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MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. TOPIC: GEOMETRY OF 2D SHAPES: Classifying 2D shapes (Lesson 1)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

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

- revise properties and definitions of triangles in terms of their sides and angles, distinguishing between:
 - equilateral triangles.
 - isosceles triangles.
 - right-angled triangle.

3. RESOURCES:	DBE Workbook 1, Sasol-Inzalo Book 1, textbooks, ruler, protractor, pencil, (mathematical set), calculator
4. PRIOR KNOWLEDGE:	• types of triangles • properties of triangles • constructions
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learner's 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)

Prepare the following questions on a chart in order to give learners to respond.

1. The sum of the interior angles of triangles is equal to _____
2. The equilateral triangle has all sides equal in length and all angles equal to _____
3. An _____ triangle has at least two equal sides opposite equal angles
4. A _____ triangle has one angle that is a right angle
5. The side opposite the right angle in a right-angled triangle, is called the _____
6. In a right-angled triangle, the square of the hypotenuse is equal to the sum of the _____.

7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 30 minutes)

Teaching activities	Learning activities (learners are expected to:)
Complete the following activities with the learners: Activity 1 - Let learners draw 3 different sized triangles and measure the interior angles using a protractor. - Have them add all the interior angles of their triangles and discuss their answers. - Learners should discover that the sum of the interior angles of a triangle is equal to 180°	complete the activities given by the teacher

Activity 2

2.1 Allow learners to construct any triangle which has all sides equal.

- Let learners measure all the angles of the drawn triangle and write their observation

2.2 Allow learners to draw any triangle with all angles equal to 60°

- Let learners measure all the sides of the drawn triangle and write their observation

Possible responses

- Learners observed that each interior angle of the triangle measures 60° .
- Learners observed that all sides of the triangle are equal in length

- draw, measure and write observations on given activities

Activity 3

3.1 Allow learners to construct a triangle with 2 sides equal in length (the triangle must not extend beyond the A4 page).

- Let learners measure all interior angles and write their observations

3.2. Allow learners to construct a triangle with 2 angles equal.

- Let learners measure all the sides and write their observations

Possible responses

- Learners observe that two angles opposite the equal sides are equal.
- Learners observe that two sides opposite equal angles are equal.

- draw, measure and write observations on given activities

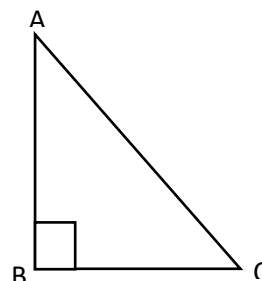
8. CLASSWORK (Suggested time: 20 minutes)**Activity 1**

- Construct a 90° angle in order to draw a right-angled triangle.
- Measure the other 2 angles and the 3 sides of the triangle.
- Add all the interior angles of your triangle. What can you conclude?
- Make a summary of your findings.

Activity 2

In the right-angled triangle given below, not drawn to scale, $\hat{B} = 90^\circ$, $\hat{A} = 43^\circ$. $AB = 8\text{cm}$, $BC = 6\text{cm}$ and $AC = 10\text{cm}$

- What do you notice about the sides of the $\triangle ABC$?
- What is the relationship between AC and $\angle ABC$?

**a) Emphasise that:**

- The sum of interior angles of a triangle is 180° .
 - An equilateral triangle has all sides equal and each interior angle = 60° .
 - Isosceles triangle has at least two equal sides opposite the equal angles.
 - Right – angled triangle has one angle that is a right angle and the side opposite it called hypotenuse which is always the longest side.
- 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 books, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework

Sasol–Inzalo Book 1 page 199 - 200 no. 1 - 4



MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. **TOPIC: GEOMETRY OF 2D SHAPES: Similar and Congruent triangles (Lesson 2)**
2. **CONCEPTS & SKILLS TO BE ACHIEVED:**

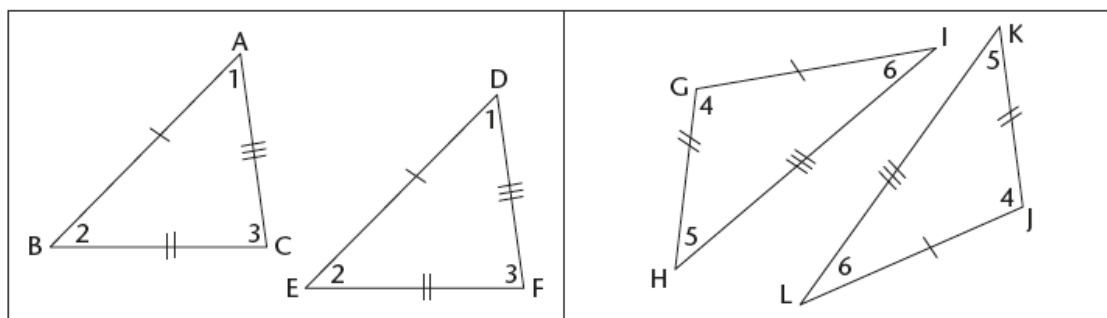
By the end of the lesson learners should know and be able to establish through investigation the conditions for congruent triangles

3. RESOURCES:	Textbooks, DBE workbook, Sasol-Inzalo Book 1, ruler, compass, protractor
4. PRIOR KNOWLEDGE:	• construction of triangles
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 to give their understanding of the concept congruency. Use various objects (e.g. leaves from a tree,) to illustrate the meaning of congruency. Present learners with different objects and ask them to identify congruent figures.

Note: Two triangles are **congruent** if they have exactly the **same shape and size** i.e. they are able to fit exactly on top of each other. This means that all three corresponding sides and three corresponding angles are equal, as shown in the following two pairs.



$\triangle ABC \cong \triangle DEF$ and $\triangle GHI \cong \triangle JKL$. In each pair, the corresponding sides and angles are equal.

($\cong$) is the sign to indicate that figures are congruent

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

Teaching activities	Learning activities (Learners are expected to:)						
Activity Divide class into groups. Ask learners to construct the triangle below. - Use a ruler, a compass and protractor to construct the following triangle. $\triangle TRS$ with $TR \perp RS$, $RS = 7$ cm and $TS = 8$ cm. - Compare your triangle with those of three group mates. Is your triangle congruent to theirs? - Hence complete the table. <table border="1" data-bbox="181 1633 1088 1871"> <thead> <tr> <th>Conditions</th><th>Congruent (Yes or No)</th></tr> </thead> <tbody> <tr> <td>3 sides (SSS)</td><td></td></tr> <tr> <td>3 angles (AAA)</td><td></td></tr> </tbody> </table>	Conditions	Congruent (Yes or No)	3 sides (SSS)		3 angles (AAA)		- follow the instructions and use the provided material to construct the triangle and make the necessary conclusions. - discuss findings with group members.
Conditions	Congruent (Yes or No)						
3 sides (SSS)							
3 angles (AAA)							

2 angles and a side (SAA)			
2 sides and an angle not between the sides (SSA)			
2 sides and an angle between the sides (SAS)			
Right angle with hypotenuse and a side (RHS)			
2 sides (SS)			

8. CLASSWORK (Suggested time: 15 minutes)

DBE workbook 1 Grade 9 page 140 – 141 No. 1 (e), No. 2 and 3

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

a) Emphasise that:

Triangles are congruent if:

- three sides of one triangle are equal to the three corresponding sides of the other triangle. (S,S,S)
- two sides and the included angle of one triangle are equal to the corresponding sides and included angle of another triangle. (S,A,S)
- two angles and a side of the one triangle are equal to two corresponding angles and a side of the other triangle. (AAS)

The corresponding sides of two triangles are the sides that are in the same position relative to the angles of the triangles.

- right-angle, hypotenuse and a side of one triangle are equal to the corresponding right-angle, hypotenuse and a side of the other triangle (R,H,S)

Hypotenuse – The side opposite the right angle in a right-angled triangle

- 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 Book 1, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework: Sasol-Inzalo Book 1 Grade 9 page 208 – 209 no. 1-6



MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1.TOPIC: GEOMETRY OF 2D SHAPES: Similar and Congruent triangles (Lesson 3)

2.CONCEPTS & SKILLS TO BE ACHIEVED:

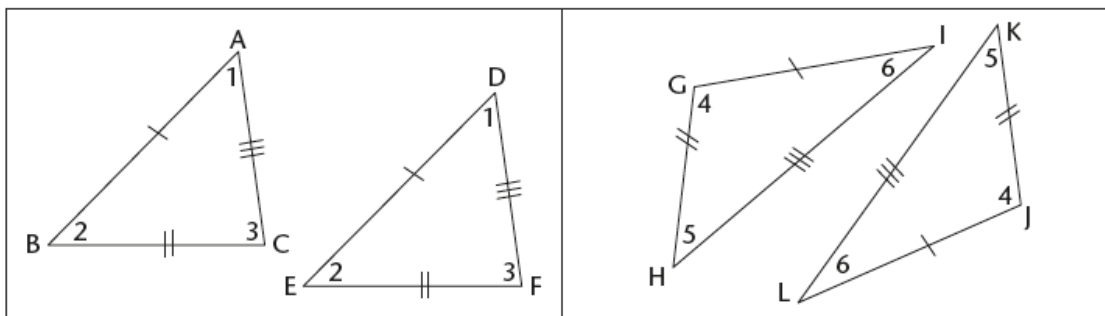
By the end of the lesson learners should know and be able to establish through investigation the conditions for congruent triangles

3.RESOURCES:	Textbooks, DBE workbook, Sasol-Inzalo Book 1, ruler, compass, protractor
4. PRIOR KNOWLEDGE:	construction of triangles
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 to give their understanding of the concept congruency. Use various objects (e.g. leaves from a tree,) to illustrate the meaning of congruency. Present learners with different objects and ask them to identify congruent figures.

Note: Two triangles are **congruent** if they have exactly the **same shape and size** i.e. they are able to fit exactly on top of each other. This means that all three corresponding sides and three corresponding angles are equal, as shown in the following two pairs.



$\triangle ABC \equiv \triangle DEF$ and $\triangle GHI \equiv \triangle JKL$. In each pair, the corresponding sides and angles are equal.

($\equiv$) is the sign to indicate that figures are congruent

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

Teaching activities	Learning activities (Learners are expected to:)						
Activity Divide class into groups. Ask learners to construct the triangle below. 8. Use a ruler, compass and protractor to construct the following triangle. $\triangle TRS$ with $TR \perp RS$, $RS = 7$ cm and $TS = 8$ cm. 9. Compare your triangle with those of three group mates. Is your triangle congruent to theirs? 10. Hence complete the table. <table border="1" data-bbox="181 1633 1088 1869"> <thead> <tr> <th>Conditions</th><th>Congruent (Yes or No)</th></tr> </thead> <tbody> <tr> <td>3 sides (SSS)</td><td></td></tr> <tr> <td>3 angles (AAA)</td><td></td></tr> </tbody> </table>	Conditions	Congruent (Yes or No)	3 sides (SSS)		3 angles (AAA)		- follow the instructions and use the provided material to construct the triangle and make the necessary conclusions. - discuss findings with group members.
Conditions	Congruent (Yes or No)						
3 sides (SSS)							
3 angles (AAA)							

2 angles and a side (SAA)			
2 sides and an angle not between the sides (SSA)			
2 sides and an angle between the sides (SAS)			
Right angle with hypotenuse and a side (RHS)			
2 sides (SS)			

8.CLASSWORK (Suggested time: 15 minutes)

DBE workbook 1 Grade 9 page 140 – 141 No. 1 (e), No. 2 and 3

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

c) **Emphasise that:**

Triangles are congruent if:

- three sides of one triangle are equal to the three corresponding sides of the other triangle. (S,S,S)
- two sides and the included angle of one triangle are equal to the corresponding sides and included angle of another triangle. (S,A,S)
- two angles and a side of the one triangle are equal to two corresponding angles and a side of the other triangle. (AAS)

The corresponding sides of two triangles are the sides that are in the same position relative to the angles of the triangles.

- right-angle, hypotenuse and a side of one triangle are equal to the corresponding right-angle, hypotenuse and a side of the other triangle (R,H,S)

Hypotenuse – The side opposite the right angle in a right-angled triangle

- d) 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 Book 1, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework: Sasol-Inzalo Book 1 Grade 9 page 208 – 209 no. 1-6



MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1.TOPIC: GEOMETRY OF 2D SHAPES: Solving problems (**Lesson 4**)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners must know and be able to solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent triangles.

3. RESOURCES:	DBE workbook, Sasol-Inzalo Book 1, textbooks
4. PRIOR KNOWLEDGE:	• minimum conditions for congruent triangles • properties of triangles • properties of straight lines
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)	

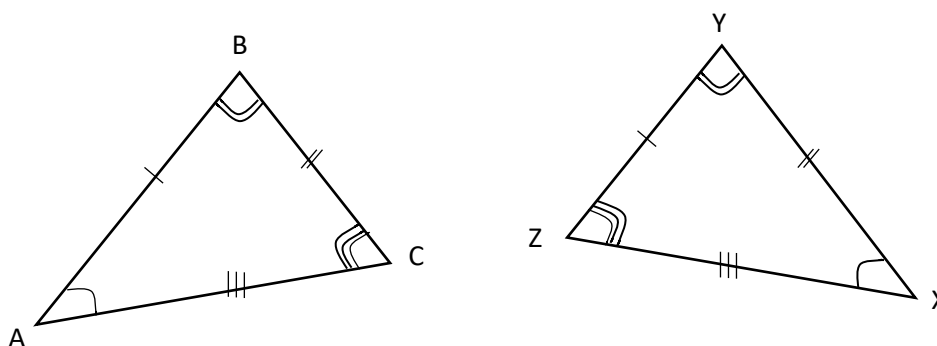
Activity 1

Ask learners to state the four conditions for congruent triangles

- SSS (all corresponding sides are equal)
- SAS (two corresponding sides and the angle between the two sides are equal)
- AAS (two corresponding angles and any corresponding side are equal)
- RHS (both triangles have a 90° angle and have equal hypotenuses and one other side equal).

Activity 2

Discuss the correct notation for congruent triangles with learners.



The order in which we write the letters when stating that two triangles are congruent is very important. The letters of the corresponding vertices between the two triangles must appear in the same position in the notation. For example, the notation for the triangles above should be: $\triangle ABC \equiv \triangle XYZ$, because it indicates that $\hat{A} = \hat{X}$, $\hat{B} = \hat{Y}$, $\hat{C} = \hat{Z}$, $AB = XY$, $BC = YZ$ and $AC = XZ$.

It is incorrect to write $\triangle ABC \equiv \triangle ZYX$. Although the letters refer to the same triangles, this notation indicates that $\hat{A} = \hat{Z}$, $\hat{C} = \hat{X}$, $AB = ZY$ and $BC = YX$, and these statements are not true.

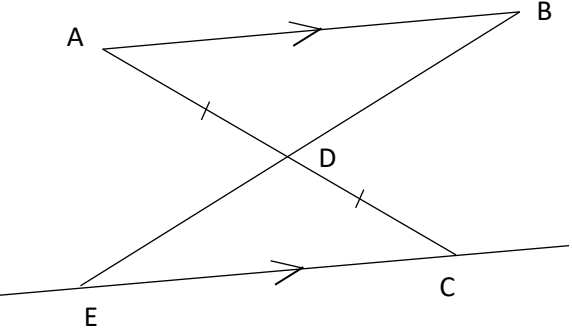
Write down the equal angles and sides according to the following notations:

1. $\triangle KLM \equiv \triangle PQR$
2. $\triangle FGH \equiv \triangle CST$

Note:

Guard against the misconception that the use of the angles to notate the congruency might create the impression that equal angles in triangles are a condition for congruency.

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

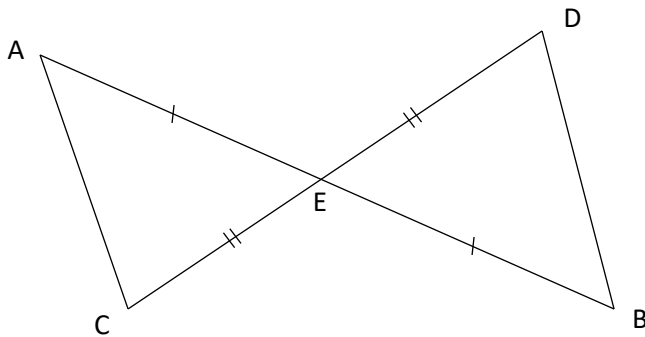
Teaching activities	Learning activities (Learners are expected to:)
Work through the example with the learners showing them how to use the four conditions of congruency for triangles to prove that two triangles are congruent. Give learners the following hints when proving two triangles congruent: • Provide a reason for every statement. • You must give three statements to prove any two triangles congruent. • The order in which you write the letters when stating that two triangles are congruent is very important. The letters of the corresponding vertices between the two triangles must appear in the same position in the notation. Example: In the sketch: $AB \parallel EC$ and $AD = DC$. Prove that the triangles are congruent. 	• follow the presentation and respond to questions as the presentation unfolds. • copy example in their notebooks.

Solution:

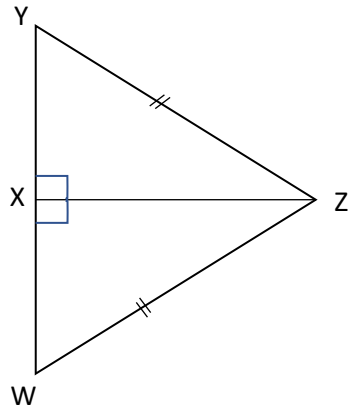
Statement	Reason
In $\triangle ABD$ and $\triangle CED$:	
1) $AD = DC$	Given
2) $\hat{A}DB = \hat{C}DE$	Vert. opp. $\angle$ s
3) $\hat{B}AD = \hat{E}CD$	Alt. $\angle$ s ($AB \parallel EC$)
$\therefore \triangle ABD \equiv \triangle CED$	AAS

Note:

Purposely do not name the triangles at first so that learners can practice the correct notation of congruent triangles

8. CLASSWORK (Suggested time: 15 minutes)1. Prove that $\triangle ACE \equiv \triangle BDE$.

2. Prove that $\triangle WXZ \equiv \triangle YXZ$.



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

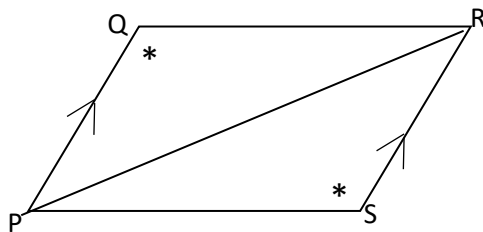
a) **Emphasise that:**

- to prove two triangles congruent, one of the four conditions for congruency must be met.
- use the correct notation for congruency.
- always provide a reason for the conclusion.

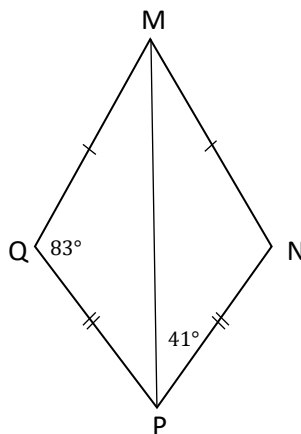
- b) The primary purpose of Homework is to give each learner an opportunity to demonstrate mastery of mathematics skills taught in class. Therefore Homework should be purposeful and the principle of 'Less is more' is recommended, i.e. give learners few high quality activities that address variety of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

Homework:

1. Prove that $QR=SR$. (Hint prove that the triangles are congruent)



2. Prove that the triangles below are congruent. Then find the size of $\widehat{QMP}$.





MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. TOPIC: GEOMETRY OF 2D SHAPES: Similar triangles (Lesson 5)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

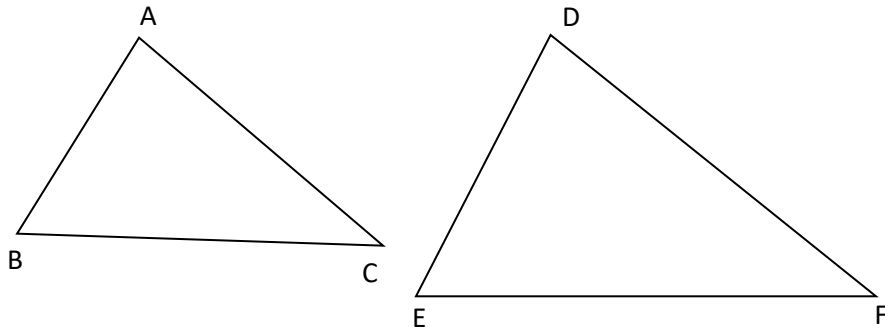
By the end of the lesson learners should know and be able to establish through investigation the minimum conditions for similar triangles

3. RESOURCES:	DBE workbook, Sasol-Inzalo Book 1, textbooks, ruler, protractor
4. PRIOR KNOWLEDGE:	- measuring of angles - measuring of lines segments - ratio
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 to give their understanding of the concept similarity. Use various objects (e.g. leaves from a tree,) to illustrate the meaning of similarity. Present learners with different objects and ask them to identify similar figures. Note: Two triangles are similar if they have exactly the same shape but not necessarily the same size i.e. the one is normally an enlargement of the other.

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

Teaching activities	Learning activities (Learners are expected to:)
Divide class in small groups. Allow learners to investigate the minimum conditions for two triangles to be similar. Note: Draw one triangle and make numerous different enlargements on a photocopy machine. This will ensure that the triangles investigated by the learners will be similar. Hand drawn sketches or computer generated triangles may not always be perfectly drawn. <i>(The use of grid paper to generate enlarged triangles may be considered if photocopying is a challenge)</i>	complete the instructions on the worksheet

Example of two triangles that can be investigated.



Make sure that the triangles that are used in this activity are similar.

1. Use a protractor to measure the angles in each triangle above.

a) Complete the table below:

Angle	Angle	What do you notice?
$\hat{B}$	$\hat{D}$	
$\hat{A}$	$\hat{E}$	
$\hat{C}$	$\hat{F}$	

b) What is the relationship between the sizes of the angles in the triangles?

2. Use a ruler to measure the lengths of the sides in each triangle in question 1.

a) Complete the table below.

Length (cm)	Length (cm)	Ratio
BA	DE	BA:DE =

- measure angles

- make the necessary conclusions

BC	DF	BC:DF =	measure the lengths of the sides of triangles
CA	FE	CA:FE =	
b) Discuss the relationship between the sides in similar triangles? 3. From your observations in no 1 and 2, two triangles are similar if: (a) _____ (b) _____ Note: When proving that triangles are similar, you either need to show that the: - corresponding angles are equal or, - corresponding sides are proportional.			make the necessary conclusions

8. CLASSWORK (Suggested time: 15 minutes)

Sasol-Inzalo Book 1 page 213, no. 1 (a) to (d)

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

a) Emphasise that:

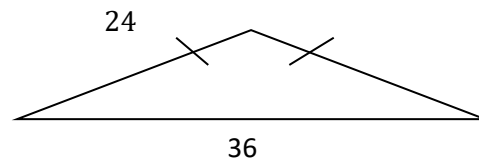
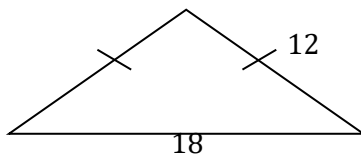
- two triangles are similar if corresponding angles are equal or the corresponding sides are proportional (in the same ratio).
- we use the symbol ($\sim$) to show similarity between triangles e.g. $\triangle ABC \sim \triangle DEF$

- 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.

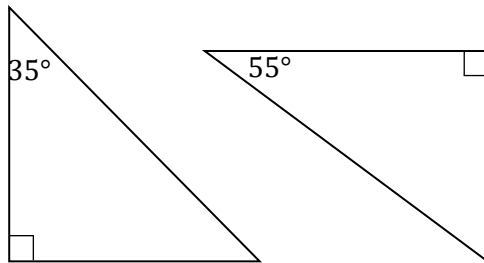
Homework

1. Decide whether the following set of triangles are similar. Give reasons for your decision.

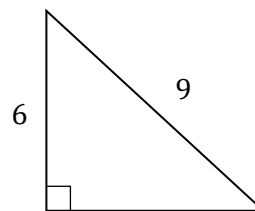
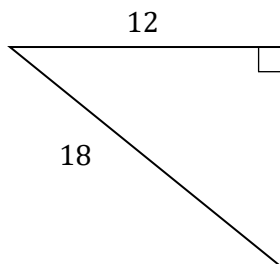
(a)



(b)



(c)





MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. TOPIC: GEOMETRY OF 2D-SHAPES: Solving problems (Lesson 6)

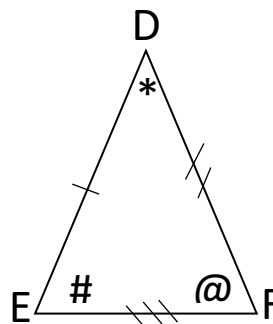
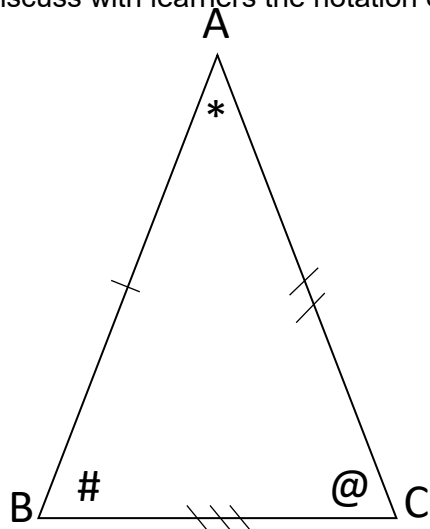
2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of similar triangles.

3. RESOURCES:	DBE workbook, Sasol-Inzalo Book 1, textbooks
4. PRIOR KNOWLEDGE:	• minimum conditions for similar triangles • solving of equations
5. INTRODUCTION (Suggested time: 10 Minutes)	
Activity 1 Ask learners to list the conditions for similarity of triangles.	

Activity 2

Discuss with learners the notation of similar triangles.



The correct notation is very important when naming the similarity between triangles. For example, the notation for the triangles above should be: $\triangle ABC \sim \triangle DEF$, because it indicates that $\hat{A} = \hat{D}$,

$$\hat{B} = \hat{E}, \hat{C} = \hat{F} \text{ and } \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

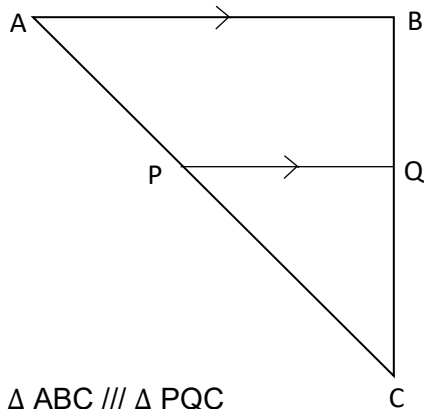
6. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)
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Activity 1

Demonstrate to learners how to use the conditions for similar triangles to prove that triangles are similar.

1. Study the figure below and answer the questions that follow.



- (a) Prove that $\triangle ABC \sim \triangle PQC$
 (b) Calculate the length of AB
 If AC = 10 units
 PC = 4 units
 PQ = 2 units

Solution

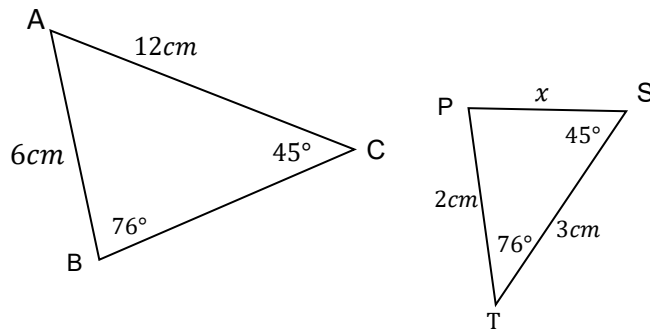
Statement	Reason
(a) In $\triangle ABC$ and $\triangle PQC$:	
$\hat{C} = \hat{C}$	common
$\hat{ABC} = \hat{PQC}$	Corresponding $\angle$ s (AB // PQ)
$\hat{BAP} = \hat{QPC}$	Corresponding $\angle$ s (AB // PQ)
$\therefore \triangle ABC \sim \triangle PQC$	(A,A,A)

(b) In ΔABC and ΔPQC: $\frac{AB}{PQ} = \frac{BC}{QC} = \frac{AC}{PC}$ $\frac{AB}{2} = \frac{10}{4}$ $4 AB = 20$ $AB = 5 \text{ units}$	$\Delta ABC \parallel \Delta PQC$	• follow demonstration and engage in questions as demonstration unfolds. • copy example in their notebooks.
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Activity 2

Work through the problem showing learners how to use the properties of similar triangles to find unknown sides

Calculate the length of PS if $\triangle ABC \sim \triangle PTS$



Possible solution

$$\frac{AB}{PT} = \frac{BC}{TS} = \frac{AC}{PS} \text{ (Given } \triangle ABC \sim \triangle PTS)$$

$$\frac{6}{2} = \frac{12}{x}$$

$$\frac{6}{2} = \frac{12}{x}$$

$$6x = 24$$

$$\frac{6x}{6} = \frac{24}{6}$$

$$x = 4 \text{ cm}$$

Substitute the given sides

Cross multiply

Applying the multiplicative inverse

7. CLASSWORK (Suggested time: 15 minutes)

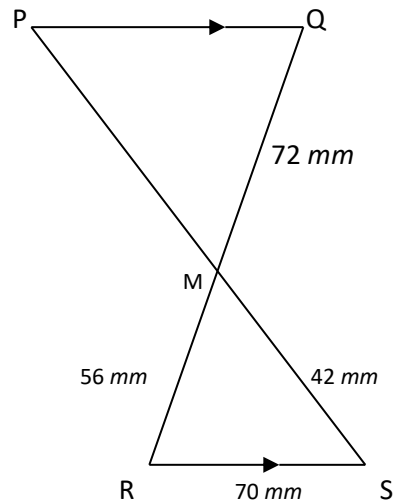
In $\triangle PQR$, $PQ = 7,5 \text{ cm}$, $QR = 6,4 \text{ cm}$, $\hat{P} = 50^\circ$ and $\hat{R} = 60^\circ$. In $\triangle TSM$, $TM = 4,8 \text{ cm}$, $SM = 4,5 \text{ cm}$, $\hat{S} = 70^\circ$ and $\hat{T} = 60^\circ$.

- Write down the size of $\hat{M}$ with reasons.
- Prove that $\triangle PQR \sim \triangle TSM$.
- Calculate the lengths of PR and ST .

8. CONSOLIDATION/CONCLUSION & HOMEWORK (Suggested time: 5 minutes)**a) Homework**

1. Study the figure below and answer the following questions:

- (a) Prove $\triangle PQM \sim \triangle SRM$.
 (b) Calculate the lengths of PM and PQ.



2. Consider the similar triangles drawn below using concentric circles. Explain why the triangles are similar in each diagram.

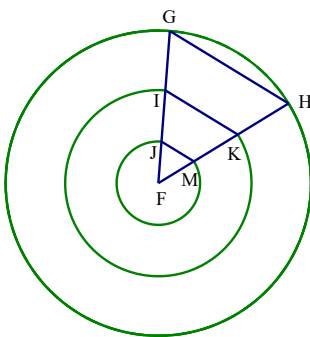


Figure 1

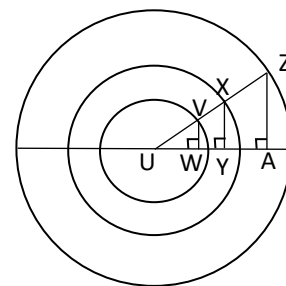


Figure 2



MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. TOPIC: GEOMETRY OF 2D SHAPES: Solving problems (**Lesson 7**)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to, solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles.

3. RESOURCES:

Textbooks, DBE workbook 1, Sasol-Inzalo Book 1

4. PRIOR KNOWLEDGE:

- solve simple equations
- properties of quadrilaterals

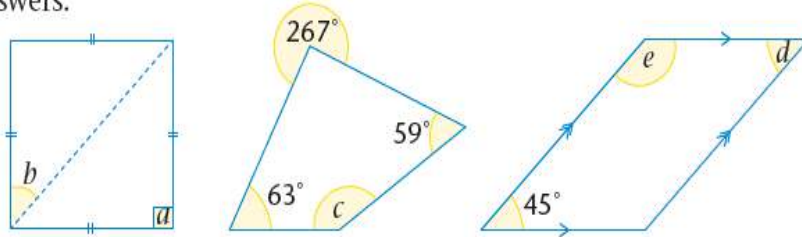
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes)

Homework provides an opportunity for teachers to track learner's 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.

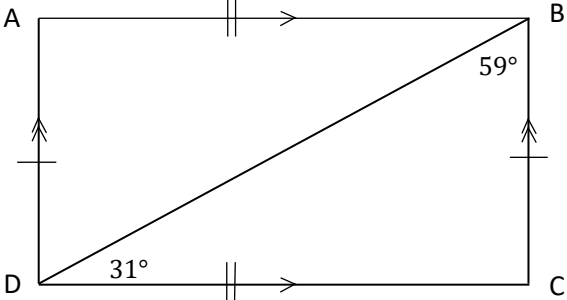
6. INTRODUCTION (Suggested time: 10 Minutes)

Activity: Teacher works with learners.

1. Determine the sizes of angles a to e in the quadrilaterals below. Give reasons for your answers.

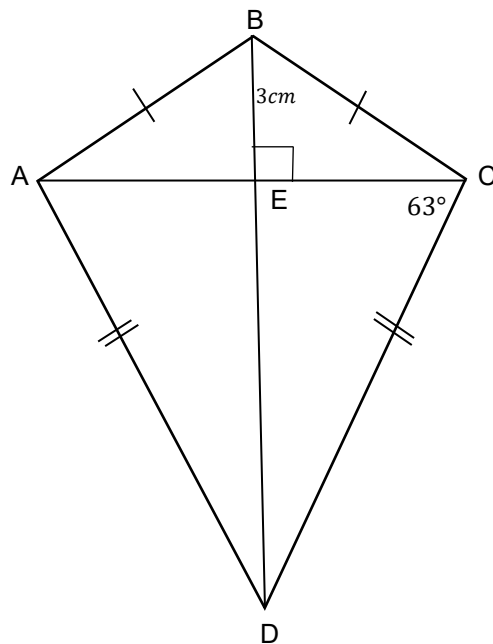


7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)
Present this activity to learners Activity 1 In the figure, DC is parallel and equal to AB, AD is parallel and equal to BC, $\widehat{BDC} = 31^\circ$, and $\widehat{DBC} = 59^\circ$.  1) Prove that $\triangle ABD \cong \triangle BCD$ with reasons 2) Write down with reasons the sizes of: a) $\widehat{ABD}$ b) $\widehat{ADB}$ c) $\widehat{DAB}$ d) $\widehat{BCD}$ e) $\widehat{DAB} + \widehat{ABC} + \widehat{BCD} + \widehat{ADC}$	learners complete the activity on their exercise books with the teacher.

Activity 2

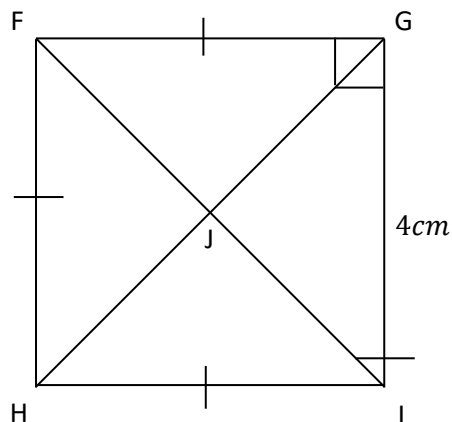
- 1) Given the quadrilateral below. $BE = 3\text{cm}$, $AC = 6\text{cm}$, $BC = AB$, $AD = CD$, $\angle ACD = 63^\circ$.
- Name the quadrilateral given below.
 - Calculate the sizes of BC , CE and $\angle ADB$. Give reasons for your answers:



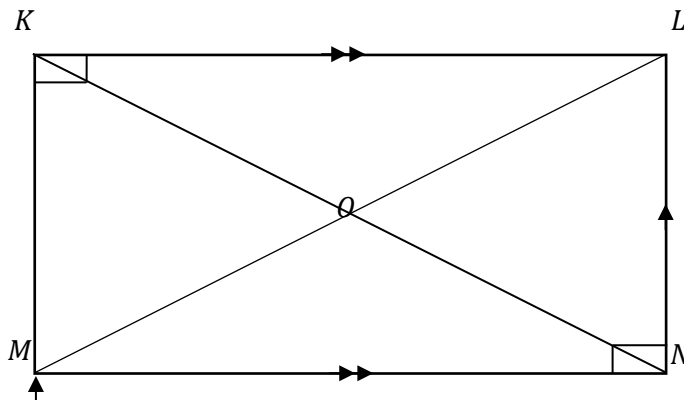
- complete the activity on their exercise books with the teacher.

Activity 1

- 1) Given the quadrilateral below. $IG = 4\text{ cm}$.
- Name the quadrilateral.
 - Calculate the sizes of $\widehat{GFJ}$, $\widehat{FJ}$, $\widehat{FJI}$, and $\widehat{IJ}$. Give reasons for your answers:

**Activity 2**

- 1) Given the quadrilateral below. $\widehat{MKN} = 34^\circ$, $ON = 43\text{ mm}$. $KN \parallel LM$, $KL \parallel NM$.
- Name the quadrilateral.
 - Calculate the sizes of $\widehat{KMN}$, $\widehat{LO}$, $\widehat{M\hat{O}N}$, $\widehat{K\hat{O}L}$. Give reasons for your answers:

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

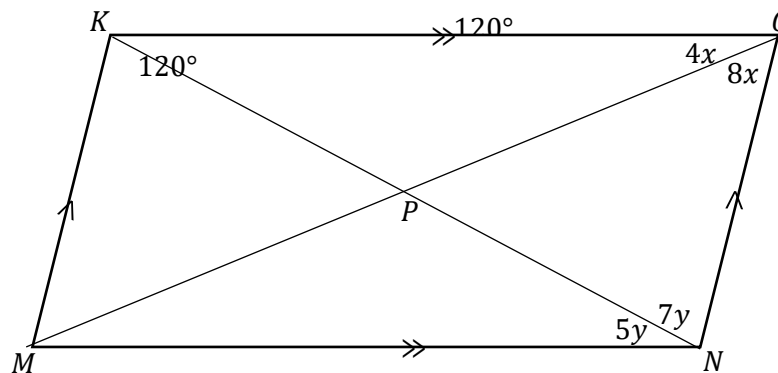
a) **Emphasise that:**

- explore different methods of solving for unknowns
- colour equal angles
- analyse the given information and the sketch, applying learnt properties before answering the questions, e.g. mark off equal quantities and do simple calculations by inspection.

- 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 books, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework

KMNO is a parallelogram. Study the diagram below and calculate the values of x and y





MATHEMATICS LESSON PLAN GRADE 9

TERM 2: April - June

DURATION: 1 Hour

1. TOPIC: GEOMETRY OF 2D SHAPES: Solving problems (Lesson 8)

2. CONCEPTS & SKILLS TO BE ACHIEVED:

By the end of the lesson learners should know and be able to solve geometric problems involving unknown sides and angles in triangles and quadrilaterals, using known properties of triangles and quadrilaterals, as well as properties of congruent and similar triangles.

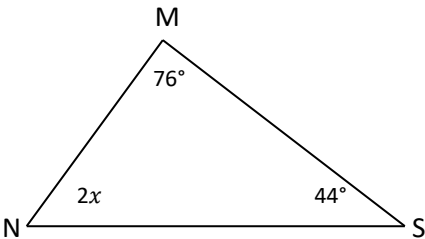
3. RESOURCES:	DBE workbook 1, Sasol-Inzalo Book 1, textbooks
4. PRIOR KNOWLEDGE:	• solve for unknown in simple equations • properties of triangles • types of triangles
5. REVIEW AND CORRECTION OF HOMEWORK (suggested time: 10 minutes) Homework provides an opportunity for teachers to track learner's progress 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: 5 Minutes)

Give learners a few simple equations to solve for unknowns such as:

- a) $4x + 5x = 180^\circ$
 b) $a + 30^\circ = 90^\circ$

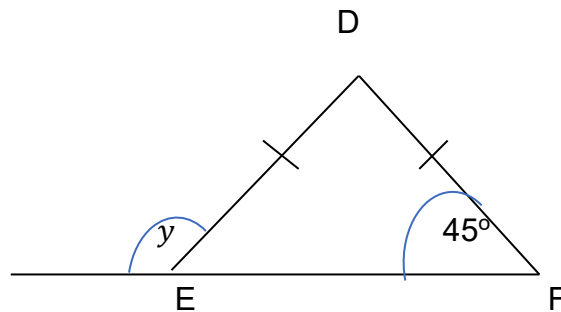
7. LESSON PRESENTATION/DEVELOPMENT (Suggested time: 20 minutes)

Teaching activities	Learning activities (Learners are expected to:)
Activity 1 Guide learners in calculating the value of x with reasons.  (Expected answer) $\begin{aligned}\hat{M} + \hat{N} + \hat{S} &= 180^\circ && \text{(Interior angles of triangle)} \\ 2x + 76^\circ + 44^\circ &= 180^\circ \\ 2x + 120^\circ &= 180^\circ \\ 2x &= 60^\circ \\ x &= 30^\circ\end{aligned}$	complete the activities given by the teacher.

NB: give learners the opportunity to verify their solutions by substituting the value of x into the original equation.

Activity 2

- Let learners calculate the value of y with reasons:



(Expected answer)

$\widehat{DEF} = 45^\circ$ (angles opposite equal sides in an isosceles Δ)

$\widehat{DEF} + \widehat{DFE} + \widehat{EDF} = 180^\circ$ (sum angles of a triangle)

$$45^\circ + 45^\circ + \widehat{EDF} = 180^\circ$$

$$\widehat{EDF} = 180^\circ - 90^\circ$$

$$\widehat{EDF} = 90^\circ$$

$$y = \widehat{D} + \widehat{F} \text{ (exterior angle of a } \Delta = \text{sum of 2 opp. Int. angles)}$$

$$y = 45^\circ + 90^\circ$$

$$y = 135^\circ$$

NB: give learners the opportunity to verify their solutions by substituting the value of y into the equation $y = \widehat{D} + \widehat{F}$.

- complete the activities given by the teacher.

8. CLASSWORK ACTIVITIES (Suggested time: 15 minutes)

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

- Learners should know what is given, how to use the information given.

- (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 Books, DBE workbooks and/or textbooks for learners' homework. The selected activities should address different cognitive levels.

Homework**Activity**

In the figure below $KM \parallel NP$, $LN = LP$ and $\angle NLP = 120^\circ$. Determine, with reasons, the size of $\angle TLM$

