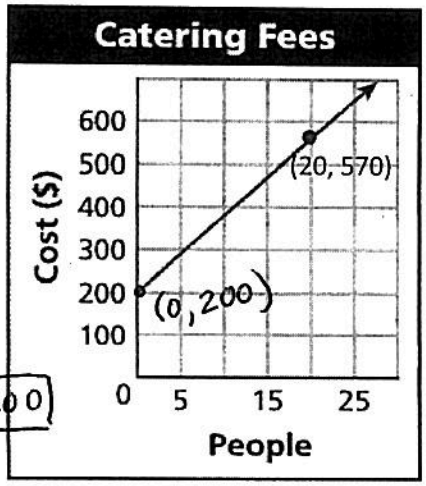
**Essential Question:** How can we represent a linear relationship symbolically from a graph?

**Do Now:**

The graph pictured to the right shows the relationship between the fees charged by a catering company and the number of people served.




a) Calculate the rate of change and identify the y-intercept. Write an equation that represents the linear relationship.

x y
(0, 200)
(20, 570)

x: # of people y: cost ($)

$m \rightarrow \frac{\Delta y}{\Delta x} = \frac{570-200}{20-0} \rightarrow \frac{37}{2} \rightarrow \frac{18.50}{1}$ ← unit rate

$b \rightarrow$ y intercept is 200

$\boxed{y = 18.50x + 200}$

b) What is the meaning of the y-intercept and the rate of change in your equation?

y intercept (0, 200) people $ the initial fee to book a party (event) is $200

rate of change (slope for a linear equation) $\frac{18.50\ \$}{1\ \text{people}}$ the event costs $18.50 per person

c) If you have $4,000, can you hold an event for 200 guests? Justify your response.

$y = 18.50x + 200$

$y = 18.50(200) + 200$

$y = 3,900$

The event can be held because there is enough money

$4,000 > $3,900

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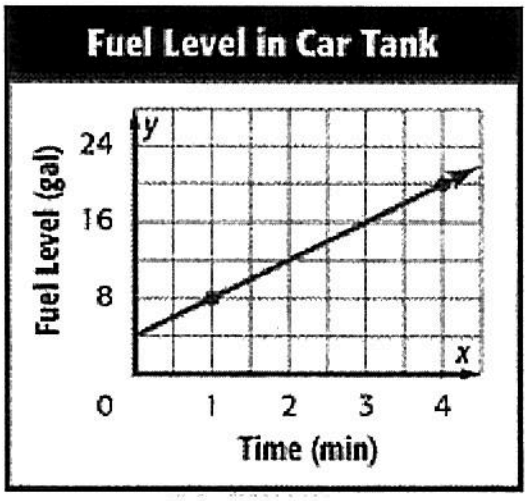
***Think about this...***

Linear relationships can be represented symbolically by creating an equation in two variables.

1) Write an equation to represent the linear relationship shown by the graph.
What does the y-intercept represent?
What does the rate of change represent?




x y
(1, 8)
(4, 20)

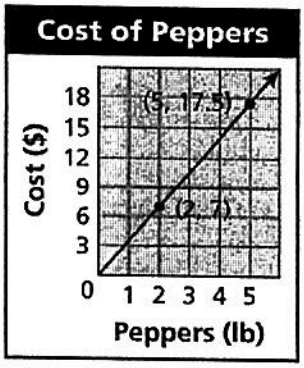
$\frac{\Delta y}{\Delta x} = \frac{20-8}{4-1} \rightarrow \frac{12}{3} \rightarrow \frac{4}{1}\ \frac{\text{gal}}{\text{min}}$

It takes 1 minute to put in 4 gallons of gas.

y intercept: 4 The car initially had 4 gallons of gas.

$\boxed{y = 4x + 4}$

2) Write an equation to represent the linear relationship. What does the y-intercept represent? What does the rate of change represent?




x, y
(2, 7)
(5, 17.5)

y int: 0
at the beginning, you pay nothing if you don't buy peppers

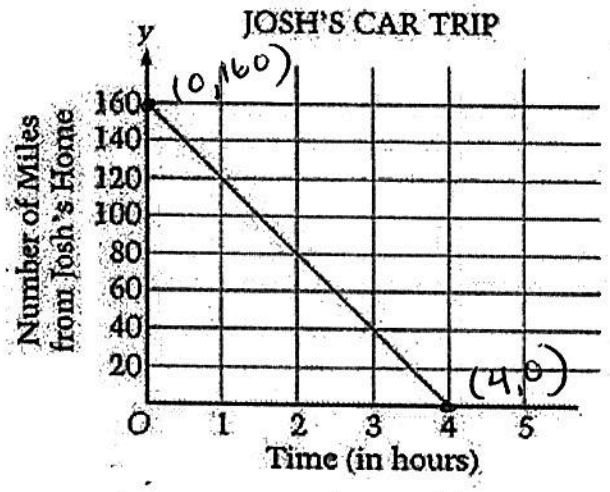
total cost → $y = 3.5x$

$3.50 per pound

$\frac{\$}{lb}$ $\frac{\Delta y}{\Delta x} = \frac{7-17.5}{2-5} = \frac{-10.5}{-3} = \frac{3.5}{1}$ $3.50 per pound of peppers

**Interpreting X and Y-Intercepts of a Graph**

3) The graph below shows the relationship between time and miles as Josh leaves his cousin's house to travel home.




a) Identify the y-intercept of the graph.
What does it tell us in the context of this situation?

(0, 160)
hrs miles

At the start of the trip, Josh is 160 miles from home.

b) Identify the x-intercept of the graph.
What does it tell us in the context of this situation?

x intercept: y value is 0

(4, 0)
hrs ↑ ↑ miles away

In 4 hours, Josh will be zero miles from his house (Josh is home!)

c) Use the intercepts to calculate the rate of change.
What does the rate of change tell us in the context of this situation?

(0, 160)
(4, 0)

$\frac{\Delta y}{\Delta x} = \frac{160-0}{0-4} = \frac{160}{-4} = \frac{-40}{1}$

Josh is 40 miles less away from home each hour (Josh is 40 miles closer to home)

d) Write an equation that represents the linear relationship.

total distance → $y = -40x + 160$ ← 160 miles away

40 miles closer per hour

e) Using your equation, determine how long Josh has been driving when he is 52 miles from home.

(x) (y)

$y = -40x + 160$

$52 = -40x + 160$

$-108 = -40x$

$2.7 = x$

.7 x 60 → 42. minutes

Josh has been driving 2.7 hours or 2 hours and 42 minutes when he is 52 miles from home.