

# Lesson 6-5

## Trapezoids and Kites

<p><b>Lesson Objective</b></p> <p>▼ Verify and use properties of trapezoids and kites</p>	<p><b>NAEP 2005 Strand:</b> Geometry</p> <p><b>Topic:</b> Relationships Among Geometric Figures</p> <p><b>Local Standards:</b> _____</p>
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### Vocabulary and Key Concepts

#### Trapezoids

##### Theorem 6-15

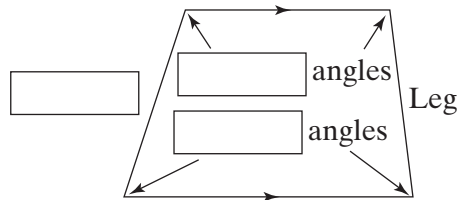
The base angles of an isosceles trapezoid are .

##### Theorem 6-16

The  of an isosceles trapezoid are congruent.

The base angles of a trapezoid are \_\_\_\_\_

\_\_\_\_\_



#### Kites

##### Theorem 6-17

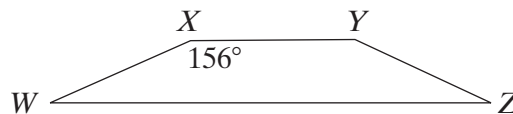
The diagonals of a kite are .

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**Examples**

- 1 **Finding Angle Measures in Trapezoids**  $WXYZ$  is an isosceles trapezoid, and  $m\angle X = 156$ . Find  $m\angle Y$ ,  $m\angle Z$ , and  $m\angle W$ .



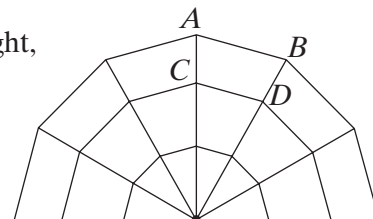
$m\angle X + m\angle W = \boxed{\phantom{000}}$  Two angles that share a leg of a trapezoid are  $\boxed{\phantom{000}}$ .

$\boxed{\phantom{000}} + m\angle W = \boxed{\phantom{000}}$  Substitute.

$m\angle W = \boxed{\phantom{000}}$  Subtract  $\boxed{\phantom{000}}$  from each side.

Because the base angles of an isosceles trapezoid are  $\boxed{\phantom{000}}$ ,  $m\angle Y = m\angle X = 156$  and  $m\angle Z = \boxed{\phantom{000}} = \boxed{\phantom{000}}$ .

- 2 **Using Isosceles Trapezoids** Half of a spider's web is shown at the right, formed by layers of congruent isosceles trapezoids. Find the measures of the angles in  $ABDC$ .



Trapezoid  $ABDC$  is part of an isosceles triangle whose vertex is at the center of the web. Because there are 6 adjacent congruent vertex angles at the center of the web, together forming a  $\boxed{\phantom{000}}$  angle, each vertex angle measures  $\frac{180}{6}$ , or  $\boxed{\phantom{000}}$ .

By the Triangle Angle-Sum Theorem,  $m\angle A + m\angle B + 30 = \boxed{\phantom{000}}$ , so  $m\angle A + m\angle B = \boxed{\phantom{000}}$ .

Because  $ABDC$  is part of an isosceles triangle,  $m\angle A = m\angle B$ , so  $2(m\angle A) = \boxed{\phantom{000}}$  and  $m\angle A = m\angle B = \boxed{\phantom{000}}$ .

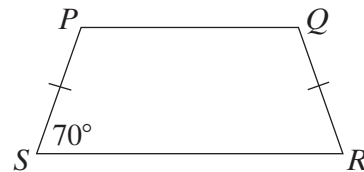
Another way to find the measure of each acute angle is to divide the difference between 180 and the measure of the vertex angle by 2:

$$\frac{180 - 30}{2} = \boxed{\phantom{000}}.$$

Because the bases of a trapezoid are parallel, the two angles that share a leg are  $\boxed{\phantom{000}}$ , so  $m\angle C = m\angle D = 180 - 75 = \boxed{\phantom{000}}$ .

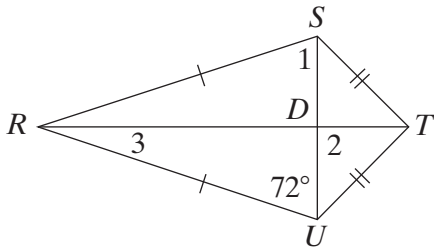
**Quick Check**

1. In the isosceles trapezoid,  $m\angle S = 70$ . Find  $m\angle P$ ,  $m\angle Q$ , and  $m\angle R$ .



**Example**

**3 Finding Angle Measures in Kites** Find  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$  in the kite.



$m\angle 2 = 90$

$RU = \square$

$m\angle 1 = \square$

$m\angle 3 + m\angle RDU + 72 = \square$

$m\angle RDU = \square$

$m\angle 3 + \square + 72 = \square$

$m\angle 3 + \square = \square$

$m\angle 3 = \square$

Diagonals of a kite are .

Definition of a kite

Triangle Theorem

Diagonals of a kite are perpendicular.

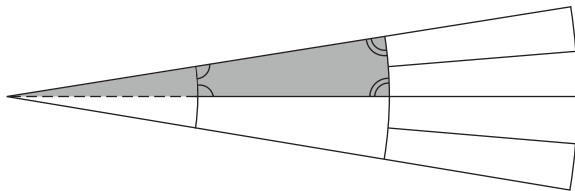
Substitute.

Simplify.

Subtract  from each side.

**Quick Check**

2. The middle ring of the piece of ceiling shown is made from congruent isosceles trapezoids. Imagine a circular glass ceiling made from the ceiling pieces with 18 angles meeting at the center. What are the measures of the two sets of base angles of the trapezoids in the middle ring?



3. Find  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$  in the kite.

