

Final Exam Review #4

ANSWER KEY

Ratios, Rates & Proportional Relationships

Percents

Practice Problem Set:

Ratios, Rates & Proportional Relationships

1. Lauren can run a 10-kilometer race in 75 minutes. If she maintains that same pace, how many kilometers can she run in 3 hours?

$$\frac{10 \text{ km}}{75 \text{ min}} = \frac{x}{180 \text{ min}}$$

$$\frac{1800}{75} = \frac{75x}{75}$$

$$x = 24$$

She can run 24 km in 3 hours.

2. Dan and Stan are competing in a 20-mile bicycle race. Dan rides 6.2 miles in $\frac{1}{4}$ hour. Stan rides 11.9 miles in $\frac{1}{2}$ hour.

- a. What is the bike rate, in *miles per hour*, for each racer? $\frac{\text{miles}}{\text{hours}}$ (divide miles by hours)

$$\text{Dan: } 6.2 \div \frac{1}{4} = 24.8 \text{ miles per hour} \quad \text{Stan: } 11.9 \div \frac{1}{2} = 23.8 \text{ miles per hour}$$

- b. If Dan and Stan both continue to ride at the same average speed, who will finish first? Explain your response.

Dan will finish first because he is going at a faster speed (24.8 miles per hour) than Stan (23.8 miles per hour). He covers more distance in one hour. He can go 1 extra mile per hour.

3. Annie spends \$56 on 25 gallons of paint and Cory spends \$34.50 on 15 gallons of paint. Calculate the *unit price* and determine who spends more per gallon.

$$\text{Unit Price} = \frac{\$ (\text{price})}{\text{quantity}}$$

$$\text{Annie: } 56 \div 25 = \$2.24 \text{ per gallon}$$

$$\text{Cory: } 34.50 \div 15 = \$2.30 \text{ per gallon}$$

Cory spends more per gallon (6 cents more per gallon).

4. Greg ordered 12 cheese pizza pies from Gino's pizzeria and was charged \$102 before tax. Raymond ordered 17 cheese pizza pies from Tony's pizzeria and was charged \$141.10 before tax. Based on this information, determine which statement below is **true**.

- A. Greg paid 20 cents more per pizza pie than Raymond
- B. Raymond paid 20 cents more per pizza pie than Greg
- C. Greg and Raymond paid the same amount per pizza pie
- D. For the same amount of pizza, Raymond paid \$39.10 more than Greg

Greg: $\frac{\$102}{12 \text{ pies}} = \8.50 per pie

Raymond: $\frac{\$141.10}{17 \text{ pies}} = \8.30 per pie

5. On average, Damian hits the baseball 3 times out of 5 times up at bat. At this rate, how many hits can we expect from Damian if he bats 45 times during a season?

Set up a proportion, cross multiply and solve for the unknown value.

$$\frac{\text{hits}}{\text{times at bat}} = \frac{\text{hits}}{\text{times at bat}}$$

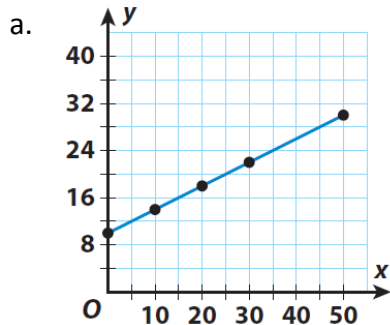
$$\frac{3 \text{ hits}}{5 \text{ times at bat}} = \frac{x}{45}$$

$$5x = 135$$

$$x = 27$$

We can expect 27 hits from Damian.

6. For a – d, determine if the model displays a *proportional relationship*. If so, determine the constant of proportionality and write an **equation** that defines the relationship.



Not proportional
the graph doesn't start at the point (0,0)

b.

x	y
9	3
12	4
18	6
25	$8\frac{1}{3}$

$$\text{C.O.P} = \frac{y}{x}$$

$$\frac{3}{9} = \frac{1}{3}$$

$$\frac{4}{12} = \frac{1}{3}$$

$$\frac{6}{18} = \frac{1}{3}$$

$$\frac{4}{12} = \frac{1}{3}$$

$$\frac{8\frac{1}{3}}{25} = \frac{1}{3}$$

$$\text{Equation: } y = kx$$

constant of proportionality

Proportional
Constant of Proportionality: $\frac{1}{3}$
Equation: $y = \frac{1}{3}x$

c.

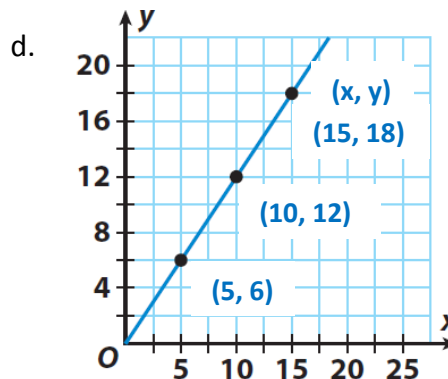
x	y
0	0
1	65
2	85
3	105
4	125

$$\frac{65}{1} = 65$$

$$\frac{85}{2} = 42.5$$

$$65 \neq 42.5$$

Not proportional
The ratios are not equal



$$\text{C.O.P} = \frac{y}{x}$$

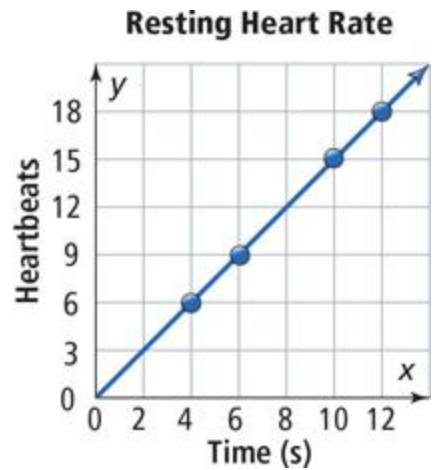
$$\frac{6}{5}$$

$$\frac{12}{10} = \frac{6}{5}$$

$$\frac{18}{15} = \frac{6}{5}$$

Proportional
Constant of Proportionality: $\frac{6}{5}$
Equation: $y = \frac{6}{5}x$ or $y = 1\frac{1}{5}x$

7. Consider the proportional relationship displayed by the graph.



- a. What does the point (6, 9) represent in the context of the situation?

At 6 seconds, the heart will have beaten 9 times.

- b. What is the *constant of proportionality*? What does this number mean in the context of the situation?

**The constant of proportionality is 1.5.
This means that the heart beats at a rate of 1.5 heartbeats per second.**

- c. Write an **equation** that defines the relationship.

$$y = 1.5x$$

x: time (seconds)
y: number of heartbeats

- d. Use your equation from part (c) to determine how many times the heart beats in one minute.

1 minute = 60 seconds (x = 60)

$$y = 1.5x$$

$$y = 1.5(60)$$

$$y = 90$$

90 heartbeats in one minute

Percents

Solve each problem below. **Round all percents to the nearest tenth when necessary.**

8. A coat is on sale for $\frac{1}{4}$ off the regular price. At checkout, a 5.5% sales tax is applied to the sale price of the coat. What is the total cost, *including tax*, of a coat originally priced at \$320 if it is purchased on sale?

Discount

$$(320)\left(\frac{1}{4}\right) = 80$$

Sale Price

$$320 - 80 = \$240$$

Tax

$$\text{Tax} = \% \times \text{price}$$

$$\text{Tax} = (0.055)(240) \\ = \$13.20$$

Final Price

$$240 + 13.20 = \mathbf{\$253.20}$$

9. Last week, the price of peaches at a grocery store was \$2.89 per pound. This week, the peaches at the same grocery store have been *marked up* by 5%. What is the price of $2\frac{1}{2}$ pounds of peaches?

Markup

$$\text{Markup} = \% \times \text{price}$$

$$n = (0.05)(2.89)$$

$$n = 0.1445$$

$$n = \mathbf{\$0.14}$$

New Price

$$2.89 + 0.14 = \mathbf{\$3.03}$$

$$\text{Price per pound this week (after markup)} = \$3.03$$

Price of 2.5 pounds of peaches:

$$(2.5)(3.03) = 7.575$$

$$= \mathbf{\$7.58}$$

10. Joey, the pitcher for the Roslyn Bulldogs, struck out 4 batters in yesterday's game. In today's game he struck out 9 batters. What is the percent increase in the number of strikeouts?

Change or Difference = % \times Original Amount

$$(9 - 4 = 5)$$

$$\frac{5}{4} = \frac{n\% \times 4}{4}$$

$$1.25 = n\%$$

$$125\%$$

The percent increase is 125%

11. Teddy invested \$5,300 in a bank account that pays an annual simple interest rate of 2%. If he left his money in the account for 4 years, how much **interest** did he earn on his investment?

A. \$9540 $I = PRT$ [(principle)(rate)(time)]

$$I = (5300)(0.02)(4)$$

B. \$5724 $I = \$424$

C. \$424

D. \$106

12. Dana bought two boxes of Junior Mints. She noticed that there were 20% more mints in the second box than in the first box. If she counted 15 mints in the first box, how many mints were in the second box?

Change or Difference = % \times Original Amount

$$n = (0.20)(15)$$

$$n = 3 \text{ (3 more mints are in the second box than in the first box)}$$

$$15 + 3 = 18$$

There were 18 mint in the second box.

13. The population of a city is represented by x . Which expression represents the new population after a 12% increase in the city's population?

A. $1 + 0.12x$

B. $1.12x$

C. $0.88x$

D. $0.12x$

New = (100% + %increase) \times Original Amount

$$\text{New} = (100\% + 12\%)(x)$$

$$\text{New} = (112\%)(x)$$

$$\text{New} = 1.12x$$

or

New = Original + Increase

$$\text{New} = x + 0.12x$$

$$\text{New} = 1.12x$$

14. The regular price of an item at a store is x dollars. The item is on sale for 10% off the regular price. Based on this information, answer parts a – c.

a. Which expression represents the **discount**? A. $0.10x$ B. $0.90x$ C. $1.10x$

b. Which expression(s) represent the **sale price**? Select all that apply.

A. $1 - 0.10x$

B. $0.90x$

C. $x - 0.10x$

D. $0.10x$

E. $1.10x$

F. $x + 0.10x$

New = $(100\% - \%increase) \times \text{Original Amount}$

New = $(100\% - 10\%)(x)$

New = $(90\%)(x)$

New = $0.90x$

or

New = $\text{Original} - \text{Decrease}$

New = $x - 0.10x$

New = $0.90x$

c. If the regular selling price of the item is \$25.95. Calculate the discount to the *nearest cent*. Calculate the sale price to the *nearest cent*.

Discount = $\% \times \text{price}$

$n = (0.10)(25.95)$

$n = 2.595$

$n = 2.60$

The discount is \$2.60

Sale Price = $\text{Price} - \text{Discount}$

$\$25.95 - \2.60

The sale price is \$23.35