

Geometry Notes

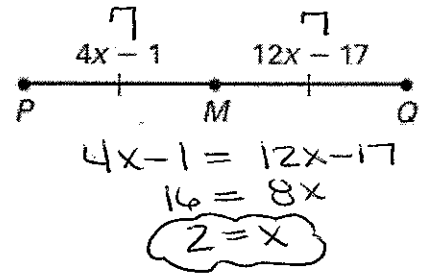
Name Key

1.3 Use Midpoint and Distance Formulas

Vocabulary:

Midpoint of a segment: the point that divides the segment into 2 \cong segments

If M is the midpoint of segment PQ then: $\overline{PM} \cong \overline{MQ}$
OR $PM = MQ$

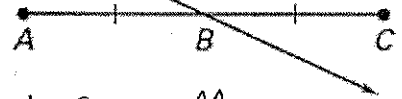


Bisect: to cut in $\frac{1}{2}$

Segment Bisector: A point, segment, ray, line or plane that intersects a segment at its midpoint

* if ℓ bisects \overline{AC} then $AB = BC$

* it does not mean both segments are cut equally.



In the figure at the right, \overline{WY} bisects \overline{UV} at Y and \overline{UY} bisects \overline{TW} at S.

5. $UY = 4x - 3$, $YV = x$; UV

$$UY = YV$$

$$4x - 3 = x$$

$$3x = 3$$

$$* \boxed{x = 1}$$

$$* UY = 4(1) - 3 = 1$$

$$* YV = 1$$

$$UY + YV = UV$$

$$1 + 1 = UV$$

$$2 = UV$$

$$\boxed{UV = 2}$$

6. $WS = x + 5$, $TW = 4x + 5$; TS

$$WS = TS$$

$$WS + TS = TW$$

$$WS + WS = TW$$

$$2WS = TW$$

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

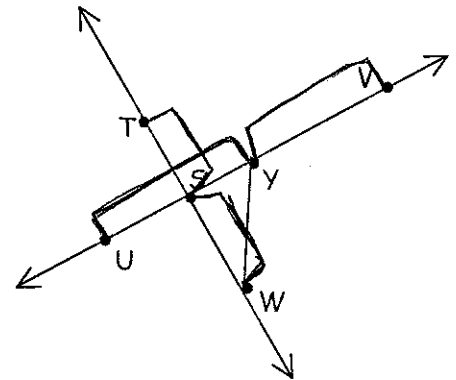
$$2x + 10 = 4x + 5$$

$$5 = 2x$$

$$* \boxed{\frac{5}{2} = x}$$

$$WS = \frac{5}{2} + 5 \rightarrow \frac{5}{2} + \frac{10}{2} = \frac{15}{2}$$

$$\boxed{TS = \frac{15}{2}}$$



In your homework tonight you will have to work with fractions.

7. What is $3\frac{2}{7} \cdot 2$?

$$\frac{23}{7} \cdot 2$$

$$\boxed{\frac{46}{7}}$$

8. What is $9\frac{1}{2} \div 2$?

$$\frac{19}{2} \div 2$$

$$\frac{19}{2} \cdot \frac{1}{2}$$

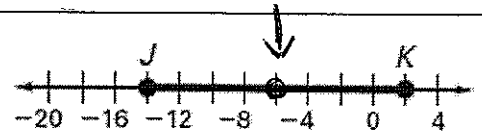
$$\boxed{\frac{19}{4}}$$

Midpoint Formula:

on a number line:

$$\frac{\text{endpoint} + \text{endpoint}}{2}$$

$$\frac{-14 + 2}{2} = \frac{-12}{2} = -6$$

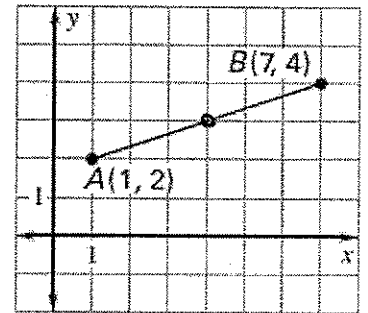


on a coordinate plane:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left(\frac{1 + 7}{2}, \frac{2 + 4}{2} \right)$$

$$(4, 3)$$



Find the coordinates of the midpoint of the segment with the given endpoints.

1. S(4, -1) and T(6, 0) $\left(\frac{4+6}{2}, \frac{-1+0}{2} \right) = (5, -1/2)$

2. G(-2, -8) and H(-3, -12) $\left(\frac{-2+(-3)}{2}, \frac{-8+(-12)}{2} \right) = \left(-\frac{5}{2}, -10 \right)$

Use the given endpoint R and midpoint M of RS to find the coordinates of the other endpoint S.

3. R(6, 0), M(0, 2) S(x, y) $\left(\frac{6+x}{2}, \frac{0+y}{2} \right) = (0, 2)$ $x+6=0$ $y=4$
 $x=-6$

4. R(11, -5), M(-8, -4) $\frac{x+11}{2} = -8$ $\frac{0+y}{2} = -4$ $(-6, 4)$

* Double Midpoint - Endpoint $-8-11 = -19$ $-8-(-5) = -3$ $(-19, -3)$

The Distance Formula

If A (x_1, y_1) and B (x_2, y_2) are points on a coordinate plane then the distance between A and B

is found using the formula $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

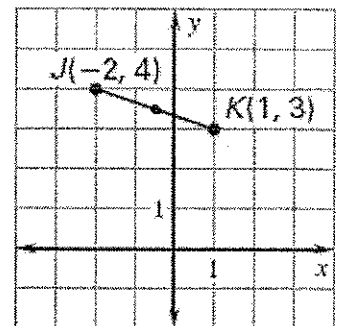
Use the picture to the right and find the approximate length of JK.

$$JK = \sqrt{(-2-1)^2 + (4-3)^2}$$

$$JK = \sqrt{(-3)^2 + (1)^2}$$

$$JK = \sqrt{9+1}$$

$$JK = \sqrt{10} \approx 3.2$$



Can you find the midpoint of JK? $\left(\frac{-2+1}{2}, \frac{4+3}{2} \right) = \left(-\frac{1}{2}, \frac{7}{2} \right)$