# Lesson on Trapezoids

OK kids. So we need to move forward, even though I'm busy finding out what it takes to be a new dad. I'd like each of you to read this in your groups.

We talked about the following special quadrilaterals: parallelograms, rhombuses and rectangles. You MUST remember the properties _as well as the converse properties_ of each. You noticed how the converse properties were necessary to do coordinate proofs, a six point question on the geometry regents!

The next two figures you're going to learn are kites and trapezoids. We'll do trapezoids first. A trapezoid is a quadrilateral that has only one pair of parallel lines. This means that for a **quadrilateral** to be a **trapezoid** it CANNOT have both pairs of opposite sides parallel. (If it did, it would be a parallelogram, wouldn't it)?

So here is an example of a trapezoid:
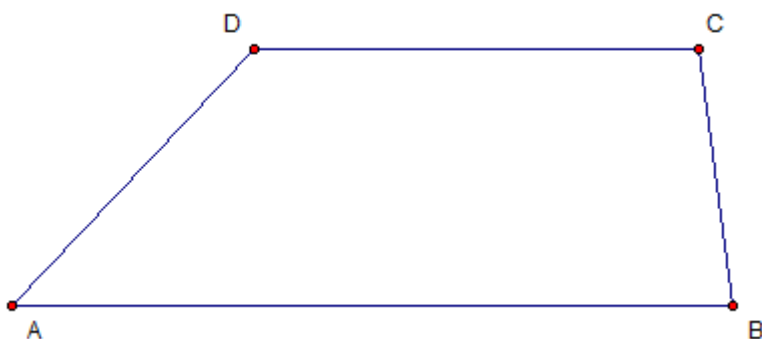
Notice how DC and AB are parallel, however CB and AD are NOT parallel. This is important. Only ONE pair of lines may be parallel for it to be a trapezoid. Remember: _parallel does NOT mean equal_!! You can tell that DC and AB are NOT equal!

Now let's talk vocabulary. Each of the parallel lines are called **bases**, so DC and AB are called **bases**. In the same fashion, angle A and B are called **base angles**. So are angles D & C. They are called base angles too. Lastly, line segments AD and BC are each called **legs** of the trapezoid.

So now we'll explore a special type of trapezoid, called an isosceles trapezoid. Just like an **isosceles triangle** has two congruent opposite sides and two congruent opposite angles, and **isosceles trapezoid** works the same way. Here's one below. Check it out:

D   C

m∠ADC = 118.79°   m∠DCB = 118.79°

DA = 3.96 cm   CB = 3.96 cm

m∠DAB = 61.21°   m∠CBA = 61.21°

A   B
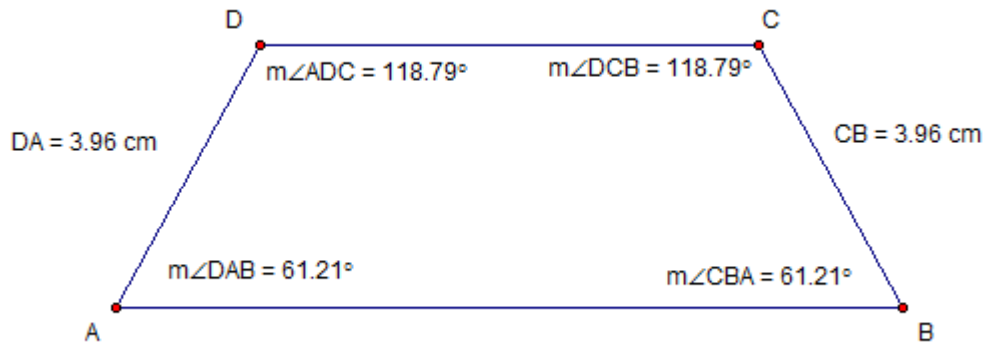
Notice how segments AD and BC are equal. Look at their lengths. Also, notice how both pairs of **base angles** are congruent. Look at those measures.

Here's one more thing I'd like you to notice. I'm going to draw diagonals and what do you notice about the lengths of the diagonals of this trapezoid below?

D   C

E

DB = 9.17 cm

AC = 9.17 cm

A   B
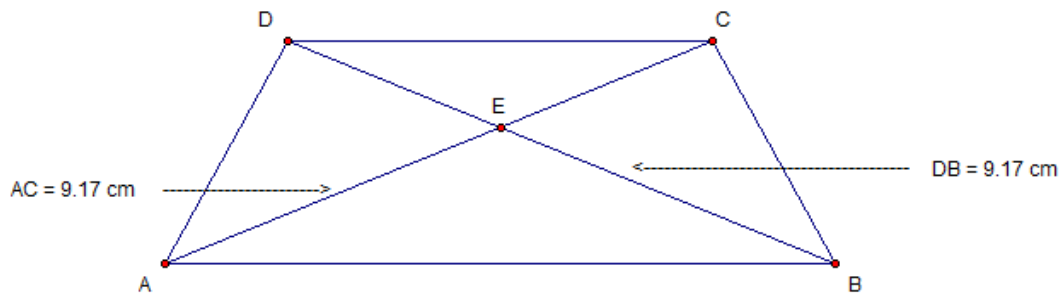
That's right. They're equal! So I'd like you to put the following in your notebooks/binders.

1. **Definition: A trapezoid is a quadrilateral that has one pair of opposite sides that are parallel and the other pair that are NOT parallel.**
2. **Definition: An isosceles trapezoid has congruent legs. Remember, the legs are the sides that are NOT parallel. Look at the first figure.**
3. **In an isosceles trapezoid, both pairs of base angles are equal. (I suggest you draw both figures above in your notebooks and point to the base angles).**
4. **In an isosceles trapezoid, the diagonals are congruent.**

Here's a worksheet for you to work on. Do 9-4-EE 1 – 8 and 10 – 15. For questions 10 – 15, ask yourself what happens when you drop an altitude from a vertex perpendicular to the base on both the left and right side of the trapezoid? You end up creating a rectangle. Right? So what are the lengths of the remaining left and right side of the base? Think!!