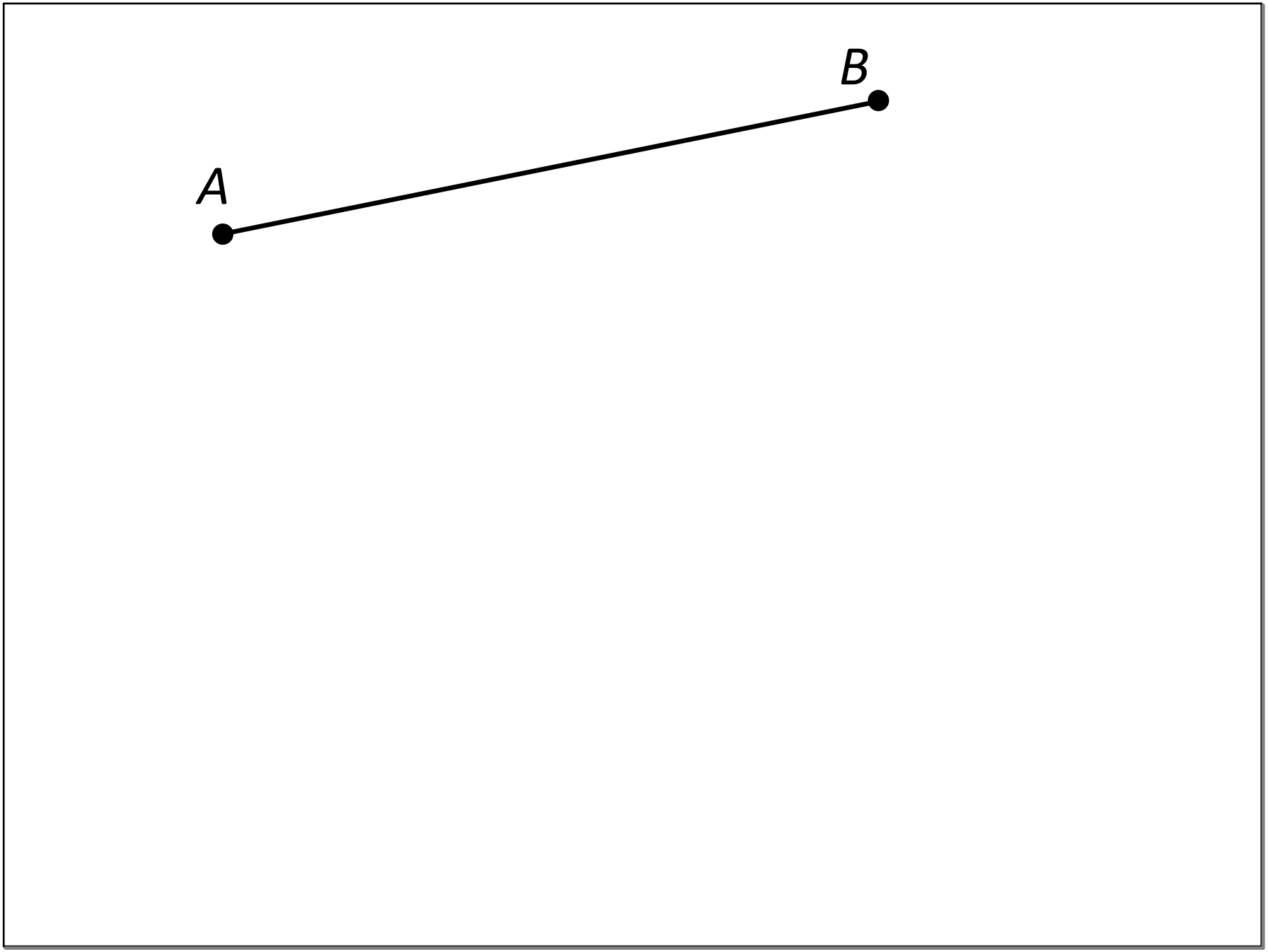
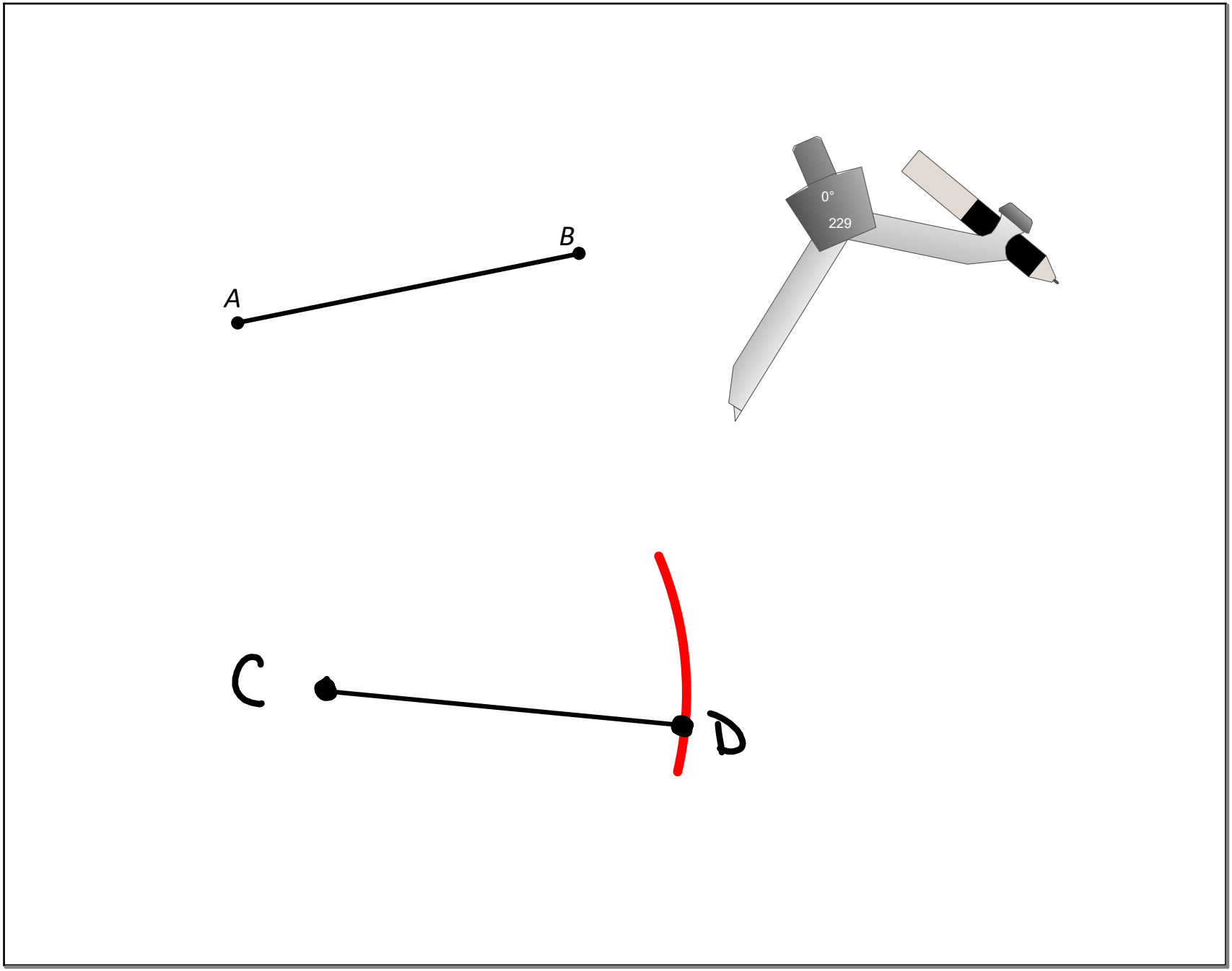
Using constructions to copy a segment

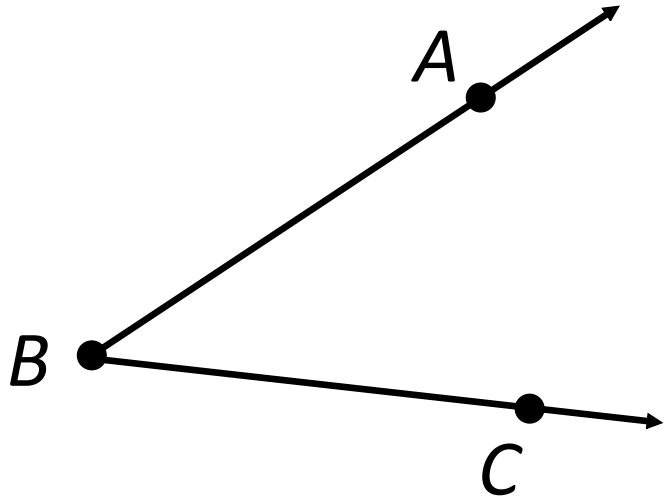
1. Mark an endpoint of the new segment
2. Set the point of the compass onto one of the endpoints of the initial line segment
3. Adjust the compass's width to the other endpoint
4. Without changing the compass's width, place its point on the endpoint of the new segment
5. Draw an arc
6. Mark the other endpoint of the new segment somewhere along the arc
7. Connect the points to create the new segment

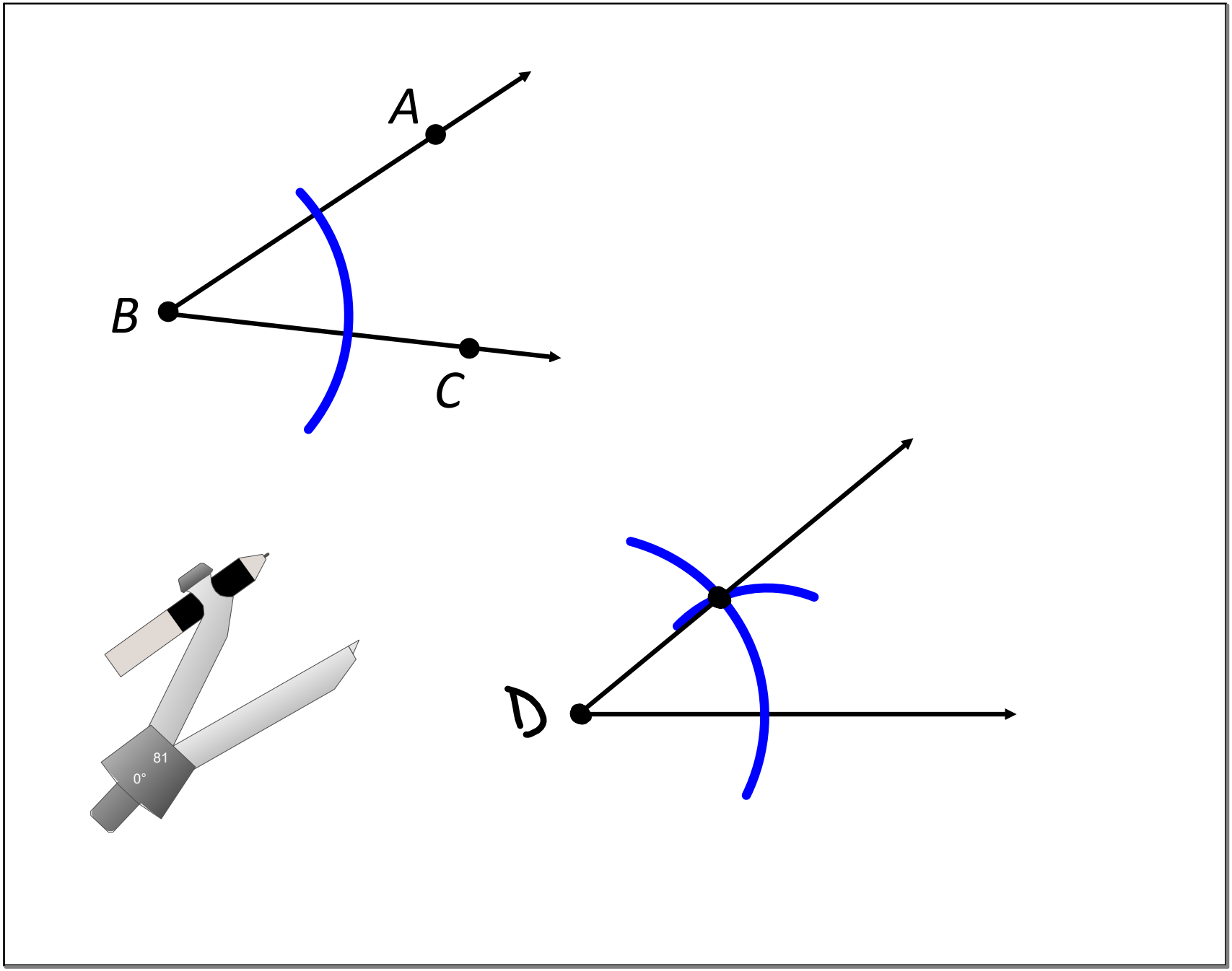

B
A


A
B
0°
229
C
D

Using constructions to copy an angle

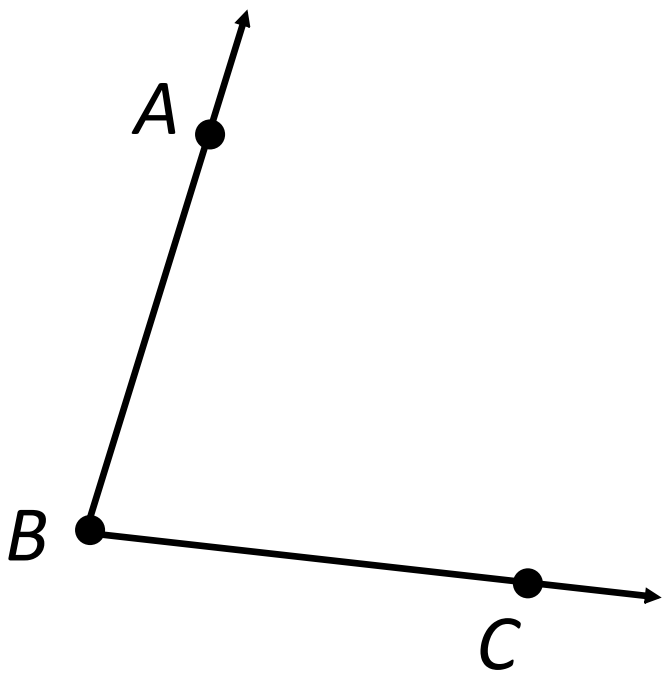
1. Mark the vertex of the new angle
2. Draw a ray extending from that vertex
3. Place the point of the compass on the vertex of the original angle, and open it to any width along one of the rays
4. Draw an arc across both sides of the angle
5. Without changing the compass's width, place the point of the compass on the new vertex and draw the same arc
6. On the original angle, set the width of the compass to equal the distance between the points of intersection of the angle and the arc
7. On the new angle, without changing the compass's width, place the point where the ray and the arc intersect and draw an arc that intersects the existing arc
8. Draw a ray from the vertex through this point of intersection

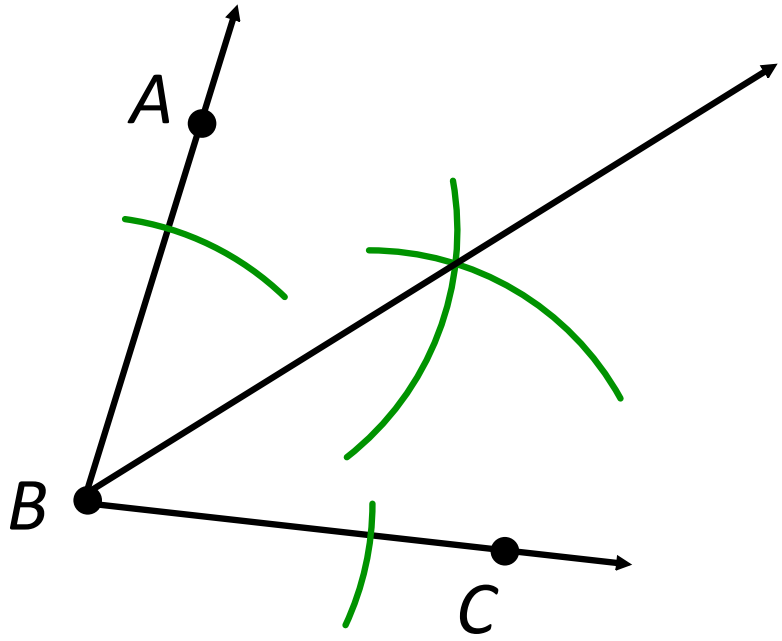

A
B
C

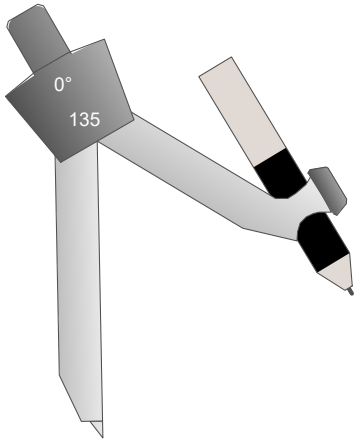

A
B
C
81
0°
D

Using constructions to create an angle bisector

1. Place the point of the compass on the vertex of the angle
2. Draw two small arcs using the same width of the compass - one across each leg of the angle
3. Place the point of the compass on one of the two intersection points and draw an arc in the interior of the angle
4. Repeat for the other leg so that the two arcs cross
5. Use a straightedge to draw a segment from the vertex of the angle to the point of intersection of these two interior arcs

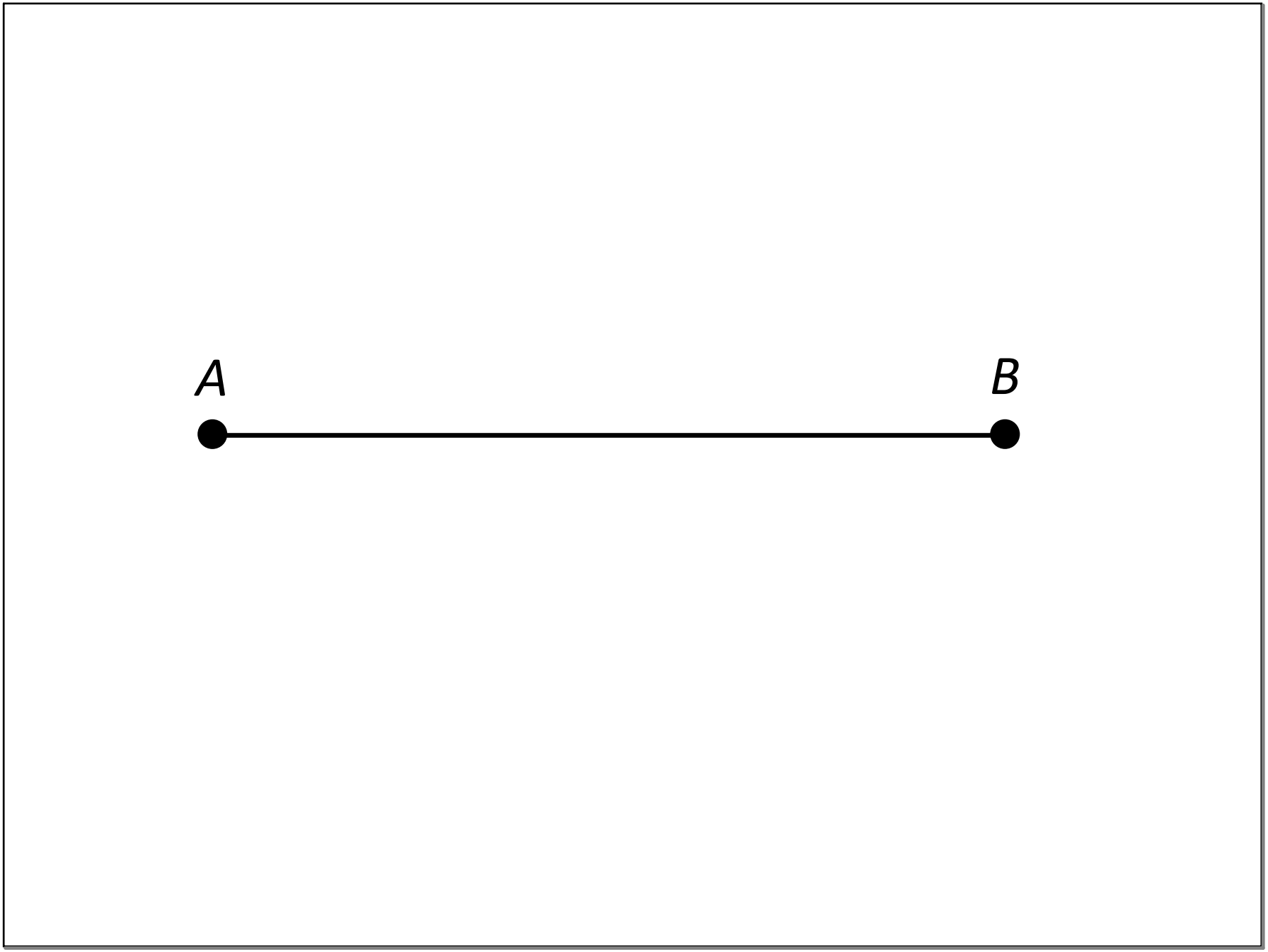

A
B
C

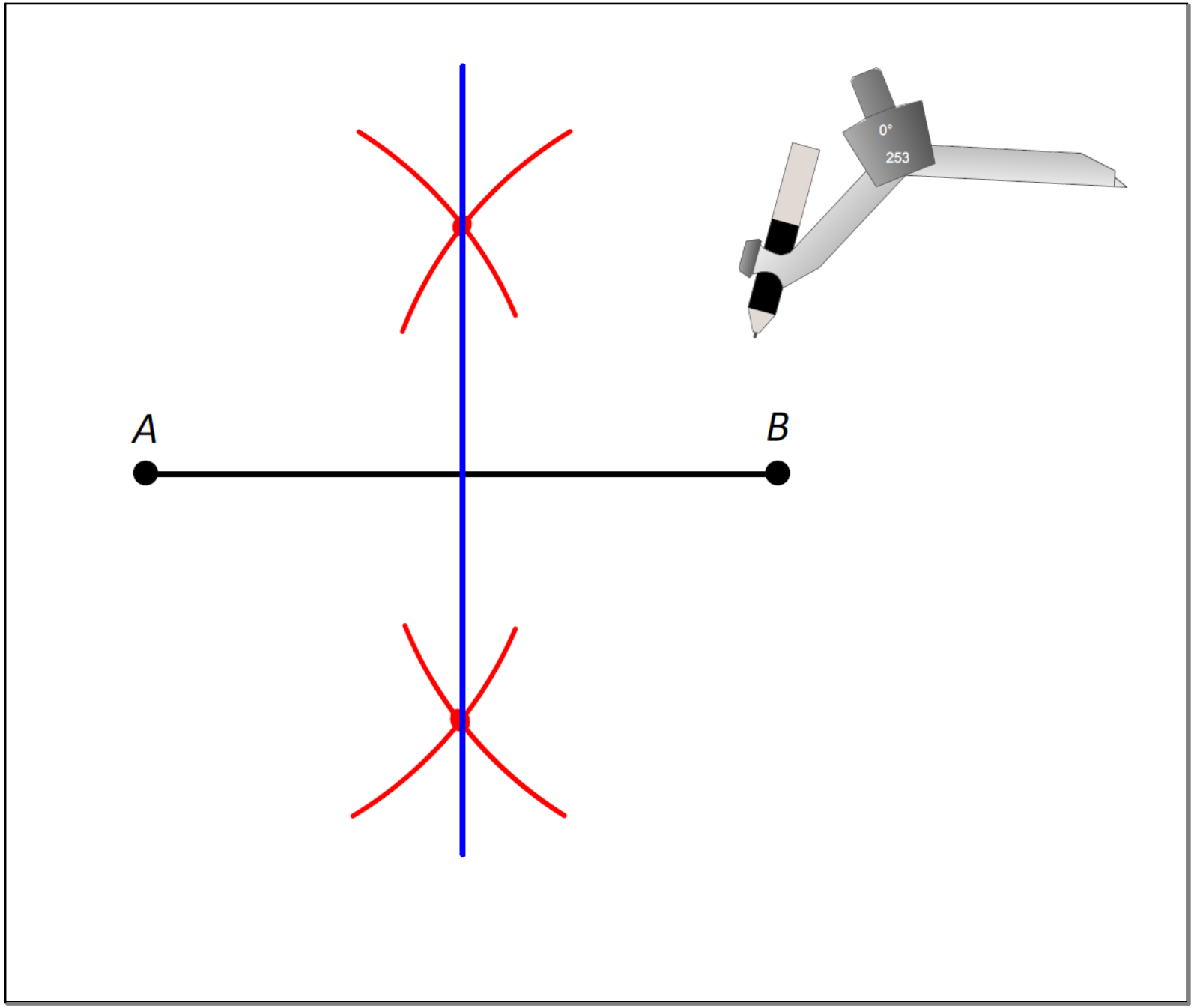

A
B
C


0°
135

Constructing a Perpendicular Bisector

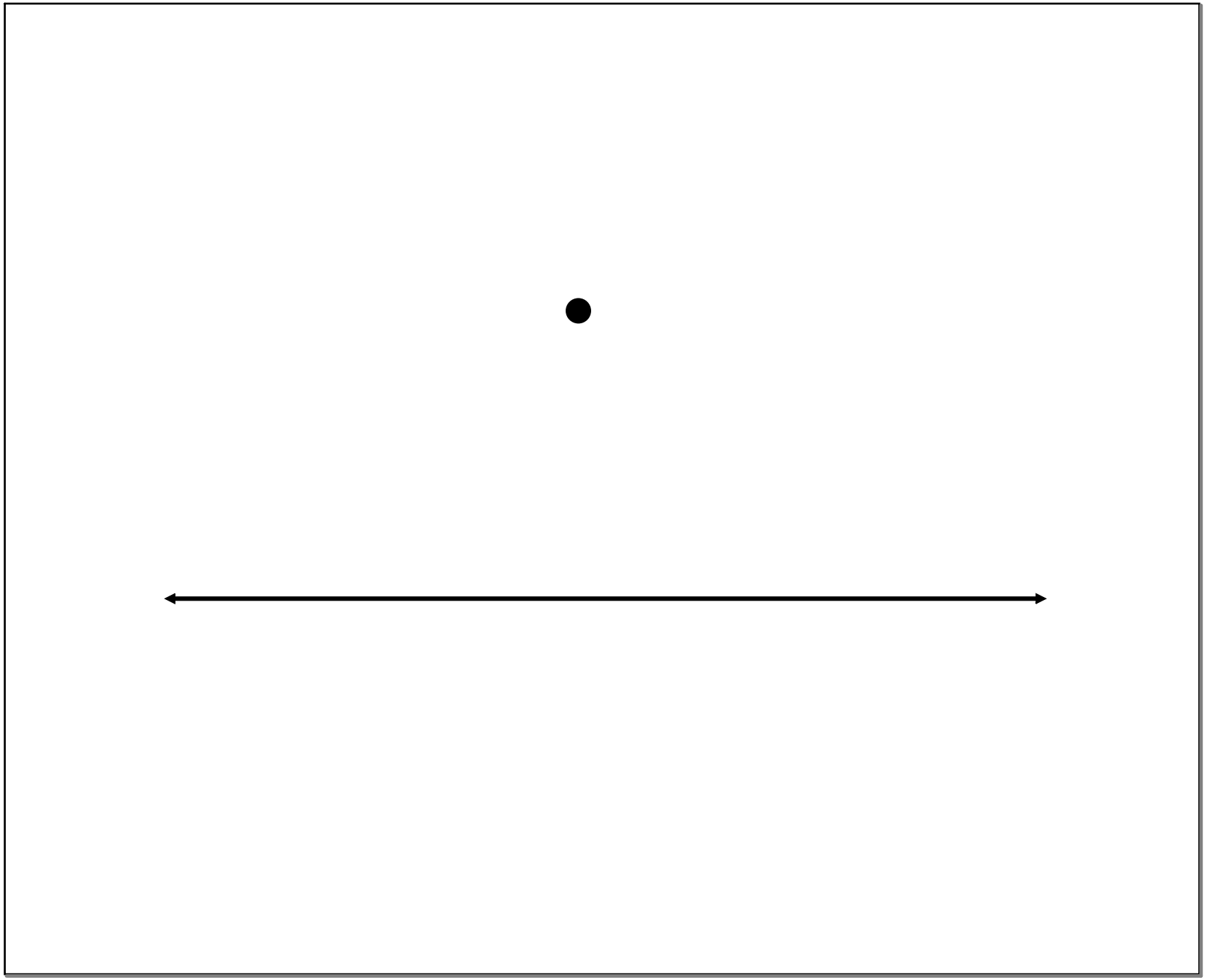
1. Set the point of the compass onto one of the endpoints of the line segment
2. Adjust the compass's width to approx 2/3 of the length of the entire segment
3. Without changing the width, draw an arc above the line, and another below the line
4. Set the point of the compass onto the other endpoint of the line segment
5. Draw arcs above and below the line so that they intersect the first two arcs
6. Use a straightedge to connect the arc intersection points

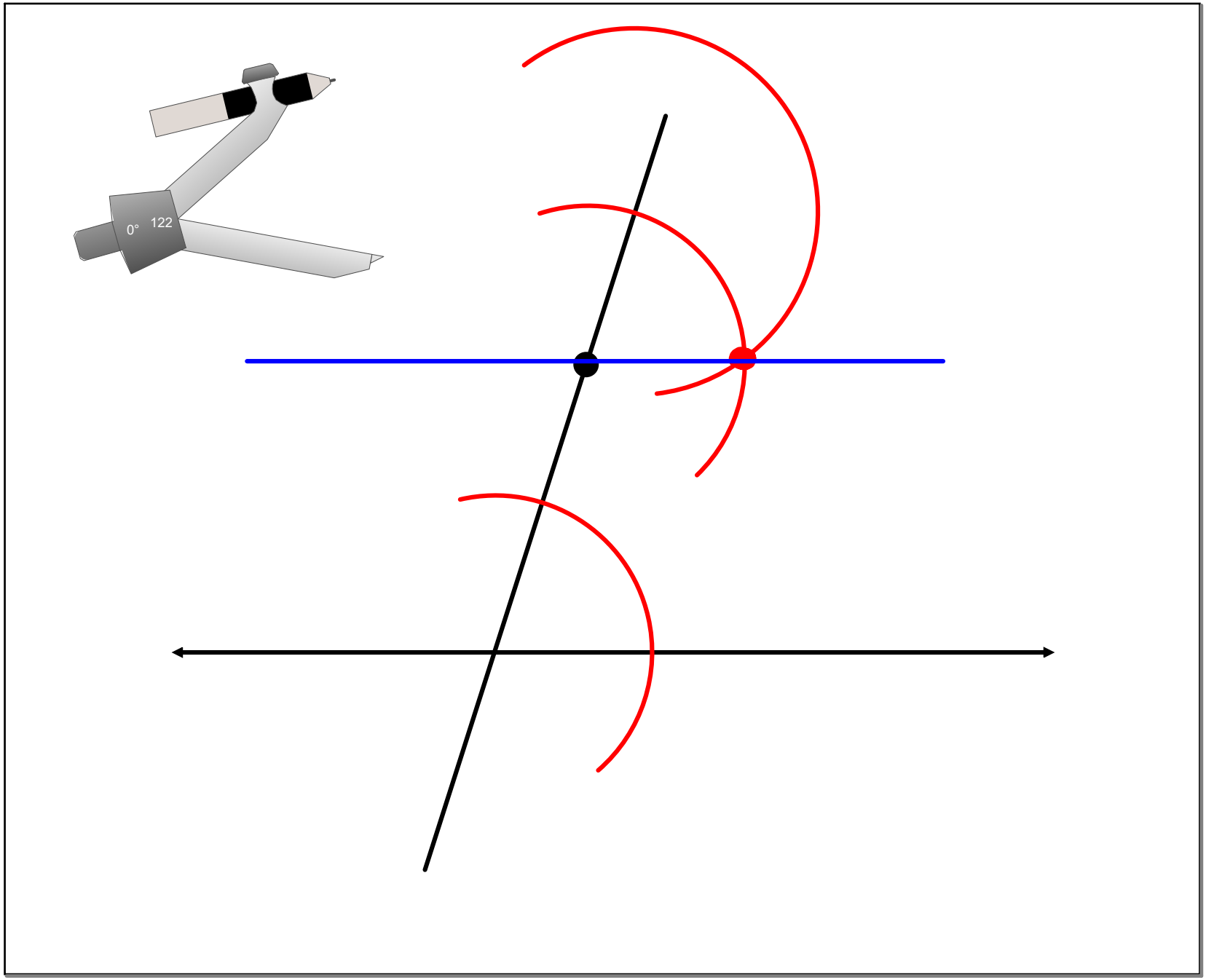

A
B


A
B
0°
253

Constructing a parallel line through a point

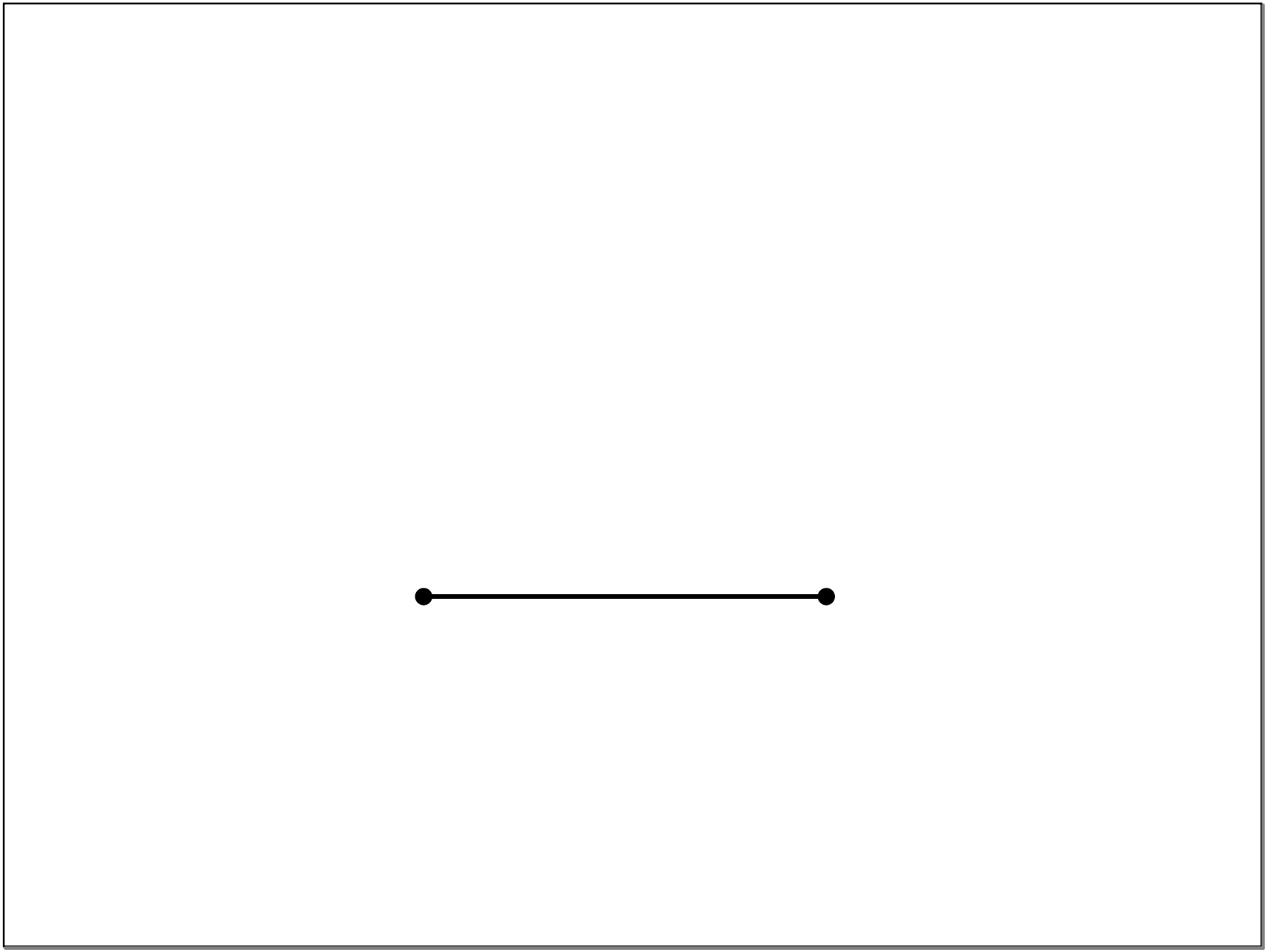
1. Draw a line through the point that crosses the line at an angle (make sure to extend it well above the point)
2. Place the compass at the intersection point, and set its width to about half the distance between this point and the initial point
3. Draw an arc across both lines
4. Without adjusting the width, move the compass to the initial point and draw another arc in a similar location relative to the point
5. On the lower arc, set the width of the compass to the distance between it's two points of intersection
6. Place the compass at the upper point of intersection, and draw an arc that crosses the other arc
7. Draw a straight line through the initial point and this point of intersection

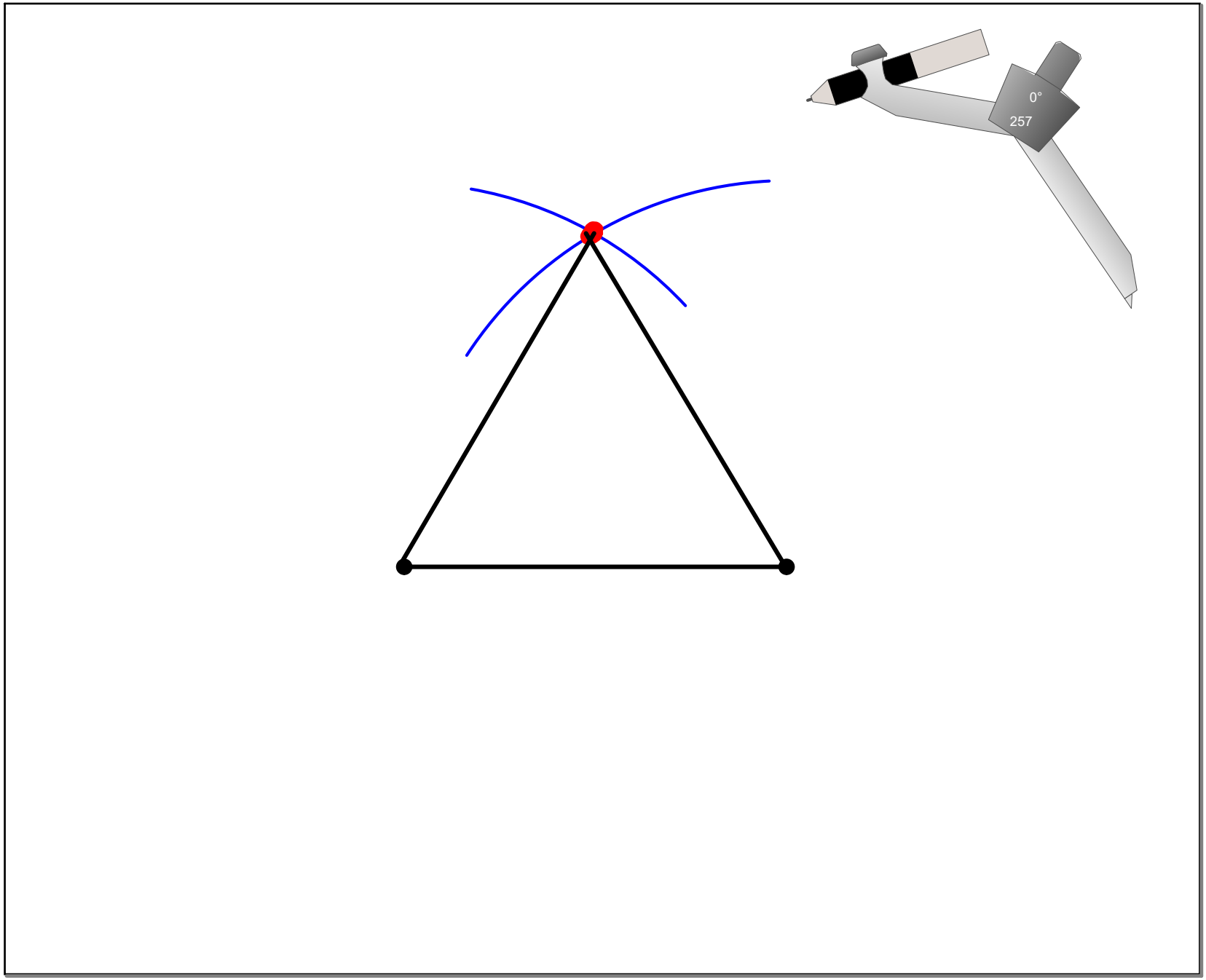



0°
122

Constructing an equilateral triangle

1. Start with a line segment
2. Measure the line segment by placing the compass on one endpoint and extending it to the other endpoint
3. Keeping the compass on the first endpoint, make an arc above the line segment across the halfway point
4. Without adjusting the width of the compass, place it on the other endpoint
5. Make an arc above the line segment that intersects the first arc
6. Using a straightedge, connect each endpoint to the intersection of the arcs to make an equilateral triangle



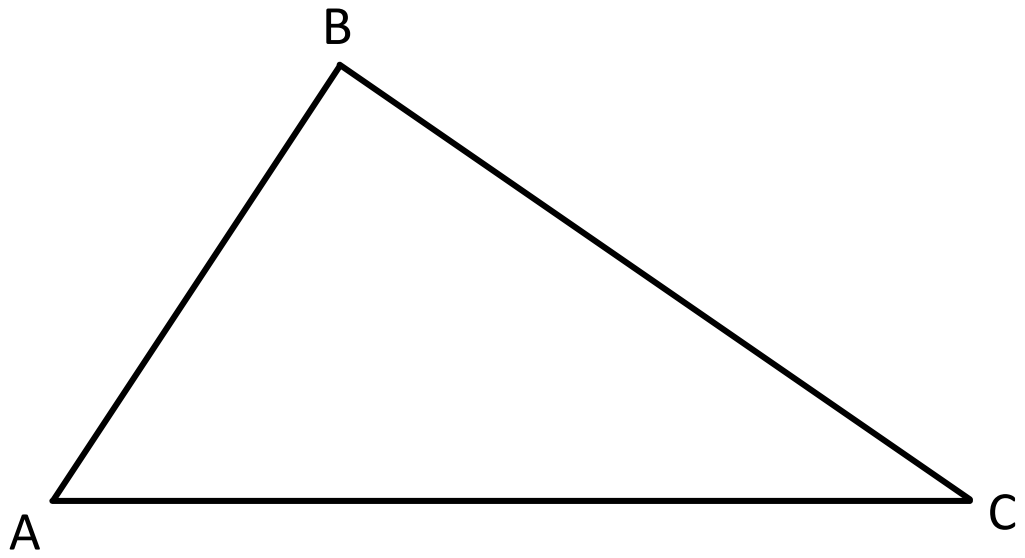

0°
257

Centroid of a Triangle

- point of concurrency for the medians of a triangle
- always in the interior of the triangle
- center of gravity
- length from vertex to centroid is 2/3 the length of the entire median

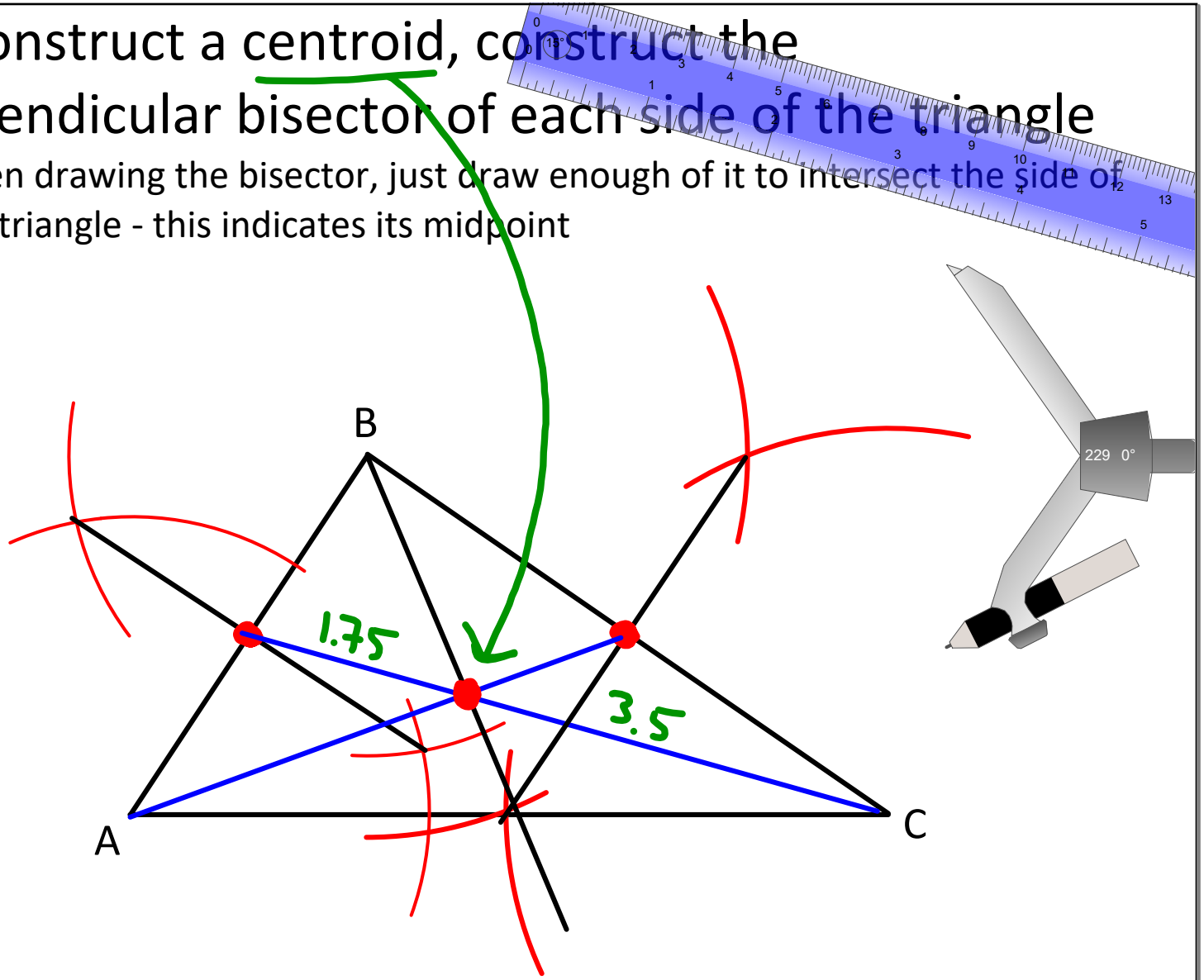
To construct a centroid, construct the perpendicular bisector of each side of the triangle

** when drawing the bisector, just draw enough of it to intersect the side of the triangle - this indicates its midpoint



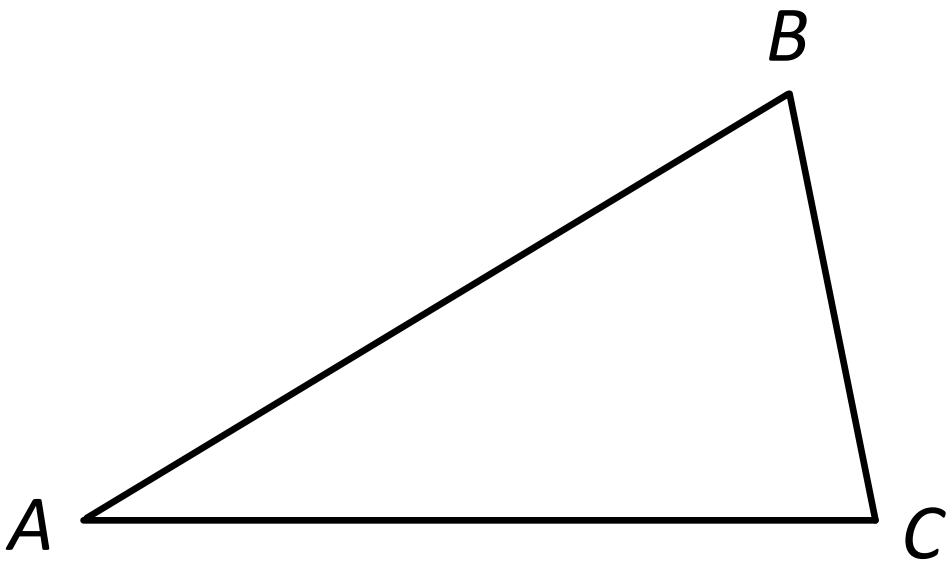
To construct a centroid, construct the perpendicular bisector of each side of the triangle

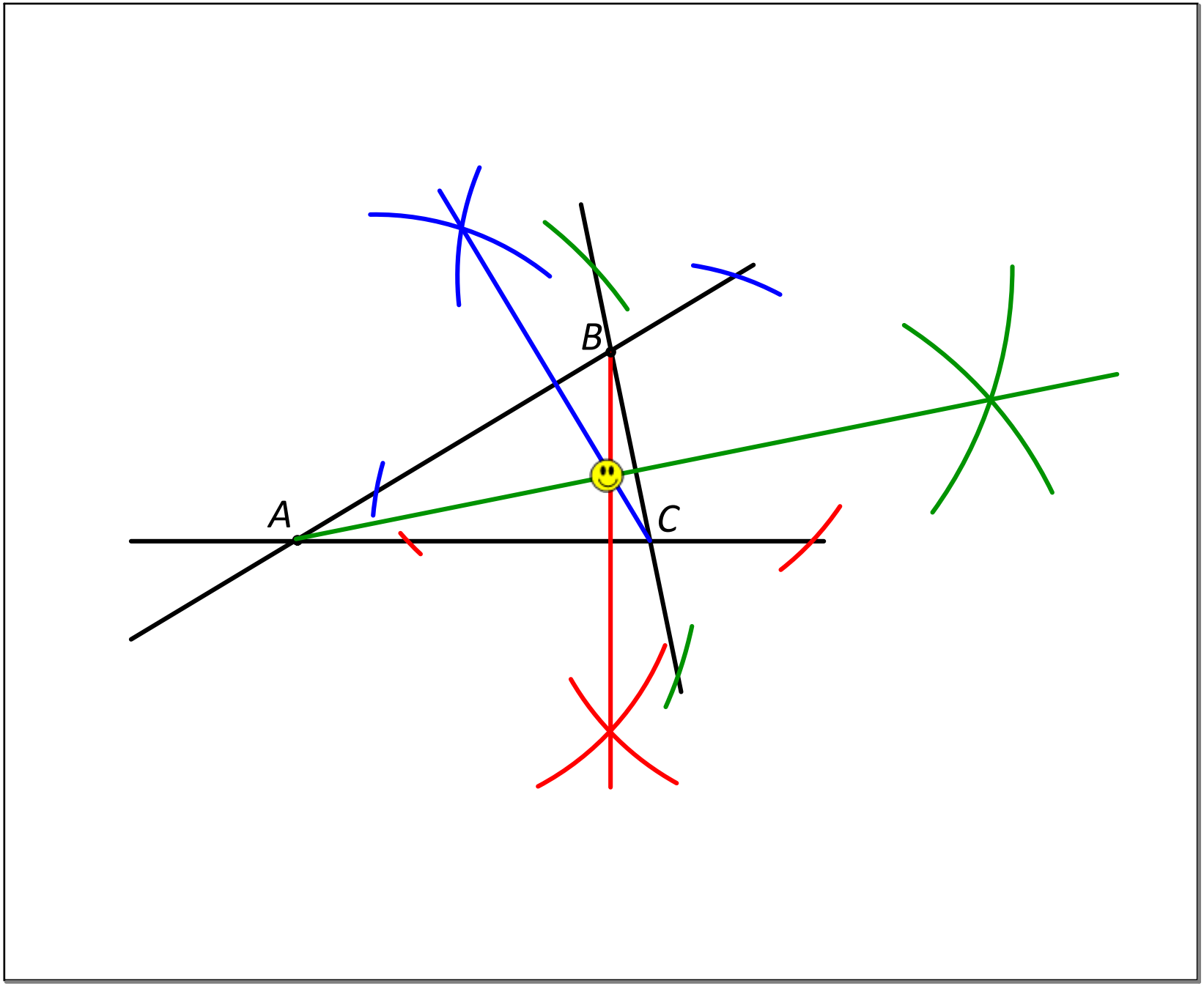
** when drawing the bisector, just draw enough of it to intersect the side of the triangle - this indicates its midpoint



Constructing the Altitudes of a Triangle

1. Choose a side and extend it in both directions
2. Set the compass on the opposite vertex, and adjust its width to beyond the side
3. Make two arcs intersecting the line
4. From the two points of intersection, without adjusting the width of the compass, draw two overlapping arcs beyond the side of the triangle
5. Using a straightedge, connect this point of intersection with the vertex in order to create the altitude
6. Repeat the process to construct the two other altitudes

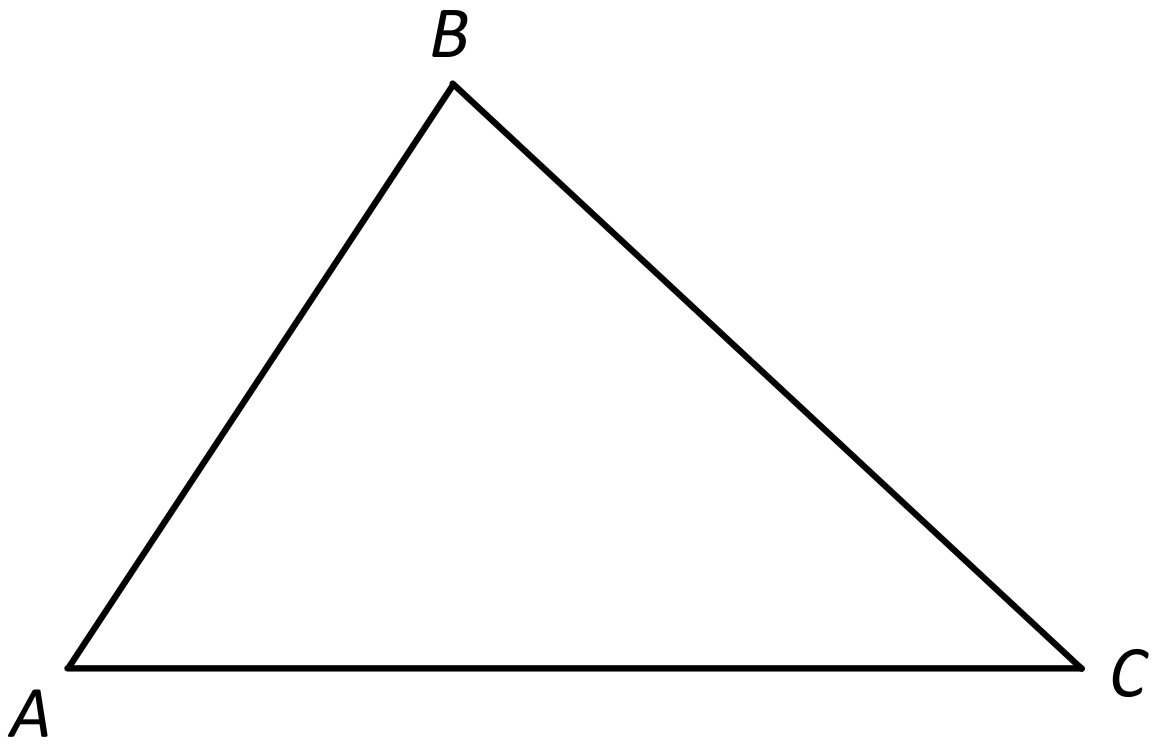

B
A
C


B
A
C

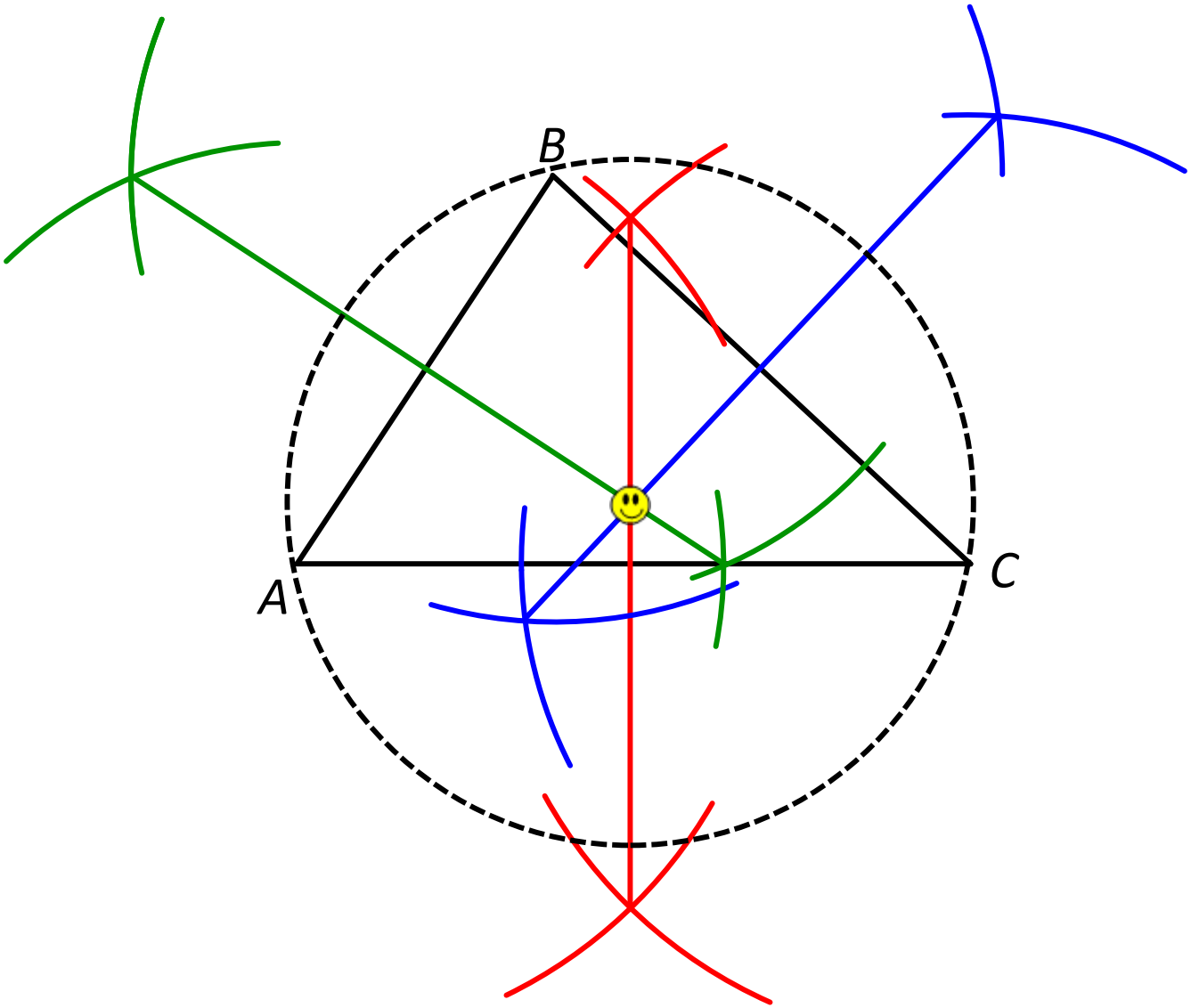
Circumcenter of a Triangle

- point of concurrency for the perpendicular bisectors of a triangle
- can be outside of a triangle
- center of the circumscribed circle
- equidistant to each...

Construct the circumcenter of the triangle:



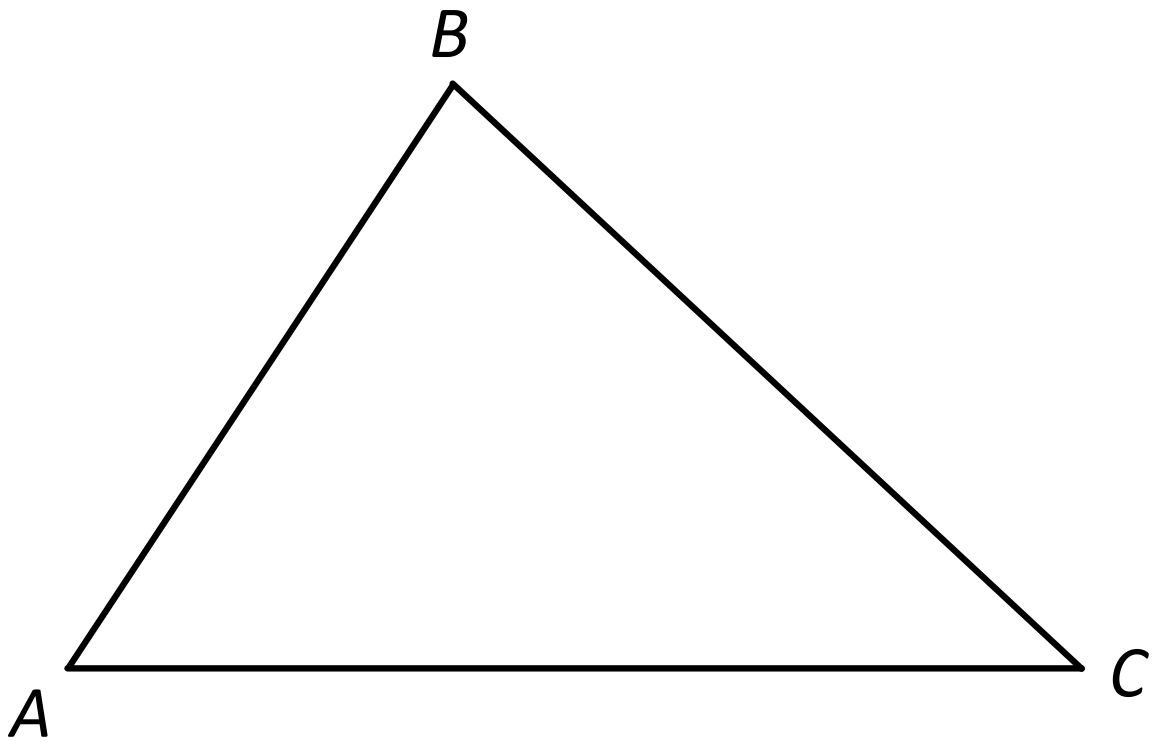
Construct the circumcenter of the triangle:



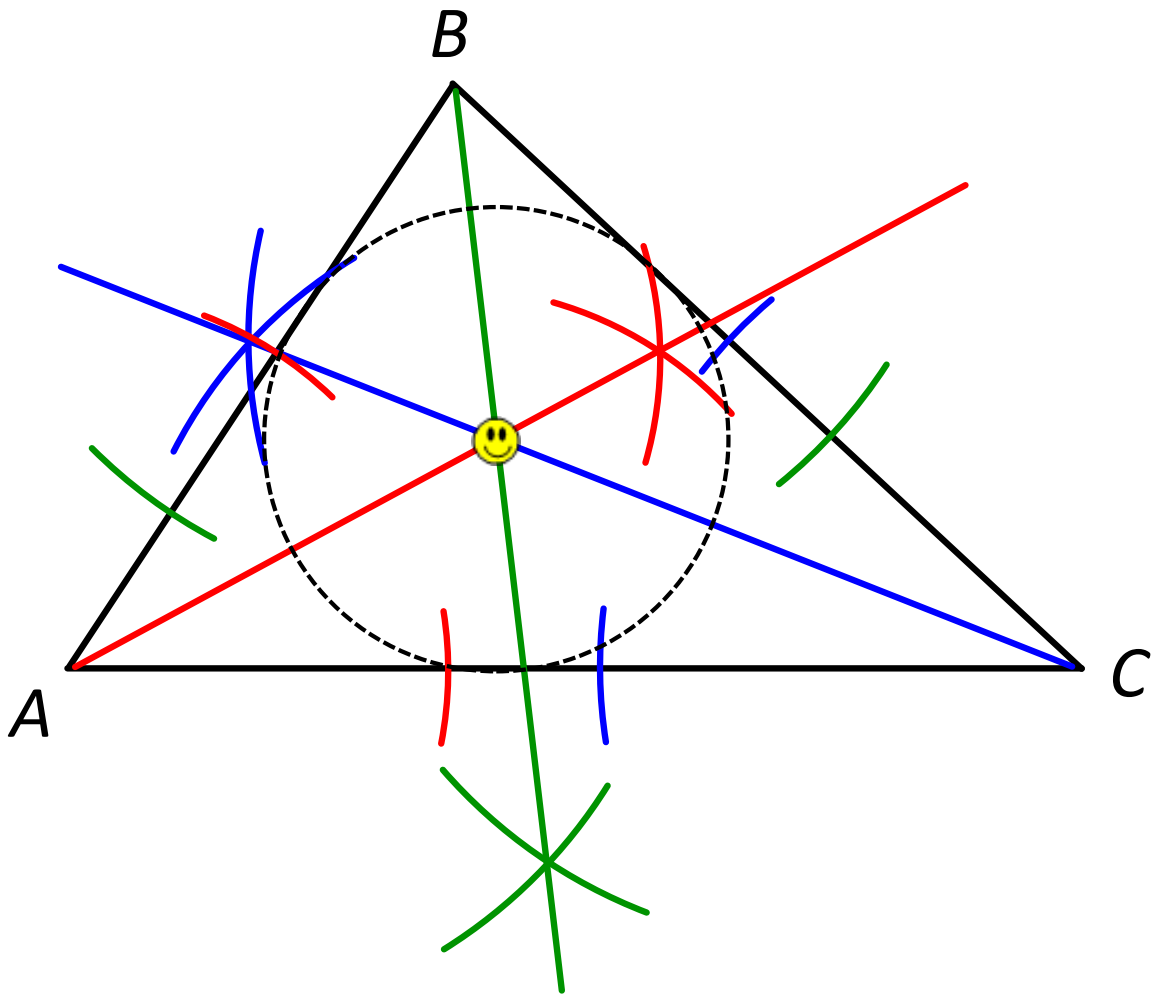
Incenter of a Triangle

- point of concurrency for the angle bisectors of a triangle
- always in the interior of a triangle
- center of the inscribed circle
- equidistant to each...

Construct the incenter of the triangle:

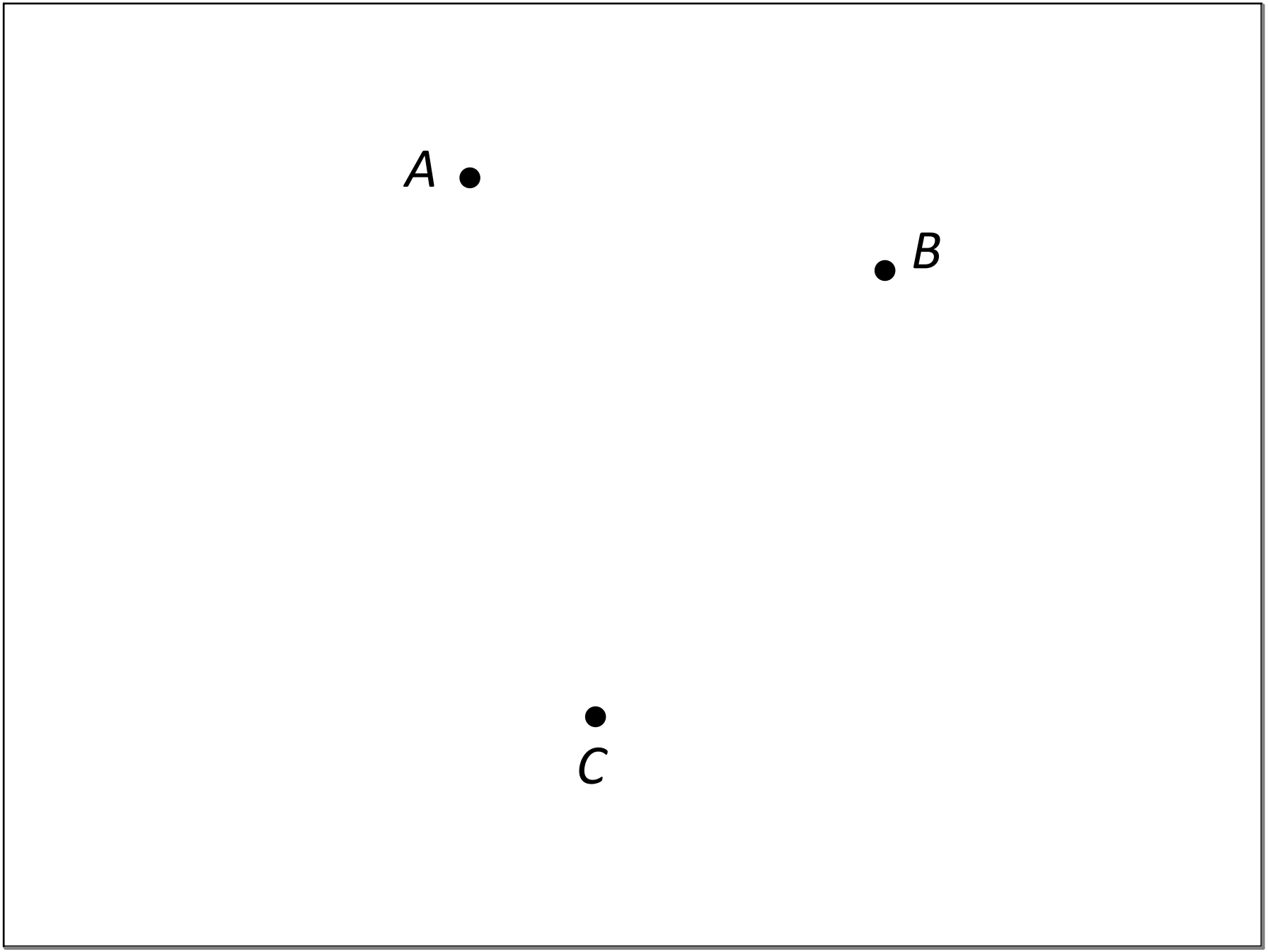


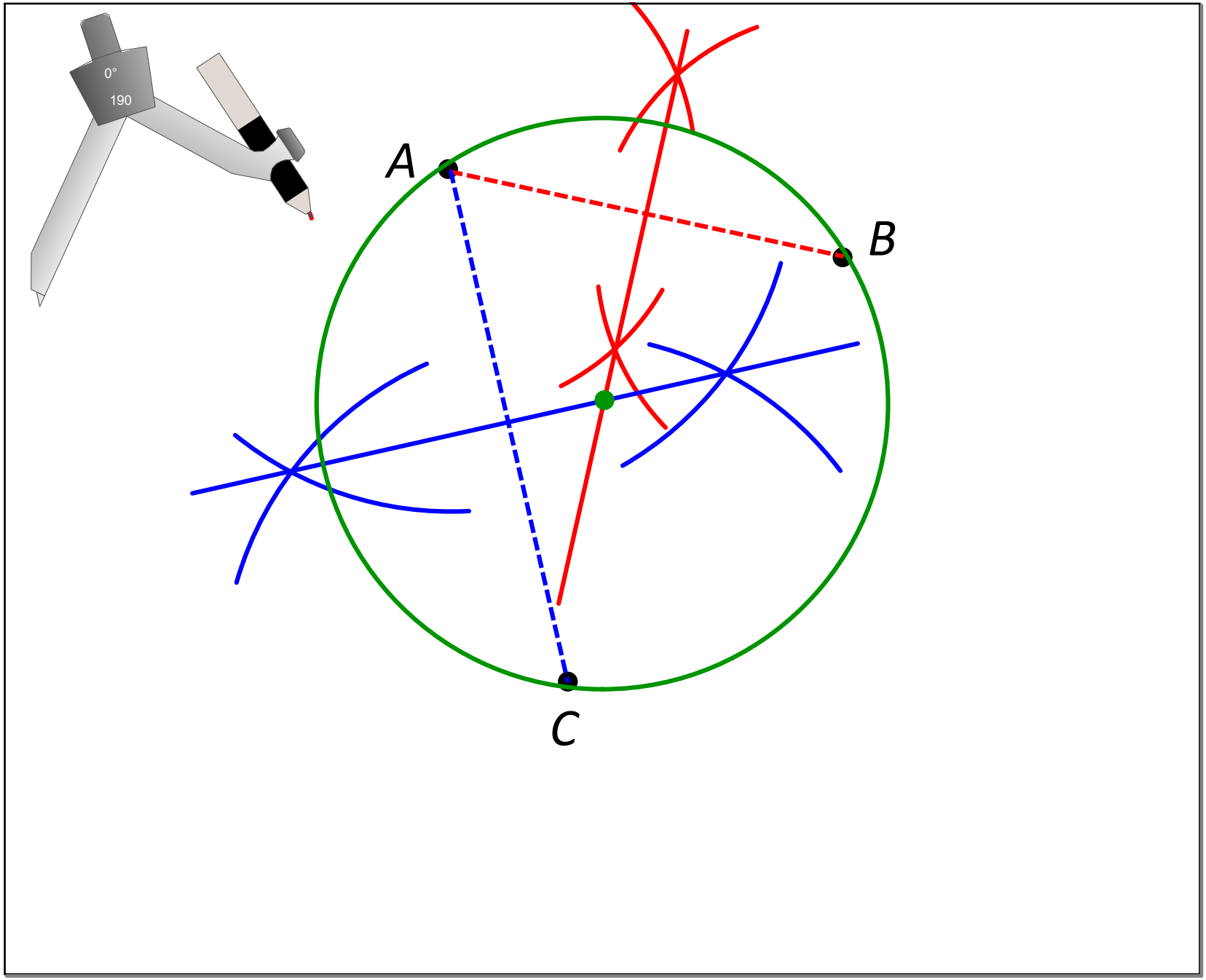
Construct the incenter of the triangle:



Constructing a circle through three given points

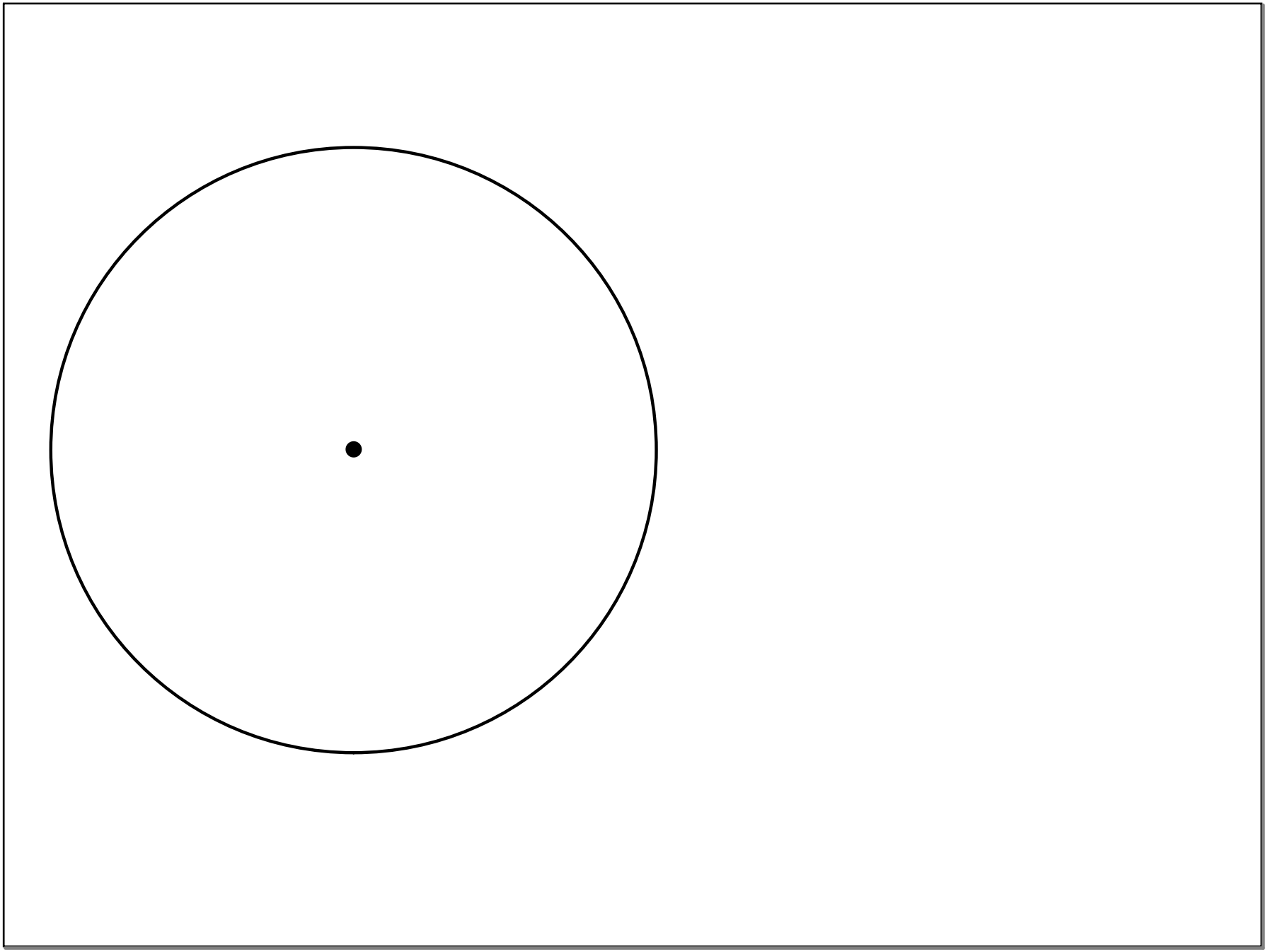
1. Draw a segment between any two of the points
2. Construct the perpendicular bisector of this segment
3. Draw a segment between two other points
4. Construct the perpendicular bisector of this segment
5. The point of intersection of these two perpendicular bisectors is the center of the circle that is being constructed. Place the tip of the compass at this point of intersection, and open it to any of the three original points.
6. Draw a circle passing through all three points

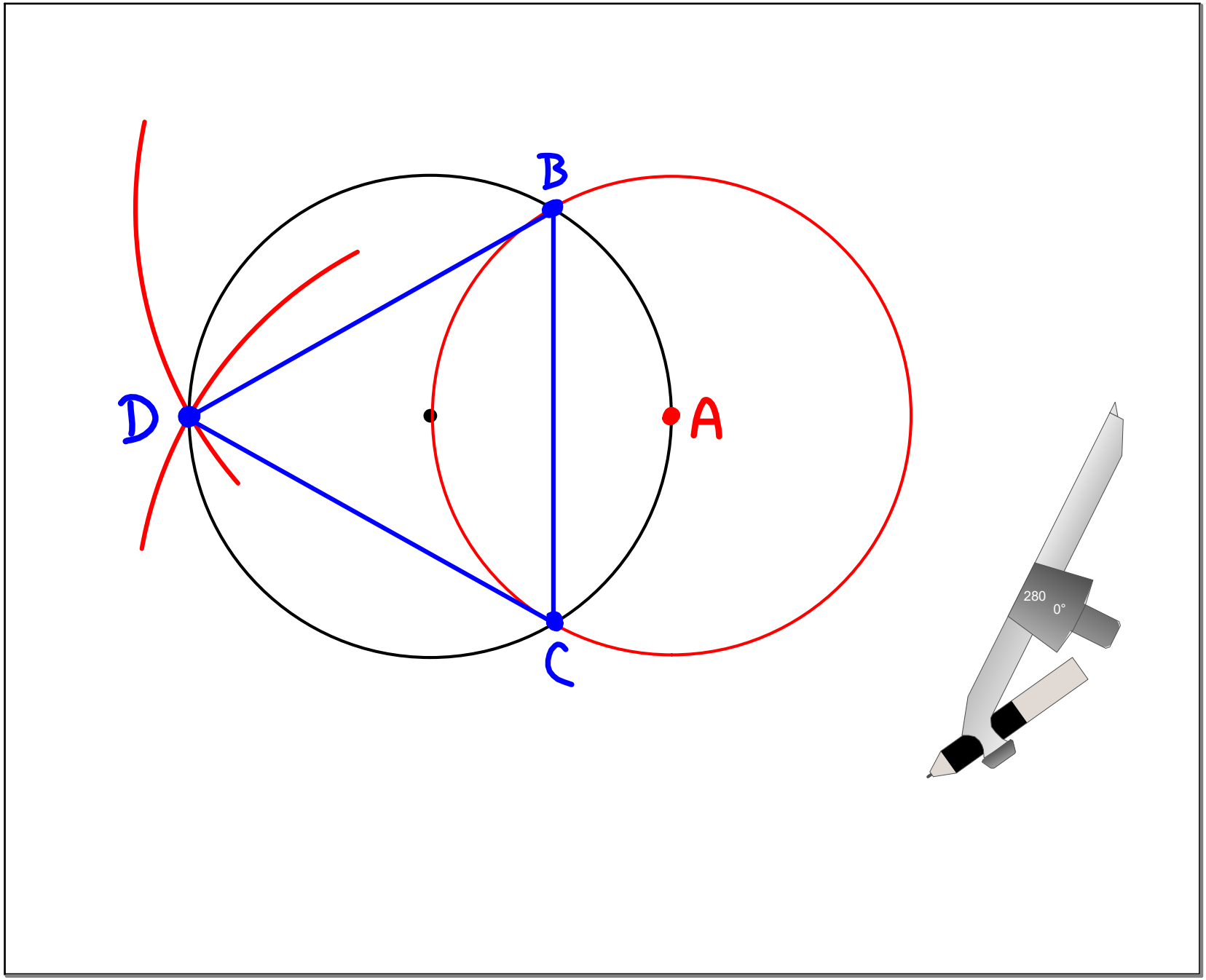

A
B
C


0°
190
A
B
C

Constructing an equilateral triangle inscribed in a circle

1. Mark a point anywhere on the circle, and label it *A*
2. Set the width of the compass as the radius of the circle
3. Without adjusting the width of the compass, place the tip at *A* and draw a circle of equal radius
4. Label the intersection points of the two circles as *B* and *C*, and use a straightedge to draw $\overline{BC}$
5. Set the width of the compass to the length of $\overline{BC}$
6. Place the tip of the compass at *B*, and draw an arc intersecting the original circle. Repeat this process from *C*.
7. The two arcs should intersect on the circle. Label this point of intersection as *D*.
8. Using a straightede, draw $\overline{BD}$ and $\overline{CD}$. ΔBCD is equilateral.

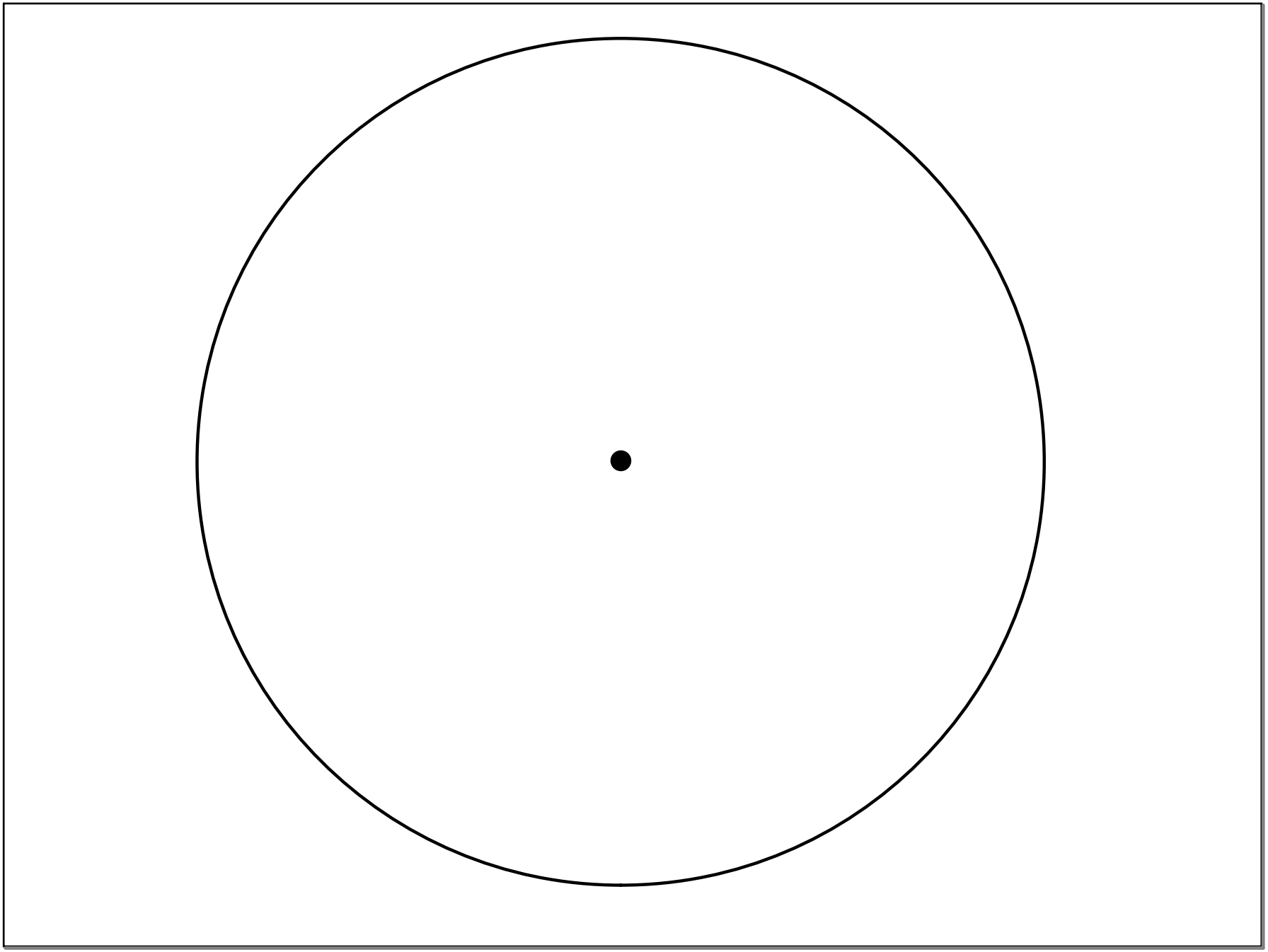


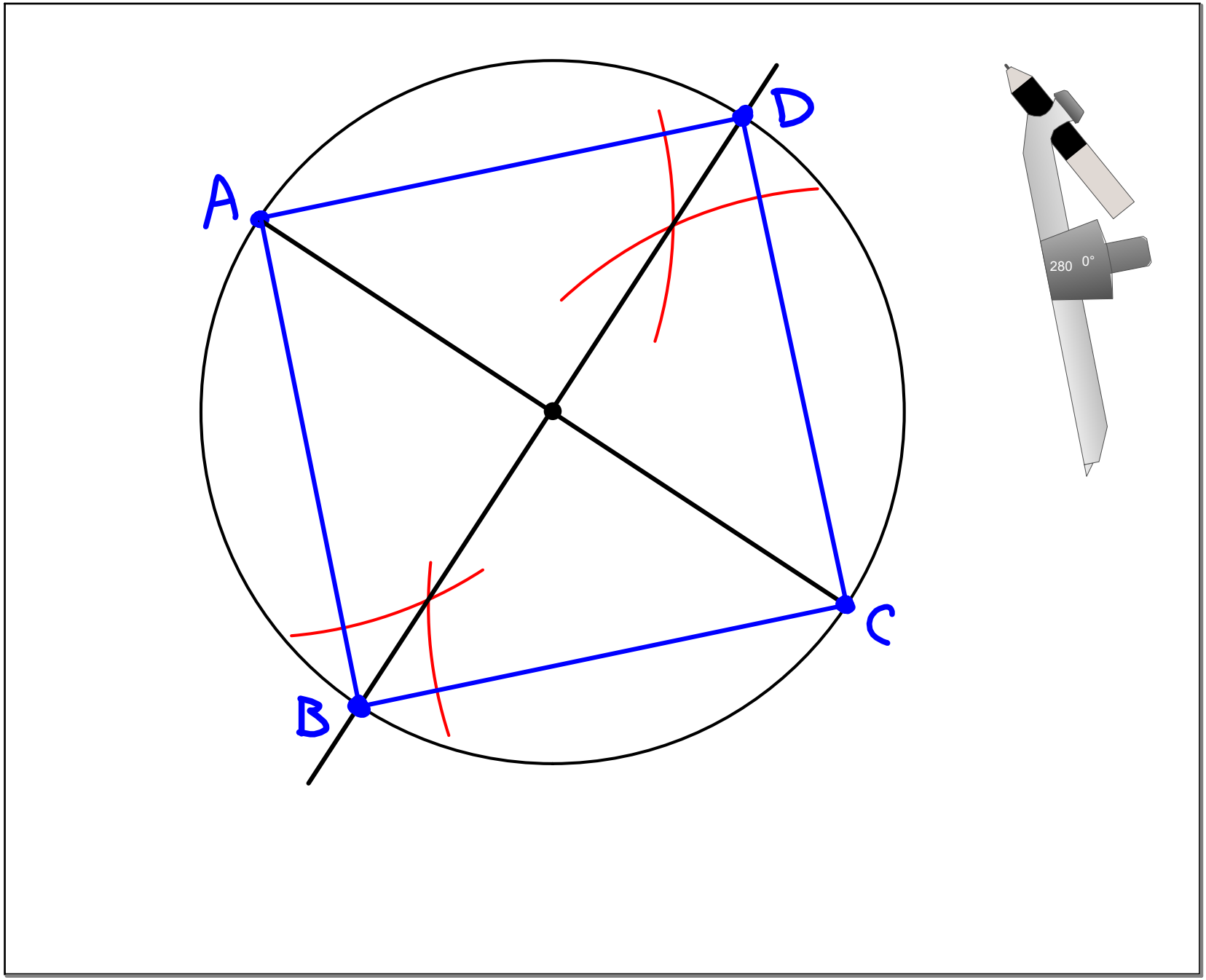

B
D
A
C

280
0°

Constructing a square inscribed in a circle

1. Mark a point anywhere on the circle. This will be the first vertex of the square.
2. Using a straightedge, draw a diameter from this vertex. Label its endpoints as *A* and *C*
3. Construct the perpendicular bisector of this diameter. When drawing the segment, make it long enough to intersect the circle, and label the points where it does so as *B* and *D*
4. Using a straightedge, draw segments $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$

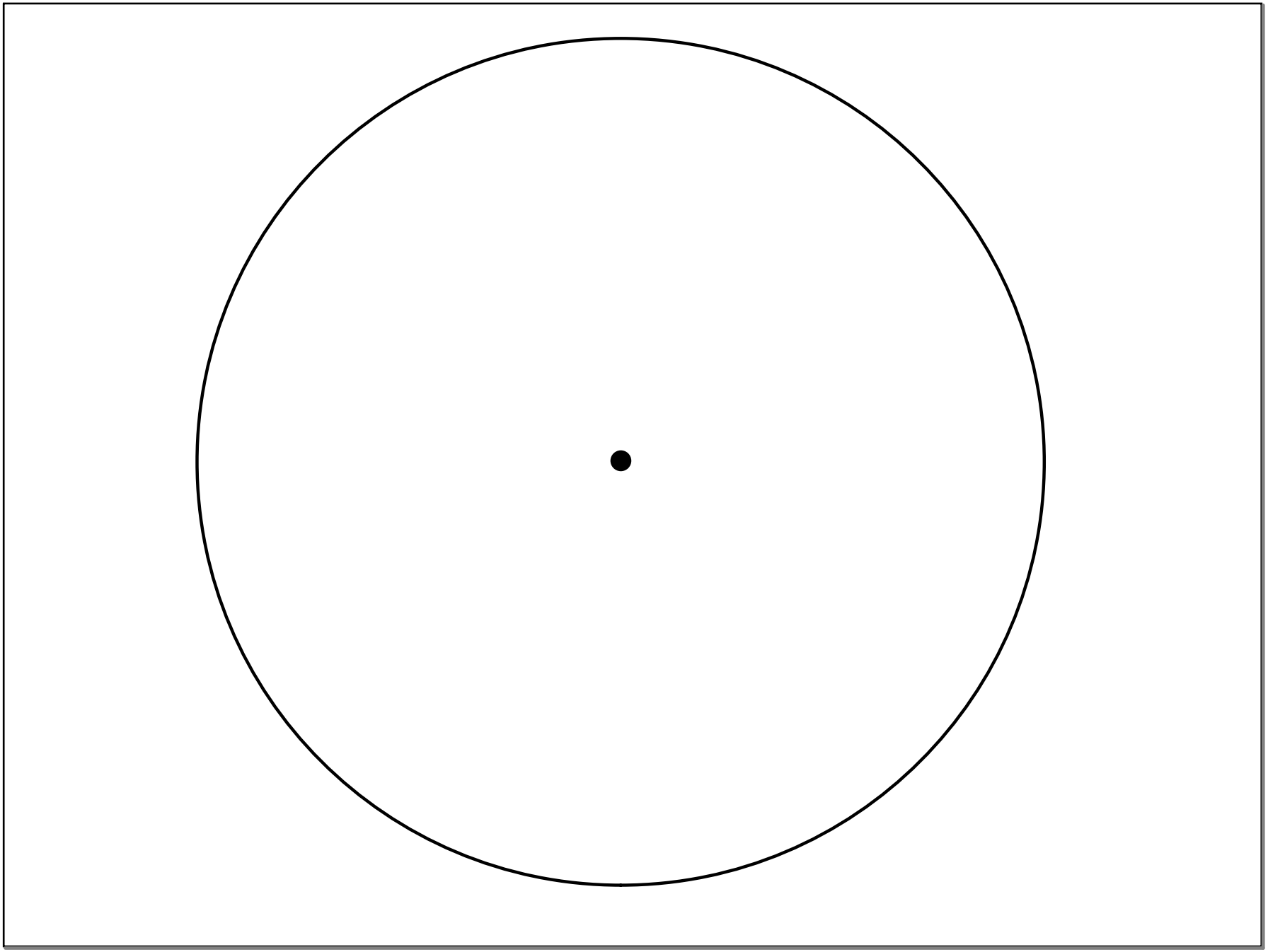


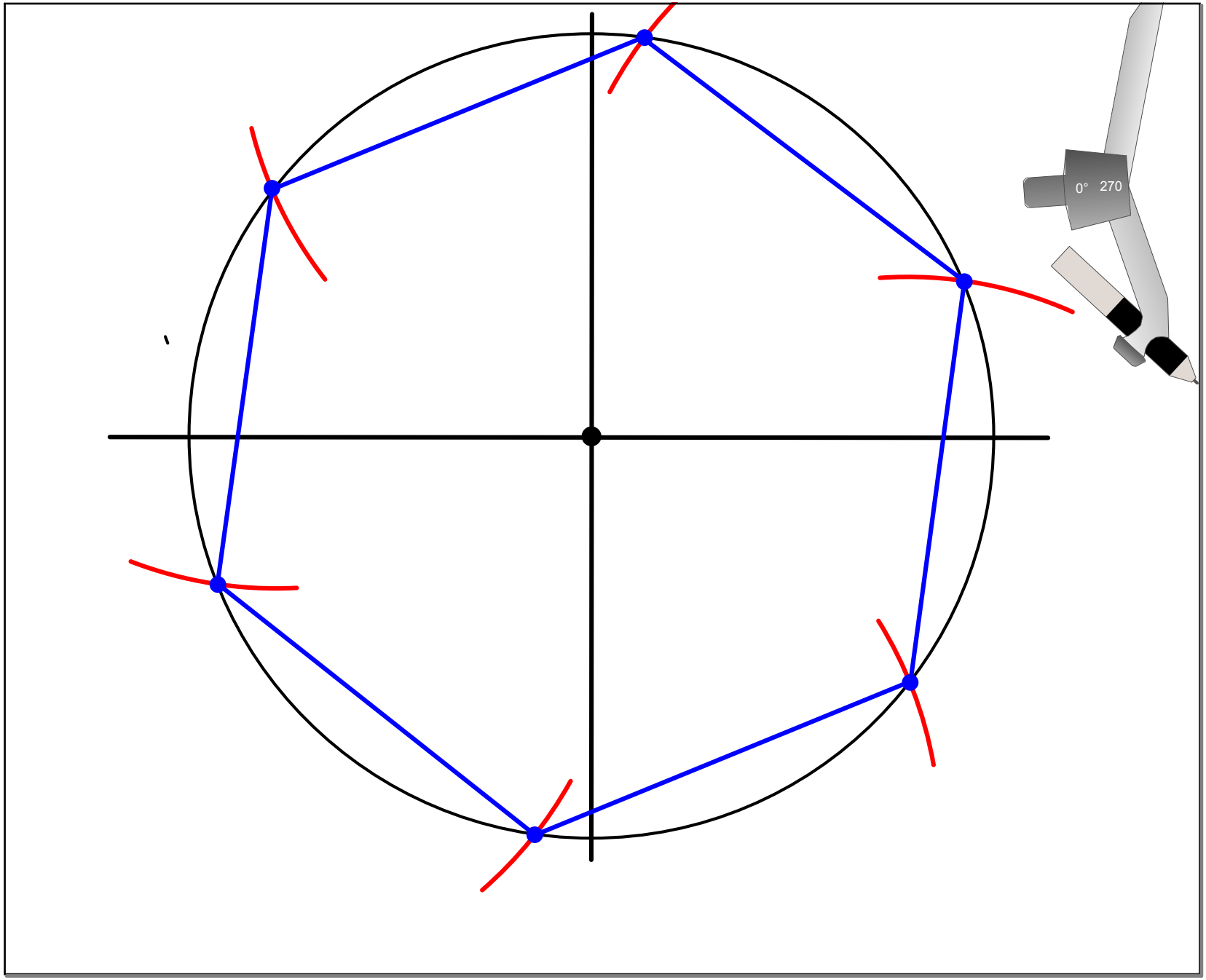

A
D
B
C
280
0°

Constructing a regular hexagon inscribed in a circle

** Property of regular hexagons: side is equal to radius

1. Mark a point anywhere on the circle. This will be the first vertex of the hexagon
2. Set the tip of the compass on this vertex, and set its width to be the center of the circle
3. Make an arc across the circle. This will be the next vertex.
4. Set the tip of the compass on this 2nd vertex, and draw another arc across the circle
5. Continue this process until all six vertices are drawn
6. Using a straightedge, draw a segment between each pair of successive vertices




0°
270