Lesson 1.3 Locating Points Using Ratios (Partitioning)

Wednesday, August 23, 2023 8:51 PM

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1.3
Locating

Lesson 1.3 Locating Points Using Ratios

Workbook pages 23-30

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.3.3
Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals.

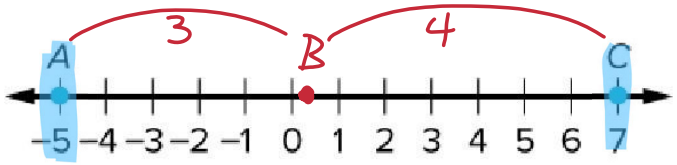
Content Objective

Students will find points that partition line segments on number lines and determine the coordinates of a point on a line segment that partitions the segment in a given ratio on the

coordinate plane.

Example 1
Locate a Point on a Number Line When Given a Ratio

Find *B* on $\overline{AC}$ such that the ratio of *AB* to *BC* is 3:4.



-5×7

$3+4$ total parts

$\frac{21-20}{3+4} = \frac{1}{7} = 0.14$

Students, write a response!

Example 1
Locate a Point on a Number Line When Given a Ratio

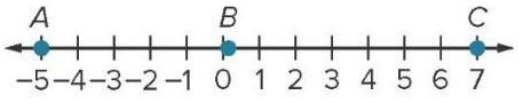
Use the Section Formula to determine the coordinate of point *B*.

$$B = \frac{nx_1 + mx_2}{m+n}$$

$$= \frac{4(-5)+3(7)}{3+4} = \frac{1}{7}$$

Section Formula

$m = 3$, $n = 4$, $x_1 = -5$, and $x_2 = 7$



So, *B* is located at $\frac{1}{7}$ on the number line.

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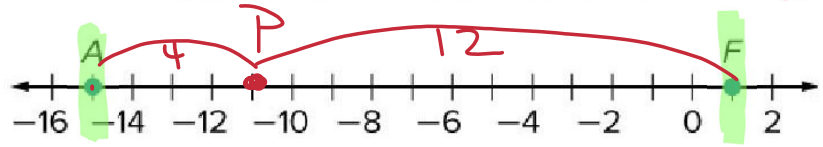
Example 1
Locate a Point on a Number Line When Given a Ratio

Check

Find P on $\overline{AF}$ such that the ratio of AP to PF is 1:3.



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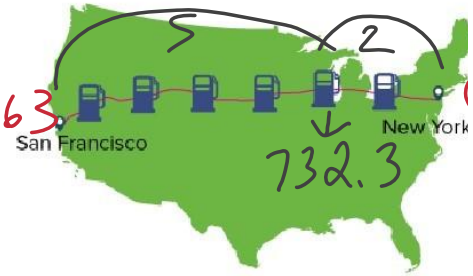
Example 2
Partition a Line Segment

ROAD TRIP Jorge is traveling 2563 miles from New York City to San Francisco by car. His next stop for gas will be when the ratio of the distance he has already traveled to the distance he still has to travel is 2:5. How far has Jorge traveled the next time he stops for gas?



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Example 2
Partition a Line Segment

Use the Section Formula to determine how far Jorge will have traveled when he stops for gas.

$$B = \frac{nx_1 + mx_2}{m + n}$$ Section Formula

$$\frac{5(0) + 2(2563)}{2 + 5} \approx 732.3$$

$m = 2$, $n = 5$, $x_1 = 0$, and $x_2 = 2563$

When Jorge has traveled approximately 732.3 miles from New York City, the ratio of the distance he has traveled to the distance that he still has to travel is 2:5.

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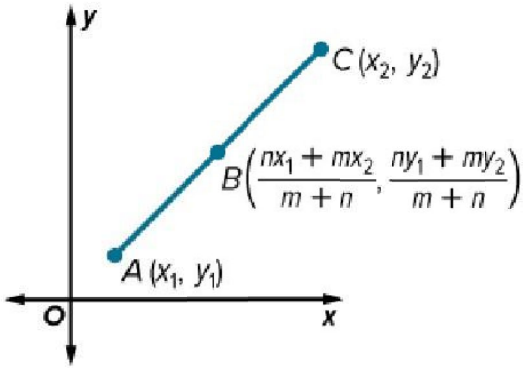
Learn

Locating Points on the Coordinate Plane with a Given Ratio

Key Concept: Section Formula on the Coordinate Plane

If A has coordinates (x_1, y_1) and C has coordinates (x_2, y_2), then a point B that partitions the line segment in a ratio of $m:n$ has coordinates $B\left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$, where $m \neq n$.



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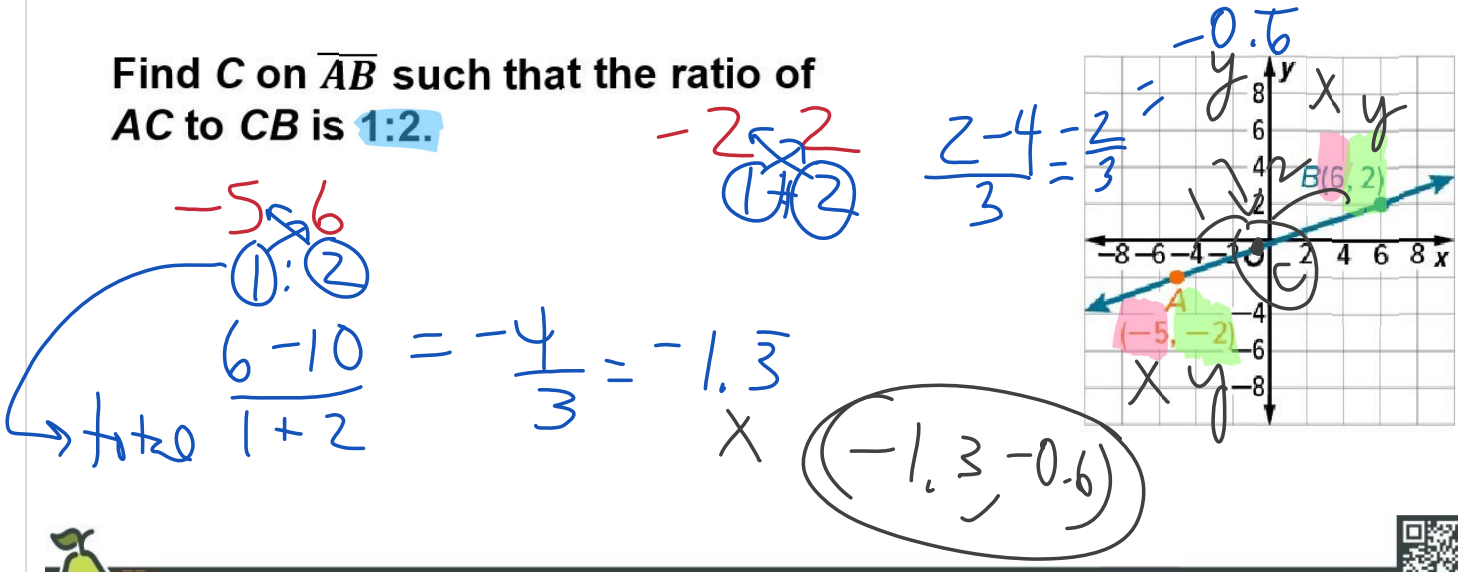
Example 3

Locate a Point on the Coordinate Plane When Given a Ratio

Find C on $\overline{AB}$ such that the ratio of AC to CB is 1:2.



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Example 4

Partition a Line Segment on the Coordinate Plane

Check

TRAVEL Andre is traveling from Jeffersonville to Springfield. He plans to stop for a break when the distance he has traveled and the distance he has left to travel have a ratio of 3:7. Where should Andre stop for his break?