- b. The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels

Homework:



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: OCTOBER– DECEMBER 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1 TOPIC: GEOMETRY OF 3D SHAPES; CLASSIFYING 3D OBJECTS (Lesson 5)

2 CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to recognise and describe the properties of cylinders.

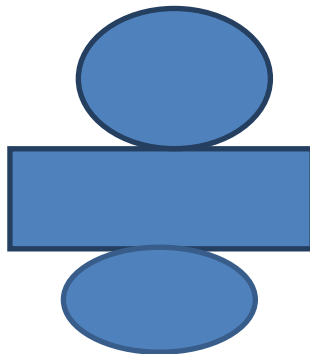
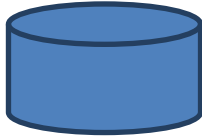


4. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook
5. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> different types of 3D objects. properties of 2D shapes
6. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
7. INTRODUCTION (Suggested time: 10 Minutes) <p>Present the following activity to learners.</p> <p>Ask learners to:</p> <ul style="list-style-type: none"> Give properties of a circle. Give properties of a rectangle. Give properties of a rectangle 	
8. LESSON PRESENTATION/DEVELOPMENT	Learners are expected to:
9. (Suggested time: 20 minutes)	



Present the following activity as a worksheet

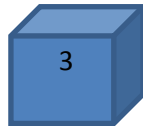
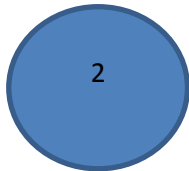
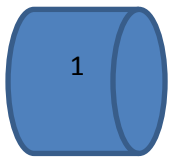
Activity 1



- How many faces does a cylinder have?
- Name the shape of the faces.
- What is the length of the rectangle in terms of π and r .
- What is the breadth of the rectangle.

NB. Practical example may be used to explain c and d.

Activity 2



- Name each of the solids.
- If number 4 has a height of 2cm and a radius of 1cm, construct an accurate net for this figure.

Work in groups and report to the whole class

10. **CLASSWORK** (Suggested time: 15 minutes)

Sasol-Inzalo Page 121 no.1-3

11. **CONSOLIDATION/CONCLUSION & HOMEWORK** (Suggested time: 5 minutes)

a. **EMPHASISES THAT:**

- a cylinder has three faces:
- Two congruent circular base faces and one curved face
- When enrol the curved surface of a cylinder, we get a rectangle.

- b. The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Sasol-Inzalo Workbook	DBE Workbook	Textbook
Page 121 no.3,a,c		



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: OCTOBER –DECEMBER 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC:** GEOMETRY OF 3D OBJECTS: BUILDING 3D MODELS(Lesson 6)

2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to use nets to create models of cubes.



3. RESOURCES:	textbooks, DBE Workbook, Sasol-Inzalo Workbook, pair of scissors, rulers, worksheets with nets of cubes, mathematical instruments, glue
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • platonic solids • construction of geometric figures
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Ask learners the following questions:</p> <ol style="list-style-type: none"> 1. Name 5 types of platonic solids 2. How many faces' vertices and edges does a cube have? 3. What do we call the polygon which makes the faces of a cube? 4. Are the faces identical? 	



7. LESSON PRESENTATION/DEVELOPMENT(Suggested time: 20 minutes)

Teaching activities	Learning activities(Learners are expected to:)
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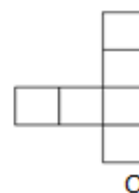
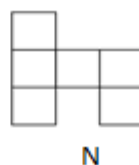
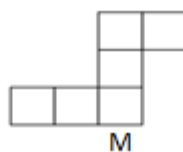
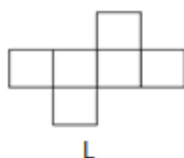
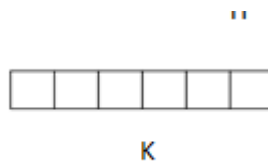
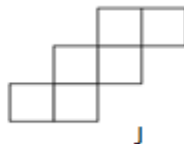
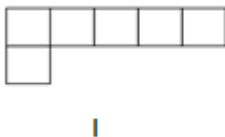
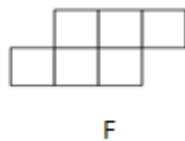
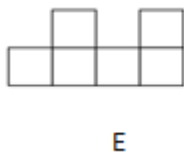
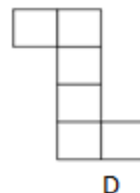
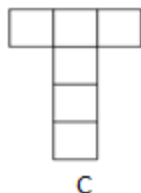
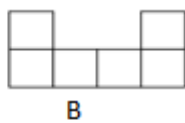
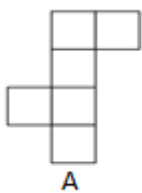
Present learners with the activity below.(work in small groups)

Activity 1

1. Construct a square with each side of 6cm .
2. Trace the square to make 5 more.
3. Arrange them to make a net of cube
4. Use the net to make a model of a cube.

Activity 2(prepare as a worksheet)

Which of the nets below can make a cube?

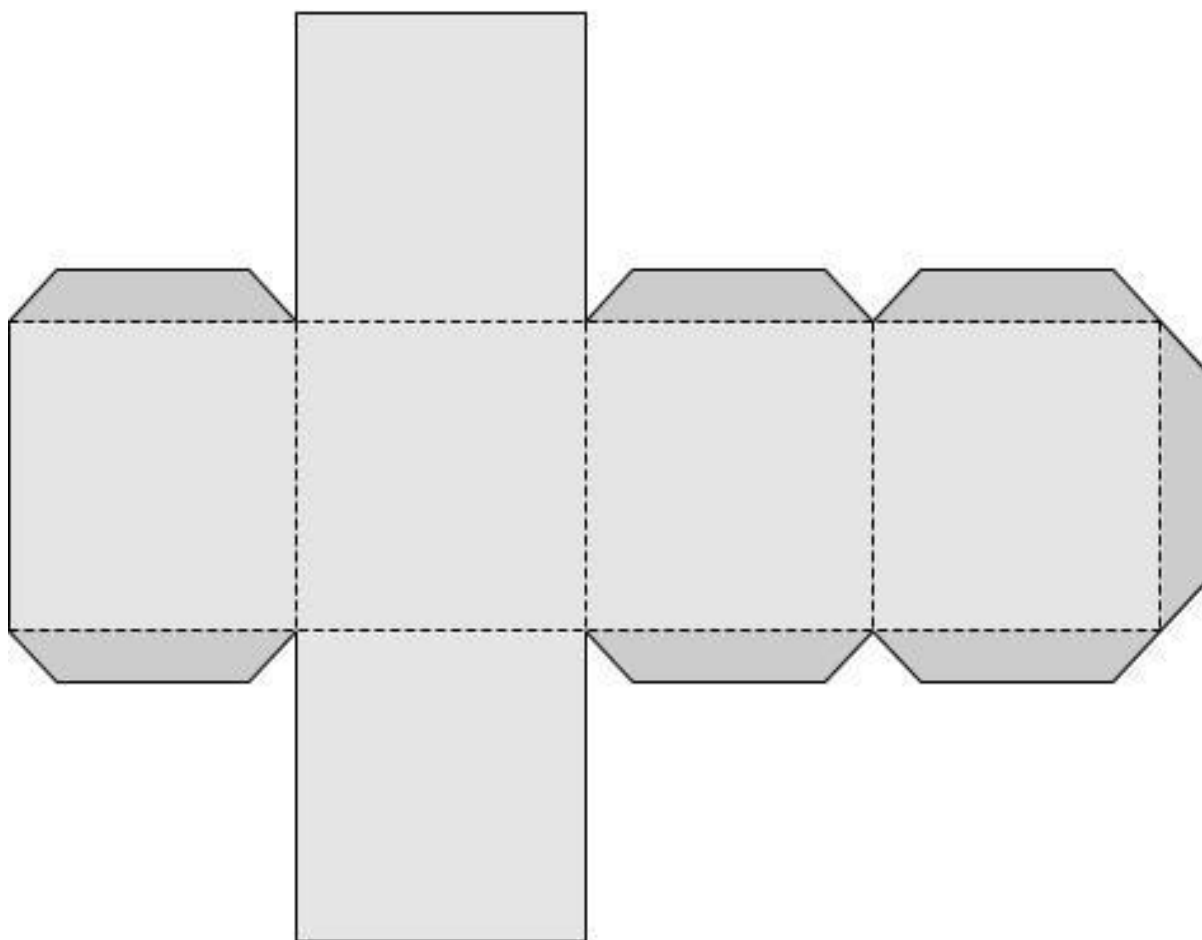


Learners will work in groups

8. CLASSWORK (Suggested time: 15 minutes)	
Draw your own net of a cube with each side of $2cm$	
9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)	
a. Emphasise that: <ul style="list-style-type: none"> a cube has all faces identical being squares Cube is also called Hexahedron because it has 6 equal plane faces 	
b. The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels. HOMEWORK: Sasol-Inzalo page 118 no.2	

Learners can be given the project to use the net below to do a model of a cube (**prepare it as a worksheet**)





MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

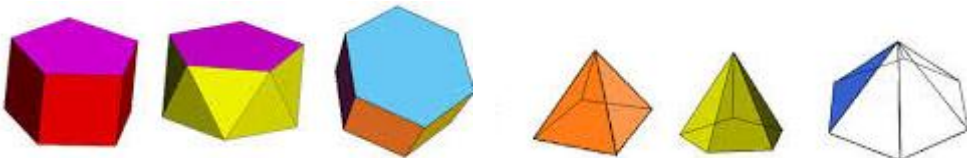
PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: GEOMETRY OF 3D OBJECTS:** Use nets to create models of geometric Solids **Lesson 7)**

2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should be able to use nets to create models of prisms.



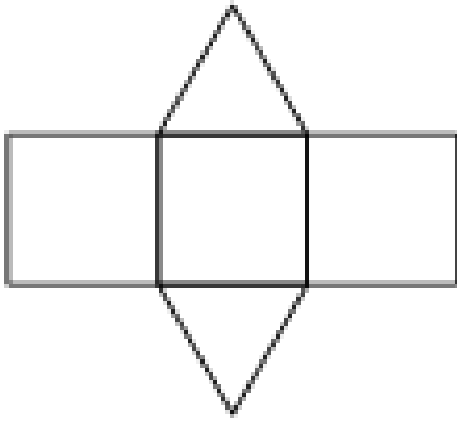
3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, pair of scissors, rulers, worksheets with nets of prisms
4. PRIOR KNOWLEDGE:	Properties of cubes, squares and rectangles
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)	
Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6. INTRODUCTION (Suggested time: 10 Minutes) Ask learners the questions below. Activity 1. What is a prism? 2. Which of the following polyhedral are prisms 	
Answers Prism definition: A prism is a polyhedral with two identical and parallel faces called bases. A, B, C are Prisms D, E, F are pyramids	

7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities(Learners are expected to:)

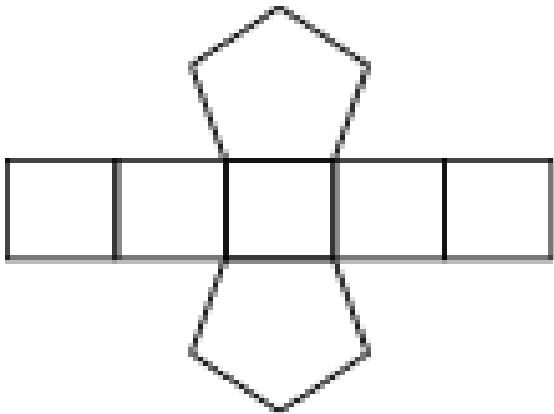
Activity 1

1. Name the 3D objects that can be made from the nets below.

a.



b.



2. Cut out the nets above and make the 3D objects.

3. List properties of each object.

NB. Advise learners to cut out the nets such that they have flaps

Activity 2

Construct with tabs in appropriate places, an accurate net for a rectangular prism. If the square face has sides of 2cm and the distance between the square faces is 5cm . Cut the net out and construct the solid.

work in groups on the activity given to them.

8. CLASSWORK (Suggested time: 15 minutes)	
Construct with tabs(flaps) in appropriate places, an accurate net for a triangular prism. If the equilateral has sides of 5cm and the distance between the triangular faces is 7cm.Cut the net out and constructs the solid	
9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)	
<p>Emphasise that:</p> <ul style="list-style-type: none"> • prism has two identical or congruent bases and the rest should be identical rectangles • prisms are named by their bases e.g. triangular prism <p>The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or Textbooks for learners' homework. The selected activities should address different cognitive levels.</p> <p>Homework: Sasol-Inzalo Page 116, 1-5</p>	



MATHEMATICS LESSON PLAN

GRADE 9

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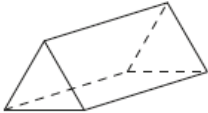

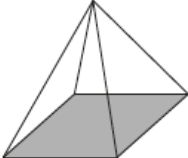
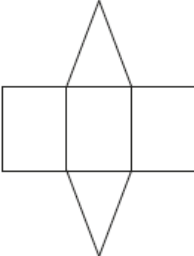
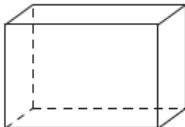
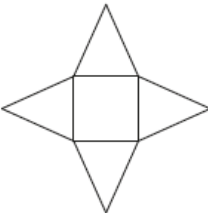
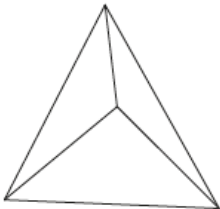
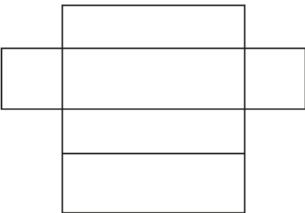
PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: GEOMETRY OF 3D OBJECTS: BUILDING 3D MODELS(Lesson 8)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to use nets to create geometric solids –pyramids.



3. RESOURCES:	textbooks, DBE Workbook, Sasol-Inzalo Workbook, protractors.
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> polygons. properties of prisms. properties of pyramids
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Present the worksheet for learners to complete.</p> <p>1. Name each object below and draw an arrow to match it with its net.</p> <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: center;"> <p>(a)</p>  </div> <div style="margin: 0 20px;"> <p>.....</p> </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: center;"> <p>(b)</p>  </div> <div style="margin: 0 20px;"> <p>.....</p> </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: center;"> <p>(c)</p>  </div> <div style="margin: 0 20px;"> <p>.....</p> </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; align-items: center;"> <div style="text-align: center;"> <p>(d)</p>  </div> <div style="margin: 0 20px;"> <p>.....</p> </div> <div style="text-align: center;">  </div> </div> </div>	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	

Teaching activities	Learning activities (Learners are expected to:)



Present the activity to learners to work in groups.

Activity

1.

Step 1

construct an equilateral triangle with dimensions 4 cm

Step 2

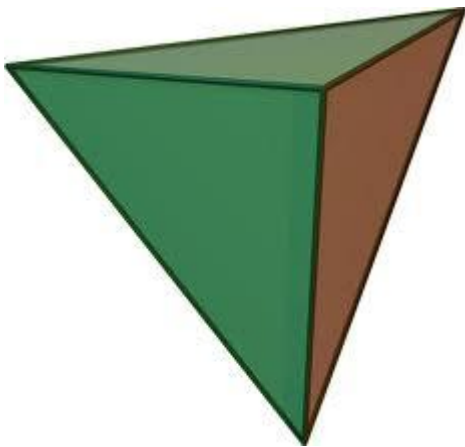
Trace the constructed triangle to make three more triangles.

Step 3

Cut out the triangles and leave tabs where necessary

Step 4

Join the triangles to make 3D object like the one below.



2. What type of 3D object is formed by the four equilateral triangles joined together?

NB. It is called tetrahedron or triangular pyramid.

Right pyramid: the apex of the pyramid is directly above the center of its base

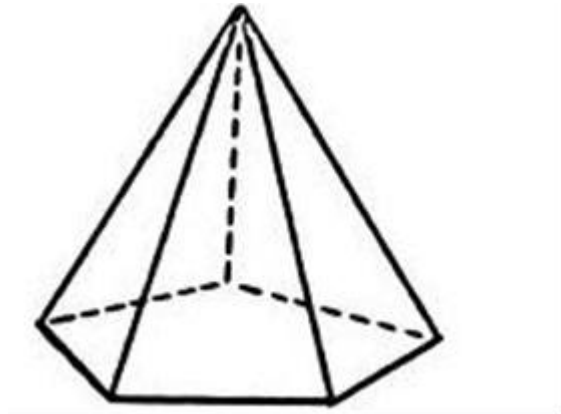
Regular pyramid: the base of this pyramid is a regular polygon (equal sides on the base)

Irregular pyramid: this type of pyramid has an irregular polygon as its base (sides are not equal).

Learners construct equilateral triangle as specified.

8. CLASSWORK (Suggested time: 15 minutes)

Activity



- What is the name of the pyramid above.
- How many faces does it have?
- Draw the net of the pyramid above.

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a) **Emphasise that:**

- Naming of pyramid depends on the base of the pyramid.
- All pyramids meet at one point called Apex.
- Pyramid is formed by triangles from the base to the apex.

- The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework:



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: OCTOBER – DECEMBER 2015

PROVINCE:	
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DURATION:	1 Hour

1. TOPIC: GEOMETRY OF 3D OBJECTS: BUILDING 3D MODELS (Lesson 9)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to use nets to create geometric solids –cylinders.



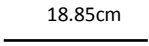

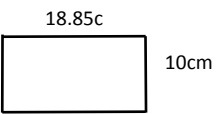
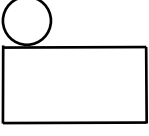
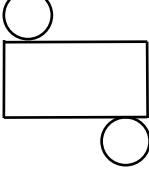
3. RESOURCES:	textbooks, DBE Workbook, Sasol-Inzalo Workbook,
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • properties of a cylinder • conversion of units • properties of a circle ,square and rectangle • circumference of a circle
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6. INTRODUCTION (Suggested time: 10 Minutes) Ask learners the questions below. <ul style="list-style-type: none"> • list properties of a cylinder. • explain how the length of the rectangle(face) is determined. • what is the relationship between the height of the cylinder and breadth of the rectangle? 	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)



Present the activity below for learners to do the activity on the worksheet below.

Activity

Follow the steps below to draw an accurate net of a cylinder with a height of 10cm and a radius of 3cm.

Step 1	Determine the circumference of the circle. Round off to two decimal places	$C = 2 \times \pi \times \text{radius}$ $C = 2 \times \pi \times 3\text{cm}$ $C = 18,85\text{cm}$
Step 2	Draw a line equal to the circumference of the circle.	
Step 3	Draw a line of the cylinder at right angle to the circumference of the circle.	
Step 4	Complete the rectangle	
Step 5	Draw a circle of given radius starting exactly on the circumference side. It can be anywhere along the circumference line.	
Step 6	Draw the second circle exactly the same but on the other opposite side of the rectangle.	

Draw the net following the steps on the worksheet.



8. CLASSWORK (Suggested time: 15 minutes)

Draw an accurate net of a cylinder with radius of 4cm and a height of 12cm.

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

a) Emphasise that:

- a cylinder consists of 3 faces namely circles and rectangle.

b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding. Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework:

1. Draw an accurate net of a cylinder with diameter of 5cm and a height of 8cm.
2. Draw an accurate net of a cylinder with circumference of 126mm and a height of 50 mm.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: DATA HANDLING: COLLECT, ORGANISE AND SUMMARISE DATA (Lesson 1)**

2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to:

- Pose questions relating to social, economic, and environmental issues
- Select and justify appropriate sources for the collection of data
- Distinguish between samples and populations, and suggest appropriate samples for investigation
- Select and justify appropriate methods for collecting data

3. **RESOURCES:**

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:

- data
- sample
- population

5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)

Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.

6. INTRODUCTION (Suggested time: 10 Minutes)

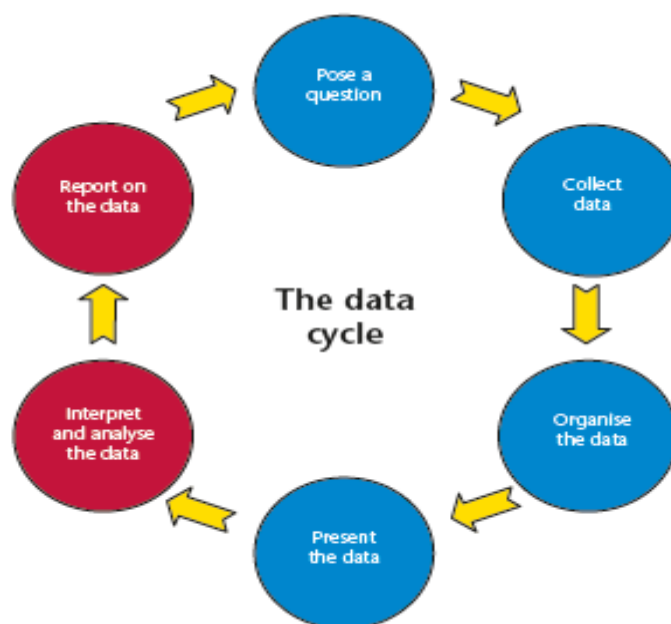
Discuss the following concepts with learners:

- Data cycle, data, data types and information.
- Population and sample (including random sample).

Refer to:

- DBE workbook, page 160 and
- Sasol-Inzalo Book 2, pages 129 and 162 for more information.

Discussion:



Data: unorganised facts (bits of information) collected to answer a question or questions

Data types: quantitative, qualitative, discrete, continuous

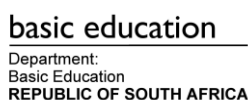
Information: processed (organised or structured) data (Sasol-Inzalo Book 2, p. 133)

Population: all members of a group about which information is collected

Sample: part (proportion) of a population with the same characteristics as the population

7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)
<p>Activity 1</p> <ul style="list-style-type: none"> Learners should identify and list data sources accessible to them. They should also suggest different methods of data collection they could use to collect data from identified data sources. <p>Refer to BDE workbook page 161 for data sources and methods of collecting data.</p>	<ul style="list-style-type: none"> identify and list data sources. make suggestions on how data could be collected
<p>Activity 2</p> <ul style="list-style-type: none"> Learners should discuss in small groups how to develop a questionnaire. Learners should agree on the data that they want to collect. They should then develop the instrument that they will use to collect data. <p>Refer to Sasol-Inzalo Book 2, pages 129 – 130 for qualities of a good questionnaire and an example of a questionnaire.</p> <p>Questionnaire</p> <p>There are some important points to consider when designing a questionnaire. Two of the most important points are that the questions are clear and accurate and that people find the questionnaire relatively easy to complete.</p> <ol style="list-style-type: none"> Keep in mind the length of the questionnaire and the time that it takes to complete. Your participants will more likely complete a short questionnaire that is quick and easy to complete. Exclude information that is not needed. Write down a selection of questions that you think will provide the information that you want. Check the wording for each question. Order the items so that they are in a logical sequence. It might make sense to have the easiest questions first but in some cases the more general questions should come first and the more specific questions towards the end of the questionnaire. 	<ul style="list-style-type: none"> decide what data they want to collect develop an instrument for data collection.



<p>5. Then try the questionnaire out on a partner. Ask the following questions:</p> <ul style="list-style-type: none"> • Is this question necessary? What information will be provided by the answer? • How easy will it be for the respondent to answer this question? How much time will it take to answer the question? • Do the questions ask for sensitive information? Will people want to answer the question? Will the respondent answer the question honestly? • Can the question be answered quickly? <p>6. Decide how the answers should be provided. Questions may require open-ended responses or closed-ended responses.</p>	
<p>8. CLASSWORK (Suggested time: 15 minutes)</p>	
<ul style="list-style-type: none"> • Activity 2 • Sasol-Inzalo Book 2, page 131, No. 1 (a) – (e): Which method for collecting data would be most appropriate for each of the cases below? Give reasons for your choice. <ul style="list-style-type: none"> (a) The number of learners who bring lunch to schools. What are the contents of the school lunch? (b) Whether the tellers at a supermarket chain are happy with their conditions of work. (c) Whether the clients of a clinic are satisfied with the professional conduct of the medical staff. (d) The types of activities preschool children choose during their free time. (e) The number of Grade 9 learners in the Gauteng North district. 	
<p>9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)</p>	
<p>h) Emphasise:</p> <ul style="list-style-type: none"> • the difference between data and information • differences between a sample and population • the correct sampling methods – sample not biased and sample representative of the population. • different data types • the qualities of a good questionnaire – easy to complete, questions clear and accurate. <p>i) Homework:</p> <ul style="list-style-type: none"> • DBE workbook page 162 – 163. • Sasol-Inzalo Book 2, page 131, No. 2: You are doing some market research for a new fast food shop near the high school. The owners of the shop want to find out what kind of food and music the target market likes. The target market is learners from the high school. Develop a questionnaire to collect this information. • DBE workbook page 194, No.1 [Collect and keep data as suggested. You will use the data in the later lessons to plot a graph.] 	



MATHEMATICS LESSON PLAN

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TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: DATA HANDLING: COLLECT, ORGANISE AND SUMMARISE DATA (Lesson 2)**

2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to organize numerical data in different ways in order to summarize by determining:

- measures of central tendency
- measures of dispersion including extremes and outliers

3. **RESOURCES:**

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.

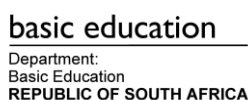


4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • measures of central tendency • measures of spread or dispersion
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes)	
<ul style="list-style-type: none"> • Write the following list of numbers on the chalkboard: 7 ; 8 ; 6 ; 4 ; 7 ; 6 ; 7 ; 8 ; 10 ; 7 ; 8 ; 6 ; 7 ; 5 ; 9 ; 7 • Inform learners that this is a random sample of marks obtained by Grade 1 learners in a test that was written out of 10. • Orally instruct them to quickly: <ul style="list-style-type: none"> ➢ copy the marks into their written work books. ➢ write down the range, mode, median, mean of the data and the extremes,. • Allow few learners to explain how they got their answers. • Ensure that learners know the concepts used in this introductory activity. <p>Refer to DBE workbook page 164 and Sasol-Inzalo Book 2, page 136 for explanation of these concepts.</p> <p>Possible solutions Range = $10 - 4 = 6$; Mode = 7; Median = 7; mean = 7. The data has no extremes.</p>	



7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)																																						
<p>Activity 1</p> <ul style="list-style-type: none"> Instruct learners to rank the above data (Grade 1 sample of marks) as shown below: 4 ; 5 ; 6 ; 6 ; 6 ; 7 ; 7 ; 7 ; 7 ; 7 ; 8 ; 8 ; 8 ; 9 ; 10 Let the learners use the ranked data to determine the range, mode, median, the mean of the data, extremes and outliers <p>NB: Allow them to help each other. Also assist learners that are struggling.</p> <p>Note: This data has no extremes or outliers. The purpose of the activity is to show learners how easy it is to summarise organised data.</p>	<ul style="list-style-type: none"> rank data. use the ranked data to summarise data. 																																						
<p>Activity 2</p> <ul style="list-style-type: none"> Give learners the list of data below. Instruct them to copy it into their written work books. <table> <tr> <td>61</td><td>58</td><td>48</td><td>59</td><td>49</td><td>51</td><td>54</td><td>67</td></tr> <tr> <td>55</td><td>70</td><td>59</td><td>60</td><td>62</td><td>59</td><td>62</td><td>63</td></tr> <tr> <td>64</td><td>48</td><td>64</td><td>55</td><td></td><td></td><td></td><td></td></tr> </table> <ul style="list-style-type: none"> Inform them that the data shows a random sample of items produced by each worker in a certain factory. Instruct them to: <ul style="list-style-type: none"> Rank this data present the data on a stem-and-leaf display as shown below. <table> <tr> <th>Stem</th><th>Leaves</th></tr> <tr> <td>4</td><td>9</td></tr> <tr> <td>5</td><td>9</td></tr> <tr> <td>6</td><td>0 2</td></tr> <tr> <td>7</td><td>5 8 9</td></tr> <tr> <td>8</td><td>0 2 6 7 7 8 9</td></tr> <tr> <td>9</td><td>4</td></tr> </table> <ul style="list-style-type: none"> Let the learners use the stem-and-leaf display to determine the extremes/outliers, range, mode, median and the mean of the data <p>NB:</p> <ul style="list-style-type: none"> An extreme value or outlier is a data value that lies an abnormal distance from other values in a random sample from a population. Learners should see that a stem-and-leaf display is an easy method of ranking large data set. 	61	58	48	59	49	51	54	67	55	70	59	60	62	59	62	63	64	48	64	55					Stem	Leaves	4	9	5	9	6	0 2	7	5 8 9	8	0 2 6 7 7 8 9	9	4	<ul style="list-style-type: none"> draw the stem-and-leaf display use the display to summarise data.
61	58	48	59	49	51	54	67																																
55	70	59	60	62	59	62	63																																
64	48	64	55																																				
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<p>Refer to Sasol-Inzalo Book 2, page 134 for information on stem-and-leaf displays.</p>																																							



8. **CLASSWORK** (Suggested time: 15 minutes)

- **Activity 2 (done during lesson development)**
 - **Sasol-Inzalo Book 2, page 136, No. 1 and 2**
1. A researcher analyses data about the people who are suffering from three different types of the flu virus: A, B and C. The ages of the people in the different groups are:
Type A: 60, 80, 75, 87, 88, 49, 94, 84, 59, 86, 82, 62, 79, 89 and 78.
Type B: 27, 39, 43, 29, 36, 70, 56, 25, 54, 36, 66, 45, 33, 46, 14 and 41.
Type C: 33, 48, 64, 15, 31, 20, 70, 21, 18, 49, 21, 19, 57, 23, 29 and 20.
For each group:
 - Draw a stem-and-leaf plot.
 - Calculate the range, mean and median of the ages.
 - Look at the shape of the stem-and-leaf displays as well as the summary measures.
 - Discuss the spread of the data in each case, and compare the three different groups.
 2. Fill in the statistic (mode, mean or median) that would best summarise each data set, and indicate the central tendency of the data.

Data set	Best measure of central tendency
The shoe sizes of boys in Grade 9	
An evenly-spread set of measurement values, such as the heights of learners in a class	
A set of measurement values with a few very low values and mostly high values	
The number of siblings each person in your class has	
The sizes of properties in a town, where most people live in small apartments or RDP houses, and a few live on large properties	

9. **CONSOLIDATION/CONCLUSION & HOMEWORK** (Suggested time: 5 minutes)

j) **Emphasise that:**

- Data should be organised before it is summarised.
- Data may not have a mode; it may have one or more than one modes.
- Only numerical data has extremes, a range, a median or a mean.
- Mode is always one of the data items, but median and mean may not be data items.
- Some data has no extremes or outliers.
- Leaves in the stem-and-leaf display are always the unit digits.
- Leaves in the stem-and-leaf display are arranged in ascending order for each stem.

k) **Homework:**

- **Sasol-Inzalo Book 2, pages 136 – 139** [What was not completed during the lesson].
- Additional activities from the Textbook.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: DATA HANDLING: COLLECT, ORGANISE AND SUMMARISE DATA (Lesson 3)**

2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to organize numerical data in different ways in order to summarize by determining:

- measures of central tendency
- measures of dispersion including extremes and outliers

3. **RESOURCES:**

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:

- tally charts/tables
- frequency table
- measures of central tendency
- measures of spread or dispersion

5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)

Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.

6. INTRODUCTION (Suggested time: 10 Minutes)

- Write the following list of numbers on the chalkboard:

7 ; 8 ; 6 ; 4 ; 7 ; 6 ; 7 ; 8 ; 10 ; 7 ; 8 ; 6 ; 7 ; 5 ; 9 ; 7

- Inform learners that this is a random sample of marks obtained by Grade 1 learners in a test that was written out of 10.
- Instruct learners to present the data on a frequency table as shown below:

	Tally	Frequency
4	/	1
5	/	1
6	///	3
7	/	6
8	///	3
9	/	1
10	/	1

- Illustrate for the learners how a frequency table is drawn (proper techniques).
- Let the learners use the Tally chart to determine measures of central tendency and measures of spread.

Refer to the previous lesson for the answers.



7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

Let the learners:

- copy the data below into their written work books
 28 122 217 130 120 86 80 90
 120 140 70 40 145 187 113 90
 68 174 194 170 100 75 104 97
 75 123 100 82 109 120 81
- represent the data on the Frequency Table like the one below:

	Tally	Frequency
0 – 40		
41 – 80		
81 – 120		
121 – 160		
161 – 200		
201 - 240		

- determine the range, the mode, the median, extremes or outliers for this data

NB:

- Allow them to help each other. Also assist learners that are struggling.
- Inform the learners that the data is a sample of the number of calls received by roadside service per day.
- Discuss with the learners when is it appropriate to group data.

Refer to Sasol-Inzalo Book 2, page 135, No. 1 for the solution below.

Number of calls	Tally marks	Frequency
0-40	//	2
41-80	###	5
81-120	### ## ////	14
121-160	###	5
161-200	////	4
201-240	/	1
Total		31

Note:

- The range is $217 - 28 = 189$. The large range suggests that 28 and 217 **may** be regarded as extremes.
- The modal class is 81 – 120. There are 14 scores that fall in this interval. The median is definitely in this class interval.
- The mode is also highly likely to be in this class interval.
- Median is 104 and the mode is 120

Learning activities (Learners are expected to:)

- complete the frequency table.
- compare the table to the stem-and-leaf display.



8. CLASSWORK (Suggested time: 15 minutes)

- **DBE workbook, page 181, No 1 a – e** (In e, do the frequency table only. Do not plot the histogram)
- **Sasol-Inzalo Book 2, page 135, No. 2**
When geologists go out into the field they make sure they have their rulers and measurement instruments in their bags. They also have their “inbuilt rulers”, for example their handspans. A handspan is the distance from the tip of the thumb to the tip of the fifth finger on an outstretched hand. This frequency table shows the handspans of different Grade 9 learners, in cm.

Handspan of Grade 9 learners in cm	Frequency
15–18	7
18–21	9
21–24	10
24 and greater	4

- (a) How many learner handspans were measured altogether?
- (b) How many learner handspans are less than 21cm wide?
- (c) How many handspans are 18 cm or wider?
- (d) In which interval would you place a handspan of 18 cm?

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

l) Emphasise that:

- If data is large, it is grouped into intervals.
- The number of class intervals should not be too small or very large.
- Class intervals should not overlap.
- Class intervals should preferably be of the same size.

m) Homework:

Hereunder is a sample of marks obtained by Grade 9 learners in a test that was written out of 20.

14 4 11 10 8 11 13 9 7 4
10 7 12 6 10 11 14 9 8 18

- a) Determine the range of the marks.
- b) Using appropriate class intervals, present the marks on a frequency table.
- c) Use your table to determine the modal class.
- d) Also using your table, determine the mode of the test scores.
- e) Are there any extremes in the test performance?



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: DATA HANDLING: COLLECT, ORGANISE AND SUMMARISE DATA (Lesson 4)**
2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

By the end of the lesson learners should know and be able to organize data according to more than one criterion.

3. **RESOURCES:**

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> collecting data summarising data
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)	<p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>
6. INTRODUCTION (Suggested time: 10 Minutes)	<ul style="list-style-type: none"> Ask learners to work in pairs and list data that could be collected about them. Capture some of the data on the chalkboard. <p>NB: Learners should be aware that sometimes we may collect several data at the same time. You may refer to DBE workbook, page 169.</p>



7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities

Learning activities (Learners are expected to:)

Note: The following activities have been taken from the DBE workbook.

Activity 1

Answer the following questions together with the learners.

Learner	Gender	Handedness
1	Female	Right-handed
2	Male	Left-handed
3	Male	Right-handed
4	Female	Right-handed
5	Female	Right-handed
6	Male	Right-handed
7	Male	Left-handed
8	Male	Right-handed
9	Female	Right-handed
10	Female	Left-handed
11	Male	Right-handed
12	Female	Right-handed

In this survey we collected two sets of data of 12 learners in our class. We know their gender and if they are right- or left-handed.

Answer the following questions:

- How many males are in the class?
- How many females are in the class?
- How many males are right-handed and how many are left-handed?
- How many females are right-handed and how many are left-handed?
- How many learners are right-handed and how many are left-handed?

- learners answer questions.
- compare the activities.

Activity 2

- Next answer the following questions together with the learners.

	Right-handed	Left-handed	Total
Males	4	2	6
Females	5	1	6
Total	9	3	12

This is called a cross-tabulation (cross-tab) or contingency table.

Now answer the following questions.

Was it easier to read?

- How many males are there in the class?
- How many females are there in the class?
- How many males are right-handed and how many are left-handed?
- How many females are right-handed and how many are left-handed?
- How many learners are right-handed and how many are left-handed?

- Make learners compare the above two tables.
- Let them decide which table made it easy to answer questions.

NB:

Draw attention of learners to the fact that this table is sometimes referred to as a two-way table

8. CLASSWORK (Suggested time: 15 minutes)



9. **CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)**n) **Emphasise that:**

- organising data with more than one variable on a table makes it easy to answer critical questions.
- a table which shows which is used to examine relationship between two sets of categorical data is often referred to as a **two-way table**.

o) **Homework:**

- DBE workbook, page 170, No. 2** and problem solving question.
- Sasol-Inzalo Book 2, page 140.**

Use the information in the table to answer the questions that follow:

Country	Total population (in 1 000s)	Total annual national income per person (US\$)	Percentage of income spent on health
Angola	18 498	4 830	4,6
Botswana	1 950	13 310	10,3
DRC	66 020	280	2,0
Lesotho	2 067	1 970	8,2
Malawi	15 263	810	6,2
Mauritius	1 288	12 580	5,7
Mozambique	22 894	770	5,7
Namibia	2 171	6 250	5,9
Seychelles	84	19 650	4,0
South Africa	50 110	9 790	8,5
Swaziland	1 185	5 000	6,3
Tanzania	43 739	1 260	5,1
Zambia	12 935	1 230	4,8
Zimbabwe	12 523	170	Not available

- What is the population range for these countries?
- Which measures for the population could be regarded as outliers?
- Which measure of central tendency would be appropriate for the population of these countries?

MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: DATA HANDLING: REPRESENT DATA (LESSON 5)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to draw a variety of graphs by hand/technology to display and interpret data including:

- bar graphs and double bar graphs.
- histograms with given and own intervals.

3. RESOURCES:

Textbooks, Poster, pencil, ruler, DBE Workbook, Sasol-Inzalo Book 2.
(Squared or graph paper also a recommended resource)



4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none">graphs																		
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)																			
Homework provides an opportunity for teachers to track learners’ progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.																			
6. INTRODUCTION (Suggested time: 10 Minutes)																			
<ul style="list-style-type: none">Prepare a poster with the graphs that are attached to this lessonDisplay the poster and let the learners identify a bar graph, a double bar graph and a histogram.Let the learners specify similarities and differences between bar graphs, double bar graphs and histograms.																			
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)																			
Teaching activities	Learning activities (Learners are expected to:)																		
Activity 1 Discuss with learners <ul style="list-style-type: none">Examples of bar graph and double bar graph in DBE workbook, page 172 and 176.Examples of bar graph, double bar graph and histogram in Sasol-Inzalo Book 2, page 143 and 146. Note: <ul style="list-style-type: none">You may present the graphed data in the Sasol Inzalo Book 2 on a table to learners as shown below: <table><tr><td>Favourite chips</td><td>Tomato</td><td>Cheese & onion</td><td>BBQ</td><td>Fruit chutney</td><td>Sour cream</td><td>Salt & vinegar</td><td>Lightly salted</td><td>Sweet Chilli</td></tr><tr><td>No. of Learners</td><td>6</td><td>8</td><td>4</td><td>10</td><td>6</td><td>3</td><td>8</td><td>4</td></tr></table> <p>Table 1: Data for the bar graph</p>	Favourite chips	Tomato	Cheese & onion	BBQ	Fruit chutney	Sour cream	Salt & vinegar	Lightly salted	Sweet Chilli	No. of Learners	6	8	4	10	6	3	8	4	<ul style="list-style-type: none">draw the graphs together with the teacher.
Favourite chips	Tomato	Cheese & onion	BBQ	Fruit chutney	Sour cream	Salt & vinegar	Lightly salted	Sweet Chilli											
No. of Learners	6	8	4	10	6	3	8	4											



Grade	8	9	10	11	12
Boys	20	19	16	12	11
Girls	19	17	13	11	8

Table 2: Data for the double bar graph

- You may then draw the graph together with the learners the above graphs on chalkboard.

Activity 2

Do, together with the learners examples of histograms in the DBE workbook, page 180.

8. CLASSWORK (Suggested time: 15 minutes)

Activity 1

DBE workbook, page, 174, No. 2.

NB: Learners should draw the graphs only. Questions will be answered in the later lessons.

Activity 2

DBE workbook, page, 176, No. 1.

NB: Learners should draw the graphs only. Questions will be answered in the later lessons.

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

p) Emphasise that:

- Discrete data is presented on bar and double bar graphs.
- Continuous data is presented on a histogram.
- Bars of a histogram have no spaces between them.
- Good bar graphs and histograms have equal bars.
- Vertical and horizontal axes of all graphs should be labelled
- Double bar graphs need a legend / key
- Bar graphs, double bar graphs and histograms enable us to easily compare data items to each other.

q) Homework:

- DBE workbook, page, 181 – 182, No. 1.

NB:

You may decide the class intervals that learners should use for uniformity.

- Sasol-Inzalo Book 2, page 144, No. 1 (c) and pages 146 – 148, No. 1 (a), (b) and 2 (a)



Activities in the Sasol-Inzalo Book 2

Page 144, No. 1 (c)

Obese (very overweight) people have many health problems. It is a concern all around the world. Health researchers analysed the change over 28 years in the numbers of people who are overweight and obese in different areas of the world. This table summarises some of the data.

	1980	2008
Sub-Saharan Africa	12%	23%
North Africa and Middle East	33%	58%
Latin America	30%	57%
East Asia (low income countries)	13%	25%
Europe	45%	58%
North America (high income countries)	43%	70%

Plot a double bar graph to compare the data for the areas, and for the two years.

Page 146 -148

- 1 (a) A fruit farmer wants to know which of his trees are producing good plums, and which trees need to be replaced. He collects 100 plums each from two trees and measures their masses. The data below gives the mass of plums from the first tree. Represent the data in a histogram

Mass of plums (g)	20–29	30–39	40–49	50–59	60–69
Frequency	6	18	34	30	12

- (b) Now draw another histogram to represent the following data giving the mass of the same type of plums from another tree in the orchard.

Mass of plums (g)	20–29	30–39	40–49	50–59	60–69
Frequency	3	14	26	36	21

- 2 (a) Draw a histogram to represent the data in the table below. Group the data in intervals of 0,5 kg.

3,3	1,34	2,88	2,54	1,87	2,06	2,72
1,89	0,85	1,99	2,43	1,66	2,45	1,62
1,91	1,20	2,45	1,38	0,9	2,65	2,88
1,75	2,11	3,2	1,74	0,6	3,1	1,86

Table: Birth weights (kg) of 28 babies at a clinic



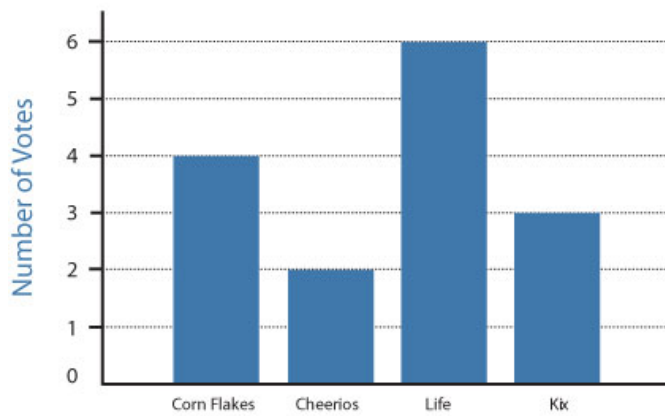


basic education

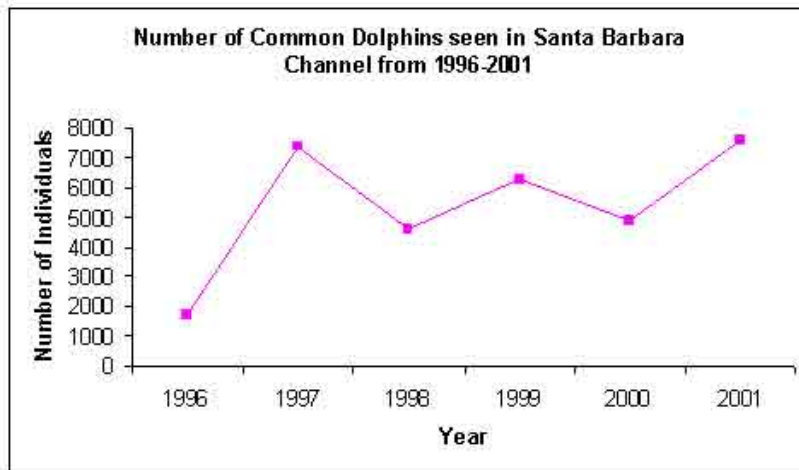
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Examples of graphs that could be on the poster

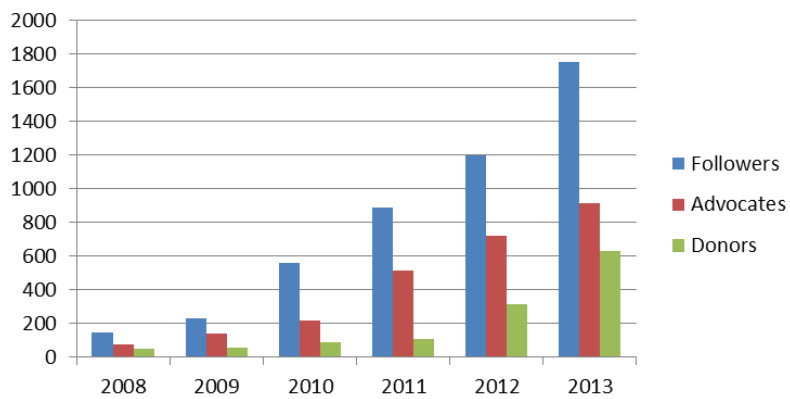
Favorite Cereal



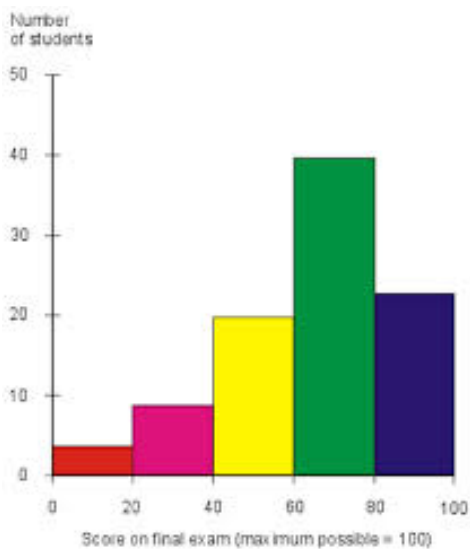
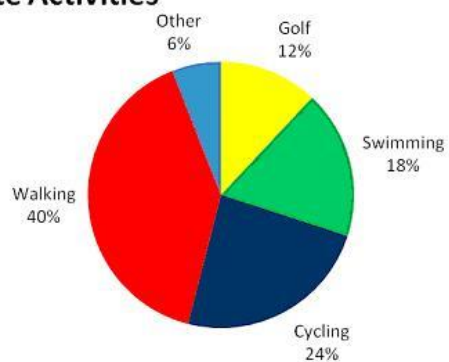
Type of Cereal






Social Media Impact



Favorite Activities



Varities of Apples in a food store	
Red Delicious	  
Golden Delicious	  
Red Rome	   
McIntosh	 
Jonathan	   

 = 10 apples  = 5 apples

MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: DATA HANDLING: REPRESENT DATA (LESSON 6)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to draw a variety of graphs by hand/technology to display and interpret data including:

- pie charts.

3. RESOURCES:

Textbooks, Poster, protractor, a pair of compass, pencil, ruler, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none">• graphs• fractions• percentage• angles										
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)											
<p>Homework provides an opportunity for teachers to track learners’ progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>											
6. INTRODUCTION (Suggested time: 10 Minutes)											
<ul style="list-style-type: none">• Display the poster used in the previous lesson and let the learners identify a pie chart.• Let the learners explain how a pie chart differs from bar graphs.• Assess if learners can calculate the fraction (percentage) of a given quantity. For example:<ul style="list-style-type: none">• $\frac{1}{10}$ of 40• 15% of 360°											
Note: You may discuss with learners the pie chart on page 149 of Sasol-Inzalo Book 2											
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)											
Teaching activities	Learning activities (Learners are expected to:)										
Activity 1 <ul style="list-style-type: none">• Let the learners complete the second row of the table like the one below in their written work books using data in the pie chart on page 149 of Sasol-Inzalo Book 2. <table><tr><td>Sport</td><td>Soccer</td><td>Hockey</td><td>Basketball</td><td>Cricket</td></tr><tr><td>Fraction or percentage</td><td></td><td></td><td></td><td></td></tr></table> <ul style="list-style-type: none">• Take the learners through the steps for drawing a pie chart on page 188 of the DBE workbook. (Note that the first step has already been done for them)	Sport	Soccer	Hockey	Basketball	Cricket	Fraction or percentage					<ul style="list-style-type: none">• complete the second row of the table.• follow steps on page 188 of the DBE workbook and draw a pie chart.
Sport	Soccer	Hockey	Basketball	Cricket							
Fraction or percentage											
8. CLASSWORK (Suggested time: 15 minutes)											
Activity 1 <ul style="list-style-type: none">• DBE workbook, page, 188 – 190, No. 1 and 2. NB: <p>It is advisable that learners focus on drawing only. In the later lessons, the focus will shift to analysing and reporting.</p>											



9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

r) Emphasise that:

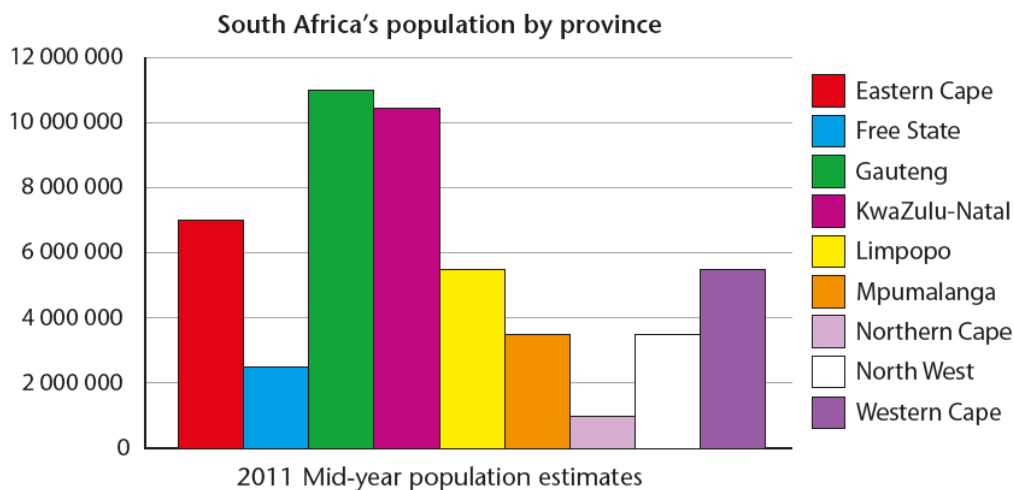
- Discrete data may also be presented on pie charts
- Pie charts enable us to compare relative size of each data item to entire data sample or population.

s) Homework:

- Sasol-Inzalo Book 2, page 149, No. 1 (a) – (d)

For 1 (c), learners should add a row for sector angles.

- The following bar graph shows the population of South Africa by province.



[In case the graph is not in colour, The first bar (extreme left) is for Eastern Cape, the next for Free State, ... and the last for Western Cape]

- Write the figures in the graph correct to the nearest 500 000 in the table below.

Province	E Cape	FS	Gau	KZN	Lim	Mpum	NC	NW	WC
Population (× 1 000)									

- What is the total of the rounded off numbers?

- Work out the percentage of the whole for each province and sector angle size for each province in the next table.

Province	E Cape	FS	Gau	KZN	Lim	Mpum	NC	NW	WC
Percentage									
Angle									

- Draw a pie chart showing the data in the completed table in (c).



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: DATA HANDLING: REPRESENT DATA (LESSON 7)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to draw a variety of graphs by hand/technology to display and interpret data including:

- broken-line graphs.
- scatter plots.

3. RESOURCES:

Textbooks, Poster, pencil, ruler, DBE Workbook, Sasol-Inzalo Book 2.
(Squared or graph paper also a recommended resource)



4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none">graphs																																																												
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)																																																													
Homework provides an opportunity for teachers to track learners’ progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.																																																													
6. INTRODUCTION (Suggested time: 10 Minutes)																																																													
<ul style="list-style-type: none">Show learners sketches of line graphs and scatter plots in your poster.Discuss with learners types of data represented by each type of graph.																																																													
Refer to DBE workbook:																																																													
<ul style="list-style-type: none">page 192 for an example and notes on line graphs.pages 196 – 197 for examples of scatter plots.																																																													
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)																																																													
Teaching activities	Learning activities (Learners are expected to:)																																																												
Activity 1 <ul style="list-style-type: none">Give learners the data tabulated on page 151 of the Sasol-Inzalo Book 2. <table><tr><th colspan="4">Rainfall at three locations in South Africa in 2012</th></tr><tr><th></th><th>Amatole, KZN</th><th>Mahikeng, NW</th><th>Ceres, WC</th></tr><tr><th></th><th>Rainfall (mm)</th><th>Rainfall (mm)</th><th>Rainfall (mm)</th></tr><tr><td>January</td><td>101</td><td>118</td><td>27</td></tr><tr><td>February</td><td>108</td><td>90</td><td>23</td></tr><tr><td>March</td><td>117</td><td>86</td><td>41</td></tr><tr><td>April</td><td>77</td><td>61</td><td>60</td></tr><tr><td>May</td><td>46</td><td>14</td><td>130</td></tr><tr><td>June</td><td>27</td><td>6</td><td>168</td></tr><tr><td>July</td><td>32</td><td>3</td><td>152</td></tr><tr><td>August</td><td>48</td><td>7</td><td>162</td></tr><tr><td>September</td><td>76</td><td>18</td><td>88</td></tr><tr><td>October</td><td>112</td><td>46</td><td>60</td></tr><tr><td>November</td><td>115</td><td>75</td><td>41</td></tr><tr><td>December</td><td>100</td><td>86</td><td>36</td></tr></table> <ul style="list-style-type: none">Draw together with them the line graph that represents this data	Rainfall at three locations in South Africa in 2012					Amatole, KZN	Mahikeng, NW	Ceres, WC		Rainfall (mm)	Rainfall (mm)	Rainfall (mm)	January	101	118	27	February	108	90	23	March	117	86	41	April	77	61	60	May	46	14	130	June	27	6	168	July	32	3	152	August	48	7	162	September	76	18	88	October	112	46	60	November	115	75	41	December	100	86	36	<ul style="list-style-type: none">copy data into their booksdraw the line graph together with the teacher.draw the scatter plot together with the teacher.
Rainfall at three locations in South Africa in 2012																																																													
	Amatole, KZN	Mahikeng, NW	Ceres, WC																																																										
	Rainfall (mm)	Rainfall (mm)	Rainfall (mm)																																																										
January	101	118	27																																																										
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March	117	86	41																																																										
April	77	61	60																																																										
May	46	14	130																																																										
June	27	6	168																																																										
July	32	3	152																																																										
August	48	7	162																																																										
September	76	18	88																																																										
October	112	46	60																																																										
November	115	75	41																																																										
December	100	86	36																																																										
Activity 2 <ul style="list-style-type: none">Let the learners copy the table on page 196 of the DBE workbook into their books.Let them draw, together with you, the scatter plot for this data.																																																													
8. CLASSWORK (Suggested time: 15 minutes)																																																													



Activity 3

DBE workbook:

- page 194, No. 2 (Drawing the graph only).
- page 197, No. 1.

9. **CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)**

Emphasise that:

- line graphs are used to see trends
- scatter plots are used to determine correlation between two sets of data and to also do regression (Make predictions and generalisations)
- **Homework:**
- DBE workbook:
 - Pages 198 – 199, No. 2 and problem solving
 - Pages 200 – 201, (a) – (e)
- Sasol-Inzalo Book 2, page 164, No. 1.
- Draw a broken line graph for Mahikeng and Ceres rainfall data in the above table.



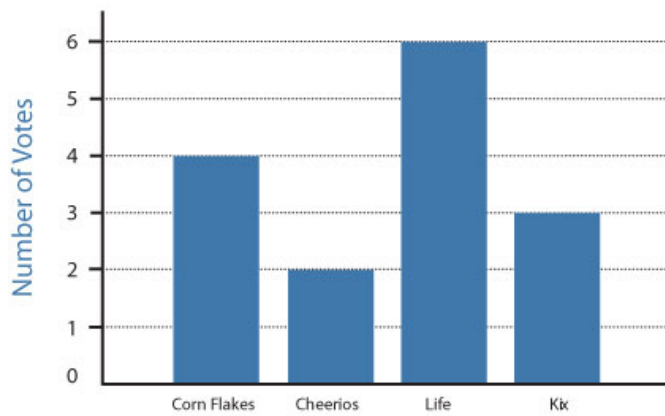


basic education

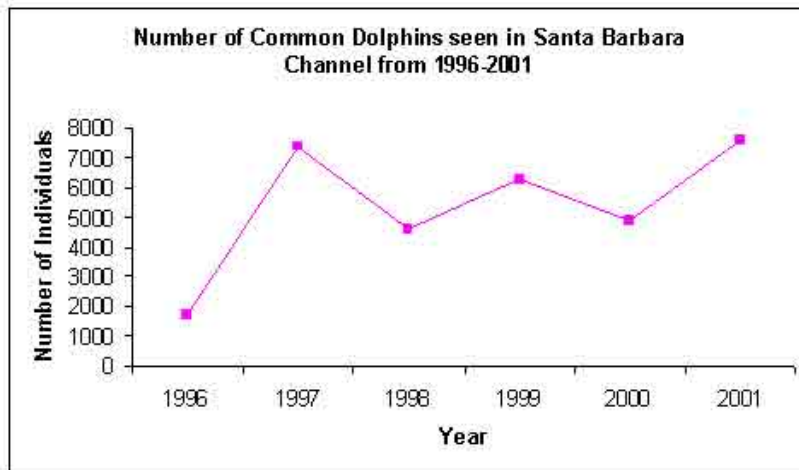
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Examples of graphs that could be on the poster

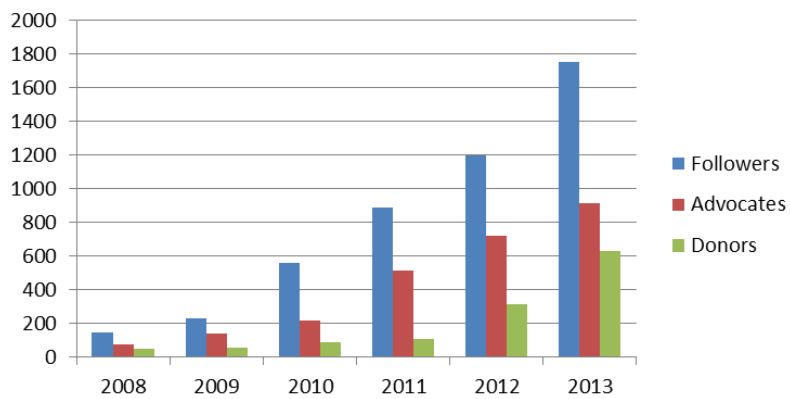
Favorite Cereal



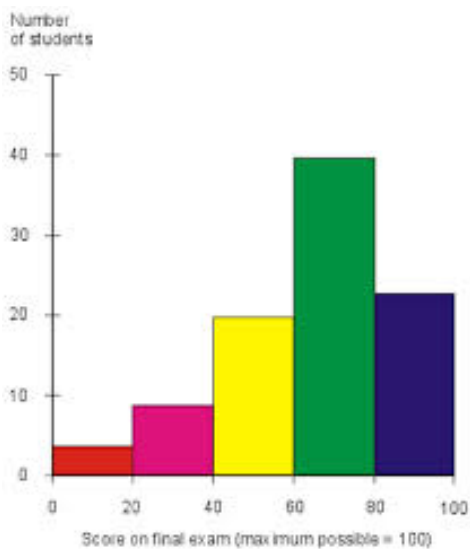
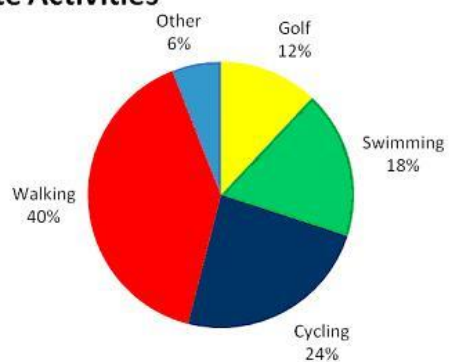
Type of Cereal






Social Media Impact



Favorite Activities



Varities of Apples in a food store	
Red Delicious	  
Golden Delicious	  
Red Rome	   
McIntosh	 
Jonathan	   

 = 10 apples  = 5 apples

MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. **TOPIC: DATA HANDLING:** INTERPRET, ANALYSE AND REPORT DATA (LESSON 8)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to:

- Critically read and interpret data represented in a variety of ways.
- Critically compare two sets of data related to the same issue
- Critically analyse data by answering questions related to:
 - data collection methods
 - summary statistics of data
 - sources of error and bias in the data

3. RESOURCES:

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:

- two-way tables
- graphs

5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)

Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.

6. INTRODUCTION (Suggested time: 10 Minutes)

Discuss with learners the purpose of presenting data on:

- A table
- Bar graph or double bar graph
- Histogram

Refer to previous lessons for answers.

Draw a table like the one below and let the learners answer the questions orally:

	Right-handed	Left-handed	Total
Male	4	2	6
Female	5	1	6
Total	9	3	12

Table 1: Sample of 12 learners

- How many males are there in the sample?
- How many females are there?
- How many males are right-handed and how many are left handed?
- How many females are right-handed and how many are left handed?
- How many people are right-handed and how many are left handed?

Note:

Learners did this activity in Lesson 4



7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)
<p>NB</p> <ul style="list-style-type: none"> Revisit the data cycle discussed in the first lesson Make learners aware of the journey you have already taken them through <p>Activity 1 Refer learners to DBE workbook, pages 174 – 175, No. 2.</p> <p>Note: Learners drew the graph as classwork in Lesson 5. Now, let them use their graphs to answer the analysis and interpretation questions.</p> <p>Activity 2 Refer learners to DBE workbook, pages 176 – 177, No. 1. and 2.</p> <p>Note: Learners drew the graph as classwork in Lesson 5. Now, let them use their graphs to answer the analysis and interpretation questions.</p> <p>Activity 3 Discuss with the learners examples of histograms on pages 184 – 185 of the DBE workbook.</p>	<ul style="list-style-type: none"> Interpret graphs analyse graphs
8. CLASSWORK (Suggested time: 15 minutes)	
<ul style="list-style-type: none"> Activities done during lesson presentation. DBE workbook pages 185 – 186, No. 1 	



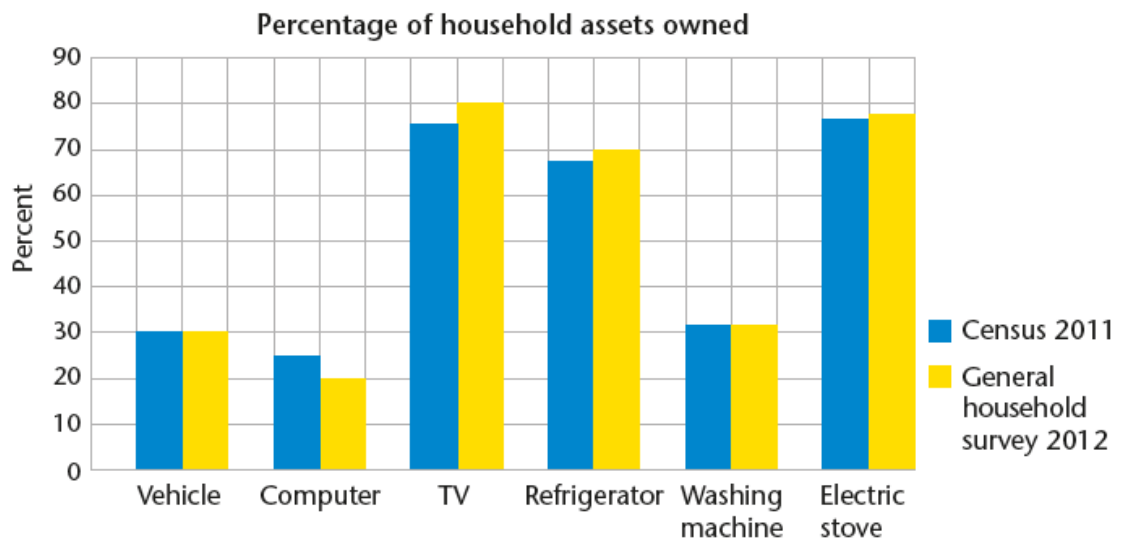
9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

Emphasise the data cycle

t) Homework:

- DBE workbook pages 185 – 187, No. 2 and problem solving.
- Sasol-Inzalo Book 2, page 164, No. 2.

This graph was published by Statistics South Africa to show the assets owned by South Africans. The blue bar shows the Census 2011 results and the yellow bar shows the General Household Survey 2012 results.



Give reasons for your answers to the questions below.

- Is it useful to show the differences in the results of Census 2011 and the General Household Survey 2012?
- Is it useful to collect data on assets that people own?
- Is it useful to show that lower percentages of people own certain assets?
- The different coloured bars represent the two different surveys. Draw up a table to show the data in table form. (Read the percentages as accurately as you can from the graph and round off the data to the nearest whole number for the table.)
- Does the table show the data as effectively as the double bar chart? Give your own opinion.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: DATA HANDLING: INTERPRET, ANALYSE AND REPORT DATA (LESSON 9)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to:

- Critically read and interpret data represented in a variety of ways.
- Critically compare two sets of data related to the same issue
- Critically analyse data by answering questions related to:
 - data collection methods
 - summary statistics of data
 - sources of error and bias in the data

3. RESOURCES:

Textbooks, DBE Workbook, Sasol-Inzalo Book 2.



4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> graphs
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Discuss with learners the purpose of presenting data on:</p> <ul style="list-style-type: none"> Pie chart line graph Scatter plot <p>Refer to previous lessons for answers.</p>	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
<p style="text-align: center;">Teaching activities</p> <p>Activity 1 Refer learners to DBE workbook, page, 188 – 190, No. 1 and 2. Note: Learners drew the graph as classwork in Lesson 6. Now, let them use their graphs to answer the analysis and interpretation questions.</p> <p>Activity 2 Refer learners to DBE workbook, page, 194, No. 2. Note: Learners drew the graph as classwork in Lesson 7. Now, let them use their graphs to answer the analysis and interpretation questions.</p>	<p style="text-align: center;">Learning activities (Learners are expected to:)</p> <ul style="list-style-type: none"> interpret graphs analyse graphs
8. CLASSWORK (Suggested time: 15 minutes) <p>Sasol-Inzalo Book 2 page 152, No. 1 – 4; page 153, No. 7</p> <p>Learners should use the broken line graphs that they drew in lesson 7 to answer the following questions (taken from Sasol-Inzalo Book 2).</p> <ol style="list-style-type: none"> During which four months does Amatole have the least rain? During which six months does Amatole have the most rain? During which months would you plan a hike if you were only considering the rainfall patterns? What other factors should you consider when planning a hike in this region? Write a few lines on the difference in rainfall patterns between Ceres and Mahikeng. 	
9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)	

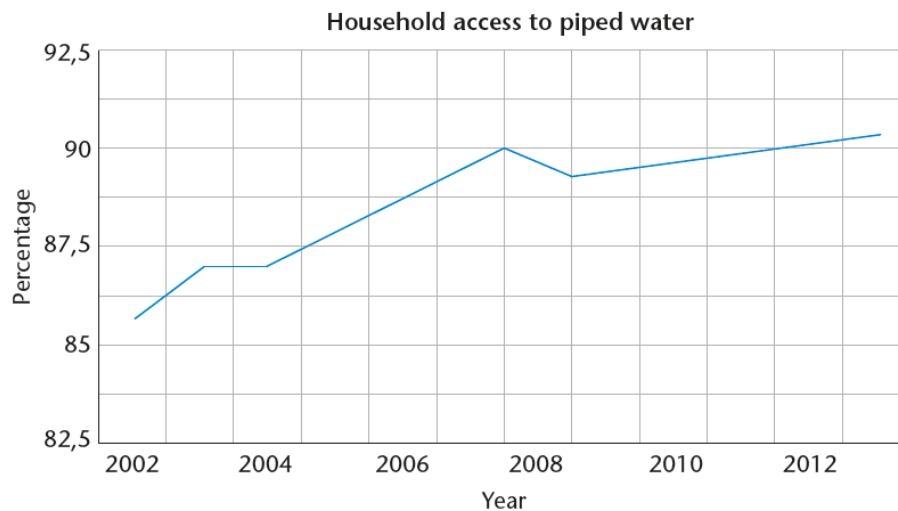


Emphasise data cycle

u) **Homework:**

- DBE workbook pages 185 – 187, No. 2 and problem solving
- Sasol-Inzalo Book 2, page 170, No. 1 and page 172 -176, No. 1 – 4.

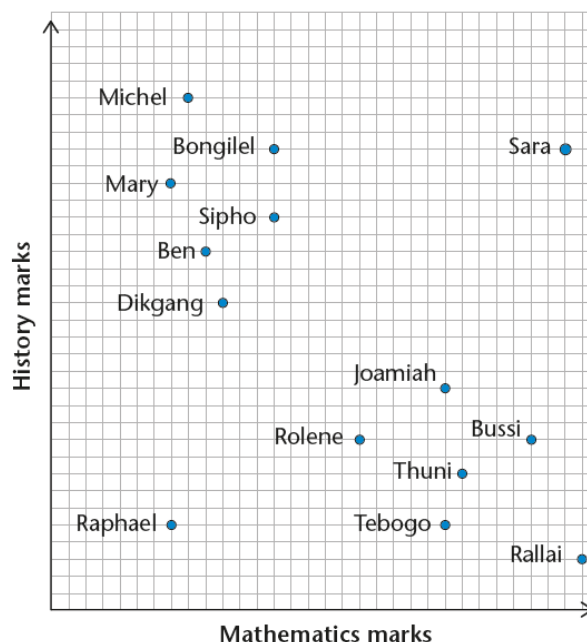
Page 170, No. 1:



- (a) Comment on the scale used on the vertical axis. Is this a misleading graph?
- (b) How could you redraw the graph so that the differences on the graph are more noticeable?
- (c) How could you draw the graph so that the differences are less noticeable?

Pages 172 – 176, No. 1 – 4

1.



The above scatter plot shows the performance of a group of learners in Mathematics and History. Which of the points on the scatter plot can be regarded as outliers? Give reasons for your answer.



Job number	Distance (km)	Load weight (kg)	Fuel used (litres)	Fuel consumption (litres/100 km)
1	1 304	5 445	879	67.4
2	1 320	2 954	639	48.4
3	1 151	4 705	698	60.6
4	1 371	4 378	787	57.4
5	325	3 673	176	54.2
6	1 630	5 995	1 113	68.3
7	1 023	5 357	600	58.7
8	620	4 988	382	61.6
9	73	1 992	35	47.9
10	1 071	5 529	680	63.5
11	370	4 140	218	58.9
12	1 423	4 062	843	59.2
13	394	4 068	221	56.1
14	1 536	1 678	682	44.4
15	1 633	3 736	887	54.3
16	435	3 644	241	55.4

The above table gives information that was recorded for previous transport jobs. The jobs are numbered from 1 to 16 and for each job the values of the four variables *distance*, *load weight*, *amount of fuel used* and *fuel consumption rate* are given.

2. (a) Which of the four variables are represented on the scatter plot given above?
(b) What are the values of these two variables for the point indicated by the blue arrow on the scatter plot?
3. (a) Consider the scatter plot and the data set. What is the effect of load weight on fuel consumption?
(b) Is job 7 an exception in this respect? Explain your answer.
4. Further investigations revealed that the driver for jobs 2 and 7 was the same person, and that he was not the driver for any other jobs. What may this indicate?



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: DATA HANDLING: INTERPRET, ANALYSE AND REPORT DATA (LESSON 10)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to summarize data in short paragraphs that include:

- drawing conclusions about the data
- making predictions based on the data
- making comparisons between two sets of data
- identifying sources of error and bias in the data
- choosing appropriate summary statistics for the data (mean, median, mode, range)
- the role of extremes and outliers in the data



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Book 2.
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> graphs
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6. INTRODUCTION (Suggested time: 10 Minutes) Discuss with learners the purpose of presenting data on: <ul style="list-style-type: none"> Pie chart line graph Scatter plot Refer to previous lessons for answers.	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)
Take the learners through the notes on page 202 of the DBE workbook. Activity 1 <ul style="list-style-type: none"> Refer learners to DBE workbook, page, 188 – 190, No. 1 and 2. Note: Learners drew the graph as classwork in Lesson 6. Now, let them use their graphs to analyse and interpret data, and report on the data. Probable errors are: <ul style="list-style-type: none"> these may be omissions. For example, what data is shown along the vertical axis of the bar graph. It might also be language issues. For example, the title does not clarify that graphs show number of pets owned by learners. It gives an impression that learners brought pets to school. Story: Half of the pets owned by learners are dogs. There is an equal number of guinea pigs and rabbits. The number of cats is half the number of dogs while the number of cats is double the number of rabbits or guinea pigs. Activity 2 Refer learners to DBE workbook, page, 194, No. 2. Note: Learners drew the graph as classwork in Lesson 7. Now, let them use their graphs to answer the analysis and interpretation questions.	<ul style="list-style-type: none"> go through page 202 together with the teacher. copy the table into their books they answer the questions in pairs or small groups.



8. CLASSWORK (Suggested time: 15 minutes)

- Sasol-Inzalo Book 2, page 152, No. 1 – 4; page 153, No. 7

Pages 152 - 153

Use graphs drawn in Lesson 7 to answer these questions

1. During which four months does Amatole have the least rain?
2. During which six months does Amatole have the most rain?
3. During which months would you plan a hike if you were only considering the rainfall patterns?
4. What other factors should you consider when planning a hike in this region?
7. Write a few lines on the difference in rainfall patterns between Ceres and Mahikeng.

9. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)

Emphasise

- One can move back and forth in a data cycle.
- Reporting entails making generalisations from interpretation and analysis of data.

v) Homework:

DBE workbook:

- Page 191 – problem solving activity
- selected questions on pages 206 – 213



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: PROBABILITY (Lesson 1)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to

- Consider situations with equally probable outcomes and determine probabilities of compound events using two way tables.



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook 2.
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • outcomes • probability • Single events
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Revision : Grade 8</p> <p>Consider the situations below with equally likely outcomes Guide learners to respond to the following questions</p> <ol style="list-style-type: none"> If we flip a coin there are two possible outcomes <ol style="list-style-type: none"> What are the two possible outcomes? What is the probability of each outcome? Rolling a fair die <ol style="list-style-type: none"> What are the possible outcomes? What is the probability of each outcome? <p>NB: Ensure learners know the concepts : event, outcome, probability From the examples above flipping a coin and rolling a die are events Getting a head when rolling a die is an outcome</p> <p>Probability of Heads is $\frac{1}{2}$</p>	



7. LESSON PRESENTATION/DEVELOPMENT(Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)									
<p>The outcome of the two situations above can be combined i.e. flipping the coin once and throwing the die once. We now have a combined event. When we use more than one object or we repeat an experiment, we call this a compound event.</p> <p>Activity 1</p> <p>Table worksheet</p> <p>1. The table below shows different types and colours of Michele’s basketball shoes.</p> <table><tr><td></td><td>Red</td><td>White</td></tr><tr><td>Hi Top</td><td>16</td><td>22</td></tr><tr><td>Lo Cut</td><td>9</td><td>3</td></tr></table>		Red	White	Hi Top	16	22	Lo Cut	9	3	<p>Work with the teacher to complete the activity.</p>
	Red	White								
Hi Top	16	22								
Lo Cut	9	3								
<p>1.1 How many pairs of shoes does she have? 1.2 How many pairs are red? 1.3 How many pairs are Lo Cut?</p> <p>Before each game, she picks a pair at random.</p> <p>1.4 P (white) = 1.5 P (Lo Cut) =</p>										
<p>Solutions</p> <p>1.1 She have 50 pairs of shoes 1.2 There are 25 red pairs. 1.3 There are 12 Lo Cut basket ball shoes?</p> <p>When she picks a pair at random.</p>										



$$1.4 P(\text{White}) = \frac{25}{50} = \frac{1}{2}$$

$$1.5 P(\text{Lo Cut}) = \frac{12}{50} = \frac{6}{25}$$

NB: To find the probability of two or more independent events that occur in sequence, find the probability of each event separately and then multiply answers

$$P(\text{A and B}) = P(\text{A}) \cdot P(\text{B})$$

Activity 2

2. The table below shows the distribution of students in a mathematics class.

	Male	Female
Juniors	7	16
Seniors	12	15

2.1 How many students are in the class?

2.2 How many males are in the class?

A student is chosen from the class at random. Write:

2.3 Probability (male)

2.4 Probability (not male)

2.5 Probability (junior)

2.6 Probability (male or junior)

2.7 Probability (male and junior)

Discuss the activity and complete it

8. CLASSWORK(Suggested time: 15 minutes)



1. Two dice are rolled at the same time.
 - a) Complete the two way table below to determine the combination of outcomes.

Use the table to answer the questions below.

- b) The probability of 2 and 4
- c) The probability of at least one 3

	Die 1					
Die 2	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

9. CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)

2 Emphasise that:

- Two way tables are generally used when two events in a compound event occur at the same time.
- To find the probability of two or more independent events that occur in sequence, find the probability of each event separately and then multiply answers

- 3 The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework

DBE Workbook Page 218 Worksheet 139b Number 3 a



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE:	
DISTRICT:	
SCHOOL:	
TEACHER'S NAME:	
DATE:	
DURATION:	1 Hour

1. TOPIC: PROBABILITY (Lesson 2)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to

- Consider situations with equally probable outcomes and determine probabilities of compound events using tree diagrams.



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook.
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • outcomes • probability
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.	
6. INTRODUCTION(Suggested time: 10 Minutes) Let learners answer the following questions 1. Simon threw a coin and the outcome was heads. He will now throw the coin again <ol style="list-style-type: none"> What are the possible outcomes? What is the probability of each of the possible outcomes? What are the possible outcomes if Simon throws the coin for the third time? What is the probability of each of the possible outcomes for the third throw? Note : The purpose of this activity is to show learners that when a coin is thrown for a second time has nothing to do with what happened when it was thrown for the first time. The first throw and the second throw are called independent events .	



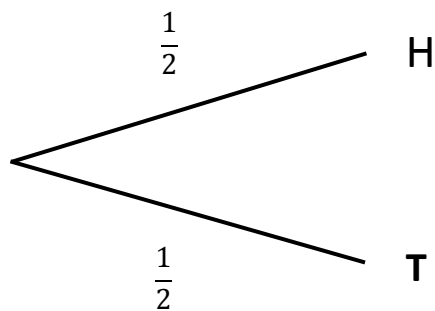
7. LESSON PRESENTATION/DEVELOPMENT(Suggested time: 20 minutes)

Teaching activities

Tree diagrams can also be used to show all the possible outcomes of events.

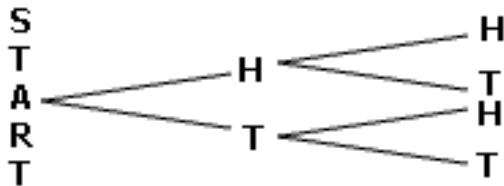
If we toss a coin once there are two possible outcomes which can be represented in a tree diagram as follows.

:



Activity 1

1.1 Draw a tree diagram to show the possible outcomes of tossing two coins.



Questions

Determine

- P (two heads)
- P (two tails)

Learning activities (Learners are expected to:)

Work with the teacher to complete the activity.



Solutions

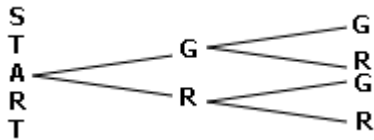
a) $P(\text{two heads}) = \frac{1}{4}$

b) $P(\text{two tails}) = \frac{1}{4}$

NB: Explain to learners that as with two way tables, once you have drawn the diagram and listed the sample space, you can use it to determine probabilities.

Activity 2

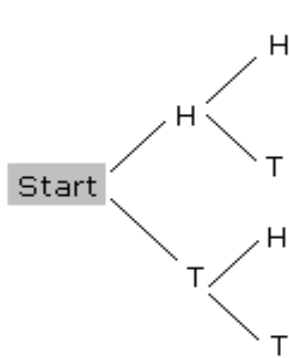
From a bottle containing 1 green ball and 1 red ball, a ball is drawn at random, replaced in the bottle and another ball is drawn. Find the sample space from the tree diagram below.



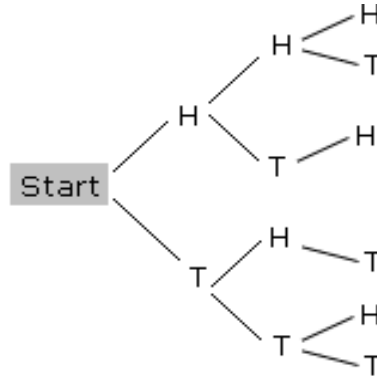
Work in pairs to complete the activity.

Activity 3

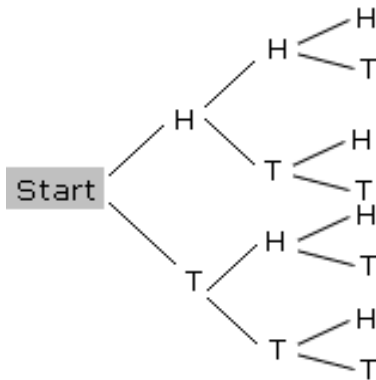
Amy tossed a 20c coin, a 50c coin, and a R1 coin at the same time. Identify the tree diagram that shows all the possible outcomes.



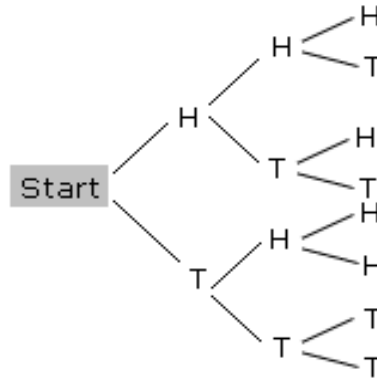
Tree diagram 1



Tree diagram 2



Tree diagram 3



Tree diagram 4

Discuss the activity and complete it

8. CLASSWORK(Suggested time: 15 minutes)

1. A coin is tossed and a die is rolled.
 - a) Draw a tree diagram for this compound event
 - b) Determine all possible outcomes for the compound event
 - c) Determine a probability of scoring a Heads and a 6 (H,6)
2. One coin is tossed and a three number spinner is spun at the same time.
 - a) Determine the probability of obtaining a tails and a 3
 - b) Determine the probability of obtaining at least a heads.



9. CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)

4 Emphasise that:

- Tree diagrams are generally used when a compound event contains more than two events.

5 The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework

Sasol-Inzalo Page 185 number 4, 5 and 6.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE :	
DISTRICT :	
SCHOOL :	
TEACHER'S NAME :	
DATE :	
DURATION :	1 Hour

1. TOPIC: PROBABILITY: (Lesson 3)

2. CONCEPTS & SKILLS TO BE ACHIEVED :

By the end of the lesson learners should know and be able to

- Consider situations with equally probable outcomes and compare relative frequency with probability and explain possible differences



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, dice
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • Probability
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Begin the lesson by asking learners to define the following concepts</p> <ul style="list-style-type: none"> • Trial • Frequency • Relative frequency • Probability 	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)



Do the following activity with learners.

Activity 1

Predict the frequency of heads when a coin is tossed 50 times.

Solution

Probability of getting heads = $\frac{1}{2}$ or 0,5 or 50%

Expected number of heads = $50 \times \frac{1}{2} = 25$

NB: Explain that in experiments, the actual frequency of outcomes often differs from the expected value. This is so because Theoretical probability is based on equally likely outcomes i.e no bias or error is involved.

Activity 2

A six sided die was rolled 12 times and the frequency of the outcomes was as follows :

Possible outcome	1	2	3	4	5	6
Frequency	3	2	0	2	2	3

- What is the probability of rolling a 4?
 - What is the probability of rolling an even number?
- What is the frequency of 5? or 3?
 - What was the relative frequency of 5? And of 3?
- What was the frequency of a number larger than 4?
 - What was the relative frequency of a number larger than 4?



8. CLASSWORK(Suggested time: 15 minutes)

DBE Workbook Page 215 number 1,2 and 3.

9. CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)

2 **Emphasise that :**

- In experiments, the actual frequency of outcomes often differs from the expected value.
- The relative frequency often differs from the probability (or theoretical probability)

3 The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.



MATHEMATICS LESSON PLAN

GRADE 9

TERM 4: October – December 2015

PROVINCE :	
DISTRICT :	
SCHOOL :	
TEACHER'S NAME :	
DATE :	
DURATION :	1 Hour

1. TOPIC: PROBABILITY: (Lesson 4)

2. CONCEPTS & SKILLS TO BE ACHIEVED :

By the end of the lesson learners should know and be able to

- Consider situations with equally probable outcomes and compare relative frequency with probability and explain possible differences



3. RESOURCES:	Textbooks, DBE Workbook, Sasol-Inzalo Workbook, dice
4. PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> • Probability • Frequency • Relative frequency
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) <p>Homework provides an opportunity for teachers to track learners' progress in the mastery of mathematics concepts and to identify the problematic areas which require immediate attention. Therefore it is recommended that you place more focus on addressing errors from learner responses that may later become misconceptions.</p>	
6. INTRODUCTION (Suggested time: 10 Minutes) <p>Begin the learners by asking them to define the following concepts</p> <ul style="list-style-type: none"> • Trial • Frequency • Relative frequency 	
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)	
Teaching activities	Learning activities (Learners are expected to:)



Learners must work in small groups to complete this investigation

Allow learners to work with a partner and roll a die 12 times.

1.1 Record the outcomes in a table such as the one shown here

Outcome	Tally	Frequency
1		
2		
3		
4		
5		
6		

Write down the probability of getting a 5 when a die is rolled.

1.2 Write down the frequency and the relative frequency of getting 5 in this activity

2 Repeat Question 1 but now roll the die 30 times.

3 3.1 Use the table to record results and collect results from 4 groups of learners.

Fill in your own results in the first blank row of the table , and the results of the other groups in rows 2 to 5

Group	Frequency of getting 5
My partner and I	
2	
3	
4	
5	
Total frequency of the 5 groups	

3.2 Calculate the frequency and the relative frequency of getting a 5 in 150 rolls of a die.

3.3 Compare the relative frequency in question 3.2 with probability of rolling a 5 when a die is rolled. What do you find?

Complete the investigation



4.1 Complete the table below using your answers in question 1,2,3

Probability of getting 5 when a die is rolled	Relative frequency of getting 5 in 12 rolls	Relative frequency of getting 5 in 30 rolls	Relative frequency of 5 in 150 rolls

4.2 Compare the relative frequency of getting 5 (in columns 2,3 and 4 with the probability of rolling a 5 when a die is rolled. What do you find?

NB: Learners should be able to notice that when only a small number of trials are done, the actual relative frequencies for different outcomes may differ a lot from the probabilities of the outcomes.

When many trials are done, the actual relative frequencies of the different outcomes are quite close to the probabilities of the outcomes.

8. CLASSWORK(Suggested time: 15 minutes)

9. CONSOLIDATION/CONCLUSION& HOMEWORK (Suggested time: 5 minutes)

4 Emphasise that:

- When more trials are performed, the relative frequencies will get closer to the probabilities

5 The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of skills than many activities that do not enhance learners' conceptual understanding.

Carefully select appropriate activities from the Sasol-Inzalo workbooks, workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework:

