10/6

Warm Up

Linear or not?

- If not linear, provide evidence to support your claim.
- If linear, write the equation.

x	y	
15	20	
18	14	-6
24	2	-12
36	–22	-24

$+3$, $+6$, $+12$

We must check ALL slopes

$\frac{\Delta y}{\Delta x} = \frac{-6}{3} = \frac{-12}{6} = \frac{-24}{12} = -2$

$(20) = -2(15) + b$

$20 = -30 + b$

$+30 \quad +30$

$50 = b$

$Y = -2x + 50$

Homework Questions?

11. (9, -2) and (-3, 2)

$\frac{\Delta y}{\Delta x} = \frac{2-2}{-3-9} = \frac{4}{-12} = -\frac{1}{3}$

$y = -\frac{1}{3}x + b$

$2 = -\frac{1}{3}(-3) + b$

$2 = 1 + b$

$-1 \quad -1$

$1 = b$

$y = -\frac{1}{3}x + 1$

12. (-3, -3) and (7, 2)

$\frac{\Delta y}{\Delta x} = \frac{-3-2}{-3-7} = \frac{-5}{-10} = \frac{1}{2}$

$y = \frac{1}{2}x + b$

$2 = \frac{1}{2}(7) + b$

$2 = \frac{7}{2} + b$

$-\frac{7}{2} \quad -\frac{7}{2}$

$-3/2 = b$

$y = \frac{1}{2}x - \frac{3}{2}$

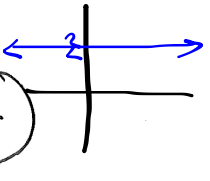
13. (1, 2) and (7, 2)

$\frac{\Delta y}{\Delta x} = \frac{2-2}{1-7} = \frac{0}{-6} = 0$

$y = 0x + b$

$2 = 0(1) + b$

$2 = b$



$y = 2$

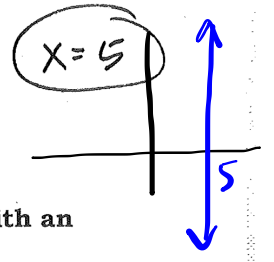
14. (5, -6) and (5, -3)

$\frac{\Delta y}{\Delta x} = \frac{-6-3}{5-5} = \frac{-3}{0}$

undefined slope

OR

no slope



$x = 5$

Is the relationship shown by the data linear? If it is, model the data with an equation.

15. LINEAR

x	y	
2	3	
3	7	+4
4	11	+4
5	15	+4
		+1, +1, +1

$\frac{\Delta y}{\Delta x} = \frac{4}{1} = 4$

$y = 4x + b$

$3 = 4(2) + b$

$3 = 8 + b$

$-8 \quad -8$

$-5 = b$

$y = 4x - 5$

16.

x	y	
-3	4	
-1	6	+2
1	7	+1
3	10	+3
		+2, +2, +2

$\frac{\Delta y}{\Delta x} = \frac{2}{2} \neq \frac{1}{2} \neq \frac{3}{2}$

Not Linear

17. LINEAR

x	y	
-2	5	
3	-5	-10
7	-13	-8
11	-21	-8
		+5, +4, +4

$\frac{\Delta y}{\Delta x} = \frac{-10}{5} = \frac{-8}{4} = \frac{-8}{4} = -2$

$y = -2x + b$

$5 = -2(-2) + b$

$5 = 4 + b$

$-4 \quad -4$

$1 = b$

$y = -2x + 1$

18. LINEAR

x	y	
2	3	
5	18	+15
8	33	+15
14	63	+30
		+3, +3, +6

$\frac{\Delta y}{\Delta x} = \frac{15}{3} = \frac{15}{3} = \frac{30}{6} = 5$

$y = 5x + b$

$3 = 5(2) + b$

$3 = 10 + b$

$-10 \quad -10$

$-7 = b$

$y = 5x - 7$

19. LINEAR

x	y	
-2	25	
0	19	-6
3	10	-9
7	-2	-12
		+2, +3, +4

$\frac{\Delta y}{\Delta x} = \frac{-6}{2} = \frac{-9}{3} = \frac{-12}{4} = -3$

$y = -3x + b$

$y = -3x + 19$

y-intercept in table!

20.

x	y	
2	3	
3	10	+7
4	17	+7
10	24	+7
		+1, +1, +6

$\frac{\Delta y}{\Delta x} = \frac{7}{1} = \frac{7}{1} \neq \frac{7}{6}$

Not Linear

2.4 Boat Rental Business

Solving Linear Equations

Sandy's Boat House rents canoes at a cost advertised as $9 per hour for trips on the Red Cedar River. The owner actually gives customers a better deal. She was once a mathematics teacher, and she uses the equation $c = 0.15t + 2.50$ to find the charge c in dollars for renting a canoe for t minutes.

???

$C = 0.15(60) + 2.50$

$C = 11.50$

Let's label our equation:

$$c = 0.15t + 2.50$$

- t: # of minutes canoe is rented for
- c: Cost ($) for renting a canoe for 't' minutes
- $0.15t$: it costs 15¢/minute to rent a canoe
- 2.50: it costs $2.50 just to take out a canoe

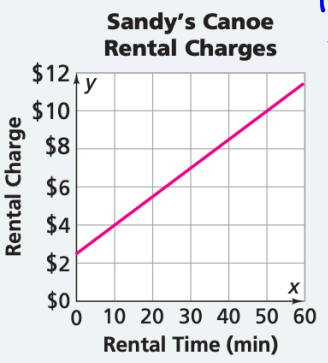
Problem 2.4

When Rashida and Serena applied for jobs at Sandy's, the owner gave them the following test questions to see if they could calculate charges correctly.

A

1. Explain what the numbers in the equation $c = 0.15t + 2.50$ tell you about the situation.
2. How much does it cost to rent a canoe for 25 minutes?
3. A customer is charged \$9.25. How long did he use the canoe?
4. A customer has \$6 to spend. How long can she use a canoe?

B The owner gave Rashida a graph of $c = 0.15t + 2.50$ and asked her how it could be used to estimate answers to Question A. How could Rashida respond?



C The owner asked Serena to explain how she could use the table below to estimate answers to Question A. How could Serena respond?

Canoe Rental Time (min)	10	20	30	40	50	60
Rental Charge (dollars)	4.00	5.50	7.00	8.50	10.00	11.50

continued on the next page >

$c = 0.15(25) + 2.50$

How can she use this graph to answer questions A 2, 3 & 4?

Proper way to show your work:

A 2. $c = 0.15t + 2.50$

$c = 0.15(25) + 2.50$

$c = 3.75 + 2.50$

$c = 6.25$

It will cost \$6.25 to rent a canoe for 25 minutes.

D The owner next asked Serena and Rashida to work together to find exact answers, not estimates, for Question A, parts (3) and (4).

1. For part (3) of Question A, the girls solved the linear equation $0.15t + 2.50 = 9.25$. They reasoned as follows:

   - If $0.15t + 2.50 = 9.25$, then $0.15t = 6.75$.
   - If $0.15t = 6.75$, then $t = 45$.
   - To check the answer, substitute 45 for t: $0.15(45) + 2.50 = 9.25$.

   Are Serena and Rashida correct? How do you know?

E River Fun Boats rents paddle boats. The equation $c = 4 + 0.10t$ gives the charge in dollars c for renting a paddle boat for t minutes.

1. What is the charge to rent a paddle boat for 20 minutes?
2. A customer at River Fun is charged \$9. How long did the customer use a paddle boat?
3. Suppose you want to spend at most \$12. How long could you use a paddle boat?

Homework

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