

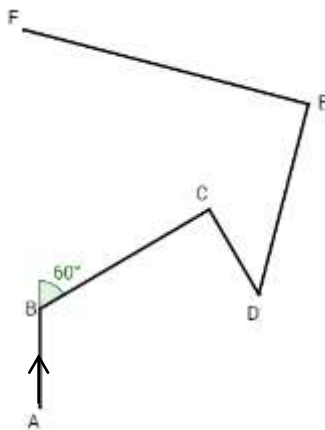
Activity #1: Guide the Robot

The map in the next figure shows a route that you must program Dave, a robot, to “walk.” On the map, ½ inch represents 5 of Dave’s paces. Dave starts at point A, facing the route, so that he is ready to start walking along it. Use a protractor and a ruler to help you describe how Dave should get to point F.

For example, here’s what Dave should do to get from point A to point C:

Starting at A, go 5 paces to B. At B, turn clockwise (to your right) 60°. Go another 10 paces to C.

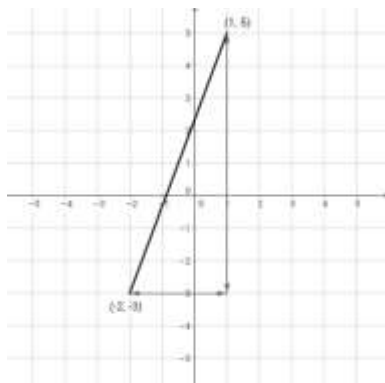
Each step should have a turn direction (clockwise/counterclockwise), a number of degrees, and a number of paces.



From:	Turn Direction	# of degrees	# of paces
C to D			
D to E			
E to F			

Activity #2: The Distance Formula

Use the picture below, which represents finding the distance from $(-2, -3)$ to $(1, 5)$, and the Pythagorean Theorem (provided below) to find the distance between these points.



Pythagorean Theorem

If a and b are the lengths of legs of a right triangle and c is the length its hypotenuse, then

$$a^2 + b^2 = c^2$$

Find the distance by using the Pythagorean Theorem:

Find the distance by using the distance formula:

Activity #3: The Midpoint Formula

Points $P(-4,6)$, $Q(2,4)$, and R are collinear. One of the points is the midpoint of the segment formed by the other two points.

What are the possible coordinates of R ?

Activity #4: Geometry Constructions

1. Construct a segment \overline{CD} that is three times as long as \overline{AB} .



2. In the space below, mark a point P , and use your compass to draw three circles of radii $\frac{1}{2}$ inch, 1 inch, and $1\frac{1}{2}$ inch about P .

Exam 1 Tip: I highly recommend that you practice the following constructions until you can produce them from memory!

EXAMPLE 1 Constructing Congruent Segments

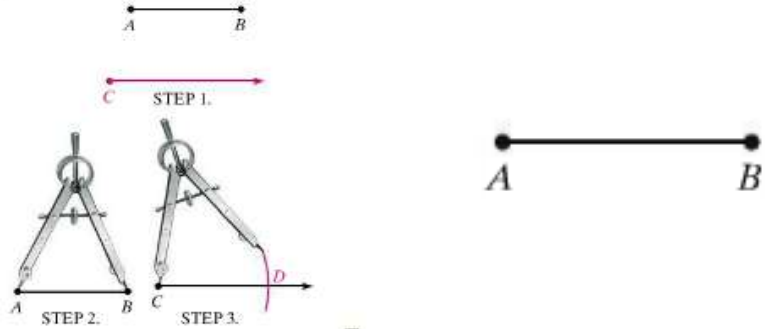
Construct a segment congruent to a given segment.

Given: \overline{AB}

Construct: \overline{CD} so that $\overline{CD} \cong \overline{AB}$

Solution

- STEP 1.** Draw a ray with endpoint C .
- STEP 2.** Open the compass to the length of \overline{AB} .
- STEP 3.** With the same compass setting, put the compass point on point C . Draw an arc that intersects the ray. Label the point of intersection D .



The segments are congruent, or $\overline{CD} \cong \overline{AB}$. □

EXAMPLE 2 Constructing Congruent Angles

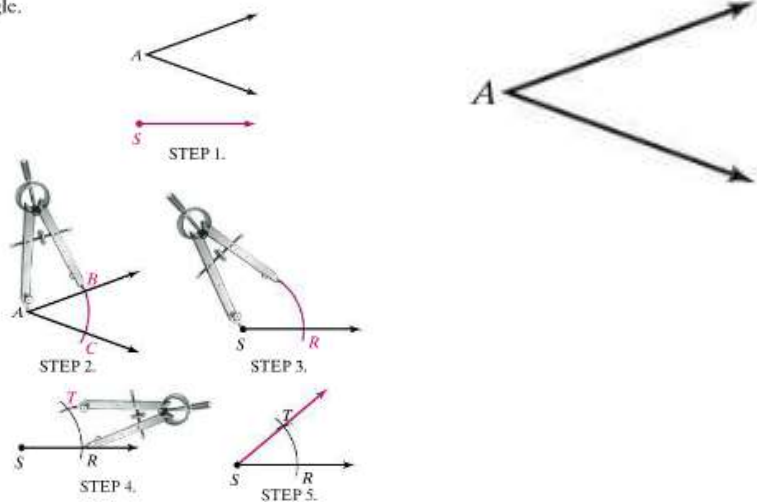
Construct an angle congruent to a given angle.

Given: $\angle A$

Construct: $\angle S$ so that $\angle S \cong \angle A$

Solution

- STEP 1.** Draw a ray with endpoint S .
- STEP 2.** With the compass point on vertex A , draw an arc that intersects the sides of $\angle A$. Label the points of intersection B and C .
- STEP 3.** With the same compass setting, put the compass point on point S . Draw an arc and label its point of intersection with the ray as R .
- STEP 4.** Open the compass to the length BC . Keeping the same compass setting, put the compass point on R . Draw an arc to locate point T .
- STEP 5.** Draw \overline{ST} .



The angles are congruent, or $\angle S \cong \angle A$. □

EXAMPLE 3 Constructing the Perpendicular Bisector

Construct the perpendicular bisector of a segment.

Given: \overline{AB}

Construct: \overleftrightarrow{XY} so that \overleftrightarrow{XY} is the perpendicular bisector of \overline{AB} .

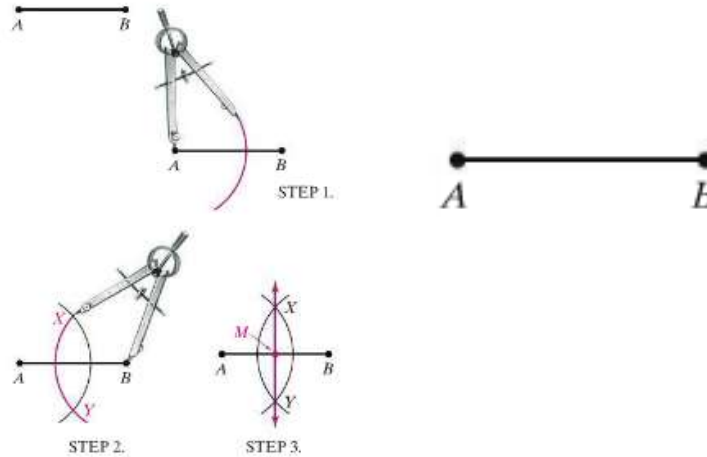
Solution

STEP 1. Put the compass point on point A and draw a long arc as shown. Be sure the opening is greater than $\frac{1}{2}AB$.

STEP 2. With the same compass setting, put the compass point on point B and draw another long arc. Label the points where the two arcs intersect as X and Y .

STEP 3. Draw \overleftrightarrow{XY} . Label the point of intersection of \overline{AB} and \overleftrightarrow{XY} as M , the midpoint of \overline{AB} .

$\overleftrightarrow{XY} \perp \overline{AB}$ at midpoint M , so \overleftrightarrow{XY} is the perpendicular bisector of \overline{AB} . \square



EXAMPLE 4 Constructing the Angle Bisector

Construct the bisector of an angle.

Given: $\angle A$

Construct: \overline{AD} , the bisector of $\angle A$

Solution

STEP 1. Put the compass point on vertex A . Draw an arc that intersects the sides of $\angle A$. Label the points of intersection B and C .

STEP 2. Put the compass point on point C and draw an arc. With the same compass setting, draw an arc using point B . Be sure the arcs intersect. Label the point where the two arcs intersect as D .

STEP 3. Draw \overline{AD} . \overline{AD} is the angle bisector of $\angle CAB$. \square

