THIRD TERM
WEEKLY LESSON NOTES
WEEK 8

<table>
<tr><td>Week Ending: 18-08-2023</td><td>DAY:</td><td colspan="2">Subject: Mathematics</td></tr>
<tr><td colspan="2">Duration: 60MINS</td><td colspan="2">Strand: Geometry & Measurement</td></tr>
<tr><td>Class: B8</td><td>Class Size:</td><td colspan="2">Sub Strand: Pythagoras Theorem</td></tr>
<tr><td colspan="2">Content Standard:
B.8.3.2.1 Apply the Pythagoras theorem, the primary trigonometric ratios and the formulas for determining the area of a circle to solve real problems</td><td>Indicator:
B8.3.2.1.4 Use the Pythagoras theorem to calculate the area of a triangle in real life problems</td><td>Lesson:
2 of 2</td></tr>
<tr><td colspan="2">Performance Indicator:
Learners can apply the Pythagorean Theorem to calculate the area of a triangle in real-life problem-solving situations.</td><td colspan="2">Core Competencies:
Communication and Collaboration (CC)
Critical Thinking and Problem solving (CP)</td></tr>
<tr><td colspan="4">References: Mathematics Curriculum Pg. 145</td></tr>
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Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson by engaging the learners with a question: "Have you ever wondered how to calculate the length of a side of a right-angled triangle when you know the lengths of the other two sides?" Allow learners to share their ideas and experiences, and lead the discussion towards the need for a theorem to solve such problems. Introduce the Pythagorean Theorem as a fundamental concept in geometry, explaining that it allows us to find the length of the missing side in a right-angled triangle.	
PHASE 2: **NEW LEARNING**	Define a right-angled triangle and its three sides: hypotenuse, base, and perpendicular. Write the Pythagorean Theorem on the board: $a^2 + b^2 = c^2$, where 'a' and 'b' are the lengths of the legs, and 'c' is the length of the hypotenuse. Explain the meaning of each term in the theorem and how it applies to a right-angled triangle. Demonstrate a few examples of applying the Pythagorean Theorem to calculate the length of a side in different right-angled triangles. Review the concept of the area of a triangle: Area = 1/2 × base × height. Explain that the Pythagorean Theorem can also be used to find the area of a right-angled triangle. Derive the formula for the area of a right-angled triangle using the Pythagorean Theorem: Area = 1/2 × a × b.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

Distribute worksheets with real-life problem scenarios that involve right-angled triangles.

Example 1:

A triangular piece of land has two sides measuring 15 meters and 20 meters. Find the length of the third side and calculate the area of the triangle.

Solution:
Given:
Side a = 15 meters
Side b = 20 meters

Using the Pythagorean Theorem:
$c^2 = a^2 + b^2$
$c^2 = 15^2 + 20^2$
$c^2 = 225 + 400$
$c^2 = 625$
$c = \sqrt{625}$
$c = 25$ *meters*

To calculate the area:
$Area = 1/2 \times a \times b$
$Area = 1/2 \times 15 \times 20$
Area = 150 square meters

Therefore, the length of the third side is 25 meters, and the area of the triangle is 150 square meters.

Example 2:
A ladder is leaning against a wall. The base of the ladder is 6 feet away from the wall, and the ladder is 8 feet long. What is the height at which the ladder reaches the wall, and what is the area of the triangle formed by the ladder, the wall, and the ground?

Solution:
Given:
Base (b) = 6 feet
Hypotenuse (c) = 8 feet

Using the Pythagorean Theorem:
$a^2 = c^2 - b^2$
$a^2 = 8^2 - 6^2$
$a^2 = 64 - 36$
$a^2 = 28$
$a = \sqrt{28}$
$a \approx 5.29$ *feet*

To calculate the area:
$Area = 1/2 \times b \times a$
$Area = 1/2 \times 6 \times 5.29$
$Area \approx 15.87$ *square feet*

Therefore, the height at which the ladder reaches the wall is approximately 5.29 feet, and the area of the triangle is approximately 15.87 square feet.

In pairs or small groups, ask learners to read and analyze the problems, identify the right-angled triangles involved, and apply the Pythagorean Theorem to find the missing side or calculate the area.

<table>
<tr><td></td><td>After solving the problems, encourage learners to share their solutions and explain their reasoning.

Provide a few additional examples for further practice,

<u>Assessment</u>
1. A flagpole is 10 meters tall. A rope is tied from the top of the flagpole to a point on the ground, forming a right-angled triangle. If the rope is 12 meters long, what is the distance from the flagpole to the point on the ground, and what is the area of the triangle?
2. The sides of a right-angled triangle are in the ratio 3:4:5. If the length of the shortest side is 6 cm, find the lengths of the other two sides and calculate the area of the triangle.

3. A boat travels 2m South and then 9m east. How far is the boat from its starting point?

4. Yeboah hangs a picture frame of width 15cm on the wall. The distance from the nail to the edge of the picture frame is 10cm. (i) find the length of the wire used to hang the picture frame. (ii) Find the area of the triangle.

5. A ladder leans against a vertical wall of height 13m. If the foot of the ladder is 6m away from the wall, calculate the length of the ladder.

6. The length of a side of an equilateral triangle is 12cm.
Find i. the height of the triangle ii. The area of the triangle iii. the perimeter of the triangle</td><td></td></tr>
<tr><td>PHASE 3:
REFLECTION</td><td>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.</td><td></td></tr>
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Week Ending: 18-08-2023	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Geometry & Measurement
Class: B8	**Class Size:**	**Sub Strand:** Pythagoras Theorem

Content Standard:	**Indicator:**	**Lesson:**
B.8.3.2.1 Apply the Pythagoras theorem, the primary trigonometric ratios and the formulas for determining the area of a circle to solve real problems	B8.3.2.1.5 Establish the relationship between the basic trigonometric ratios and solve problems involving right-angled triangles	2 of 2

Performance Indicator:	**Core Competencies:**
Learners can; • Establish the relationship between trigonometric ratios and the sides of a right-angled triangle. • Apply trigonometric ratios to solve problems involving right-angled triangles.	Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 145

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Discuss briefly that trigonometry is the study of relationships between angles and sides in triangles. Explain that trigonometric ratios are used to define these relationships and help solve problems involving right-angled triangles. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Introduce the three primary trigonometric ratios: sine (sin), cosine (cos), and tangent (tan). Write the ratios on the board and explain their definitions: • Sine (sin) = Opposite/Hypotenuse • Cosine (cos) = Adjacent/Hypotenuse • Tangent (tan) = Opposite/Adjacent Emphasize that these ratios are specific to right-angled triangles. Illustrate the meaning of each ratio using diagrams on the board and examples. Draw a right-angled triangle on the board and label its sides: opposite, adjacent, and hypotenuse. Explain how each trigonometric ratio relates to the sides of the triangle using the definitions from Step 2. Highlight that the ratios remain constant for any similar right-angled triangle, as long as the corresponding sides are used.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	Discuss the importance of understanding these ratios for solving problems involving right-angled triangles. Distribute worksheets with practice problems involving right-angled triangles and trigonometric ratios. *Example 1:* *In a right-angled triangle, the length of the hypotenuse is 13 cm, and the length of one of the legs is 5 cm. Find the measure of angle A and the length of the other leg.* *Solution:* *Given:* *Hypotenuse (c) = 13 cm* *Leg (b) = 5 cm* *To find angle A:* *Using the cosine ratio:* *cos(A) = b/c* *cos(A) = 5/13* *A ≈ 66.42°* *To find the length of the other leg (a):* *Using the sine ratio:* *sin(A) = a/c* *sin(A) = a/13* *a = 13 × sin(A)* *a ≈ 10.66 cm* *Therefore, angle A is approximately 66.42°, and the length of the other leg is approximately 10.66 cm.* *Example 2:* *In a right-angled triangle, the measure of angle B is 30°, and the length of the adjacent side is 8 cm. Find the lengths of the hypotenuse and the opposite side.* *Solution:* *Given:* *Angle B = 30°* *Adjacent side (b) = 8 cm* *To find the length of the hypotenuse (c):* *Using the cosine ratio:* *cos(B) = b/c* *cos(30°) = 8/c* *c = 8 / cos(30°)* *c ≈ 9.24 cm* *To find the length of the opposite side (a):* *Using the sine ratio:* *sin(B) = a/c* *sin(30°) = a/9.24* *a = 9.24 × sin(30°)* *a ≈ 4.62 cm* *Therefore, the length of the hypotenuse is approximately 9.24 cm, and the length of the opposite side is approximately 4.62 cm.* In pairs or small groups, ask learners to read and analyze the problems, identify the relevant sides and angles, and apply the appropriate trigonometric ratio to find the missing side or angle. Highlight real-life applications of trigonometry, such as measuring heights, distances, and angles in various fields (e.g., architecture, engineering, navigation). <u>Assessment</u>	

	1. In a right-angled triangle, the length of the hypotenuse is 10 m, and the length of the opposite side is 6 m. find the measure of angle C and the length of the adjacent side. 2. In a right-angled triangle, the measure of angle A is 45°, and the length of the adjacent side is 12 cm. Find the lengths of the hypotenuse and the opposite side. 3. A hunter, on top of a tower, sees a fire at an angle of depression of 30˚. The height of the tower is 18m. What is the distance between the fire and the hunter? Round off your answer to 2 significant figures.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	