Lesson 1.3: Segment Bisectors

AGENDA:

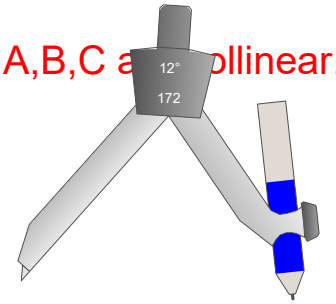
- Warm Up Quiz *Pick up your tools pouch
- Homework Check & Review
- Turn in Information Form
- Lesson 1.3 Notes & Constructions

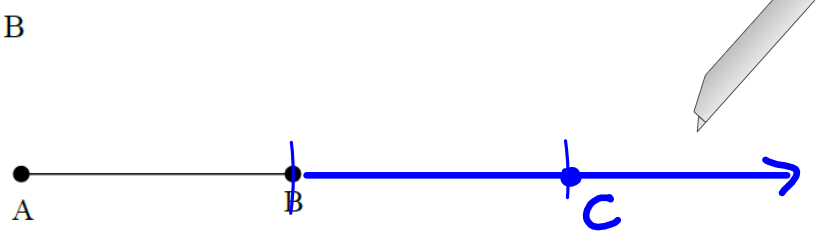
Homework:

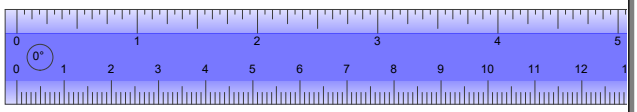
- PP 17-18: 17, 18, 23, 25
- Worksheet Unit 1 - Day 3
- Make sure you have gotten a compass for home

Warm Up Quiz - B

Construct $\overline{BC}$ such that it is congruent to $\overline{AB}$ and A,B,C are collinear.
Complete the sentence.







AB + BC = AC because

SEGMENT ADDITION POSTULATE

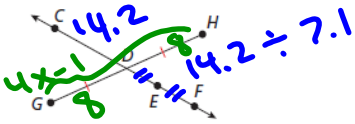
p. 17 #13, 14, 21, 22, 24, 26, 28, 30, 35

13. Sketch, draw, and construct a segment twice the length of $\overline{AB}$. Check students' work.

14. D is between C and E, $CE = 17.1$, and $DE = 8$. Find CD. 9.1

21. $\overline{CD} \cong \overline{DF}$, E bisects $\overline{DF}$, and $CD = 14.2$. Find EF. 7.1

22. $GH = 4x - 1$, and $DH = 8$. Find x. 4.25

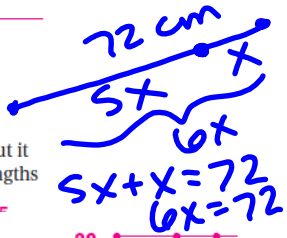


Tell whether each statement is sometimes, always, or never true. Support each of your answers with a sketch.

24. Two segments that have the same length must be congruent. A;

26. If Y is between X and Z, then X, Y, and Z are collinear. A

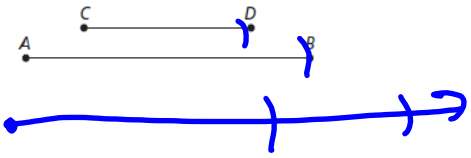
28. **Carpentry** A carpenter has a wooden dowel that is 72 cm long. She wants to cut it into two pieces so that one piece is 5 times as long as the other. What are the lengths of the two pieces? 60 cm; 12 cm



30. Draw three collinear points where E is between D and F. Then write an equation using these points and the Segment Addition Postulate.

Possible answer: $DE + EF = DF$

35. **Construction** Use a compass and straightedge to construct a segment whose length is $AB + CD$. Check students' constructions.

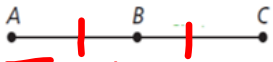


Geometry & Lab Name: _____ Date: _____ Class: _____
Lesson Unit 1 Day 3 Note Sheet: Segment Bisectors

A segment bisector is any point, line, segment, ray, or plane that intersects a segment at the midpoint of the segment and divides the segment into two congruent collinear segments. A **midpoint** is the point that divides a segment into two congruent collinear segments.

That is, **midpoint** → 2 ≅ COLLINEAR SEGMENTS OR SEG BISECTOR

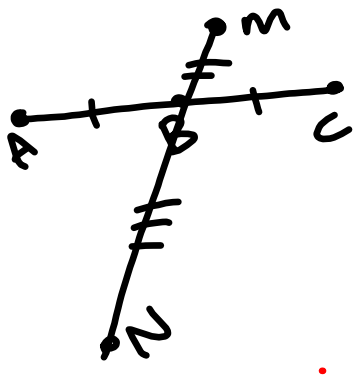
This is often "hidden" information. Ways to know that a point on the segment is the midpoint:

1. 

CONGRUENCY MARKS IN DRAWING

2. $\overline{AB} \cong \overline{BC}$ OR $AB = BC$ & COLLINEAR

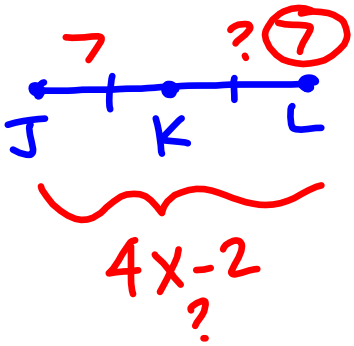
3. IT IS STATED "B IS MIDPOINT OF $\overline{AC}$"



→ 2 ≅ SEGMENTS

Ex 1: K is the midpoint of $\overline{JL}$, JL = 4x -2 and JK = 7. Find x, KL, and JL.

Draw it:



Statement: $\overline{JK} \cong \overline{KL}$

Reason: MIDPOINT → 2 ≅ SEGMENTS

Equation: JK = KL KL=7

Reason: ≅ FIGURES ↔ = MEASURE

Equation: JK + KL = JL

Reason: SEGMENT ADDITION POST.

7 + 7 = 4X - 2

14 = 4X - 2

16 = 4X

4 = X

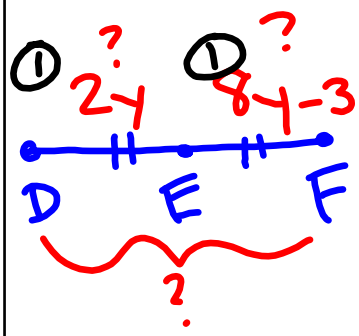
JL = 7 + 7

JL = 14

→ 2 ≅ SEGMENTS

Ex 2: Point E bisects $\overline{DF}$, DE = 2y, and EF = 8y – 3. Find DE, EF, and DF.

Draw it:



Statement: $\overline{DE} \cong \overline{EF}$

Reason: SEGMENT BISECTOR → 2 ≅ SEGMENTS

Equation: DE = EF

Reason: ≅ FIGURES ↔ = MEASURE

2y = 8y - 3 $y = \frac{1}{2}$ $DE = 2(\frac{1}{2}) = 1$ $EF = 8(\frac{1}{2}) - 3 = 1$

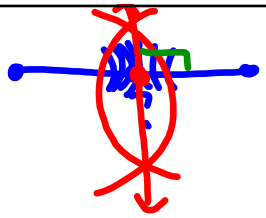
Equation: DE + EF = DF

Reason: SEGMENT ADDITION POST.

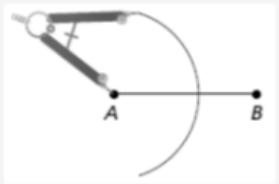
1 + 1 = DF

2 = DF

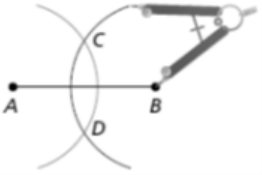
Construction: Constructing the Perpendicular Bisector of a Segment



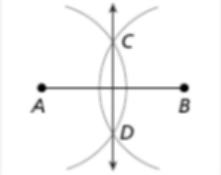
Construction Perpendicular Bisector of a Segment



1. Draw $\overline{AB}$. Open the compass wider than half of AB and draw an arc centered at A.

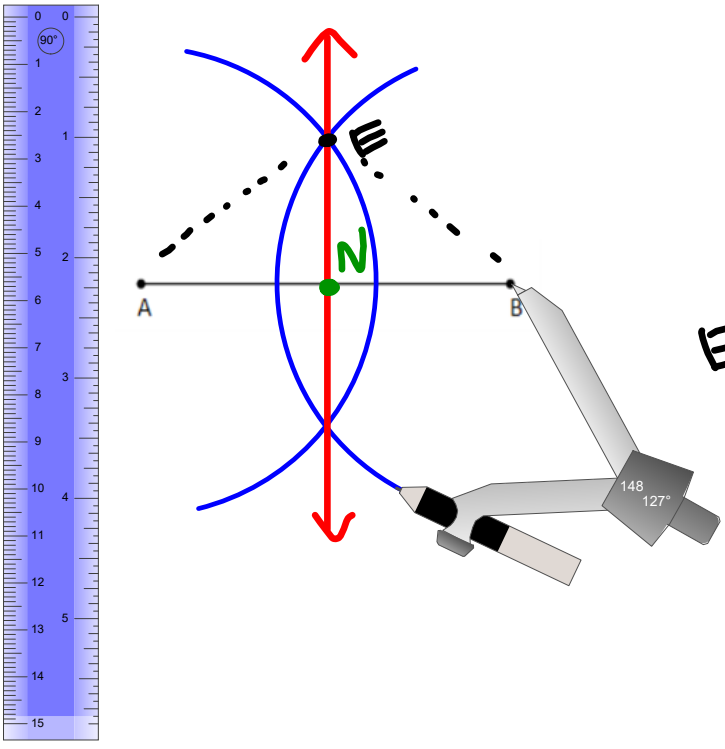


2. Using the same compass setting, draw an arc centered at B that intersects the first arc at C and D.



3. Draw $\overleftrightarrow{CD}$. $\overleftrightarrow{CD}$ is the perpendicular bisector of $\overline{AB}$.

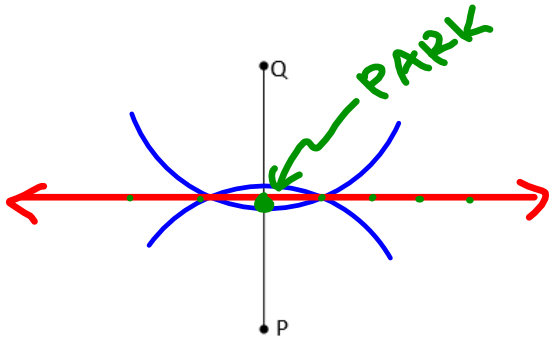
Practice 1: Locate and label the midpoint N of $\overline{AB}$ through a formal geometric construction.

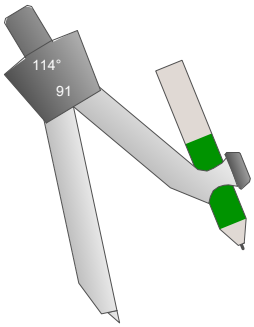


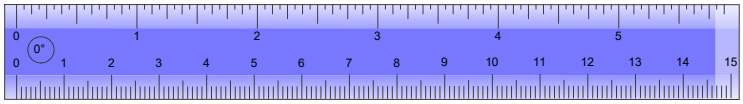
Label the point of intersection of the arcs from A and B above the segment as E. What do you notice about the distance from E to A and E to B? EQUAL

So any point an a segment bisector is EQUIDISTANT to the endpoints of the segment.

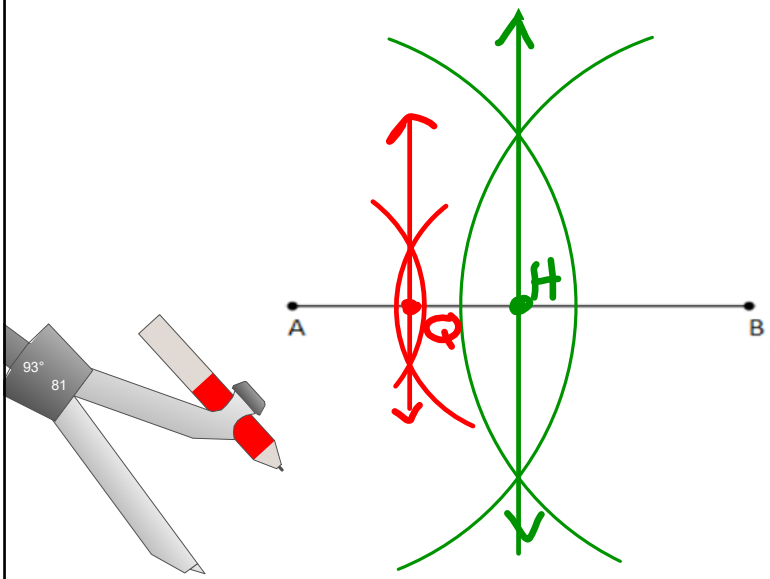
Practice 2: A town is planning to build a park that is equidistant between two schools represented by P and Q. Locate and label one possible point for the center of the park through a formal geometric construction.



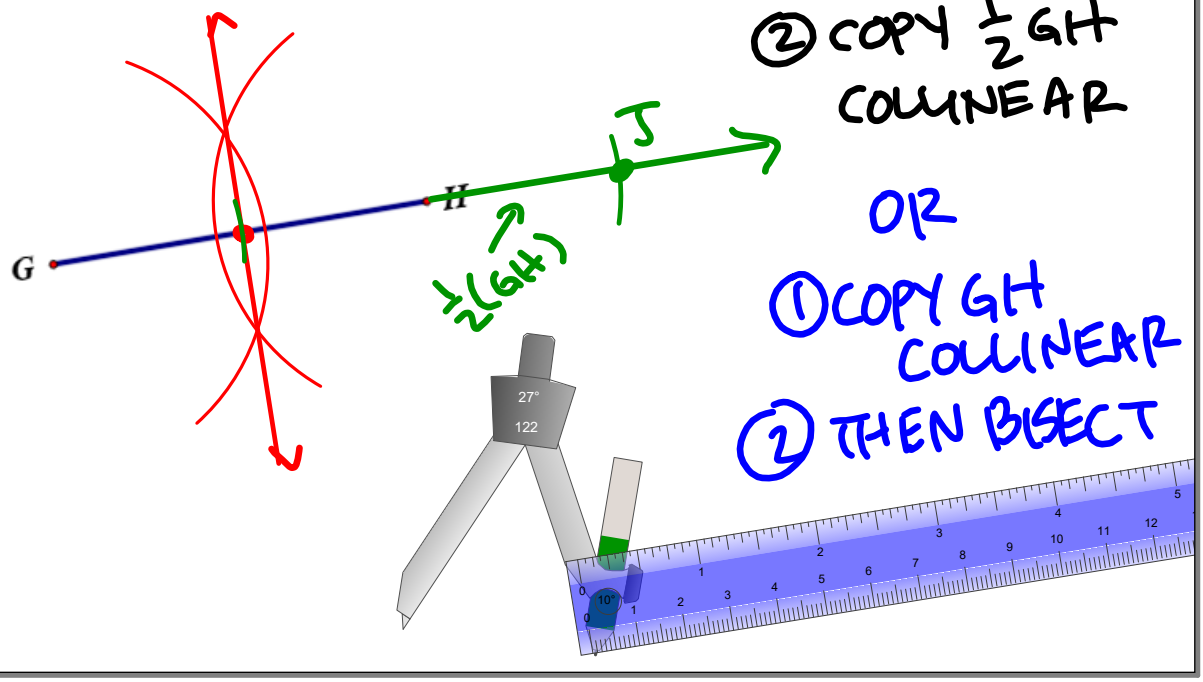




Practice 3: Construct $\overline{AH}$ such that AH= ½ (AB). Then construct $\overline{AQ}$ such that AQ= ¼ (AB).



Practice 4: Combining Construction Skills. Construct $\overline{GJ}$ such that GJ = 1.5(GH)



① BISECT $\overline{GH}$

② COPY $\frac{1}{2}$GH COLLINEAR

OR

① COPY GH COLLINEAR

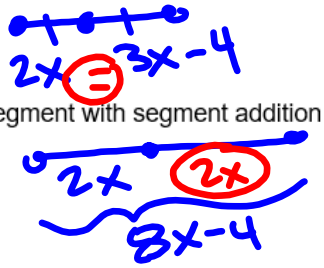
② THEN BISECT

Mixed Practice

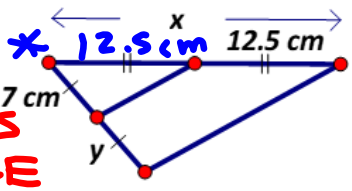
Remember, there are two scenarios for using the midpoint:

1) Using the same expression or value for both little halves of the segment with segment addition postulate
2) Setting the two little halves equal to each other

Be careful identifying which segment is being bisected!



Ex 3: Determine the values of x and y as an informal proof (writing reasons for any equation).



12.5 + 12.5 = 25 cm = x

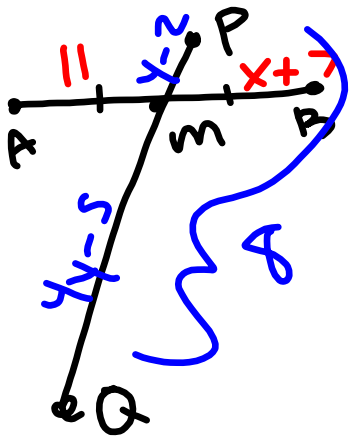
SEGMENT ADDITION POSTULATE

* ≅ = SEGMENTS

↔ = MEASURE

Y = 7cm

Ex 4: Try own your own, including drawing a picture:
$\overline{PQ}$ bisects $\overline{AB}$ at M. When AM=11, MB=x+7, PM=y-2, MQ=4y-5, and PQ=8, determine the values of x & y.



$\overline{Am} \cong \overline{mB}$ SEG BISECTOR → 2 ≅ SEGMENTS

$Am = mB$

$11 = x + 7$

$x = 4$

$(y-2)+(4y-5)=8$ SEG ADD POST

$PM + MQ = PQ$

$y = 3$