Trigonometric Functions

6.1 Angles, Degrees and Triangles

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Degree Measure of Angles

An angle formed by one complete counterclockwise rotation has **measure 360 degrees**, denoted 360°.

The Greek letter θ (theta) is the most common name for an angle. Other common names are α (alpha), β (beta) and γ (gamma).

- Right angle: quarter rotation
- Straight angle
- acute angle
- obtuse angle
- complementary angles
- supplementary angles

Example

Find the measure of each angle:

(a) Find the complement of $50°$.

(b) Find the supplement of $110°$.

(c) Represent the complement of α in terms of α.

(d) Find two supplementary angles such that the first angle is twice as large as the second angle.

Angle Sum of a Triangle

The sum of the measure of the angles of any triangle is 180°.

Example

If two angles of a triangle have measures 32° and 68°, what is the measure of the third angle?

Special triangles in geometry:

- equilateral triangle
- isosceles triangle
- right triangle

Pythagorean Theorem

In any right triangle, the square of the length of the longest side (hypotenuse) is equal to the sum of the squares of the lengths of the other two sides.

Example

Suppose you have a 10-foot ladder and want to reach a height of 8 feet to clean out the gutters on your house. How far from the base of the house should the base of the ladder be?

Special Right Triangles

- the $45^\circ - 45^\circ - 90^\circ$
- the $30^\circ - 60^\circ - 90^\circ$

Similar Triangles

Similar triangles are triangles with equal corresponding angle measures (equal angles).

Congruent Triangles

Congruent triangles are triangles with equal corresponding angle measures (equal angles) and corresponding equal sides.

Conditions for Similar Triangles

One of the following must be verified in order for two triangles to be similar:

- Corresponding angles must have the same measure.
- Corresponding sides must be proportional (ratios must be equal).

$$\frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$$