

# ME 2 Section 10.2: Rates of Change and Linear Functions

Activity: 1. Time & rate are changing, distance is the same

2.  $\frac{\text{distance}}{\text{time}}$  is  $\frac{\text{ft}}{\text{second}}$  for this problem (slope)

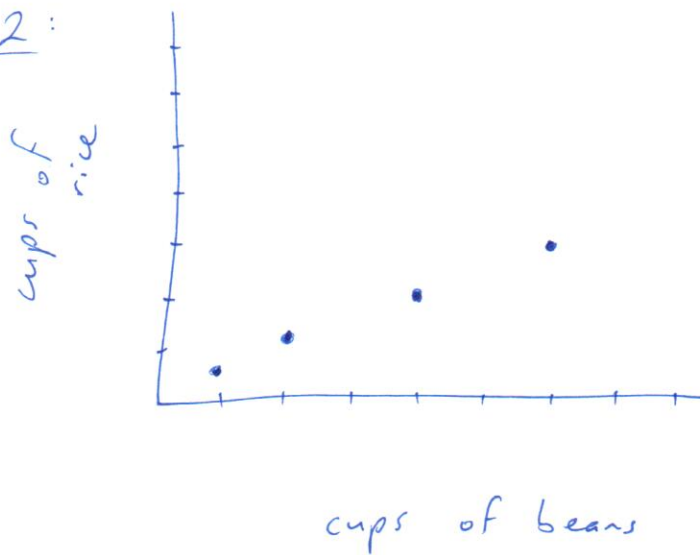
3. ex: 2 ft/s

Exploration 1: Step 1:

beans (x)	rice (y)	$\frac{\text{rice}}{\text{beans}} \left(\frac{y}{x}\right)$
1	$\frac{1}{2}$	$\frac{1}{2}$
2	1	$\frac{1}{2}$
4	2	$\frac{1}{2}$
6	3	$\frac{1}{2}$

answers  
may  
vary

Step 2:



shallow graph  
rate is  $\frac{1}{2}$

Step 3: 1:2 in every row  
rice is changing based on beans

Step 4:  $\frac{1}{2}$  cup beans :  $\frac{1}{4}$  cup rice

$\frac{1}{3}$  cup beans :  $\frac{1}{6}$  cup rice

(answers will vary)

Step 5:

$$R(x) = \frac{1}{2}x \quad \text{or} \quad R(x) = \frac{x}{2}$$

the ratio is 1 to 2.

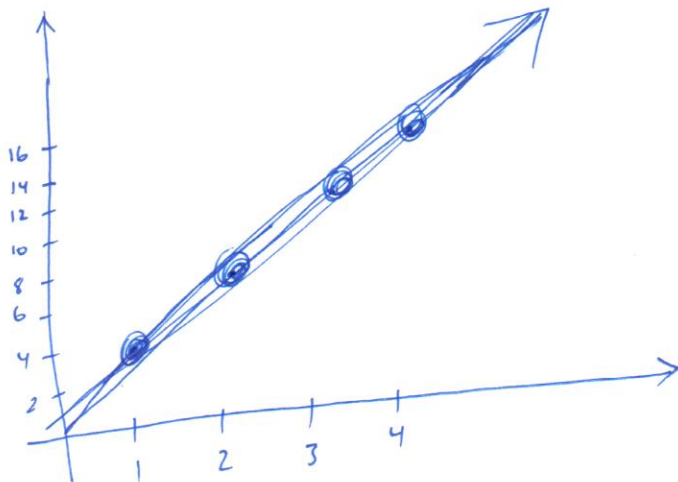
Step 6:  $3\frac{1}{2}$  cups beans

$$R\left(\frac{7}{2}\right) = \frac{1}{2}\left(\frac{7}{2}\right) = \frac{7}{4} = \boxed{\frac{3}{4} \text{ cups of rice}}$$

↑  
↑  
replace x's

Example 1:

Time (t)	Distance (d)	Rate ( $r = \frac{d}{t}$ )
1	4	4
2	8	4
3	12	4
⋮	⋮	⋮



Problem 1: a)  $\frac{15 \text{ miles}}{1 \text{ hour}} = 15 \text{ miles per hour}$

b)  $r = \frac{d}{t} \rightarrow 15 = \frac{d}{t} \rightarrow \boxed{d = 15t}$

c) answers may vary: ex: 15 miles in 1 hour, 60 miles in 4 hours, then divide

Example 2: a)  $\frac{\$9}{4 \text{ drinks}} = \$2.25 \text{ per drink}$

b) # drinks purchased (x)      total cost of drinks  $y = C(x)$        $y \div x$

1	\$ 2.25	2.25
2	\$ 4.50	2.25
3	\$ 6.75	2.25
4	\$ 9.00	2.25
5	\$ 11.25	2.25
6	\$ 13.50	2.25
7	\$ 15.75	2.25

c)  $y = 2.25 \cdot x$  or  $C(x) = 2.25 \cdot x$

d) yes, 2.25 (the slope), what is multiplied by x,  $y \div x$  is constant (always the same)

e) yes, algebraically/symbolically

Problem 2:  $\frac{y}{x} = 2.5 \rightarrow \boxed{y = 2.5 \cdot x}$

x	1	2	3	4	5	(could use other numbers)
y	2.5	5	7.5	10	12.5	

Problem 3: count or divide to find

rate of change for  $y_1$  is  $\boxed{3}$

rate of change for  $y_2$  is  $\boxed{-2}$  (because it is going down, not up)

Problem 4: ratio: 2.5 to 1 or 5 to 2

formula:  $y = 2.5 \cdot x$  (since  $\frac{y}{x} = \frac{2.5}{1} \rightarrow y = 2.5x$ )

Practice Exercises: 1)  $y = 2.5x$

x	1	2	3	4	5
y	2.5	5	7.5	10	12.5

(points may vary)

2) rate of change:  $\frac{12}{-2} = \boxed{-6}$  (all in last column are -6)

$$y = -6x$$

3) a)  $p = \frac{8}{20}x$

$$\boxed{P(x) = .4x} \text{ or } \boxed{P(x) = \frac{2}{5}x}$$

b)  $F(x) = \frac{20}{8}x$

$$\boxed{F(x) = 2.5x} \text{ or } \boxed{F(x) = \frac{5}{2}x}$$