Constructions Problems

Short-answer problems about constructions.

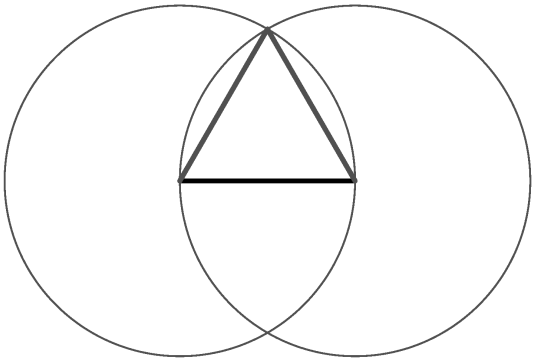
Question 1 *What is your name?*

Free Response:

Problem 2 *Given a line segment, construct an equilateral triangle whose edge has the length of the given segment. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** (a) *Draw two circles, one with each end point as the center and with the other as a point on the circle.*

(b) *The circles intersect at two points. Choose one and connect it to both of the line segment's endpoints.*



Problem 3 *Use a compass and straightedge to bisect a given line segment. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** (a) *Draw two circles, one with each end point as the center and with the other as a point on the circle.*

(b) *The circles intersect at two points. Draw a line through these two points.*

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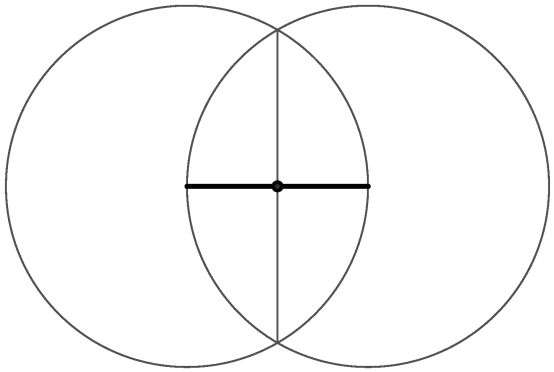
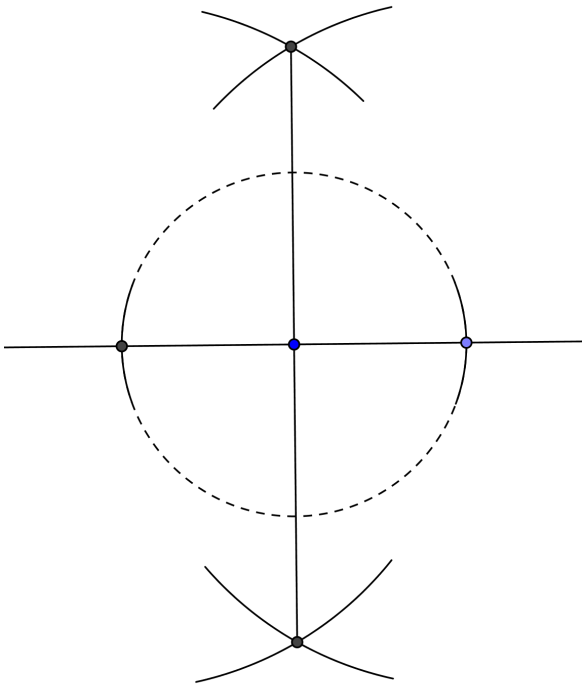
(c) *The new line bisects the original line segment.*



Problem 4 *Given a line segment with a point on it, construct a line perpendicular to the segment that passes through the given point. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** (a) *With an arbitrary radius, draw a circle to identify two points on the given line equidistant from the given point.*

(b) *Now (as above) bisect the segment defined by those two new points.*



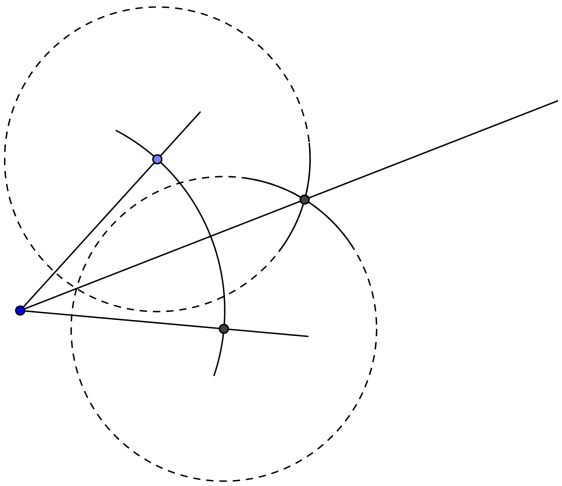
Problem 5 *Use a compass and straightedge to bisect a given angle. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** (a) *Draw a circle with its center being the vertex of the angle.*

(b) *At each of the points where that circle intersects the sides of the angle, draw a circle with the same radius.*

(c) *The two circles intersect in two points. Draw a ray from the vertex of the angle through one of those points.*

(d) *The line bisects the angle.*



Problem 6 *Given an angle and some point [or a ray], use a compass and straightedge to copy the angle so that the new angle has as its vertex the given point [or a ray as one side of the angle]. Explain the steps in your construction and how you know it works.*

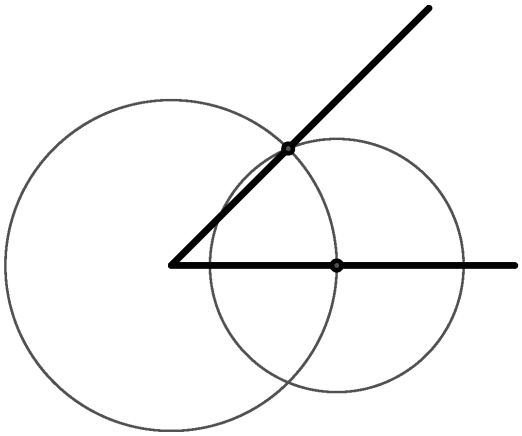
Free Response: ***Hint:*** (a) *Open the compass to a fixed width and make a circle centered at the vertex of the angle.*

(b) *Make a circle of the same radius on the line with the point [or on the ray].*

(c) *Open the compass so that one end touches the first circle where it hits one side of the original angle, with the other end of the compass extended to where the first circle hits the other side of the original angle.*

(d) *Draw a circle with the radius found above with its center where the second circle hits the line.*

(e) *Connect the point to where the circles meet. This is the other side of the angle we are constructing.*

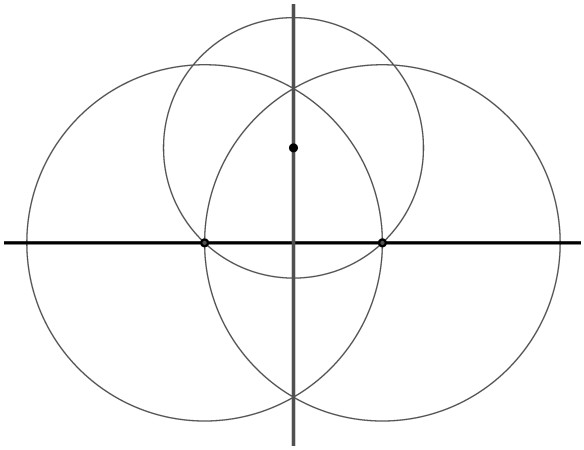


Problem 7 *Given a point and line, construct a line perpendicular to the given line that passes through the given point. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** *the original line that passes through the given point.*

(a) *Draw a circle centered at the point large enough to intersect the line in two distinct points.*

(b) *Bisect the line segment. The line used to do this will be the desired line.*



Problem 8 *Given a point and line, construct a line parallel to the given line that passes through the given point. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** *Through the given point, construct a perpendicular to the given line. Then through the same point, construct a perpendicular to the new line.*

Problem 9 *Construct a* 30-60-90 *right triangle. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** *Construct an equilateral triangle and cut it in half.*

Problem 10 *Construct an isosceles right triangle. Explain the steps in your construction and how you know it works.*

Free Response: ***Hint:*** *Construct a square and draw a diagonal.*
