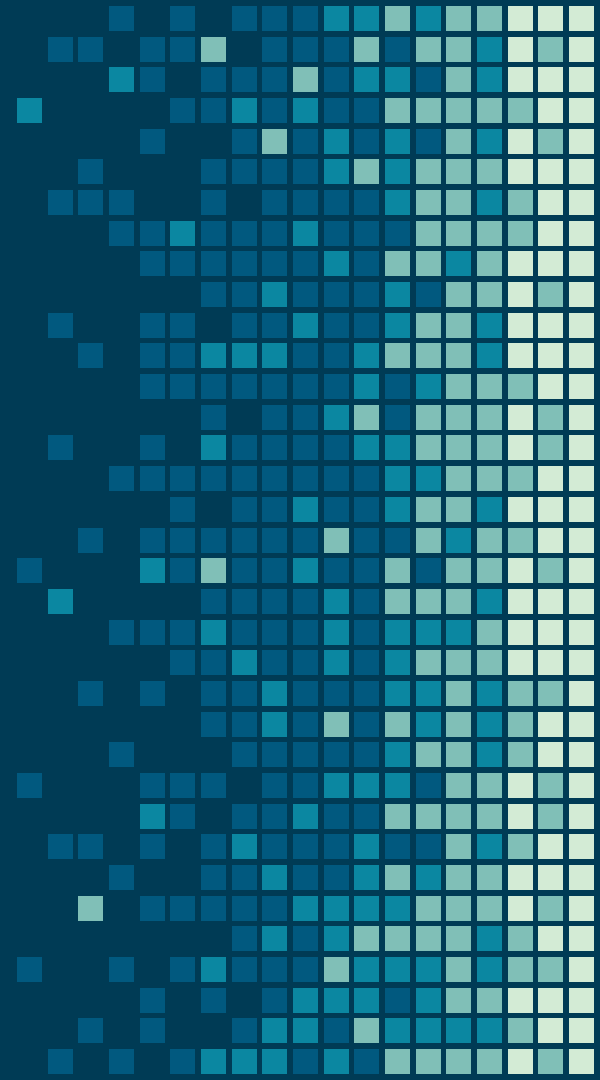# Construction Techniques 3:

Perpendicular Lines and Angle Bisectors
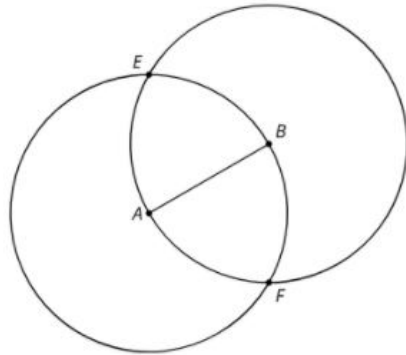
Learning Goal:

Let's use tools to solve some construction challenges.
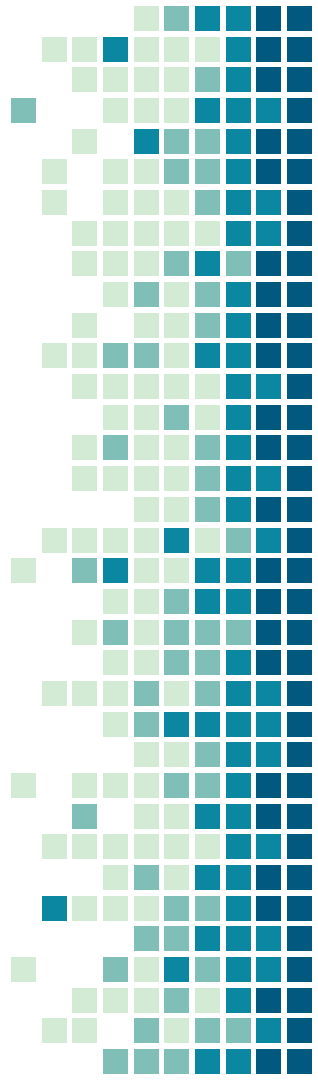
5.1 Two Circles

Points *A* and *B* are each at the centers of circles of radius *AB*.

1. Compare the distance *EA* to the distance *EB*. Be prepared to explain your reasoning.

2. Compare the distance *FA* to the distance *FB*. Be prepared to explain your reasoning.

3. Draw line *EF* and write a conjecture about its relationship with segment *AB*.

Activity Synthesis

Points *A* and *B* are each at the centers of circles of radius *AB*.
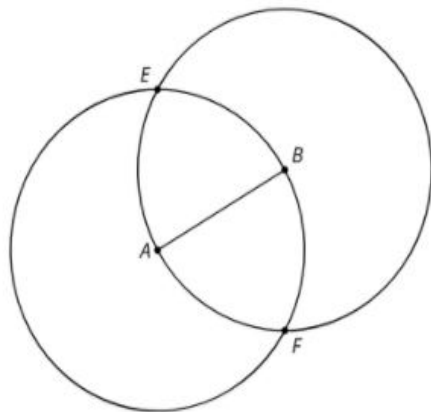
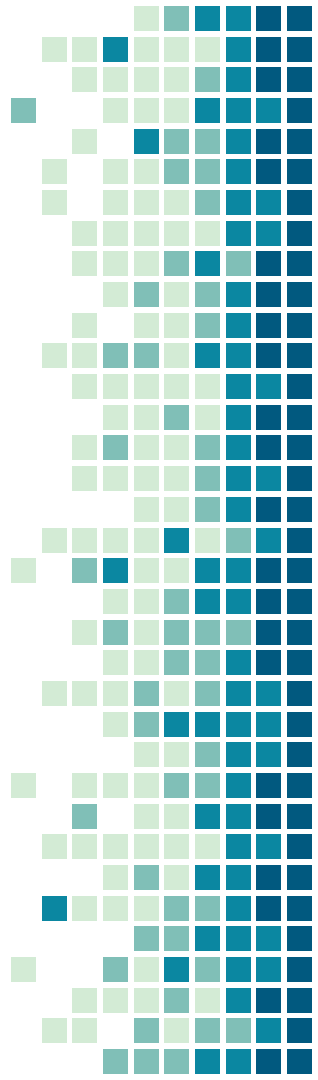What conjectures did you make based on the activity?

How does this connect to the Human Perpendicular Bisector Activity?

5.2 Make It Right

How can we create a circle centered at a marked point going through another marked point?

How could this straightedge and compass move be used to construct a line perpendicular to *I* that goes through *C*.

Geogebra Tools

5.2 Make It Right

Here is a line l with a point labeled C: Use straightedge and compass tools to construct a line perpendicular to l that goes through C.
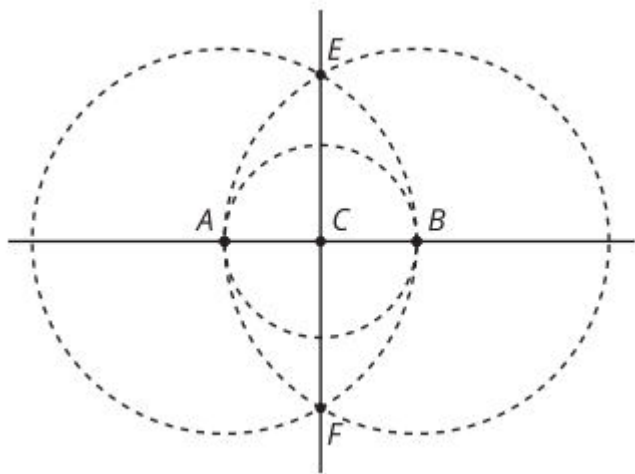
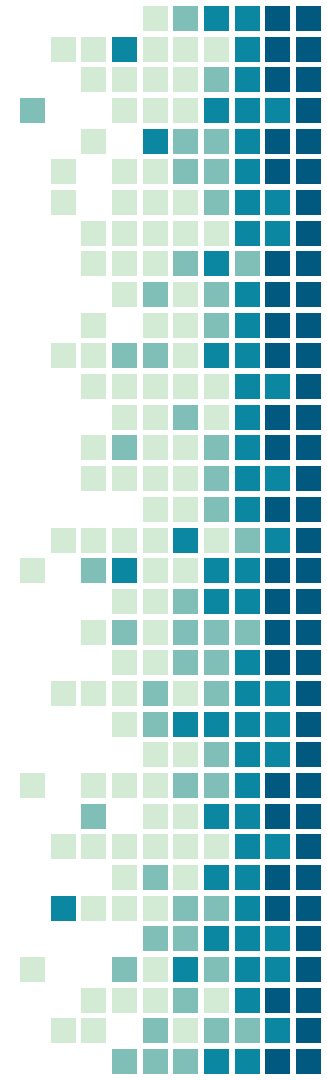c   ℓ

Digital Applet

Quiet Work Time-

5:00

Activity Synthesis

How were you able to construct a perpendicular line?

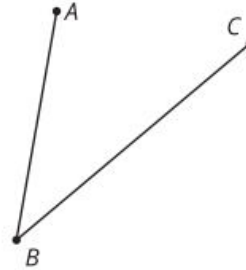How does this figure connect to the warm-up activity?

5.3 Bisect This

Now let's practice the construction technique drawing and bisecting angles.

When you divide an angle into two congruent angles you have bisected the angle.

Group Work Time-

1. Estimate the location of a point D so that angle ABD is approximately congruent to angle CBD.

2. Use compass and straightedge tools to create a ray that divides angle CBA into 2 congruent angles. How close is the ray to going through your point D?

3. Take turns with your partner, drawing and bisecting other angles.

   a. For each angle that you draw, explain to your partner how each straightedge and compass move helps you to bisect it.

   b. For each angle that your partner draws, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement
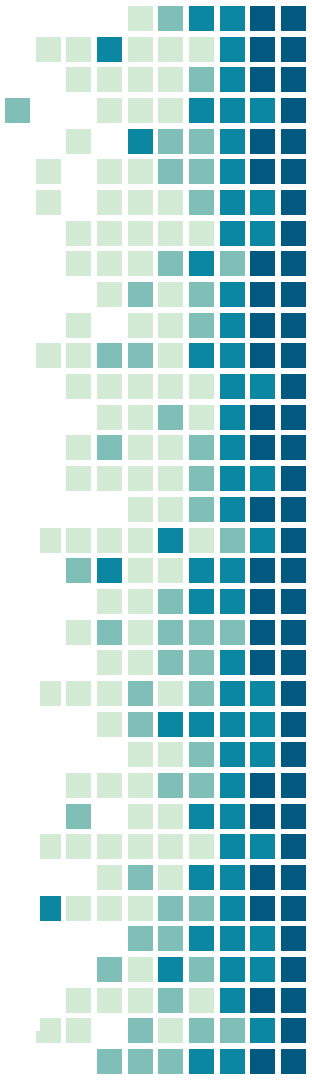
Activity Synthesis

How they were able to construct a ray that divides the angle into two congruent parts?
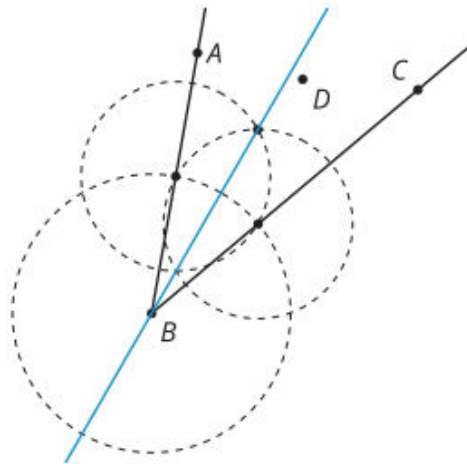
Angle bisector:- dividing an angle into two congruent angles.

Lesson Synthesis:

What was the first step in each of these constructions?

The first circle creates two points that are the same distance away from the center.

- Now, where do you see the two circles that go through each other's center in each of the constructions?
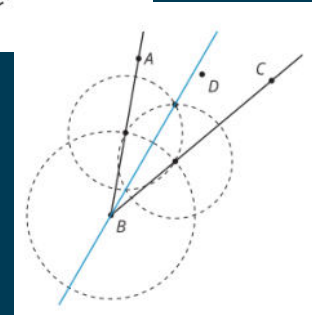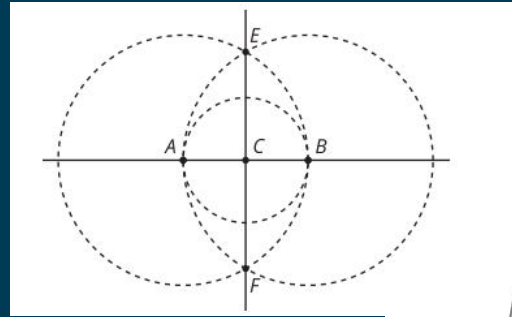
Lesson Synthesis:

Each construction is really just a perpendicular bisector.

Conjecture:

For the angle bisector, connecting the two equidistant points forms an isosceles triangle. This surfaces a surprising and important connection. The angle bisector of an isosceles triangle seems to also be the perpendicular bisector of the base.