What do you think the term **geometric constructions** implies?

The following tools are used in geometric constructions.
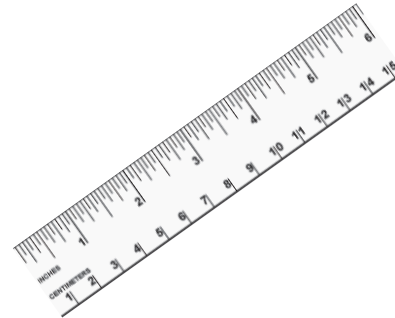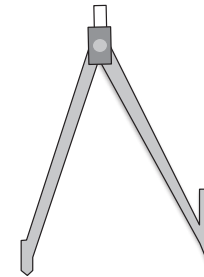
Straightedge   **Compass**

Which of the tools can help you draw a line segment?

Which of the tools can help you draw a circle?

Constructions also involve labeling points where lines or arcs intersect.

An **arc** is a section of the _____ of a circle, or any curve.

Section 2: Introduction to Geometry – Transformations and Constructions

Consider the following figure where $\overline{EF}$ was constructed perpendicular to $\overline{BC}$.
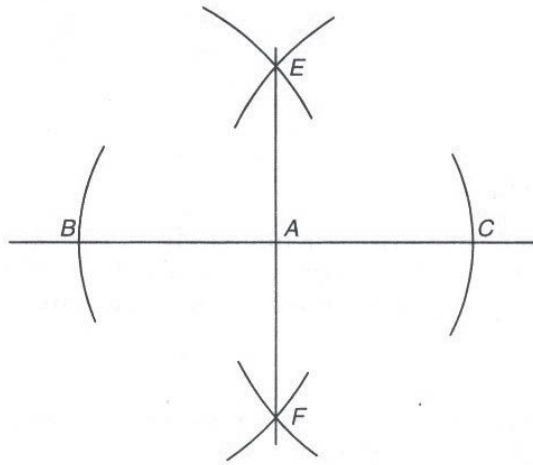
Label each part of the figure that shows evidence of the use of a straightedge with the letters SE.

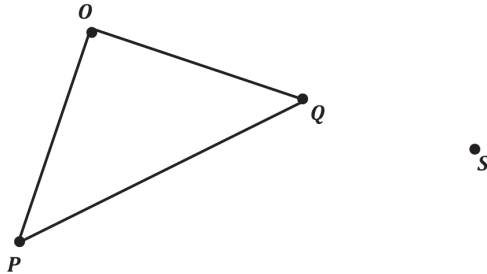*Label each part of the figure that shows evidence of the use of a compass with the letter* C.

Let's Practice!

1. Follow the instructions below for copying $\overline{AB}$.

    ➤ Mark a point M that will be one endpoint of the new line segment.

    ➤ Set the point of the compass on point A of the line segment to be copied.

    ➤ Adjust the width of the compass to point B. The width of the compass width is now equal to the length of $\overline{AB}$.

    ➤ Without changing the width of the compass, place the compass point on M. Keeping the same compass's width, draw an arc approximately where the other endpoint will be created.

    ➤ Pick a point N on the arc that will be the other endpoint of the new line segment.

    ➤ Use the straightedge to draw a line segment from M to N.
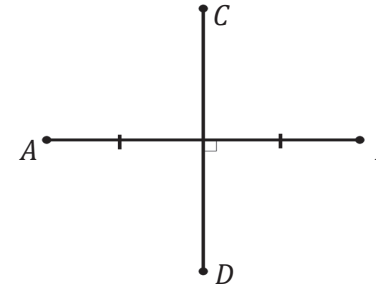

A B

Section 2: Introduction to Geometry – Transformations and Constructions

Try It!

2. Construct $\overline{RS}$, a copy of $\overline{PQ}$.

3. Write down the steps you followed for your construction.

Consider the following figure where $\overline{CD}$ is the perpendicular bisector of $\overline{AB}$.

When you make a **conjecture**, you make an educated guess based on what you know or observe.

Make a conjecture as to why $\overline{CD}$ is called the perpendicular bisector of $\overline{AB}$.

A **bisector** divides lines, angles, and shapes into two equal parts.

A **perpendicular bisector** is perpendicular to a line segment and divides the line segment into two equal parts.

Let's Practice!

3. Follow the instructions below for constructing the perpendicular bisector of $\overline{AB}$.

    ➢ Start with $\overline{AB}$.

    ➢ Place your compass point on A, and stretch the compass more than halfway to point B.

    ➢ Draw large arcs both above and below the midpoint of $\overline{AB}$.

    ➢ Without changing the width of the compass, place the compass point on B. Draw two arcs so that they **intersect** the arcs you drew in step 3.

    ➢ With your straightedge, connect the two points of where the arcs intersect.

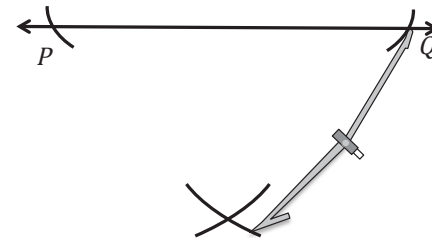   Construct a perpendicular bisector of line segment $\overline{AB}$.

    A ●————————● B

Try It!

4. Construct the perpendicular bisector of $\overline{JK}$ and $\overline{PQ}$.

    J ●————————● K

    P ●————————● Q

5. Consider the diagram below.

    •R

    P Q

    a. What type of geometric construction is being drawn?

    b. What is the next logical step(s) to complete the construction above?

1. Which of the following best describes the construction?

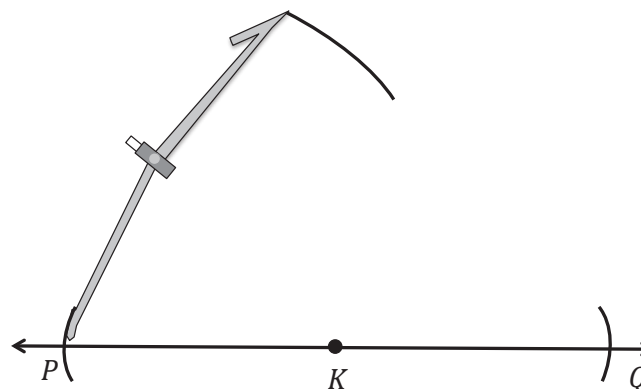$$A \bullet\!\!\!—\!\!\!—\!\!\!—\!\!\!—\!\!\!—\!\!\!—\!\!\!—\!\!\!—\!\!\!— \bullet B$$

A B

m C D

Ⓐ $\overline{AB} \parallel \overline{CD}$.
Ⓑ $\overline{AB} \cong \overline{CD}$.
Ⓒ C is the midpoint of m.
Ⓓ D is the midpoint of m.

2. Fernando was constructing a perpendicular line at a point K on the line below.

$\longleftarrow\!\!\!—\!\!\!—\!\!\!—\!\!\!— \bullet_K —\!\!\!—\!\!\!—\!\!\!—\!\!\!\longrightarrow$

The figure below represents a depiction of the partial construction Fernando made.

P K Q

What should be the next logical step to his geometric construction?

Ⓐ   Increase the compass to almost double the width to create another line.
Ⓑ   From P, draw a line that crosses the arc above K.
Ⓒ   Without changing the width of the compass, repeat the drawing process from point Q, making the two arcs cross each other at a new point called R.
Ⓓ   Close the compass and use the straight edge to draw a line from the midpoint of the arc to point K.