25SCHOOLS
FREE LEARNING NOTES FOR ZAMBIA

FORM 1

Mathematics

Angles on straight lines, elevation and depression

Lesson notes for learners · Competence-Based Curriculum

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Angles are all around us: where two roads cross, where a roof meets a wall, or when you look up at the top of a tall tree. Builders, surveyors and engineers use angles to measure and to design. In this note you meet the main kinds of angles, the pairs of angles that form when lines meet, and the angles of elevation and depression.

AFTER THESE NOTES YOU SHOULD BE ABLE TO

- Name acute, obtuse, reflex angles and a full turn
- Identify complementary, supplementary, adjacent and vertically opposite angles
- Identify corresponding, alternate and allied angles between parallel lines
- Say what the angle of elevation and the angle of depression are

KEY WORDS

acute angle	an angle less than 90 degrees
obtuse angle	an angle between 90 and 180 degrees
reflex angle	an angle greater than 180 degrees but less than 360 degrees
full turn	an angle of 360 degrees, a complete turn
complementary angles	two angles that add up to 90 degrees
supplementary angles	two angles that add up to 180 degrees
adjacent angles	angles that share a common side and a vertex
vertically opposite angles	opposite angles formed by two intersecting lines; they are always equal

1 Kinds of angles

Angles are named by their size. An acute angle is less than 90 degrees. An obtuse angle is between 90 and 180 degrees. A reflex angle is greater than 180 degrees but less than 360 degrees. A full turn, or full rotation, is 360 degrees.

A vertex is the point where two lines or edges meet. Every angle has a vertex.

Name	Size
Acute	Less than 90 degrees
Obtuse	Between 90 and 180 degrees
Reflex	Between 180 and 360 degrees
Full turn	360 degrees

Figure 1. Kinds of angles

2 Pairs of angles

Two angles that add up to 90 degrees are complementary. Two angles that add up to 180 degrees are supplementary, as angles on a straight line are. Adjacent angles share a common side and a vertex.

When two straight lines cross, the opposite angles are called vertically opposite angles, and they are always equal. When a transversal crosses parallel lines, corresponding angles are in the same relative position at each crossing, alternate angles form a zig-zag (Z) pattern, and allied angles lie between the parallel lines on the same side of the transversal.

WORKED EXAMPLE

Two angles on a straight line are x and 65 degrees. Find x.

Angles on a straight line add up to 180 degrees

x + 65 = 180

x = 180 - 65

x = 115 degrees

3 Angles of elevation and depression

Imagine a learner standing on level ground looking at the top of a tree. The horizontal line from the learner's eye is the reference. The angle between this line and the line of sight going up to the top of the tree is the angle of elevation.

If a person stands on top of a hill and looks down at a village, the angle between the horizontal line and the line of sight going down is the angle of depression.

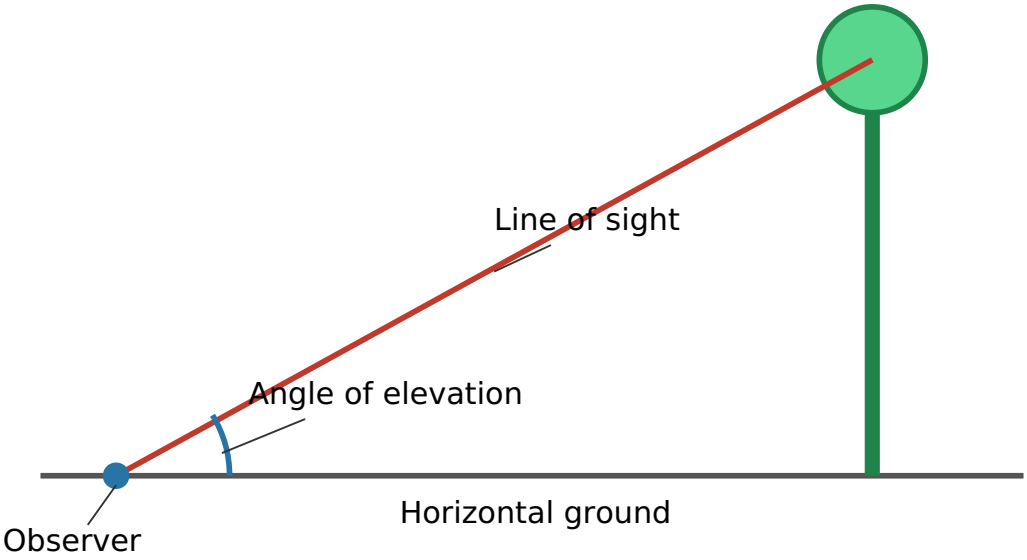

Figure 2. Angle of elevation to the top of a tree

TRY THIS

Go outside with a friend. Stand some distance from a tall tree or a building and point at its top with your arm. Describe where the angle of elevation is, and say whether it is smaller or bigger when you step closer. Then find five angles in your classroom and name each as acute, obtuse or right.

REMEMBER

- Acute is less than 90 degrees, obtuse is between 90 and 180, reflex is more than 180, a full turn is 360
- Complementary angles add up to 90 degrees and supplementary angles add up to 180 degrees
- Angles on a straight line add up to 180 degrees
- Vertically opposite angles are equal
- The angle of elevation is above the horizontal and the angle of depression is below it

? Check yourself

1. What is an obtuse angle?

2. What do complementary angles add up to?
3. What do supplementary angles add up to?
4. What is true of vertically opposite angles?
5. Two angles on a straight line are 2x and 50 degrees. Find x.
6. A learner at a school in Luangwa stands on level ground and looks up at the top of a flagpole. (a) Draw a sketch showing the horizontal line and the line of sight. (b) Mark the angle of elevation. (c) Say what happens to this angle if the learner walks closer to the pole.
7. A fisherman stands on a cliff above Lake Tanganyika and looks down at a boat. (a) Name the angle between his horizontal line of sight and the line to the boat. (b) Explain how it differs from an angle of elevation. (c) Two angles at the same corner are supplementary and one is 72 degrees; find the o

ANSWERS

1. An angle between 90 and 180 degrees.
2. 90 degrees.
3. 180 degrees.
4. They are always equal.
5. 2x + 50 = 180, so 2x = 130 and x = 65 degrees.
6. (a) A horizontal line from the eye and a line of sight rising to the top of the pole. (b) The angle between the horizontal line and the line of sight. (c) It becomes bigger as the learner gets closer.
7. (a) The angle of depression. (b) It is measured below the horizontal, while the angle of elevation is measured above it. (c) 180 - 72 = 108 degrees.

Written by 25Schools to follow the Form 1 Mathematics syllabus of the Zambian competence-based curriculum. Free for learners to read, download and share. More notes and quizzes at 25schools.com.