

Name _____

Date _____

Class _____

Construct Triangles

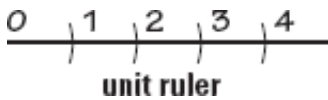
Materials:

- compass
- straightedge

QUESTION

How can you construct equilateral, isosceles, and scalene triangles?

You will need a *unit ruler* to construct triangles. You can make one by marking off equal segments along a line using a compass.



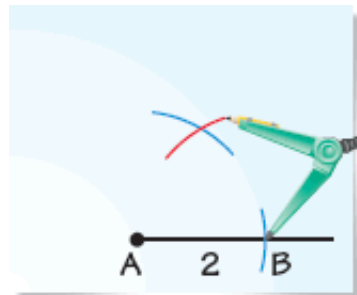
EXPLORE 1

Construct triangles classified by side lengths

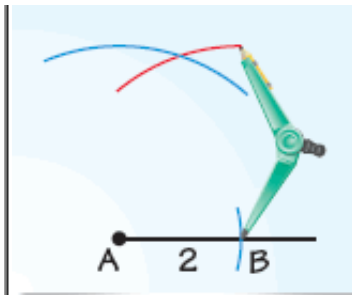
Use the following steps to construct an equilateral triangle, an isosceles triangle, and a scalene triangle with the given side length proportions.

	<i>Equilateral: 2-2-2</i>	<i>Isosceles: 2-3-3</i>	<i>Scalene: 2-3-4</i>
<p>STEP 1 Draw a line segment Draw <i>AB</i> with a length of 2 units, the first number in the proportion.</p>			
<p>STEP 2 Draw arcs Draw an arc centered at <i>A</i>. The second number in the proportion determines the radius of the arc.</p>	<p>Use radius 2.</p>	<p>Use radius 3.</p>	<p>Use radius 3.</p>
<p>STEP 3 Draw a second</p>			

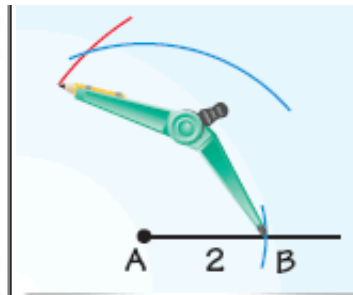
arc Draw an arc centered at B . The third number in the proportion determines the radius of the arc.



Use radius 2.



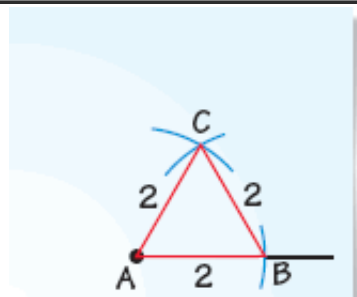
Use radius 3.



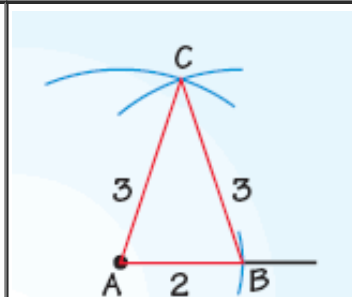
Use radius 4.

STEP 4 Draw $\triangle ABC$

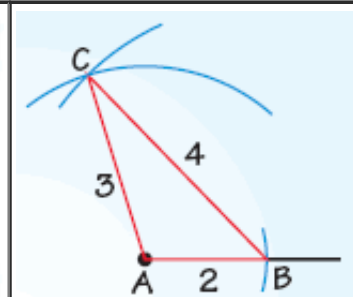
Label the intersection of the arcs C . Connect the points to form $\triangle ABC$. Label the side lengths.



$\triangle ABC$ is equilateral.



$\triangle ABC$ is isosceles.



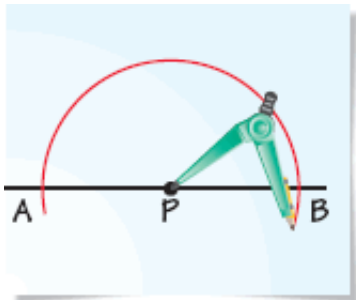
$\triangle ABC$ is scalene.

EXPLORE 2

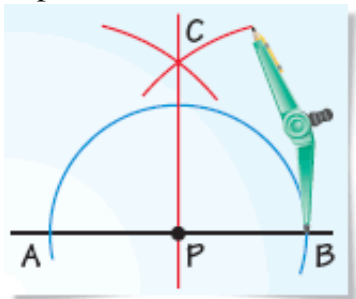
Construct triangles classified by angle measures

Use the following steps to construct different types of isosceles triangles.

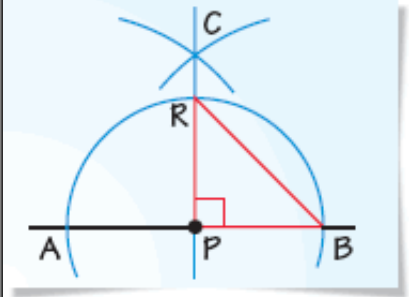
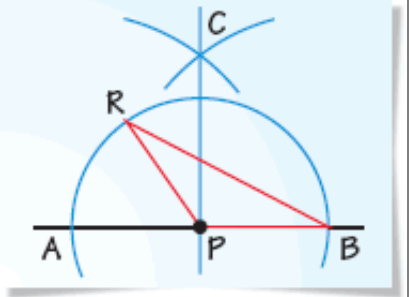
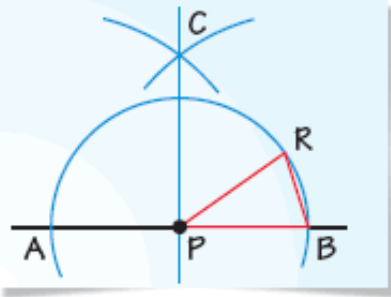
STEP 1 Draw a semicircle Draw a line and choose a point P on the line. Place the compass point at P and draw an arc that intersects the line twice, at A and B .



STEP 2 Construct a perpendicular Draw arcs with centers A and B . Use the same radius. The arcs intersect at point C . Draw $\vec{CP} \cdot \vec{CP} \perp \vec{AB}$.



STEP 3 Construct a triangle Choose a point R on the semicircle. The position of R determines the type of isosceles triangle formed.

<p>Isosceles right triangle Choose R on the semicircle along \vec{CP} to construct right triangle RPB.</p>	<p>Obtuse isosceles triangle Choose R along the left side of the semicircle to construct obtuse triangle RPB.</p>	<p>Acute isosceles triangle Choose R along the right side of the semicircle to construct acute triangle RPB.</p>
		

DRAW CONCLUSIONS

Use your observations to complete these exercises

Construct the triangle with the given side length proportions.

1. Equilateral: 3-3-3
2. Scalene: 3-4-5
3. Isosceles: 2-2-3.
4. What happens when you try to construct a scalene triangle whose side length proportions are 2-2-5?

Use your unit ruler to construct the indicated triangle.

5. Acute isosceles triangle with two side lengths of 3 units
6. Isosceles right triangle with two side lengths of 2 units
7. Obtuse isosceles triangle with two side lengths of 4 units

Construct the indicated triangle.

8. Right scalene triangle
9. Obtuse scalene triangle

Answer Key

- 1–3. Check students' constructions.
- 4. The triangle cannot be constructed. In order for the triangle to be constructed, the length of each side must be less than the sum of the lengths of the other two sides. This is not the case for a 2–2–5 triangle.
- 5–9. Check students' constructions.