Exploring Trapezoids and Kites

# Part 1: Base angles of a trapezoid

Trapezoids have two parallel bases, two non-parallel legs, and two *pairs* of base angles as shown to the right.

Base Angles

Base Angles

leg

leg

base

base

An isosceles trapezoid has two congruent legs. Let’s investigate the base angles of an isosceles trapezoid.

A

D

C

B

E

F

**Consider this:** Look at the isosceles Trapezoid *ABCD* shown here with two heights drawn in to points *A* and  *B.*

Is $∆DAE≅∆CBF$ ? Explain Why?

What does this tell you about $∠D$ and $∠C$? Explain Why?

So, what must be true about $∠A$ and $∠B$? Explain.

**Theorem 6-15: Isosceles Trapezoid Angle Theorem** The base angles of an isosceles trapezoid are \_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Part 2: Diagonals in an Isosceles Trapezoid

Now we will look at the diagonals in an isosceles trapezoid.

A

D

C

B

Use what you discovered in part 1 above to explain why $∆ABD≅∆BAC$. Provide all necessary reasoning.

What does this tell us about $\overbar{AC}$ and $\overbar{BD}$? Explain.

**Theorem 6-16: Isosceles Trapezoid Diagonal Theorem**
 The diagonals of an isosceles trapezoid are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

Q

P

R

S

T

# Part 3: Kite Diagonals

Let’s explore the angles in a kite.

By definition, points *Q* and *T* are equidistant from points *P* and *R.*

Since points *Q* and *T* are both equidistant from *P* and *R*, what special type of line is $\overbar{QS}$ in relation to $\overbar{PR}$?

**Theorem 6-17: Kite Diagonal Theorem**
The diagonals of a kite are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What triangles must be congruent in the kite to the right? Why?