Geometry – A

1.3 Midpoint Formula
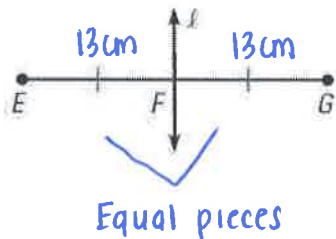
Name: _____ key _____

Date: _____ Period: _____

- I can perform calculations using the midpoint formula.
  - I can calculate the midpoint of a segment.
  - I can apply the midpoint formula to solve a context problem.

Bisector: Line l bisects the segment. Find the indicated length.

1. Find EG if $EF = 13$ cm.

13cm   13cm

E   F   G

Equal pieces

$EF + FG = EG$

$13 + 13 = EG$

$\boxed{26 = EG}$

Midpoint Formula: 1 dimension $M = \dfrac{x_1 + x_2}{2}$

2. Find the midpoint of the line segment.

A   B

11   23
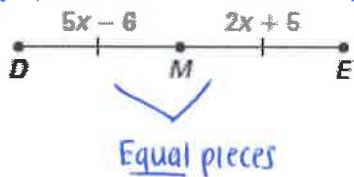
x_1 x_2

$M = \dfrac{11 + 23}{2} = \dfrac{34}{2} = 17$

$\boxed{midpoint = 17}$

3. Using Midpoints: In the diagram, M is the midpoint of the segment. Find DE.

$5(3.7) - 6 = 12.5$ $2(3.7) + 5 = 12.5$

5x – 6   2x + 5

D   M   E

Equal pieces

$5x - 6 = 2x + 5$

$3x - 6 = 5$

$\dfrac{+6 \quad +6}{}$

$\dfrac{3x}{3} = \dfrac{11}{3}$

$x \approx 3.7$

$DE = 12.5 + 12.5$

$\boxed{DE = 25}$

Midpoint Formula: 2 dimensions $M = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$ Remember: a coordinate (x, y)
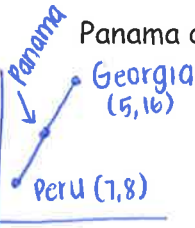
4. Find the midpoint of a line with the given endpoints: $A(4, -3)$ and $B(5, 6)$

$x_1 \; y_1 \qquad x_2 \; y_2$

$M = \left(\dfrac{4+5}{2}, \dfrac{-3+6}{2} \right) = \left(\dfrac{9}{2}, \dfrac{3}{2} \right) = (4.5, 1.5)$

$\boxed{Midpoint = (4.5, 1.5)}$

5. Caliyaah is traveling to Peru for her summer vacation. She looks at a map of the path of her flight. Her plane leaves from Georgia, located at (5, 16) on the map's $x_1 \quad y_1$ coordinate grid, makes a stop at the halfway point, Panama, and then heads to its destination, Peru, located at (7, 8) on the map's coordinate grid. Find the location of $x_2 \quad y_2$ ~~midpoint~~ Panama on Caliyaah's map.

Panama

• Georgia
(5,16)

• Peru (7,8)

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{5+7}{2}, \frac{16+8}{2} \right) = \left(\frac{12}{2}, \frac{24}{2} \right) = (6, 12)$$

Panama is located at (6, 12)

6. Find the second endpoint of the line with the given endpoint (P) and midpoint (M).
   a) P(7, -17) and M(-2, 3) ← midpoint
   $x_1 \quad y_1$
   $x_i \quad y_i$

b) P(8, 0) and M(6, -5)

x-values: $\frac{x_1}{\sqrt{}}$ $\overset{\text{x value of midpoint}}{1.\;\frac{7 + x_2}{2} = -2 \cdot 2}$ ← multiply by the reciprocal

$$= 7 + x_2 = -4$$
$$-7 \qquad -7$$

$$\boxed{x_2 = -11}$$

y-values: $\overset{y_2}{\downarrow}$ $1.\;\frac{-17 + y_2}{2} = \overset{\text{y-value of midpoint}}{3 \cdot 2}$ ← mult. by the reciprocal

$$-17 + y_2 = 6$$
$$+17 \qquad +17$$

$$\boxed{y_2 = 23}$$

{ Second endpoint is (-11, 23) }
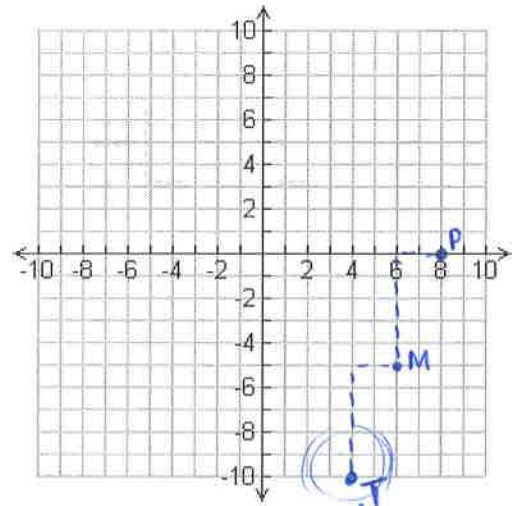
Step 1: plot points

Step 2: Figure out where other endpoint might go

Step 3: Count pattern from P to M
Left 2, Down 5

Step 4: Repeat Left 2, down 5 from M to your estimated spot in step 2

Step 5: Find coordinates of new point (I called it T)

$$\boxed{(4, -10)}$$