

MATH 191 FUNDAMENTALS OF MATHEMATICS II
14.4 STRAIGHTEDGE AND COMPASS CONSTRUCTIONS
MARCH 31, 2014

We can use what we learned about congruence to help us make precise drawings. We will use a compass and a _____, namely a _____ without any markings. That is, it can _____, but it cannot _____.

Dividing a Line Segment in Half and Drawing a Perpendicular Line

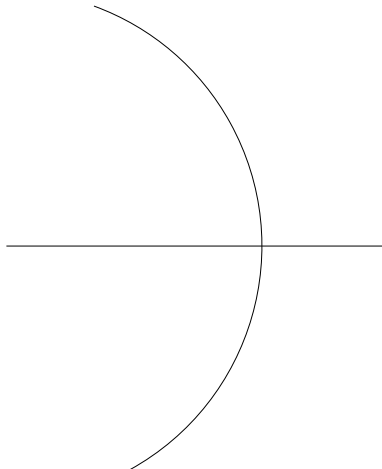
If you are given a line segment, how can you find the point on the line segment that is _____ from the _____ of the line segment? This point is called the _____.

Students might just

This method doesn't work because

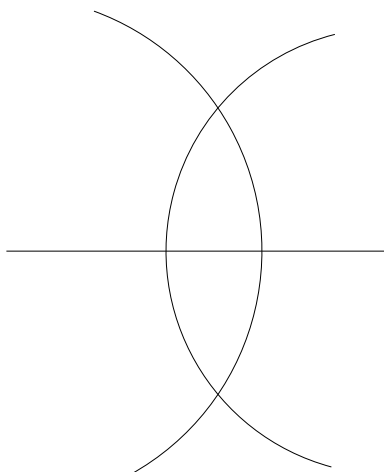
Instead, we'll use a compass and straightedge.

Step 1: Starting with a line segment AB , draw a _____ (or _____ with _____ and radius _____.

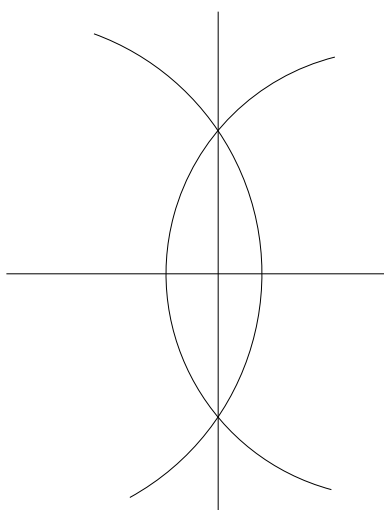


Step 2: Draw a _____ with _____ and radius

_____.



Step 3: Draw the _____ through the _____
of the two circles.

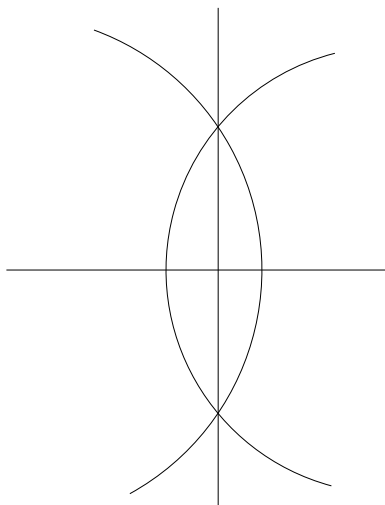


Why does this work? Imagine drawing the line segments

Now we have a _____ because

This tells us that

In addition, we even know that _____ and _____ are _____.



This tells us that _____ is the _____ of _____, that is, the line segment that is _____ and _____ (_____) AB .

Notice that if we want to draw a perpendicular line to a given line segment, we need to follow a procedure such as this one if we don't have a protractor. When asked to draw a right angle without a protractor, students might

However, this does not guarantee that the angle is exactly 90° .

Dividing an Angle in Half

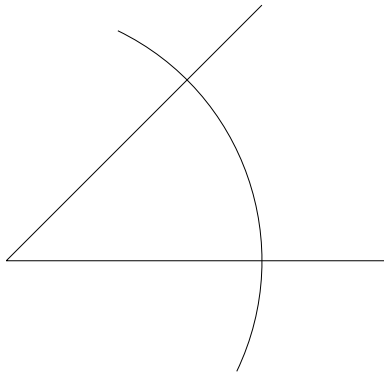
If we have an angle, $\angle P$, made by two rays with P as their endpoints, how can we divide it into two angles of equal measure? In other words, we want to draw a _____ with endpoint _____ that is _____ the two original rays.

Students might

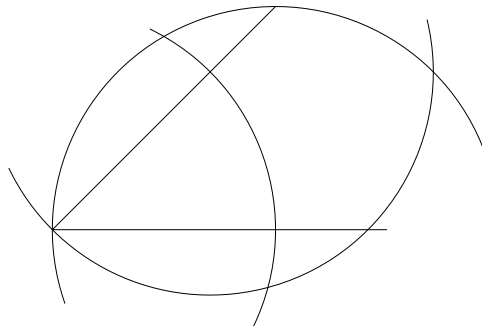
but this

Instead, we can use a compass and straightedge construction.

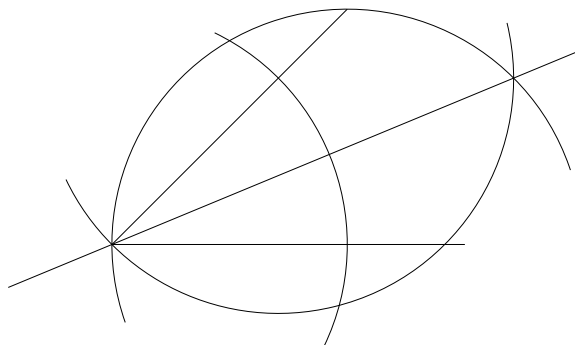
Step 1: Draw (a portion of) a _____ with _____
and _____.



Step 2: Draw _____ centered at the _____ of
the circle and the rays with the _____.



Step 3: Draw the _____ through the _____
of the two circles drawn in step 2 and P .



Why does this work? If we draw the line segments shown below, then we have

