

1.4 Classwork: Midpoints and bisectors

1. Point B is the midpoint of \overline{AC} , with $AB = x + 5$, $BC = 15$. First write an equation representing the situation, find x , then check it.



$$x + 5 = 15$$

$$x = 10$$

$$AB = (10) + 5 = 15$$

$$15 = 15 \checkmark$$

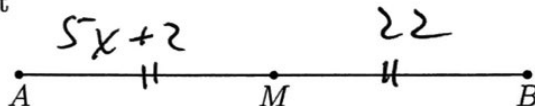
2. Given M is the midpoint of \overline{AB} , $AM = 5x + 2$, $MB = 22$.

- (a) Mark the diagram with the values and tick marks
(b) Write an equation and solve for x
(c) Check your result

$$5x + 2 = 22$$

$$5x = 20$$

$$x = 4$$

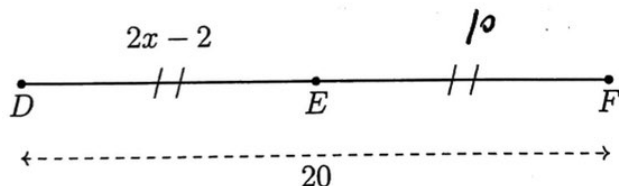


$$AM = 5(4) + 2$$

$$= 22$$

$$22 = 22 \checkmark$$

3. Point E bisects \overline{DF} and $DE = 2x - 2$, $DF = 20$. Find x . (show check)



$$2x - 2 = \frac{1}{2}(20) = 10$$

$$2x = 12$$

$$x = 6$$

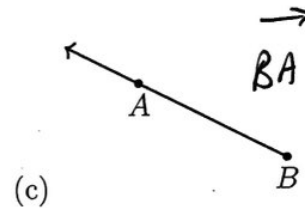
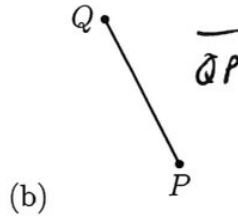
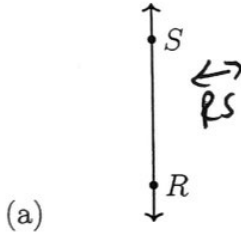
$$DE = 2(6) - 2 = 10$$

$$10 = \frac{1}{2}(20) \checkmark$$

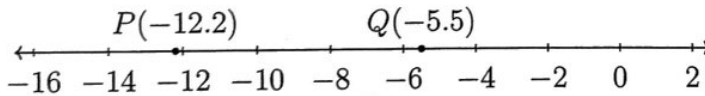
4. Two line segments or angles of equal measure are Congruent.
5. Points on the same plane are Coplanar.
6. Mark point L on the ray exactly 8 centimeters from the endpoint K . (measure it)



7. Name each object using symbolic notation.



8. Two points $P(-12.2)$, $Q(-5.5)$ are shown on the number line. Find PQ .



$$PQ = -5.5 - (-12.2) = 6.7$$

9. Assume that Dr. Huson's rides to school straight north from 80th Street to 164th Street.

- (a) How many blocks is his morning commute?

$$d = 164 - 80 = 84 \text{ blocks}$$

- (b) On what street is Dr. Huson's half way each morning?

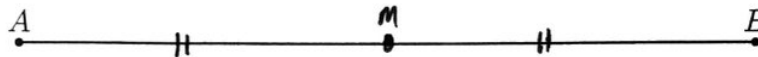
$$\text{half} = \frac{1}{2}(84) = 42 \text{ blocks} \quad m = 80 + 42 = 122 \text{nd Street}$$

- (c) In the afternoon return commute, what street is half way?

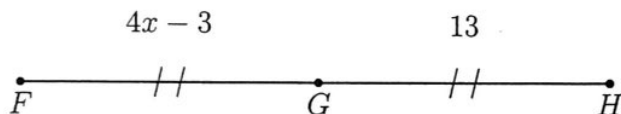
$$\text{Same } 122 \text{nd St.}$$

1.4 Homework: Midpoints and bisectors

- Line segments that have the same length are Congruent.
- The length of the segment shown below is 10 centimeters. Bisect \overline{AB} with point M . (Measure and mark it exactly. Label point M and make the hash marks.)



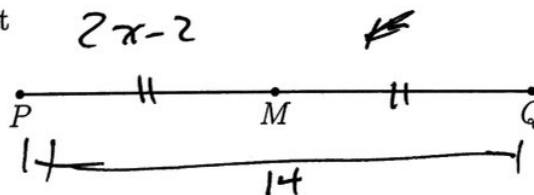
- Point G bisects \overline{FH} , with $FG = 4x - 3$, $GH = 13$. Find x . (remember to check)



$$\begin{aligned}
 4x - 3 &= 13 \\
 4x &= 16 \\
 x &= 4 \\
 4(4) - 3 &= 13? \\
 13 &= 13 \checkmark
 \end{aligned}$$

- Given M is the midpoint of \overline{PQ} , $PM = 2x - 2$, $PQ = 14$.

- Mark the diagram with the values and tick marks
- Write an equation and solve for x
- Check your result

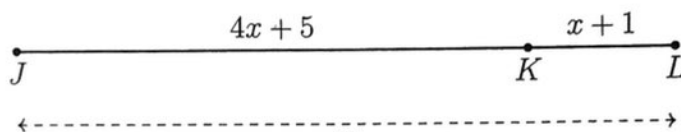


$$\begin{aligned}
 2x - 2 &= \frac{1}{2}(14) = 7 \\
 2x &= 9 \\
 x &= 4\frac{1}{2} \\
 2(4\frac{1}{2}) - 2 &= 7 = \frac{1}{2}(14) \checkmark
 \end{aligned}$$

5. Given \overline{DEF} , $DE = 3\frac{1}{3}$, and $EF = 1$. Find DF (expressed as a mixed fraction).



6. The diagram shows \overline{JKL} with $JK = 4x + 5$, $KL = x + 1$, $JL = 16$. Find x .



$$(4x + 5) + (x + 1) = 16$$

$$5x + 6 = 16$$

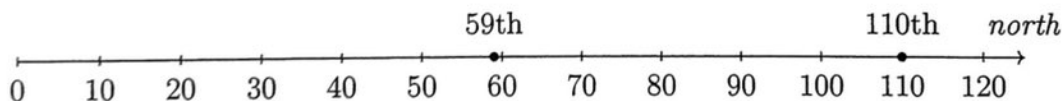
$$5x = 10$$

$$x = 2$$

$$4(2) + 5 + (2) + 1 = 16?$$

$$13 + 3 = 16 \checkmark$$

7. New York's Central Park in Manhattan runs from 59th Street in Midtown to 110th Street in Harlem. The park's streets are diagrammed below.



- (a) How many blocks long is the park in the north-south direction?

$$l = 110 - 59 = 51 \text{ blocks}$$

- (b) The Metropolitan Museum of Art (the "Met") runs from 80th Street to 84th Street on the east side of the park. Is the Met located in the southern half of the park, the northern part, or in the middle? Justify your answer.

$$M = 59 + \frac{1}{2}(51)$$

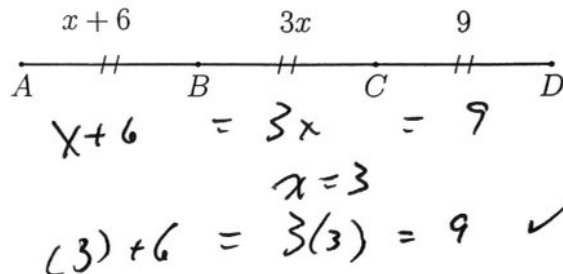
$$= 59 + 25\frac{1}{2} = 84\frac{1}{2}$$

80 and 84 < 84 1/2 Southern half, but close to middle

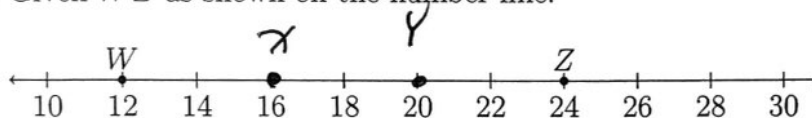
1.4 Extension: Trisecting a line segment

1. Points B and C trisect segment \overline{AD} with segment lengths as shown.

Find x .

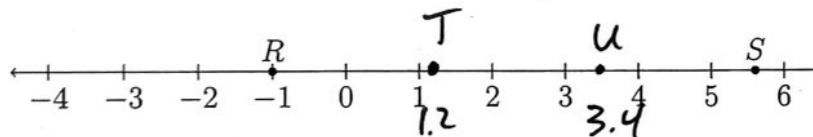


2. Given \overleftrightarrow{WZ} as shown on the number line.



Mark and label two points X and Y that trisect \overline{WZ} . $WZ = 24 - 12 = 12$
 $\text{thirds} = \frac{1}{3}(12) = 4$

3. Given \overleftrightarrow{RS} as shown on the number line, with $R = -1.0$ and $S = 5.6$.



- (a) What is the exact distance on the number line between the points R and S ?

$$d = 5.6 - (-1) = 6.6$$

- (b) The points T and U trisect \overline{RS} . Find the values of T and U , and mark and label them on the number line \overleftrightarrow{RS} .

$$\text{one third} = \frac{1}{3}(6.6) = 2.2$$

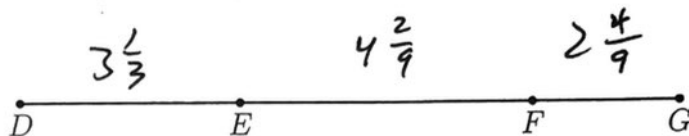
$$T = -1 + 2.2 = 1.2$$

$$U = -1 + 2(2.2) = 3.4$$

$$\text{check } 3.4 + 2.2 = 5.6 \quad \checkmark$$

4. Given \overline{DEFG} , $DE = 3\frac{1}{3}$, $EF = 4\frac{2}{9}$, and $FG = 2\frac{4}{9}$. (diagram not to scale)

Find DG .



$$\begin{aligned}
 DG &= 3\frac{1}{3} + 4\frac{2}{9} + 2\frac{4}{9} \\
 &= 9 + \frac{9}{9} = 10
 \end{aligned}$$

$$\left(\frac{1}{3} = \frac{3}{9}\right)$$

5. Solve for x . (use fractions, not decimals. Show the check.)

(a) $\frac{1}{2}(3x - 1) = 2\frac{1}{2}$

$$\begin{aligned}
 3x - 1 &= 5 \\
 3x &= 6 \\
 x &= 2 \\
 \frac{1}{2}(3(2) - 1) &= 2\frac{1}{2} \quad ? \\
 \frac{5}{2} &= 2\frac{1}{2} \quad \checkmark
 \end{aligned}$$

(b) $\frac{2}{5}(10x + 5) = 10$

$$\begin{aligned}
 4x + 2 &= 10 \\
 4x &= 8 \\
 x &= 2 \\
 \frac{2}{5}(10(2) + 5) &= 10 \quad ? \\
 \frac{2}{5}(25) &= 10 \quad \checkmark
 \end{aligned}$$

6. Find all values of x that satisfy each equation. (show the check)

(a) $|2x + 3| = 7$

$$\begin{aligned}
 2x + 3 &= 7 & 2x + 3 &= -7 \\
 2x &= 4 & 2x &= -10 \\
 x &= 2 & x &= -5 \\
 |2(2) + 3| &= 7? & |2(-5) + 3| &= 7? \\
 |7| &= 7 \quad \checkmark & |-7| &= 7 \quad \checkmark
 \end{aligned}$$

(b) $|x| - 5 = 15$

$$\begin{aligned}
 |x| &= 20 \\
 x &= -20, 20 \\
 |\pm 20| - 5 &= 15 \quad \checkmark
 \end{aligned}$$