# Similar Figures

Definition: Two geometric figures are **similar** if corresponding angles are equal *and* corresponding sides are proportional; that is, the ratio of each pair of corresponding sides is the same.

- ▶ That is, two figures are **similar** if one is a scaled version of the other.
- ▶ **In other words**, two figures are geometrically similar if they are exactly the same shape, but not necessarily the same size.

Recall:
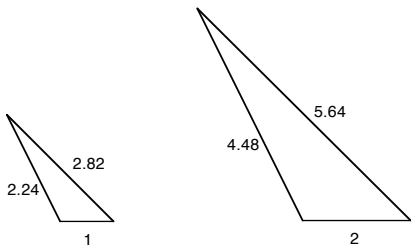
These are similar: corresponding angles are equal, and

$$\frac{2}{1} = 2 \qquad \frac{4.48}{2.24} = 2 \qquad \frac{5.64}{2.82} = 2,$$

so corresponding pairs of sides are always in the same proportion.

That proportion is also called the **scale factor**. In this case, the scale factor is 2

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- ▶ Two squares are always similar.

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- Two rectangles are similar if both pairs of corresponding sides are proportional.
- Two squares are always similar.
- Two circles are always similar.
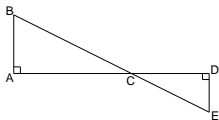
Solutions-In Class Work

1. Each of the following figures contains (at least) two triangles. Decide whether two triangles in each figure are similar.

(a)
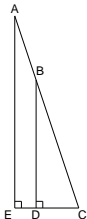
$\triangle AEC$ and $\triangle BDC$ are similar: both have right angles, and they share angle C, so two pairs of angles are equal.
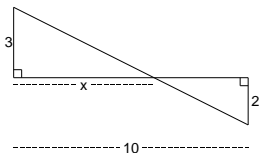
(b)

$\triangle BAC$ and $\triangle EDC$ are similar: again, both have right angles; also, recall from geometry that angle BCA and angle ECD are *vertical angles*, formed by a pair of lines intersecting; these angles are equal.

Solutions-In Class Work

2. Find x.

The two triangles are similar, as in 1(b).

The larger triangle has legs 3 and x; the smaller legs 2 and $10 - x$.

We can see from the picture that the sides of length 3 and 2 correspond, as do the sides of length x and $10 - x$.

Thus

$$\frac{x}{3} = \frac{10 - x}{2} \Rightarrow 2x = 3(10 - x) = 30 - 3x \Rightarrow 5x = 30 \Rightarrow x = 6$$