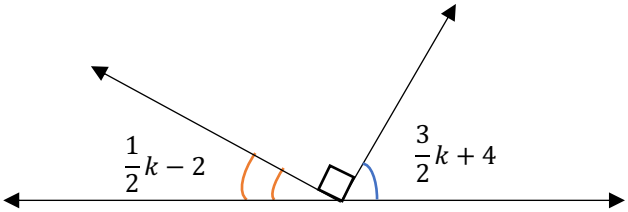
Lesson 1.05 Bisecting Segments & Angles

Students will be able to:

- Content Objective: Define segment and angle bisector and use these definitions to solve algebraic problems.
- Language Objective: Discuss the relationship between a perpendicular bisector and a segment bisector.

Warm Up

Given the diagram below (not drawn to scale), solve for k.



Vocabulary Review

Match each term to the correct definition.

1. _____ Perpendicular Lines
2. _____ Supplementary Angles
3. _____ Complementary Angles
4. _____ Midpoint
5. _____ Right Angle
6. _____ Congruent

a. Figures or objects that have the same shape and distance.

b. Two angles that sum to $180°$.

c. Lines that intersect to form right angles.

d. An angle formed by perpendicular lines and measures $90°$.

e. Two angles that sum to $90°$.

f. A point that divides a segment into two congruent segments.

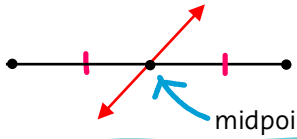
Graphic Organizer

BISECT

To divide into two _____ or _____ parts.

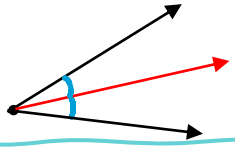
Segment Bisector

A line, segment, or ray that divides a _____ into two congruent segments.



Angle Bisector

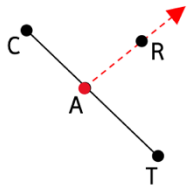
A line, segment, or ray that divides an _____ into two congruent angles.



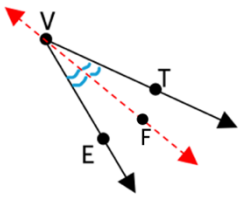
Skill 1: Segment vs. Angle Bisector

Identify whether each of the following represents a segment bisector, angle bisector, or neither. If the diagram displays a segment or angle bisector, write a congruence statement.

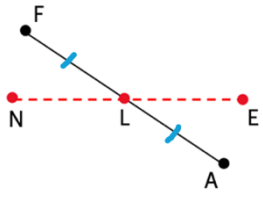
a.



b.



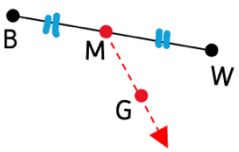
c.



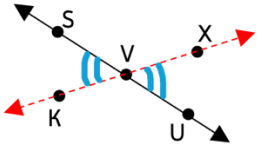
Exercise 1: Segment vs. Angle Bisector

Identify whether each of the following represents a segment bisector, angle bisector, or neither. If the diagram displays a segment or angle bisector, write a congruence statement.

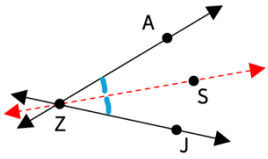
a.



b.

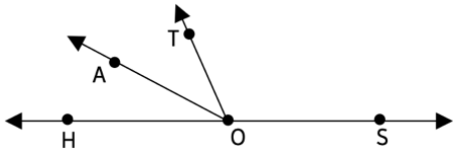


c.



Skill 2: Algebra & Bisectors

In the diagram below, $\overrightarrow{OA}$ bisects $\angle HOT$, and $\angle SOT$ has a measure of 120°. Find the mesure of $\angle HOA$ and $\angle TOA$ using this information. (Diagram is not drawn to scale)

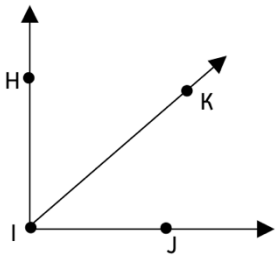


Exercise 2: Measuring Angles

In the diagram below, $\overrightarrow{IK}$ is the angle bisector of $\angle HIJ$ with $\angle HIK = 2x - 5$ and $\angle JIK = 3(x - 10)$.

a. Label the diagram. What is true about $\angle HIK$ and $\angle JIK$?

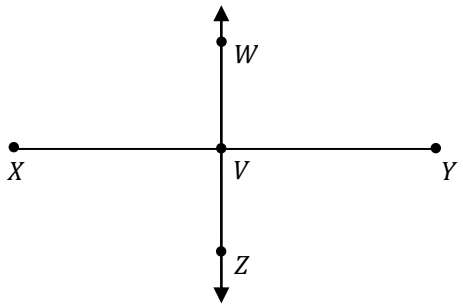
b. Set up an equation and solve for x, then find the measure of $\angle HIK$ and $\angle JIK$.



c. What type of angle is $\angle HIJ$?

Talk it Out

1. Use the diagram below to complete the following.



   a. Using a protractor, find the measure of $\angle WVY$ and $\angle WVX$.

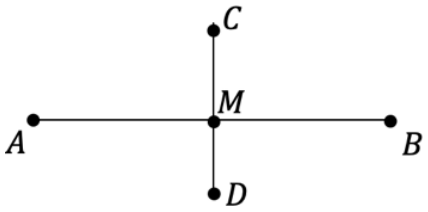
   b. Based on your answer to a. what can you say about $\overleftrightarrow{WZ}$ and $\overline{XY}$.

   c. $\overleftrightarrow{WZ}$ is the **perpendicular bisector** of $\overline{XY}$. Label the diagram above based on this information and write a congruence statement.

   d. In geometry, we will be using theorems to state conclusions just like we did in part b. What is a theorem?

2. $\overline{CD}$ is the perpendicular bisector of $\overline{AB}$ and intersects at midpoint M

   a. Construct $\overline{CA}$ and $\overline{CB}$. Then find their lengths.



   b. What can we conclude about $\overline{CA}$ and $\overline{CB}$?

Perpendicular Bisector Theorem

Any point on the perpendicular bisector is _____ from both endpoints of the line segment in which it bisects.

Check Point

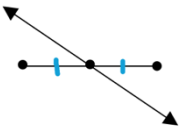
True or false. Identify whether each of the following statements are true or false.

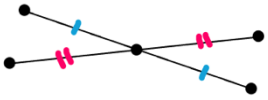
1. _____ A segment bisector divides an angle into two congruent angles.
2. _____ A segment bisector intersects a segment at the midpoint.
3. _____ An angle bisector can be a ray, line, or segment.
4. _____ A segment bisector divides a segment into two congruent segments.
5. _____ An angle bisector divides an angle into two congruent angles.
6. _____ Any point on a perpendicular bisector is equidistant from the endpoints of the segment.

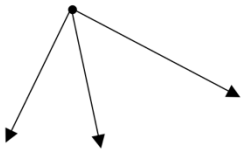
Problem Set

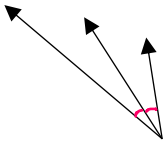
Name: _____

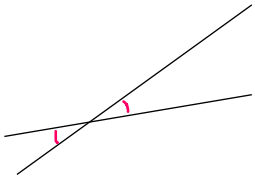
1. Identify whether each of the following represents a segment bisector, angle bisector, both or neither.

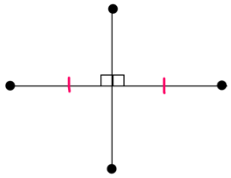
a. 

b. 

c. 

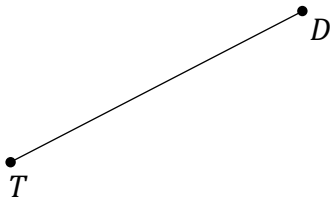
d. 

e. 

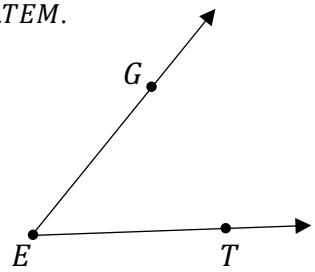
f. 

2. Use your knowledge of segment bisectors and angle bisectors to answer both parts.

a. Using a ruler to measure, construct the midpoint of line segment TD. Label the midpoint point O.



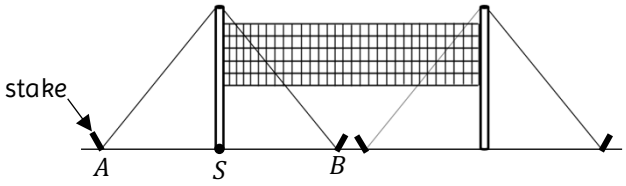
b. Using a protractor to measure, construct the angle bisector of $\angle GET$ to create $\angle GEM$ and $\angle TEM$.



3. Hudson sets up a volleyball net in her backyard. For the net to stand up properly, she sets the poles perpendicular to the ground and place the stakes equidistant from the base of the poles.

a. The pole can be thought of as which geometric vocabulary word based on the description above?

b. What must be true about $\overline{AS}$ and $\overline{SB}$?



c. If $AS = \frac{3}{2}x + 6$ and $SB = -\frac{1}{2}x + 8$, find the value of x.

d. What is the measure of AB? Use your answer from part c.