

Day 4 - Standard Form of Equations - Notes

Scenario: In the mid 1800's, delivering mail and news across the American Great Plains was time consuming and made for a long delay in getting vital information from side of the country to the other. At the time, most mail and news traveled by stagecoach along the main stagecoach lines at about 8 miles per hour. The Pony Express Riders averaged about 10.7 miles per hour. The long stretch of 782 miles from the two largest cities on either side of the plains, St. Louis and Denver, was a very important part of this trail.

| | | |
|---|--|--|
| a. Use the variable x to write an expression to represent the distance the stagecoach was driven in miles. | b. Use the variable y to write an expression to represent the distance the Pony Express rode in miles. | c. Write an expression for the distance that was traveled using both of these methods on one trip. |
| $8x$ <i>x: # of hours by stagecoach</i> | $10.7y$ <i>y: # of hours by Riders</i> | $8x + 10.7y$ <i>total distance traveled</i> |
| d. Write an equation that represents using both methods to deliver mail from St. Louis to Denver. $8x + 10.7y = 782$ | | |

a. If the Pony Express Riders rode for 20 hours from St. Louis before handing off the mail to a stagecoach, how long would it take the stagecoach to get to Denver?

| X | Y |
|-------------|-------------|
| 71 hours | 20 hours |

y=20

$$8x + 10.7(20) = 782$$

$$8x + 214 = 782$$

$$8x = 568$$

$$x = 71$$

b. If the stagecoach rode for 50 hours from St. Louis before handing off the mail to a Pony Express Rider, how long would it take the rider to get to Denver?

| X | Y |
|-------------|---------------|
| 50 hours | 35.7 hours |

x=50

$$8(50) + 10.7y = 782$$

$$400 + 10.7y = 782$$

$$10.7y = 382$$

$$y = 35.7$$

c. If mail was delivered by stagecoach only, how long would it take the stagecoach to get the mail from St. Louis to Denver?

| X | Y |
|----------------|------------|
| 97.75 hours | 0 hours |

y=0
no Pony Express riders

$$8x + 10.7(0) = 782$$

$$8x = 782$$

$$x = 97.75$$

d. If mail was delivered by Pony Express Riders only, how long would it take a rider to get the mail from St. Louis to Denver?

| X | Y |
|------------|---------------|
| 0 hours | 73.1 hours |

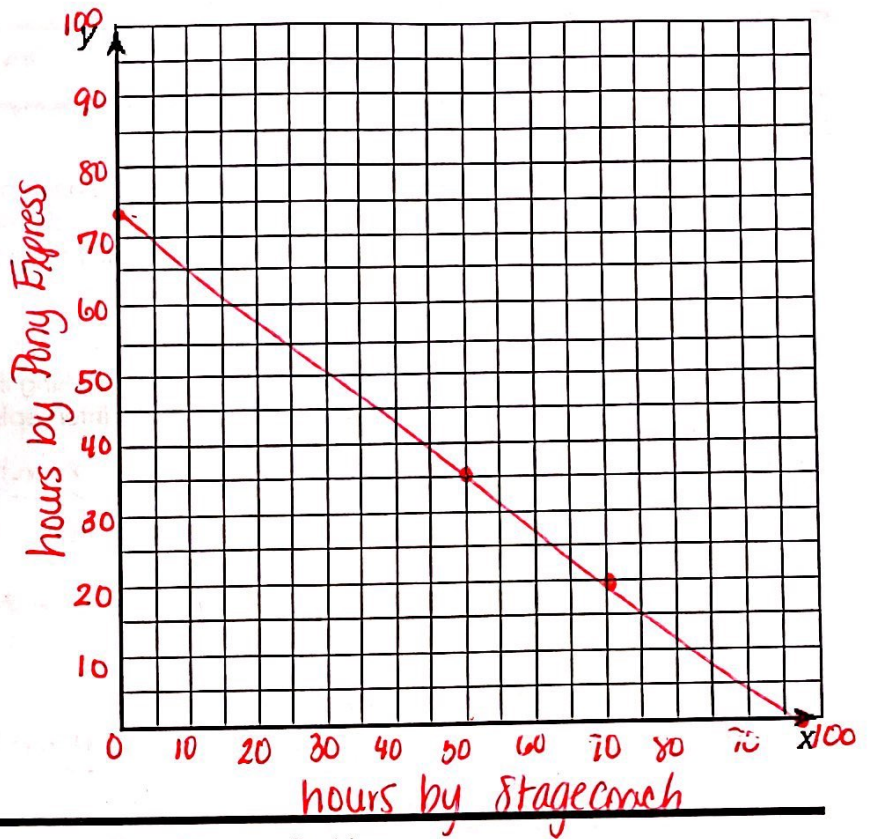
x=0
no Stagecoach

$$8(0) + 10.7y = 782$$

$$10.7y = 782$$

$$y = 73.1$$

| Time the mail was in a Stagecoach (hours) | Time the mail was with the Pony Express (hours) |
|---|---|
| 71 | 20 |
| 50 | 35.7 |
| 97.75 | 0 |
| 0 | 73 |



The Parts of the Pony Express Problem

The equation, $8x + 10.7y = 782$ is in **standard form of a linear equation**, which is $Ax + By = C$. Below, describe what each variable or expression represents in this equation.

| | |
|--------------|--|
| X | number of hours by stagecoach |
| Y | number of hours by Pony Express |
| $8x$ | distance traveled by stagecoach after x hours |
| $10.7y$ | distance traveled by Pony Express after y hours |
| $8x + 10.7y$ | total distance traveled by stagecoach & Pony Express |
| 782 | total distance to be traveled |
| x-intercept | total number of hours by stagecoach only |
| y-intercept | total number of hours by Pony Express Only |