Let's Get This Started!
Points, Lines, Planes, Rays, and Line Segments

1. Identify each of the following in the figure shown.
   a. Name all points.
   b. Name all lines.
   c. Name all planes.

2. Identify each of the following in the figure shown.
   a. Name all collinear points.
   b. Name all coplanar lines.
   c. Name all skew lines.

3. Identify each of the following in the figure shown.
   a. Name all rays and identify each endpoint.
   b. Name all line segments and identify the endpoints.

4. Explain the differences among sketching a geometric figure, drawing a geometric figure, and constructing a geometric figure.
5. Sketch two planes whose intersection is a line.

6. Sketch three planes whose intersection is a point.

7. Draw and label three collinear points $X$, $Y$, and $Z$ such that point $Y$ is between points $X$ and $Z$ and the distance between points $X$ and $Y$ is one half the distance between points $Y$ and $Z$.

8. Use a symbol to represent the name of each geometric figure.
   
   a. 
   
   b. 
   
   c. 
Let’s Move!
Translating and Constructing Line Segments

Use the map of Smalltown to answer each question. One mile is equal to 6 units on the map.

1. After school today, Mica must walk from the high school to the elementary school to pick up his younger brother.
   a. Determine the distance between the high school and the elementary school.
   b. How many miles must Mica walk to pick up his younger brother?
2. The coordinates for the points that mark the locations of the grocery store and the post office can be
determined by translating Main Street vertically 15 units down. The grocery store is located directly
south of the town hall.
   a. What are the coordinates of the points that mark the location of the grocery store and
      the post office? Explain how you determined your answers. Then, plot the points on the
      coordinate plane.

   b. What must be true about the road between the post office and grocery store and Main Street?
      Explain how you determined your answer. Then, use mathematics to verify your answer.

3. The town would like to construct a park that is one mile from the town hall. Use your compass to show
all possible locations for the new park. Explain how you determined your answer.
Treasure Hunt
Midpoints and Bisectors

The grid shows the locations of a sandbox and a fountain in a park. Each grid square represents a square that is one meter long and one meter wide.

1. Calculate the distance between the sandbox and the fountain.
2. You decide to meet your friend halfway between the fountain and sandbox.
   a. Calculate the midpoint of the line segment that passes through the point representing the sandbox and the point representing the fountain. Then, plot the point.
   b. Verify your calculations in part (a) by constructing the midpoint of the line connecting the sandbox and the fountain.

3. The swings are located at \((-4, 7)\), which is halfway between the sandbox and the slide.
   a. Plot and label the point representing the swings.
   b. Calculate the location of the slide. Show your work. Then, plot and label the point representing the slide.
   c. Verify your calculations in part (b) by constructing the midpoint of the line connecting the sandbox and the slide.
It’s All About Angles
Translating and Constructing Angles and Angle Bisectors

1. Point $K$ in $\angle JKL$ has been translated to Quadrant III to create image $K'$. Describe and perform the translation(s) needed to translate $\angle JKL$ to Quadrant III.

   a. Describe how you can translate the angle to Quadrant III.

   b. Determine what the coordinates will be for points $J'$, $K'$, and $L'$ before translating the angle. Explain how you determined your answers.

   c. Verify your answers to part (b) by translating $\angle JKL$ to Quadrant III.
2. Perform the construction(s) needed to duplicate \( \angle JKL \) to create \( \angle J'K'L' \).

a. Describe how to duplicate \( \angle JKL \).

\[ \begin{array}{c}
\text{J} \\
\text{L}
\end{array} \quad \begin{array}{c}
\text{K} \\
\text{K'}
\end{array} \]

b. Duplicate \( \angle JKL \) using construction.
3. Analyze $\angle X$.

a. Explain how to construct an angle that is one-fourth the measure of $\angle X$ using only your compass and straightedge.

b. Construct an angle that is one-fourth the measure of $\angle X$. Label the angle as $\angle WXY$. 
Did You Find a Parking Space?
Parallel and Perpendicular Lines on the Coordinate Plane

Christopher is a developer and plans to build a new community development. Use the grid to help Christopher create a map for his development. Each gridline represents one block.

1. Currently there are two main roads that pass through the development and are parallel to each other: Sunshine Avenue and Moonbeam Drive.
   a. Calculate the slope of Moonbeam Drive. Show your work.

   b. Determine the slope of Sunshine Avenue. Explain your reasoning.
2. Christopher wants to build a road named, Stargazer Boulevard that will be parallel to Moonbeam Drive. On this road, he will build a new diner located 7 blocks north of the Community Garden.

   a. Identify the coordinates of the new diner and plot the diner on the grid. Explain how you determined the coordinates of the new diner.

   b. Determine the slope of Stargazer Boulevard. Explain your reasoning.

   c. Determine the equation of the line that represents Stargazer Boulevard.

   d. Draw and label Stargazer Boulevard on the grid.

3. Christopher wants to build a road named Rocket Drive that connects Sun Bank to Moonbeam Drive. He wants this road to be as short as possible.

   a. Write an equation for the line representing Rocket Drive. Show your work. Then draw and label Rocket Drive on the grid.
b. What is the equation of the line representing Moonbeam Drive? Explain how you determined your answer.

c. Calculate the point of intersection of Rocket Drive and Moonbeam Drive. Show your work.

d. What is the distance from Sun Bank to Moonbeam Drive? Show your work.
Making Copies—Just as Perfect as the Original!
Constructing Perpendicular Lines, Parallel Lines, and Polygons

1. Construct rectangle $ABCD$ so that it is not a square using the given side lengths.

   $AB$ $BC$

   $A$ $B$

   $B$ $C$

   $A$

   

   a. Explain how you know that $AD$ and $BC$ are parallel.
2. Consider line $JK$ and point $M$.

   a. Write a paragraph to explain how you can construct parallelogram $JKLM$ using the given point and line so that the parallelogram is *not* a rectangle.

   b. Construct the parallelogram.
3. The perimeter of an isosceles triangle is shown.

   A   B

   a. Write a paragraph to explain how you will construct this triangle.

   b. Construct the isosceles triangle.

   A   B

   c. Can you construct more than one isosceles triangle using the given perimeter? Explain your reasoning.
What’s the Point?
Points of Concurrency

Use a compass and straightedge to perform each construction.

1. Construct the incenter of $\triangle DEF$.

2. Construct the circumcenter of $\triangle ABC$.

3. Construct the circumcenter of $\triangle DEF$. 
4. Construct the circumcenter of \( \triangle GHI \).

![Triangle GHI]

5. Construct the centroid of \( \triangle ABC \).

![Triangle ABC]

6. Construct the orthocenter of \( \triangle JKL \).

![Triangle JKL]
7. Write the term that best completes each statement.
   a. The incenter of a triangle is the point of concurrency of the ____________
      of a triangle.

   b. The circumcenter of a triangle is the point of concurrency of the ____________
      of a triangle.

   c. The centroid of a triangle is the point of concurrency of the ____________
      of a triangle.

   d. The orthocenter of a triangle is the point of concurrency of the ____________
      of a triangle.
8. Triangle $FGH$ has vertices $F(-4, 2)$, $G(4, 2)$, and $H(4, -2)$.
   a. Use algebra to locate the centroid of $\triangle FGH$. 
LESSON 1.7 Assignment

Name ________________________________ Date _____________

b. Use algebra to locate the circumcenter of \( \triangle FGH \).