ESSENTIAL QUESTION

How can you use angles, triangles, and equations to solve real-world problems?

EXAMPLE 1

Find the missing angle measure in each triangle.

A
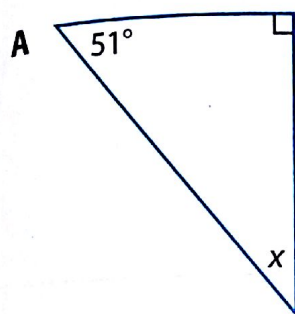
$$51 + 90 + x = 180$$
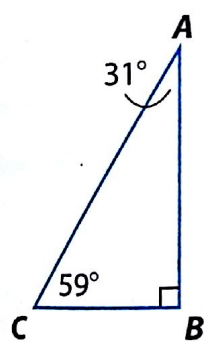$$141 + x = 180$$
$$x = 39°$$

B
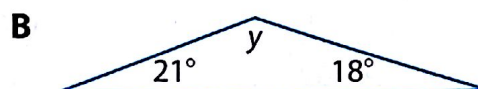
21°   y   18°

$$18 + 21 + y = 180$$
$$39 + y = 180$$
$$y = 141°$$

EXAMPLE 2

The triangle shown has approximate side lengths of 5 cm, 5.8 cm, and 3 cm. Match each side with its correct length.

31°

59°

$AB = 5$ cm

$BC = 3$ cm   Shortest side length across from the smallest angle

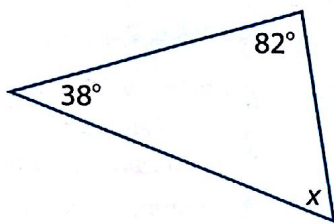$AC = 5.8$ cm   Greatest side length across from the greatest angle

EXERCISES

Tell whether a triangle can have sides with the given lengths. If it cannot, give an inequality that shows why not. (Lesson 15.1)
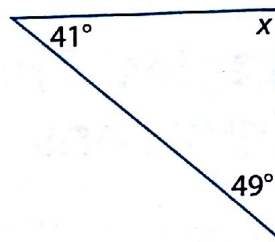
2. 4.5 ft, 5.5 ft, 11 ft _____

1. 5 in., 12 in., 13 in. _____

Find each missing angle measure. Classify each triangle as acute, obtuse, or right. (Lesson 15.2)
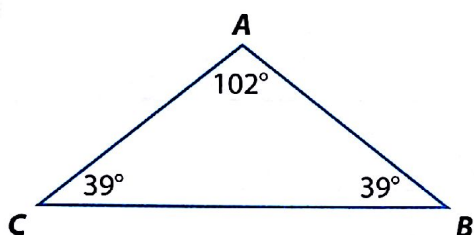
3.

82°
38°
x

_____

4.

41°   *x*
49°

_____

Match each side length with its correct measure. Classify each triangle as scalene, isosceles, or equilateral. (Lesson 15.3)

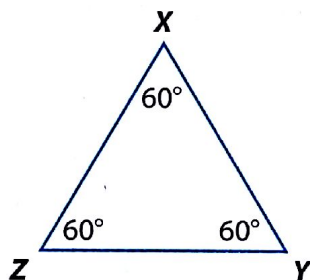5. The side lengths of triangle *ABC* are 6.4 ft, 10 ft, and 6.4 ft.

A
102°
39°   39°
C   *B*

$AB =$ _____

$BC =$ _____

$AC =$ _____

_____

6. The side length of *ZX* is 17 cm.

X
60°
60°   60°
Z   *Y*

$XY =$ _____

$YZ =$ _____

_____

MODULE 16 ▸ **Area and Volume Equations**

? ESSENTIAL QUESTION

How can you use area and volume equations to solve real-world problems?

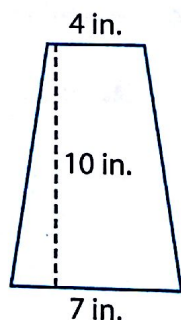**EXAMPLE 1**

Find the area of the trapezoid.

$A = \frac{1}{2}(h)(b_1 + b_2)$

$A = \frac{1}{2}(10)(7 + 4)$

$A = 55 \text{ in}^2$

4 in.
10 in.
7 in.

474 Unit 5

EXAMPLE 2

A triangular sail for a sailboat has a height of 30 feet and an area of 330 square feet. Find the base length of the sail.

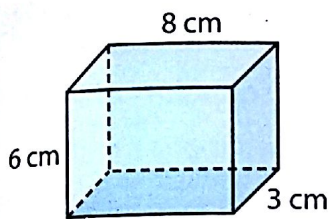$A = \frac{1}{2}bh$

$330 = \left(\frac{1}{2}\right)30b$

$b = 22$ ft

EXAMPLE 3

A cubic centimeter of gold weighs approximately 19.32 grams. Find the weight of a brick of gold that has a height of 6 centimeters, width of 3 centimeters, and length of 8 centimeters.
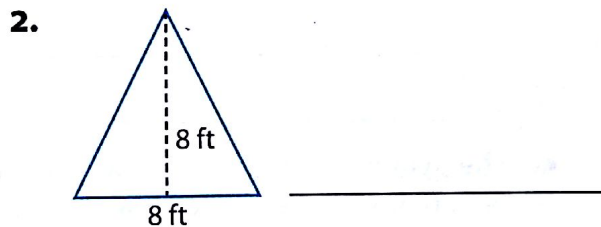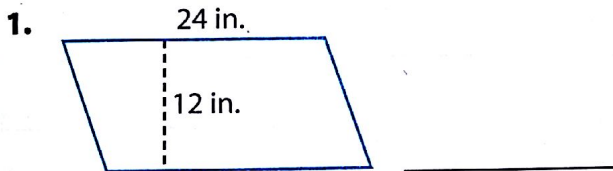
8 cm
6 cm
3 cm

$V = lwh$

$V = 8\,(3)\,(6)$

$V = 144$ cm³

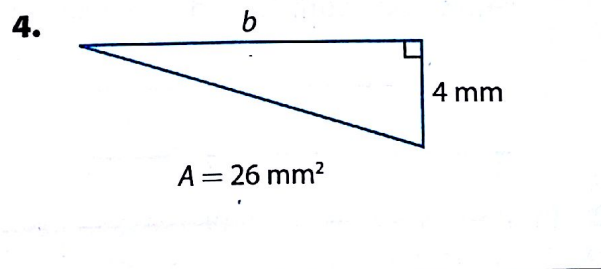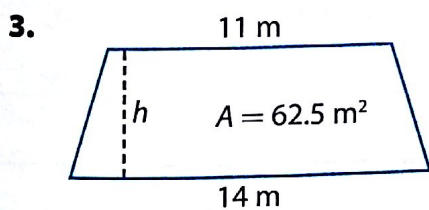The weight of the gold is 144×19.32 grams, which is 2,782.08 grams.

EXERCISES

Find the area of each figure. (Lessons 16.1, 16.2)

1.
24 in.
12 in.

_____

2.
8 ft
8 ft

_____

Find the missing measurement. (Lesson 16.3)

3.
11 m
h $A = 62.5$ m²
14 m

_____

4.
b
4 mm
$A = 26$ mm²

_____

Find the volume of each rectangular prism. (Lesson 16.4)
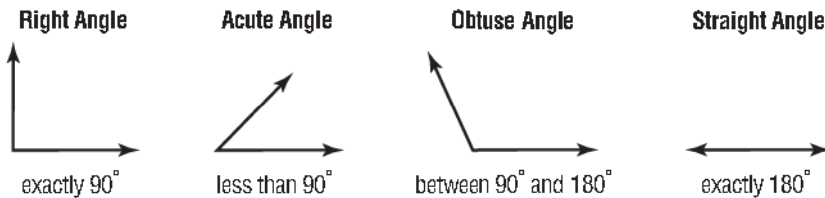
5.
6 in.
8 in.
20 in.

_____
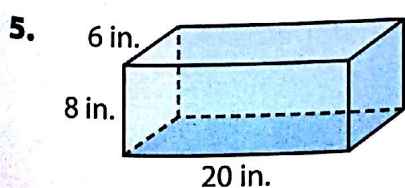
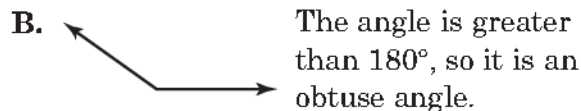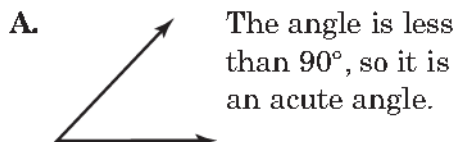6. A rectangular prism with a width of 7 units, a length of 8 units, and a height of 2 units _____

7. Jelani is ordering a piece of glass in the shape of a trapezoid to create a patio table top. Each square foot of glass costs $25. The trapezoid has base lengths of 5 feet and 3 feet and a height of 4 feet. Find the cost of the glass. (Lesson 16.1)

11-1 Study Guide and Intervention

Angle Relationships

- An **angle** has two sides that share a common endpoint. The point where the sides meet is called the **vertex.** Angles are measured in **degrees,** where 1 degree is one of 360 equal parts of a circle.

- Angles are classified according to their measure.

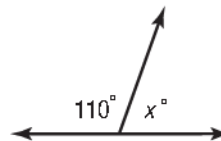| Right Angle	Acute Angle	Obtuse Angle	Straight Angle
exactly 90°	less than 90°	between 90° and 180°	exactly 180°

- Two angles are **complementary** if the sum of their measures is 90°.

- Two angles are **supplementary** if the sum of their measures is 180°.

- To **find a missing angle measure,** first determine if the angles are complementary or supplementary. Then write an equation and subtract to find the missing measure.

Example 1 Classify each angle as *acute, obtuse, right,* or *straight.*

A. The angle is less than 90°, so it is an acute angle.

B. The angle is greater than 180°, so it is an obtuse angle.

Example 2 Find the value of *x.*

The two angles form a straight line or 180°, so they are supplementary,
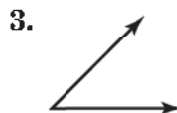
$$110 + x = 180$$
$$\underline{-110 \qquad -110}$$
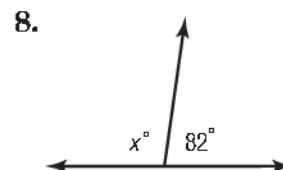$$x = 70$$

Write the equation.
Subtract 110 from each side.
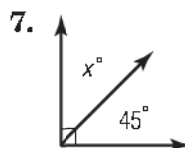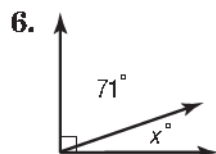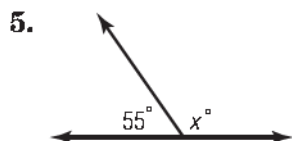
So, the value of *x* is 70°.

Exercises

Classify each angle as *acute, obtuse, right,* or *straight.*

1.

2.

3.

4.

Find the missing angle measure.

5. 55° x°

6. 71° x°

7. x° 45°

8. x° 82°

11-3 Study Guide and Intervention

Triangles

A **triangle** is a figure with three sides and three angles. The symbol for triangle is △. The sum of the measures of the angles of a triangle is 180°. You can use this to find a missing angle measure in a triangle.

Example 1 Find the value of x in △ABC.

$$x + 66 + 52 = 180 \qquad \text{The sum of the measures is 180.}$$
$$x + 118 = 180 \qquad \text{Simplify.}$$
$$\underline{-118 \quad -118} \qquad \text{Subtract 118 from each side.}$$
$$x = 62$$

The missing angle is 62°.
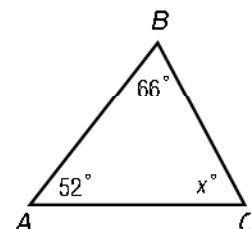
Triangles can be classified by the measures of their angles. An **acute triangle** has three acute angles. An **obtuse triangle** has one obtuse angle. A **right triangle** has one right angle.

Triangles can also be classified by the lengths of their sides. Sides that are the same length are **congruent segments** and are often marked by tick marks. In a **scalene triangle**, all sides have different lengths. An **isosceles** triangle has at least two congruent sides. An **equilateral triangle** has all three sides congruent.
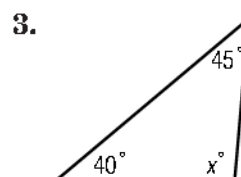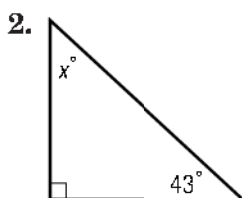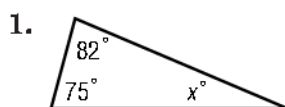
Example 2 Classify the triangle by its angles and by its sides.

The triangle has one obtuse angle and two sides the same length. So, it is an obtuse, isosceles triangle.
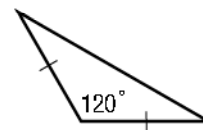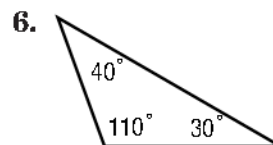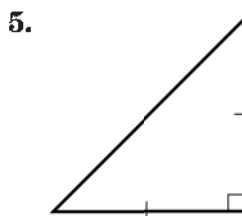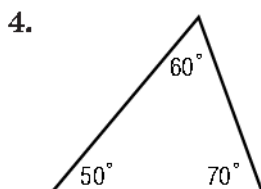
Exercises

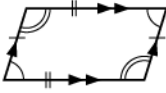Find the missing measure in each triangle. Then classify the triangle as *acute*, *right*, or *obtuse*.

1.

2.

3.
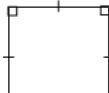
Classify each triangle by its angles and by its sides.

4.

5.

6.

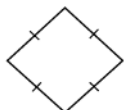Lesson 11-3

11-5 Study Guide and Intervention

Quadrilaterals

Quadrilaterals can be classified using their angles and sides. The best description of a quadrilateral is the one that is the most specific.

Trapezoid	Parallelogram	Rectangle	Rhombus	Square
one pair of parallel sides	opposite sides parallel and opposite sides congruent	parallelogram with 4 right angles	parallelogram with 4 congruent sides	parallelogram with 4 right angles and 4 congruent sides

Examples   **Classify the quadrilateral using the name that _best_ describes it.**

1   The quadrilateral is a parallelogram with 4 congruent sides. It is a rhombus.

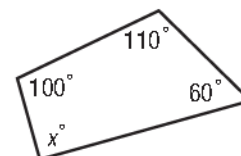**2**   The quadrilateral has one pair of parallel sides. It is a trapezoid.

3   The quadrilateral is a parallelogram with 4 right angles. It is a rectangle.

Example   **Find the missing measure in the quadrilateral.**

$$100 + 110 + 6 + x = 360 \quad \text{Write the equation.}$$
$$270 + x = 360 \quad \text{Simplify.}$$
$$\underline{-270 \qquad -270} \quad \text{Subtract 270 from}$$
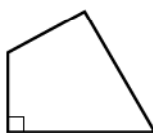$$x = 90 \quad \text{each side.}$$
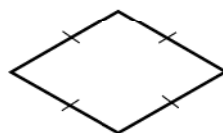
So, the missing measure is 90°.

Exercises

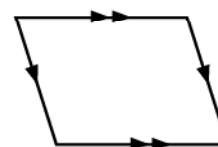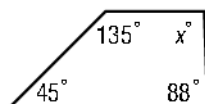**Classify the quadrilateral using the name that _best_ describes it.**

1.   2.   3.

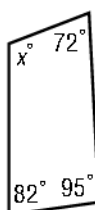**Find the missing angle measure in each quadrilateral.**

4.   135° x° 45° 88°
5.   x° 72° 82° 95°
6.   54° 125° x° 96°