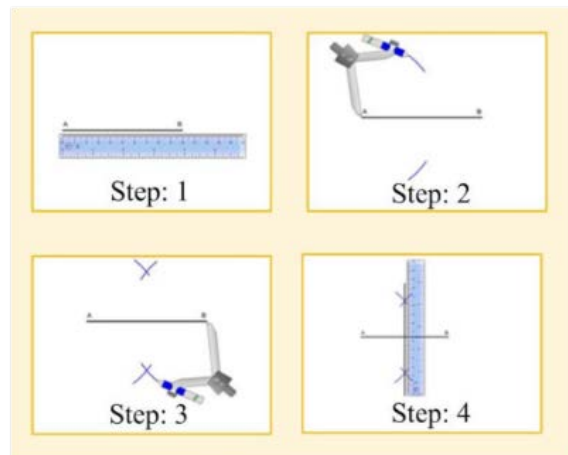


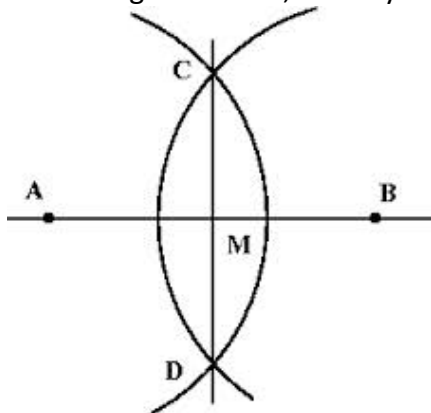
Here are the steps to constructing a perpendicular bisector of a line.

- Set the width of the compass to a little more than half of the total line (the width doesn't matter so much, as long as it does not change during this step)
- Put the point of the compass on one endpoint of the line and use the pencil side to draw a small arc above and below of the line.
- Without changing the width, repeat this step using the other endpoint of the line.
- The arcs should intersect at a point above and a point below the line. Using a straightedge, connect these points with a straight line.



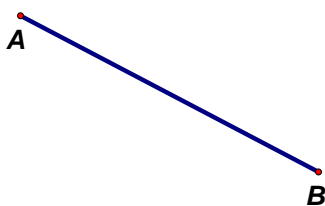
- 1) What are the tools used in geometric construction?
- 2) What is the difference between a ruler and a straightedge?
- 3) What does it mean to *bisect* a segment or an angle?
- 4) Describe how to use the perpendicular bisector of a line segment to find the midpoint of the line segment.
- 5) What's the difference between a bisector and a perpendicular bisector?
- 6) How can you construct a non-perpendicular bisector of a line segment?

7) In the diagram below, identify all congruent segments.



8) Copy the segment and construct a perpendicular bisector.

a)



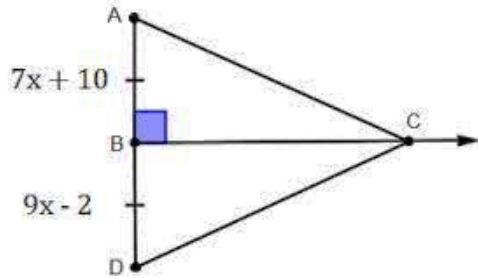
b)



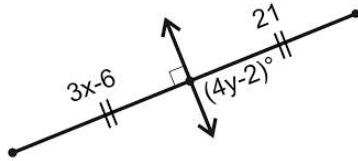


**Application:**

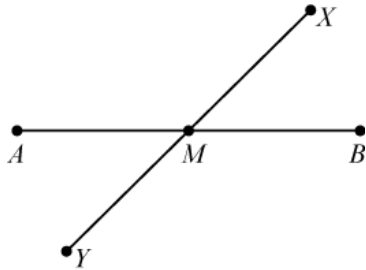
9) Find the value of  $x$ :



10) Find the values of  $x$  and  $y$ .

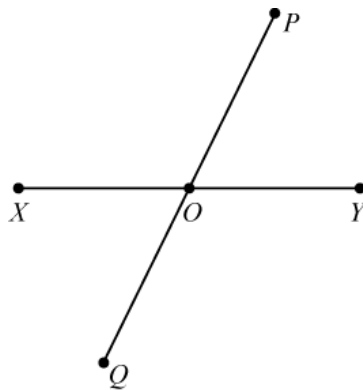


11) In the figure shown below,  $A$ ,  $M$ , and  $B$  are collinear.  $\overline{XY}$  and  $\overline{AB}$  bisect each other. Also,  $AM = 3x + 6$ ,  $MB = 4x - 1$ , and  $MX = 2x + 4$ .



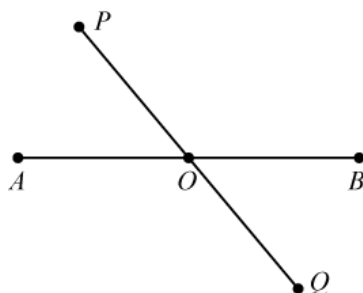
What is the length of  $\overline{XY}$ ?

12) In the figure shown below,  $X$ ,  $O$ , and  $Y$  are collinear.  $\overline{PQ}$  bisects  $\overline{XY}$ . Also,  $XO = 2x + 10$  and  $OY = 6x - 6$ .



What is the value of  $x$ ?

13) In the figure shown below,  $A$ ,  $O$ , and  $B$  are collinear.  $\overline{AB}$  and  $\overline{PQ}$  bisect each other. Also,  $AO = 7a - 4$ ,  $OB = 6a - 1$ , and  $OQ = 4a + 3$ .



What are the lengths of  $\overline{OP}$ ,  $\overline{QP}$ , and  $\overline{AB}$ ?