

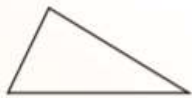
## What You Will Learn

- ▶ Classify triangles by sides and angles.
- ▶ Find interior and exterior angle measures of triangles.

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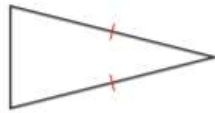
### Classifying Triangles by Sides

Scalene Triangle



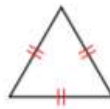
no congruent sides

Isosceles Triangle



at least 2 congruent sides

Equilateral Triangle



3 congruent sides

### Classifying Triangles by Angles

Acute Triangle



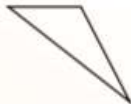
3 acute angles

Right Triangle



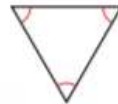
1 right angle

Obtuse Triangle



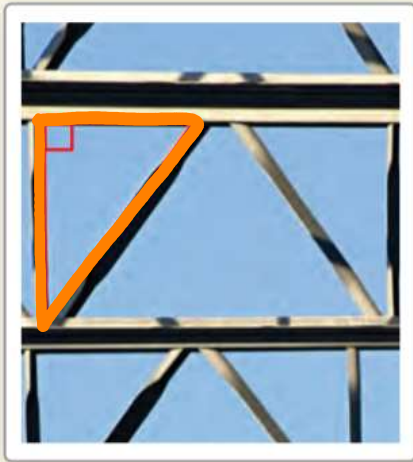
1 obtuse angle

Equiangular Triangle



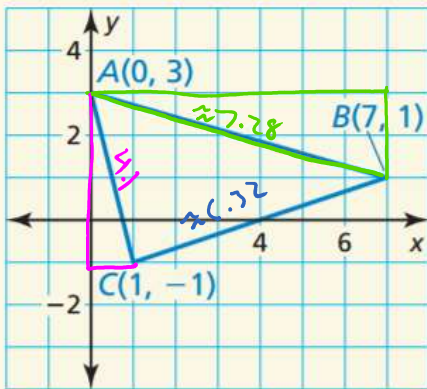
3 congruent angles

Classify the triangular shape of the support beams in the diagram by its sides and by measuring its angles.



scalene right  $\triangle$

Classify  $\triangle ABC$  by its sides. Then determine whether it is a right triangle.



Scalene not right  $\triangle$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$(7, 1) (1, -1)$$

$$\sqrt{(7-1)^2 + (1-(-1))^2}$$

$$\sqrt{6^2 + 2^2}$$

$$\sqrt{36+4}$$

$$\sqrt{40}$$

$$2\sqrt{10}$$

$$2\sqrt{10}$$

$$\approx 6.32$$

$$9^2 + 6^2 = c^2$$

$$7^2 + 2^2 = c^2$$

$$49 + 4 = c^2$$

$$\sqrt{53} = \sqrt{c^2}$$

$$\sqrt{53} = c$$



$$\frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\text{slope } (AC) = \frac{3-1}{0-1} = \frac{2}{-1} = -2$$

$$\text{slope } (CB) = \frac{-1-1}{1-7} = \frac{-2}{-6} = \frac{1}{3}$$

$$(0, 3) (1, -1)$$

$$\sqrt{(0-1)^2 + (3-(-1))^2}$$

$$\sqrt{(-1)^2 + 4^2}$$

$$\sqrt{1+16}$$

$$\sqrt{17}$$

$$4^2 + 1^2 = c^2$$

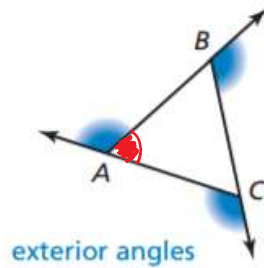
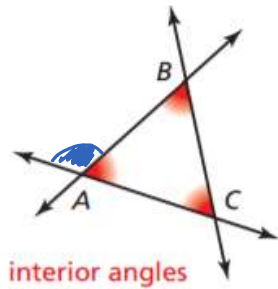
$$16 + 1 = c^2$$

$$\sqrt{17} = \sqrt{c^2}$$

$$\sqrt{17} = c$$

# Finding Angle Measures of Triangles

When the sides of a polygon are extended, other angles are formed. The original angles are the **interior angles**. The angles that form linear pairs with the interior angles are the **exterior angles**.

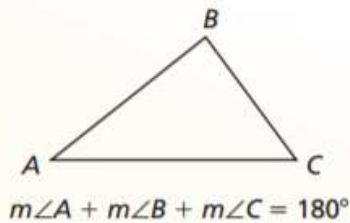


## Theorem

### Theorem 5.1 Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is  $180^\circ$ .

*Proof* p. 234; Ex. 53, p. 238

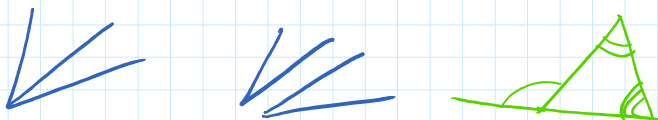
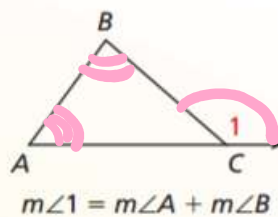


## Theorem

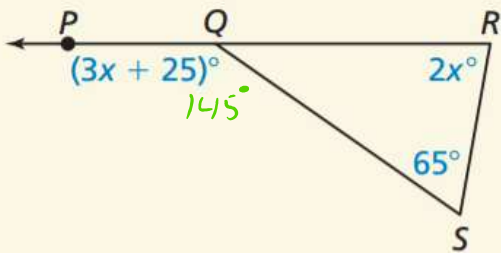
### Theorem 5.2 Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.

*Proof* Ex. 42, p. 237



Find  $m\angle PQS$ .



$$3x + 25 = 65 + 2x$$

$$-2x \quad -2x$$

$$x + 25 = 65$$

$$-25 \quad -25$$

$$x = 40$$

$$(3x + 25) ; x = 40$$

$$(3 \cdot 40 + 25)$$

$$(120 + 25)$$

$$\underline{145}$$

$$2x + 65 ; x = 40$$

$$2 \cdot 40 + 65$$

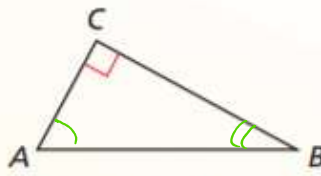
$$80 + 65$$

$$\underline{145}$$

## Corollary

### Corollary 5.1 Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are complementary.

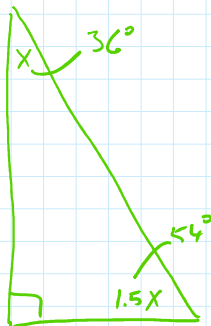


$$m\angle A + m\angle B = 90^\circ$$

*Proof* Ex. 41, p. 237

The measure of one acute angle of a right triangle is 1.5 times the measure of the other acute angle. Find the measure of each acute angle.

$$x + 1.5x = 90$$



$$x + 1.5x = 90$$

$$\frac{2.5x}{2.5} = \frac{90}{2.5}$$

$$x = 36$$



$$180 = 90 + x + 1.5x$$

$$1.5x ; x = 36$$
$$1.5 \cdot 36$$

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Practice sec 5.1 pg. 236:  
1-3A, 5-25EO, 29-36A

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