Name: Key Test Date: Wednesday 12/12

Unit 3A: Proportionality Test Study Guide

Unit Rates:

1. If Mark uses $3\frac{3}{4}$ tablespoons of coffee to make 10 cups of coffee, how much would he need to make one cup of coffee?

$\frac{\text{tbsp}}{\text{coffee}} = \frac{\frac{15}{4} \div 10}{\frac{10}{1} \div 10} = \frac{\frac{15}{4} \cdot \frac{1}{10}}{1} = \frac{\frac{15}{40}\ \text{tbsp}}{1\ \text{coffee}}$ (KCF)

2. Andre took a trip from Boston, Massachusetts to Paris, France. The plane took $6\frac{2}{3}$ hours to go $3{,}669\frac{4}{5}$ miles. How far did the plane travel in 1 hour?

$\frac{\text{miles}}{\text{hour}} = \frac{\frac{18349}{5} \div \frac{20}{3}}{\frac{20}{3} \div \frac{20}{3}} = \frac{\frac{55047}{100}}{1} = \frac{550.47\ \text{miles}}{1\ \text{hour}}$

3. A standard bathtub holds 70 gallons of water. On average, it takes $7\frac{1}{2}$ minutes to drain a bathtub. How many gallons of water go down the drain each minute?

$\frac{\text{gal}}{\text{min}} = \frac{\frac{70}{1} \div \frac{15}{2}}{\frac{15}{2} \div \frac{15}{2}} = \frac{\frac{140}{15}\ \text{gal}}{1\ \text{min}}$ or $\frac{9\frac{5}{15}\ \text{gal}}{1\ \text{min}}$ or $\frac{9\frac{1}{3}\ \text{gal}}{1\ \text{min}}$

4. Mackenzie ran the Olympic marathon of $26\frac{1}{5}$ miles in a time of $5\frac{4}{5}$ hours. How far did she run in the first hour?

$\frac{\text{miles}}{\text{hour}} = \frac{\frac{131}{5} \div \frac{29}{5}}{\frac{29}{5} \div \frac{29}{5}} = \frac{\frac{655}{145}\ \text{miles}}{1\ \text{hour}}$ or $\frac{4\frac{75}{145}\ \text{mi}}{1\ \text{h}}$ or $\frac{4\frac{15}{29}\ \text{mi}}{1\ \text{h}}$

5. Tiana's car travelled 111 miles on $\frac{3}{8}$ of a tank of gas. How far will she be able to go on a full tank of gas?

$\frac{\text{miles}}{\text{gas}} = \frac{\frac{111}{1} \div \frac{3}{8}}{\frac{3}{8} \div \frac{3}{8}} = \frac{\frac{888}{3}\ \text{mi}}{1\ \text{gas}}$ or $\frac{296\ \text{mi}}{1\ \text{gas tank}}$

6. Joey entered a hot dog eating competition. In $3\frac{3}{4}$ minutes, he ate $30\frac{1}{2}$ hot dogs. How many hot dogs did he eat in one minute?

$\frac{\text{hot dog}}{\text{min}} = \frac{\frac{61}{2} \div \frac{15}{4}}{\frac{15}{4} \div \frac{15}{4}} = \frac{\frac{244}{30}\ \text{hot dog}}{1\ \text{min}}$ or $\frac{8\frac{4}{30}}{1}$ or $\frac{8\frac{2}{15}\ \text{hot dog}}{1\ \text{min}}$

Proportionality:

Number of Hours	Total Cost ($)	Ratio: $\frac{y}{x}$
1	$75	$\frac{75}{1}$
2	$120	$\frac{120}{2} = \frac{60}{1}$
3	$165	$\frac{165}{3}$
4	$210	$\frac{210}{4}$
5	$255	$\frac{255}{5}$

7. Fill in the missing ratio values. Is the table proportional? Explain why or why not:

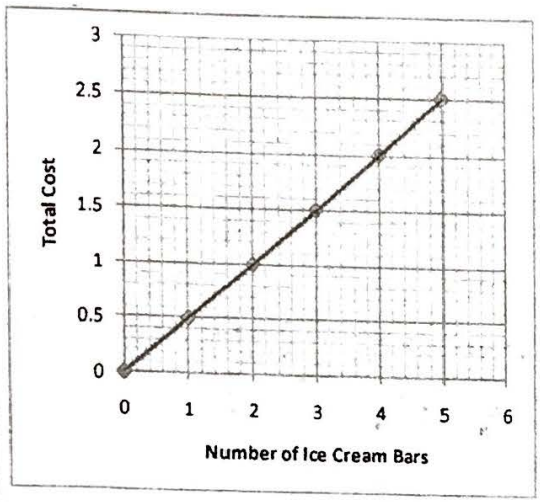
NP because the unit rate is not the same

8. Find a real-world example of a proportional relationship. _____

Answers will Vary

How could that relationship be changed to become non-proportional? _____

9.



X Number of Ice Cream	Y Total Cost
0	0
1	0.5
2	1
3	1.5
4	2
5	2.5

a. Is this a proportional graph? Why or why not?
Yes; origin, linear

b. Fill in the table for the graph

c. What is the unit rate (include labels)? $\frac{y}{x} = \frac{0.5 \text{ cost}}{1 \text{ ice cream bar}}$

d. Write the equation relating cost to number of ice cream bars purchased. $y = mx$ $y = 0.5x$

10.

Fill in the missing amounts of quarts and gallons. Then find the ratio for the number of quarts (y) to the number of gallons (x).

Gal (x)	1	2	4	5	10	20	25	30	45	100	x
Quarts (y)	4	8	16	20	40	80	100	120	180	400	y
Ratio $\frac{y}{x}$	$\frac{4}{1}$	$\frac{8}{2}$	$\frac{16}{4}$	$\frac{20}{5}$	$\frac{40}{10}$	$\frac{80}{20}$	$\frac{100}{25}$	$\frac{120}{30}$	$\frac{180}{45}$	$\frac{400}{100}$	$\frac{y}{x}$

$\rightarrow \frac{4}{1}$

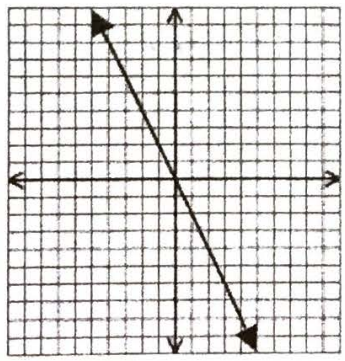
1. What does the $\frac{y}{x}$ ratio tell us? Constant of proportionality in Quarts per gallon

2. Write an equation to show how to find the number of quarts in any number of gallons.

$y = mx$ $y = \frac{4}{1}x$ or $y = 4x$

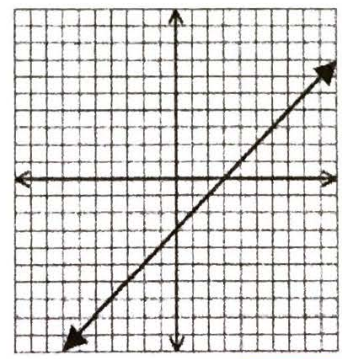
Determine which of the following graphs represent proportional relationships. Circle the appropriate response.

11.



Proportional non-proportional

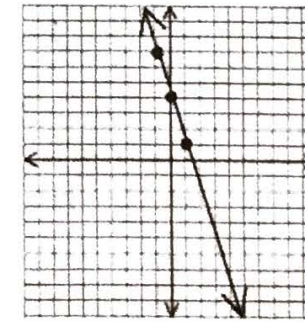
12.



Proportional non-proportional

no origin

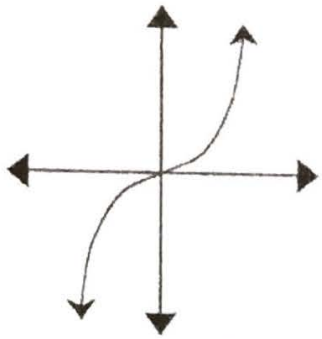
13.



Proportional non-proportional

no origin

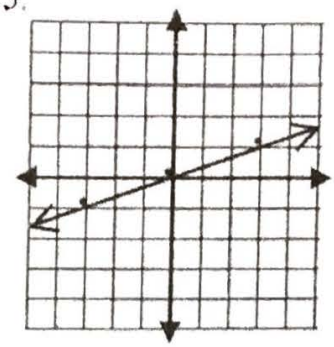
14.



Proportional (non-proportional)

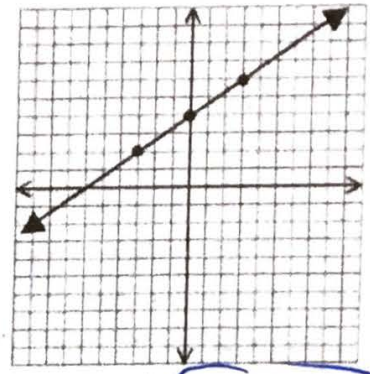
not linear

15.



(Proportional) non-proportional

16.



Proportional (non-proportional)

no origin

Number of Hours	Total Cost ($)	Ratio: $\frac{y}{x}$
1	$45	$\frac{45}{1}$
2	$90	$\frac{90}{2} = \frac{45}{1}$
3	$135	$\frac{135}{3} = \frac{45}{1}$
4	$180	$\frac{180}{4} = \frac{45}{1}$
5	$225	$\frac{225}{5} = \frac{45}{1}$

17. Fill in the missing ratio values. Is the table proportional? Explain why or why not:

P - the unit rate/constant of proportionality is the same ($\frac{45}{1}$) so the graph would be linear. It would also go through the origin (0, 0).

18. The amount of money Amy has saved is proportional to the number of weeks that have passed. This relationship is graphed below.

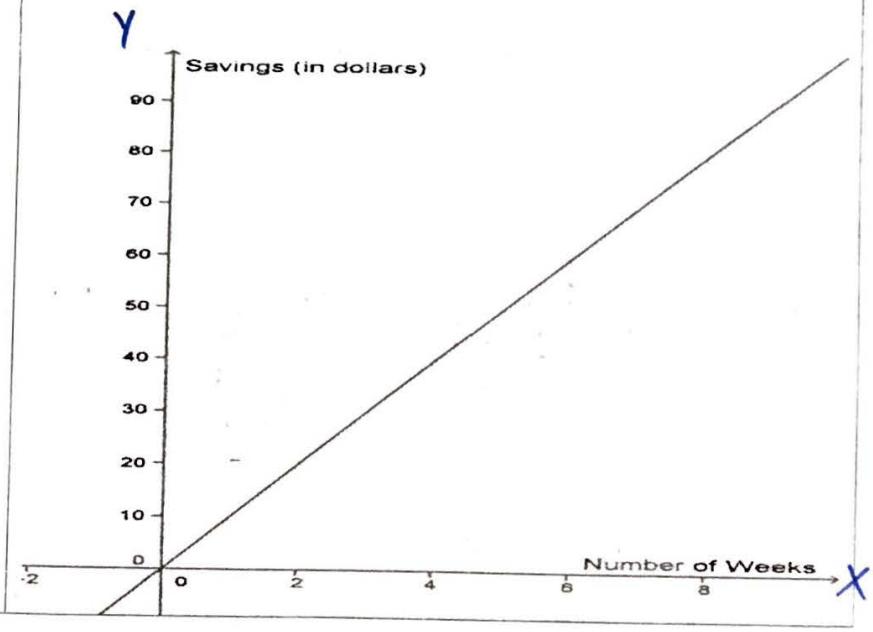
a. Identify the **unit rate or constant of proportionality** and explain its meaning, related to this context.

$\frac{y}{x} = \frac{10}{1}$ = earn $10 in savings every 1 week

b. Explain the meaning of the points, (0, 0) and (4, 40), within this context.

(0,0) - when it is week 0, there is $0

(4,40) - at week 4, there is $40



19.

a. Is this a proportional graph? Why or why not?

Yes; linear and origin

b. What is the unit rate (include labels)? How do you know?

$\frac{y}{x} = \frac{120 \text{ calories}}{1 \text{ snack}}$

When $x = 1$ on the graph, $y = 120$

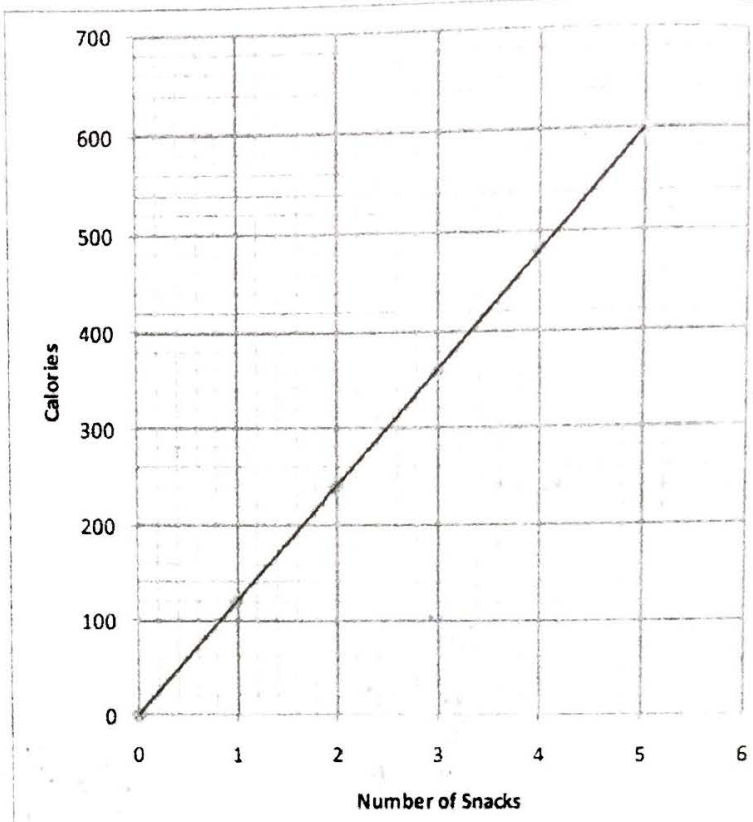
c. Write the equation for calories related to number of snacks.

$y = mx$ $\quad y = 120x$

d. Where does the unit rate show up on the graph? In the equation?

Graph - when $x = 1$

Equation - $y = mx$ (↑ unit rate)



20.

You can use table, graphs, words or equations to represent and compare proportional relationships. Different cyclists rates are represented below.

Words Cyclist *A*

A cyclist can ride 24 miles in 2 hours.

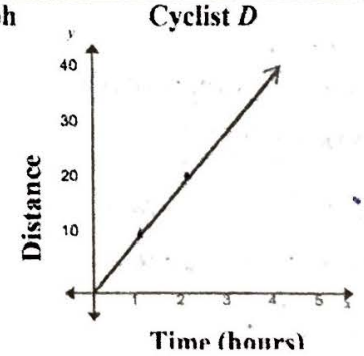
Equation Cyclist *C*

$y = 9x$

Table Cyclist *B*

Time Hours	Distance (miles)
0	0
1	5
2	10
3	15

Graph Cyclist *D*



Put the cyclists in order from fastest to slowest, using math AND words to explain your reasoning.

A. $\frac{24}{2} = \frac{12 \text{ mi}}{1 \text{ h}}$

B. $\frac{5 \text{ mi}}{1 \text{ h}}$

C. $y = 9x$ $\quad \frac{9 \text{ mi}}{1 \text{ h}}$

D. (1, 10) $\quad \frac{10 \text{ mi}}{1 \text{ h}}$

B, C, D, A → Using the unit rate/constant of proportionality for each cyclist, the fastest is B, then C, then D, then A.