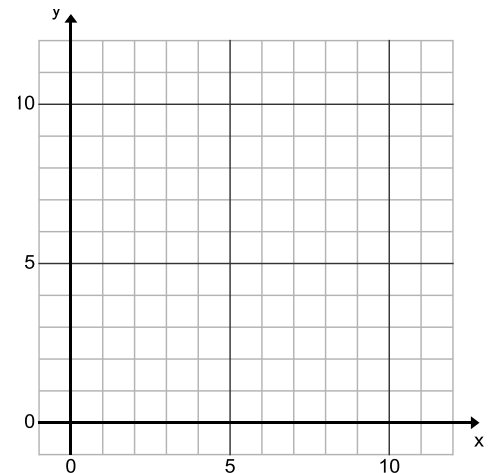**Formula**: Coordinates of a point which partitions a directed line segment AB at the ratio of a:b from $A(x_1, y_1)$ to $B(x_2, y_2)$

$$(x, y) = \frac{bx_1 + ax_2}{b+a}, \frac{by_1 + ay_2}{b+a} \quad \textbf{OR} \quad (x, y) = (x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1))$$

Given $A(3, 4)$ and $B(6, 10)$.

Ex 1 Find the point P on AB *such* that P partitions the segment at the ratio of 1:3

Steps:
1) Identify a, b, x_1, y_1, x_2, y_2,
2) Plug your values into one of the formulas
3) Simplify

1) Identify:
   a= _____
   b= _____
   x_1=_____
   y_1= _____
   x_2=_____
   y_2=_____
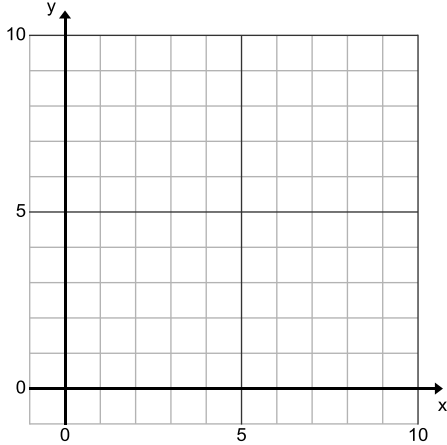
2) Plug values into the formula:

3) Simplify:

so, the coordinates of P are (_____,_____)

Unit 2	Partitioning a Segment	*How do you find the point on a segment that partitions the segment by a given ratio?*

Ex 2 Given *A* (1, 1) and *B* (7, 3).
Find the point *P* on *AB* such that *P* partitions the segment at the ratio 1:2

Ex 3 Given M (−4, −1) and *N* (0, 3).
Find the point *P* on *MN* such that *P* lies ¾ of the way from M to N.

1. Given the points A(-3, -4) and B(5, 0), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 2:3.

2. Given J (-2, 5) and K (2, -3). Find the point P on JK such that P partitions the segment at the ratio 1:4.

3. Given the points A(−1, 2) and B(7, 14), find the coordinates of the point P on directed line segment $\overline{AB}$ such that P lies ¼ of the way from A to B.

4. Given the points A(-2, 4) and B(7, -2), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:2.

5. Given M (5, -2) and *N* (-5, 3). Find the point *P* on *MN* such that *P partitions the segment at the ratio 1:3*

6. The map shows a straight highway between two tows. Highway planners want to build two new rest stops between the towns so that the two rest stops divide the highway into three equal parts. Find the coordinates of the points at which the rest stops should be built.
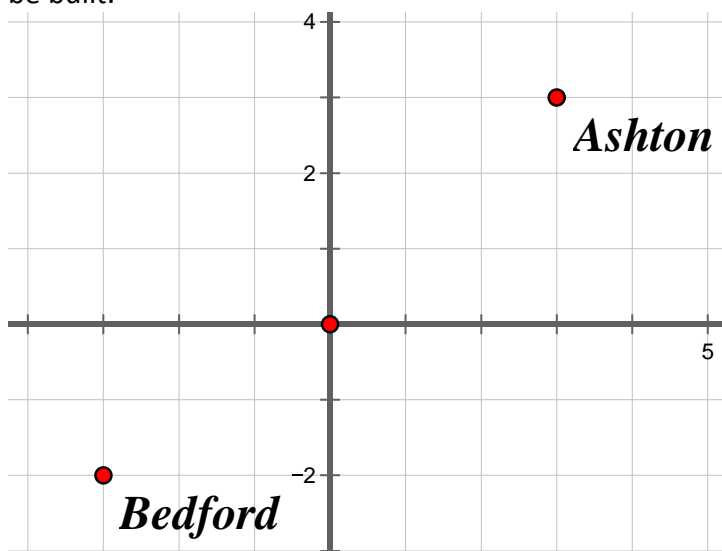
Use the map and the information given to solve each problem that follows.
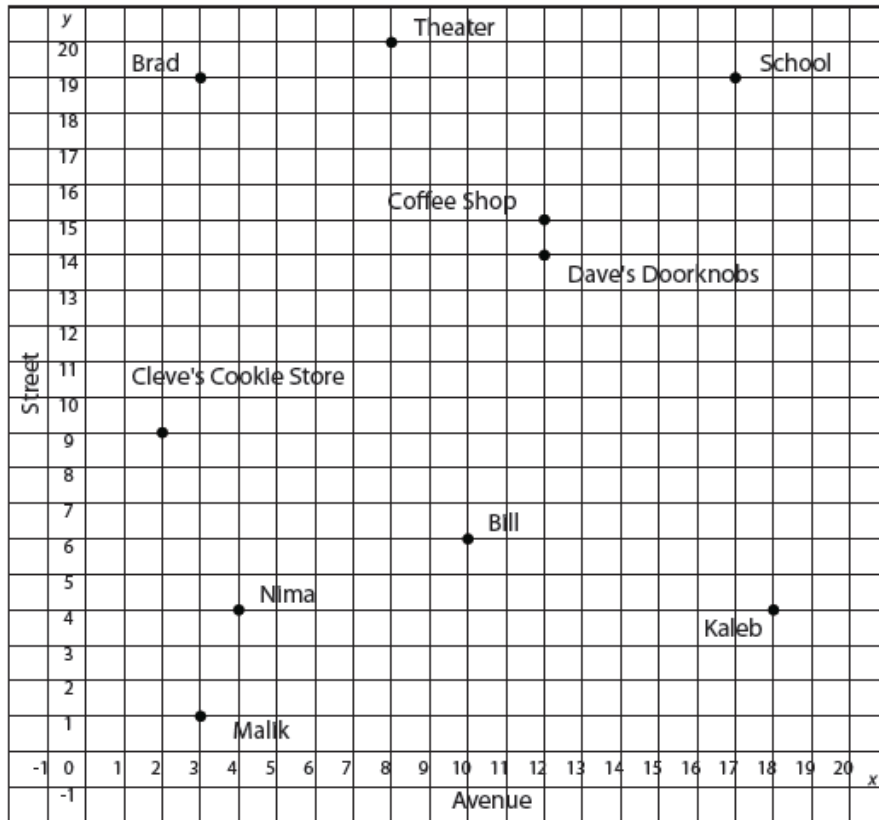
7. Luis works at a theater on 8th Avenue and 20th Street. Kaleb lives at the corner of 18th Avenue and 4th Street. What is a possible location that is midway between them?

8. Nima lives at the corner of 4th Avenue and 4th Street. Bill lives at the corner of 10th Avenue and 6th Street. Their favorite bakery is located midway between them. What is one possible location of the bakery?

9. Cleve's Cookie Store is located at the corner of 2nd Avenue and 9th Street. Dave's Doorknobs is located at the corner of 12th Avenue and 14th Street. Located 1/5 of the distance from Cleve's Cookie Store is the post office. Where is the post office?

10. Malik and Brad both live on 3rd Avenue. Malik lives at the corner of 1st Street, and Brad lives at the corner of 19th Street. 2/3 the distance from Malik's apartment to Brad's apartment is a market. Where is the market?

Additional Practice Worksheet #2 Partitioning Segments

Find the point that partitions the segment with the two given endpoints with the given ratio.

1. (-3, 4) (7, 6) 1:1

2. (-9, 3) (1, 8) 2:3

3. (8, -5) (4, 7) 1:3

4. (5, -6) (4, 5) 3:4

5. (4, 9) (-5, -3) 2:3

6. (2, -1) (-3, -5) 1:2

7. Find the coordinates of point P, that lies $\frac{2}{3}$ of the way on the directed line segment $\overline{AB}$,

where A (-2, 5), B (4, 9)

8. Find the coordinates of point P that lies on the line segment $\overline{MQ}$, M(-9, -5), Q(3, 5), and partitions the segment at a ratio of 2 to 5