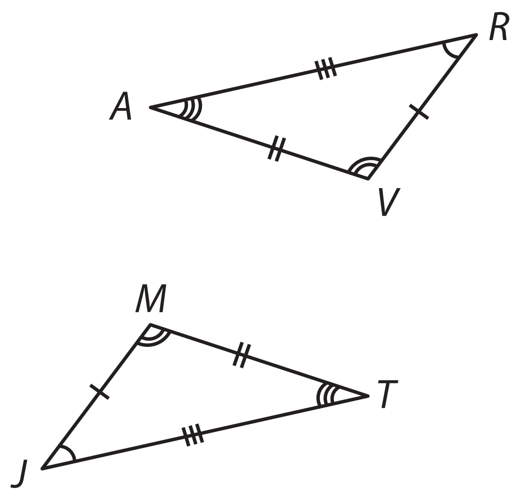
Guided Practice 4.2

Example 1

Use corresponding parts to identify the congruent triangles.



1. Match the number of tick marks to identify the corresponding congruent sides.

   $\overline{RV}$ and $\overline{JM}$ each have one tick mark; therefore, they are corresponding and congruent.

   $\overline{VA}$ and $\overline{MT}$ each have two tick marks; therefore, they are corresponding and congruent.

   $\overline{RA}$ and $\overline{JT}$ each have three tick marks; therefore, they are corresponding and congruent.

2. Match the number of arcs to identify the corresponding congruent angles.

   $\angle R$ and $\angle J$ each have one arc; therefore, the two angles are corresponding and congruent.

   $\angle V$ and $\angle M$ each have two arcs; therefore, the two angles are corresponding and congruent.

   $\angle A$ and $\angle T$ each have three arcs; therefore, the two angles are corresponding and congruent.

3. Order the congruent angles to name the congruent triangles.

   $\triangle RVA$ is congruent to $\triangle JMT$, or $\triangle RVA \cong \triangle JMT$.

   It is also possible to identify the congruent triangles as $\triangle VAR \cong \triangle MTJ$, or even $\triangle ARV \cong \triangle TJM$; whatever order chosen, it is important that the order in which the vertices are listed in the first triangle matches the congruency of the vertices in the second triangle.

   For instance, it is not appropriate to say that $\triangle RVA$ is congruent to $\triangle MJT$ because $\angle R$ is not congruent to $\angle M$.

Example 2

$\triangle BDF \cong \triangle HJL$

Name the corresponding angles and sides of the congruent triangles.

1. Identify the congruent angles.

   The names of the triangles indicate the angles that are corresponding and congruent. Begin with the first letter of each name.

   Identify the first set of congruent angles.

   $\angle B$ is congruent to $\angle H$.

   Identify the second set of congruent angles.

   $\angle D$ is congruent to $\angle J$.

   Identify the third set of congruent angles.

   $\angle F$ is congruent to $\angle L$.

2. Identify the congruent sides.

   The names of the triangles indicate the sides that are corresponding and congruent. Begin with the first two letters of each name.

   Identify the first set of congruent sides.

   $\overline{BD}$ is congruent to $\overline{HJ}$.

   Identify the second set of congruent sides.

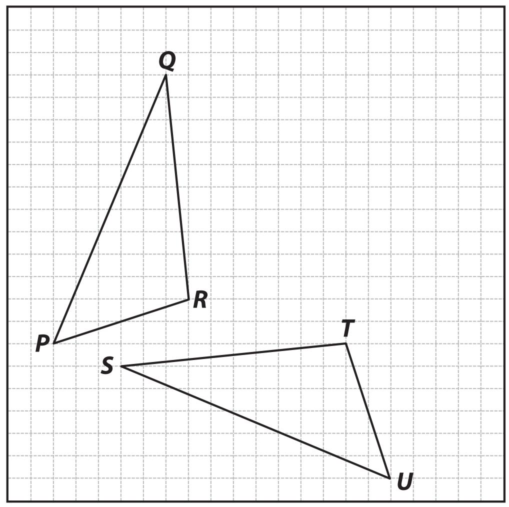
   $\overline{DF}$ is congruent to $\overline{JL}$.

   Identify the third set of congruent sides.

   $\overline{BF}$ is congruent to $\overline{HL}$.

Example 3

Use construction tools to determine if the triangles are congruent. If they are, name the congruent triangles and corresponding angles and sides.



1. Use a compass to compare the length of each side.

   Begin with the shortest sides, $\overline{PR}$ and $\overline{UT}$.

   Set the sharp point of the compass on point P and extend the pencil of the compass to point R.

   Without changing the compass setting, set the sharp point of the compass on point U and extend the pencil of the compass to point T.

   The compass lengths match, so the length of $\overline{UT}$ is equal to $\overline{PR}$; therefore, the two sides are congruent.

   Compare the longest sides, $\overline{PQ}$ and $\overline{US}$.

   Set the sharp point of the compass on point P and extend the pencil of the compass to point Q.

   Without changing the compass setting, set the sharp point of the compass on point U and extend the pencil of the compass to point S.

   The compass lengths match, so the length of $\overline{US}$ is equal to $\overline{PQ}$; therefore, the two sides are congruent.

   (*continued*)

Compare the last pair of sides, $\overline{QR}$ and $\overline{ST}$.

Set the sharp point of the compass on point Q and extend the pencil of the compass to point R.

Without changing the compass setting, set the sharp point of the compass on point S and extend the pencil of the compass to point T.

The compass lengths match, so the length of $\overline{ST}$ is equal to $\overline{QR}$; therefore, the two sides are congruent.

2. Use a compass to compare the measure of each angle.

   Begin with the largest angles, $\angle R$ and $\angle T$.

   Set the sharp point of the compass on point R and create a large arc through both sides of $\angle R$.

   Without adjusting the compass setting, set the sharp point on point T and create a large arc through both sides of $\angle T$.

   Set the sharp point of the compass on one point of intersection and open it so it touches the second point of intersection.

   Use this setting to compare the distance between the two points of intersection on the second triangle.

   The measure of $\angle R$ is equal to the measure of $\angle T$; therefore, the two angles are congruent.

   The measure of $\angle Q$ is equal to the measure of $\angle S$; therefore, the two angles are congruent.

   The measure of $\angle P$ is equal to the measure of $\angle U$; therefore, the two angles are congruent.

3. Summarize your findings.

   The corresponding and congruent sides include:

   $\overline{PR} \cong \overline{UT}$ $\overline{PQ} \cong \overline{US}$ $\overline{QR} \cong \overline{ST}$

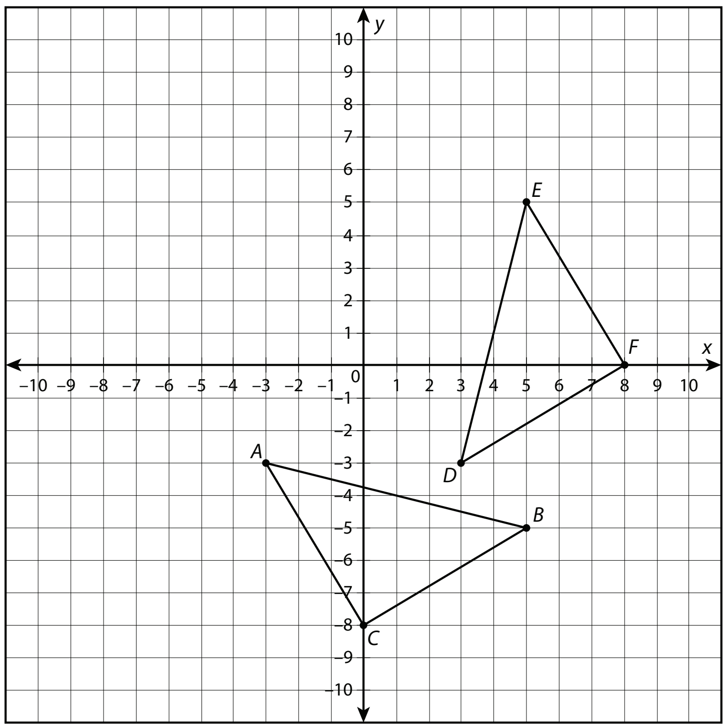
   The corresponding and congruent angles include:

   $\angle R \cong \angle T$ $\angle Q \cong \angle S$ $\angle P \cong \angle U$

   Therefore, $\triangle RQP \cong \triangle TSU$.

Example 4

Use coordinates and a protractor to determine whether the triangles are congruent. If they are, name the congruent triangles and corresponding angles and sides.



1. Determine the coordinates of the vertices of each triangle.

For $\triangle ABC$ **:**	**For** $\triangle DEF$ **:**
$A(-3, -3)$	$D(3, -3)$
$B(5, -5)$	$E(5, 5)$
$C(0, -8)$	$F(8, 0)$

2. Determine the length of each side.

   Use the distance formula, $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$, to find the length of each side. Substitute the coordinates of the vertices representing the end points of each side for (x_1, y_1) and (x_2, y_2).

For $\overline{AB}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((5)-(-3))^2+((-5)-(-3))^2}$$
$$d=\sqrt{(8)^2+(-2)^2}$$
$$d=\sqrt{64+4}$$
$$d=\sqrt{68}=2\sqrt{17}$$

For $\overline{DE}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((5)-(3))^2+((5)-(-3))^2}$$
$$d=\sqrt{(2)^2+(8)^2}$$
$$d=\sqrt{4+64}$$
$$d=\sqrt{68}=2\sqrt{17}$$

For $\overline{BC}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((0)-(5))^2+((-8)-(-5))^2}$$
$$d=\sqrt{(-5)^2+(-3)^2}$$
$$d=\sqrt{25+9}$$
$$d=\sqrt{34}$$

For $\overline{EF}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((8)-(5))^2+((0)-(5))^2}$$
$$d=\sqrt{(3)^2+(-5)^2}$$
$$d=\sqrt{9+25}$$
$$d=\sqrt{34}$$

(*continued*)

For $\overline{CA}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((-3)-(0))^2+((-3)-(-8))^2}$$
$$d=\sqrt{(-3)^2+(5)^2}$$
$$d=\sqrt{9+25}$$
$$d=\sqrt{34}$$

For $\overline{FD}$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$d=\sqrt{((3)-(8))^2+((-3)-(0))^2}$$
$$d=\sqrt{(-5)^2+(-3)^2}$$
$$d=\sqrt{25+9}$$
$$d=\sqrt{34}$$

Based on the calculations above, $\overline{AB}\cong\overline{DE}$ and $\overline{BC}\cong\overline{CA}\cong\overline{EF}\cong\overline{FD}$.

3. Use a protractor to compare the measure of each angle.

   Begin with the largest angles, $\angle C$ and $\angle F$.

   The measure of both angles is 90°.

   Next, compare $\angle A$ and $\angle D$.

   The measure of both angles is 45°.

   Finally, compare $\angle B$ and $\angle E$.

   The measure of both angles is 45°.

   Therefore, $\angle C\cong\angle F$ and $\angle A\cong\angle B\cong\angle D\cong\angle E$.

4. Summarize your findings.

   The corresponding and congruent sides include:

   $\overline{AB}\cong\overline{DE}$ $\overline{BC}\cong\overline{EF}$ $\overline{CA}\cong\overline{FD}$

   The corresponding and congruent sides include:

   $\angle C\cong\angle F$ $\angle A\cong\angle D$ $\angle B\cong\angle E$

   Therefore, $\triangle ABC\cong\triangle DEF$.

   Notice that since $\overline{BC}\cong\overline{CA}\cong\overline{EF}\cong\overline{FD}$ and $\angle A\cong\angle B\cong\angle D\cong\angle E$, we could also write $\triangle ABC\cong\triangle EDF$.