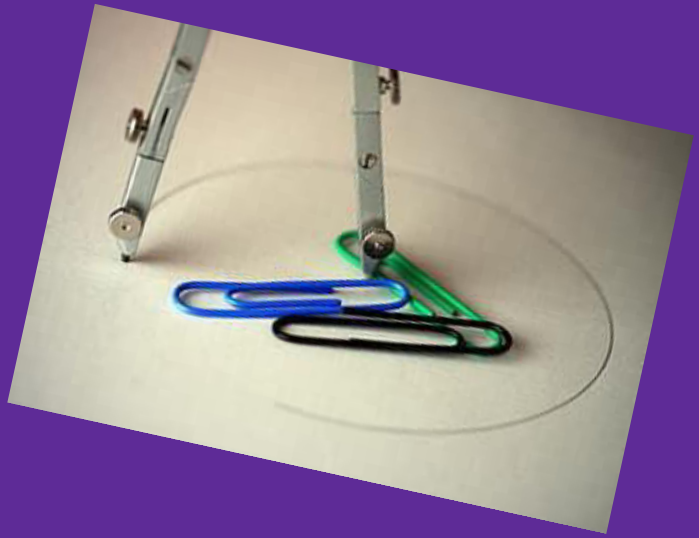
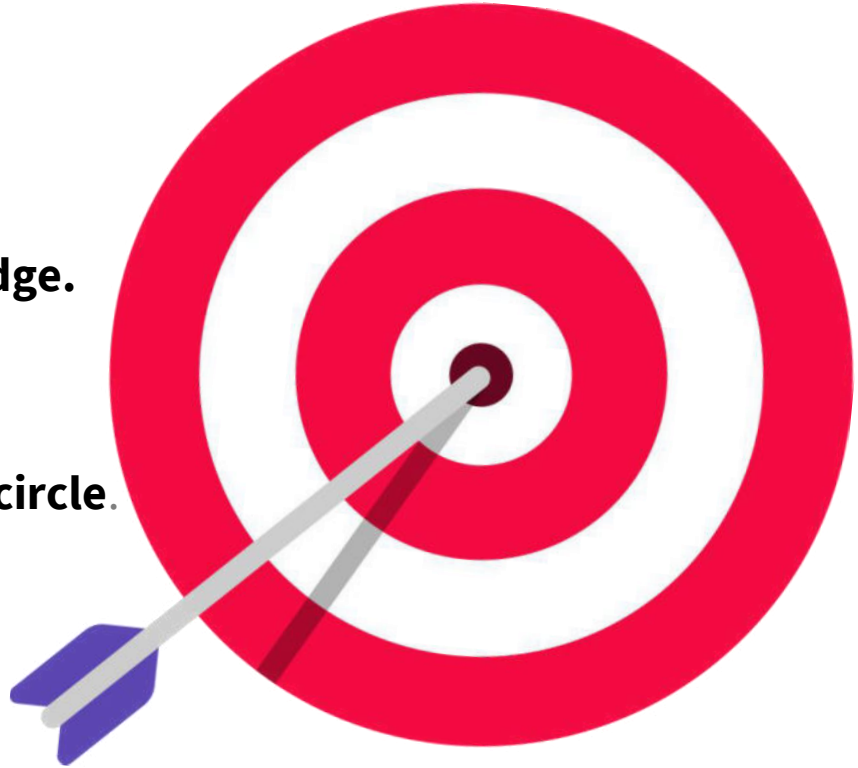


Lesson 1- Build It

Learning Targets

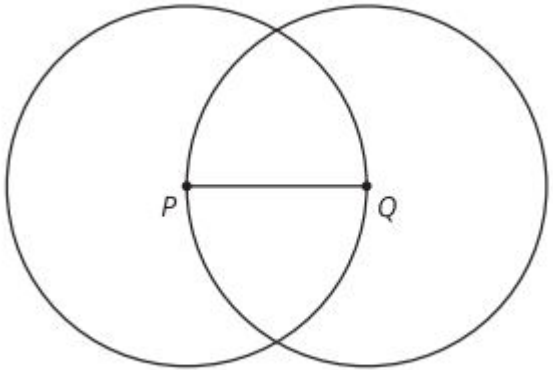
- **I can create diagrams using a straightedge.**

- **I know to use a compass to construct a circle.**

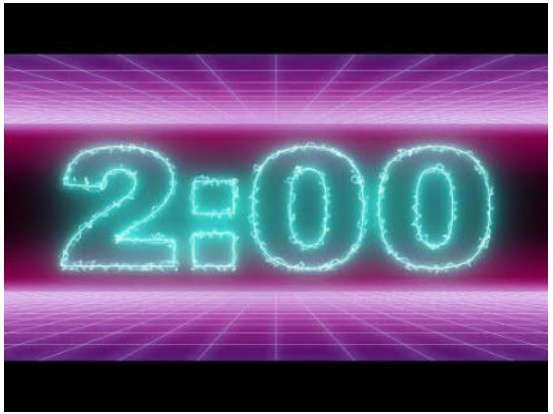


1.1 The Right Tool

1. Copy this figure using only the Pen tool and no other

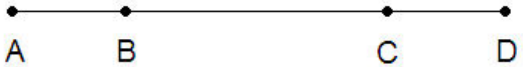


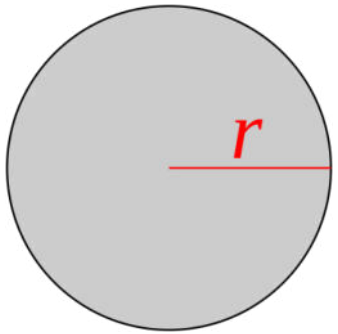
- 2 minutes of quiet work time.



Teacher Demonstrations:

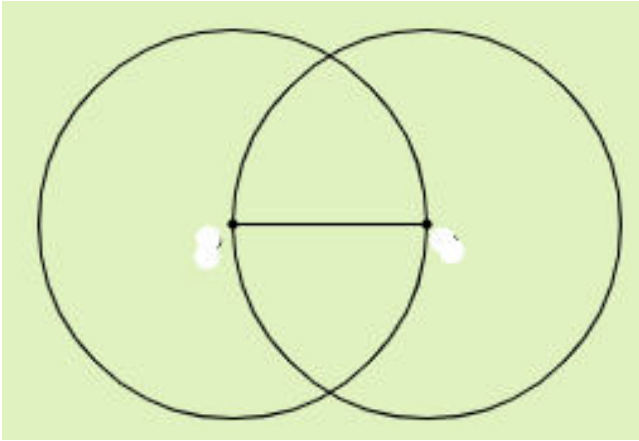
- demonstrate how to use a compass by marking a point and creating a circle centered at that point
- demonstrate how to use a straightedge by marking a point on the circle and connecting it to the center to make a radius
- Note that segment PQ is the part of the line through P and Q that has the endpoints P and Q.
- Note that length PQ is the distance from point P to point Q.





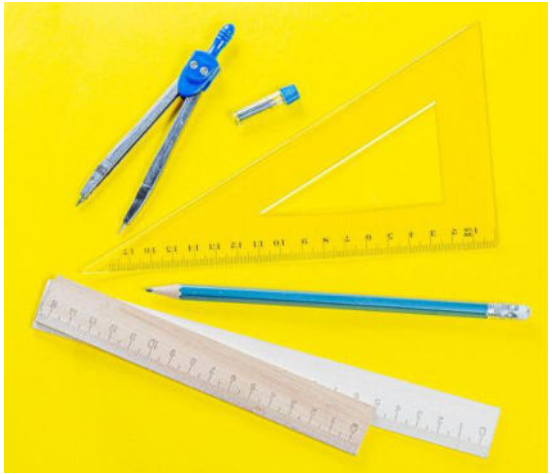
Complete these steps with a straightedge and compass:

- Draw a point and label it *A*.
- Draw a circle centered at point *A* with a radius of length *PQ.*
- Mark a point on the circle and label it *B.*
- Draw another circle centered at point *B* that goes through point *A.*
- Draw a line segment between points *A* and *B*.



Activity Synthesis

What is the difference between your attempt in the first question and what you came up with using the straightedge and compass?



1.2 Illegal Construction Moves

1. Create a circle centered at A with radius AB.
2. Estimate the midpoint of segment AB and label it C.
3. Create a circle centered at B with radius BC. This creates 2 intersection points. Label the one toward the top of the page as D and the one toward the bottom as E.
4. Use your straightedge to connect points A, D, and E to make triangle ADE and lightly shade it in with your pencil.

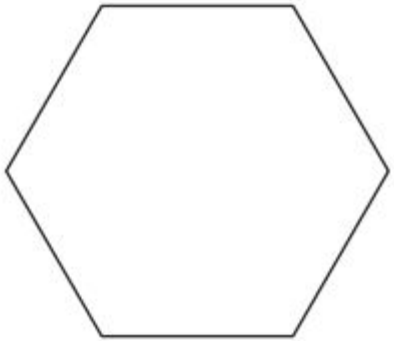
Activity Synthesis

Trace triangle *ADE* onto tracing paper and compare your triangle with your partner.

**To be sure that a construction is valid, it must not include any estimation or eyeballing.

1.3 Can you Make a Perfect Copy?

Here is a hexagon with all congruent angles and all congruent sides (called a regular hexagon).

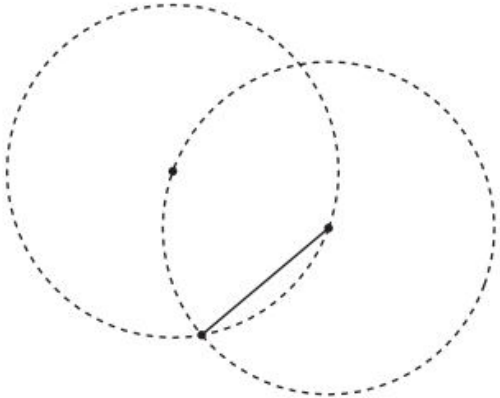


- 10 minutes to work with your partner to complete questions.

1. Draw a copy of the regular hexagon using only your pencil and no other tools. Trace your copy onto tracing paper. Try to fold it in half.

What happened?

2. Here is a figure that shows the first few steps to constructing the regular hexagon. Use straightedge and compass moves to finish constructing the regular hexagon. Trace it onto tracing paper and confirm that when you fold it in half, the edges line up.



3. How do you know each of the sides of the shape are the same length? Show or explain your reasoning.

Activity Synthesis

How do you know each of the sides of the shape are the same length?

Lesson Synthesis:

Valid Construction Moves

- If starting from a blank space, start by marking two points.
- You can create a line or line segment between two marked points.
- You can create a circle centered at a marked point going through another marked point.
- You can set your compass to the length between two marked points and create a circle with that radius centered at any marked point.
- You can mark intersection points.
- You can mark a point on a circle.
- You can mark a point on a line or line segment

Lesson Synthesis:

Point, line, and distance (or length) are undefined terms. We can use these undefined terms to define other terms. It is important to know that:

- points are infinitesimally small
- lines are infinitely long, extending in both directions
- part of a line with one endpoint is called a ray, and it extends in one direction
- part of a line with two endpoints is called a segment, and it has a measurable length
- a circle is made up of all the points a set distance from a point
- the point is called the center, and the set distance is called the radius