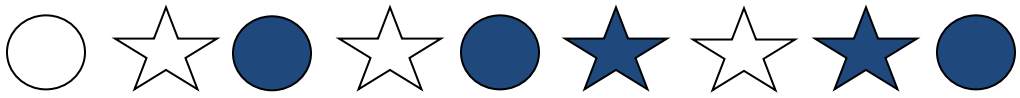
Unit 4 Study Guide: Rates, Ratios, & Proportional Reasoning

Vocabulary:

1. Percent: a fraction or ratio in which the denominator is 100
2. Proportion: an equation which states that two ratios are equal
3. Ratio: compares two quantities that share a relationship
4. Unit Rate: A rate with a denominator of 1
5. Rate: A ratio comparing 2 different units

Part A:
Ratios, Rates, & Unit Rates

Use the figure below to write each ratio three ways.



6. shaded to white figures _5:4 5 to 4 5/4_____

7. circles to stars _4:5 4 to 5 4/5_____

8. shaded figures to total figures _5:9 5 to 9 5/9_____

Use the following address to write each ratio three ways.

36541 Riverside Road

9. numbers to letters 5:13 5 to 13 5/13____ 10. vowels to consonants 6:7 6 to 7 6/7____

11. consonants to numbers _7:5 7 to 5 7/5_12. letters to complete address 13:18 13 to 18 13/18

Solve.

13. Out of 28 students in the class, 21 wore sneakers to school. What is the ratio of students who wore sneakers to those who did not wear sneakers? _21:7 = 3:1_____

14. Of the 18 students at a dance camp, 6 are boys. What is the ratio of girls to students at the camp? _12:18 = 2:3_____

15. The ratio of games the Falcons won to the games they lost if 7:5. What is the ratio of games won to the total number of games played? _7:12_____

Write each ratio in three ways.

16. A baseball team won 7 out of 15 games.
    a. wins to total games 7:15 7 to 15 7/15
    b. wins to losses 7:8 7 to 8 7/8

17. A jack for a car requires a force of 120lb. to lift a 3,000lb. car. What is the ratio of the car's weight to the force required to lift the car? Write the ratio in simplest form. 3,000:120 = 25:1

18. A 17-min telephone call from Boston to Chicago costs $2.38. What is the cost per minute?
    .14 per minute

19. You drove 120 miles in 2 hours. How many miles per hour is this? 60mph

20. A midsize car can travel 200 mi on 7 gal of gasoline. A minivan can travel 350 mi on 12 gal. Which has the greater fuel efficiency? 28.6 mpg 29.2 mpg so minivan has the greater fuel efficiency

Find each unit rate. Then determine the better buy.

21. popcorn: 15 oz. for $1.69 .11
30oz. for $2.49 .08 Better Buy

22. tennis balls: $2.25 for 3 tennis balls .75 Better Buy
$6.24 for 8 tennis balls .78

23. A chef uses 1 cup of cheese per 2 cups of milk in a casserole. How many cups of cheese are needed if the chef uses 6 cups of milk? _3 cups_____

24. Jason scored 30 goals in 15 soccer games. Using the unit rate, how many goals will he score in 20 games? _40 goals_____

25. Amy's puppy gained 36 pounds in 9 weeks. Using the unit rate, how many pounds did the puppy gain in 5 weeks? _20 pounds_____

Part B:
Solving Proportions

Determine if the ratios are proportional.

26. $\frac{15}{21}, \frac{5}{7}$ yes 27. $\frac{6}{9}, \frac{9}{15}$ no 28. $\frac{15}{6}, \frac{9}{4}$ no 29. $\frac{20}{12}, \frac{15}{9}$ yes

30. If a 10 pound turkey takes 4 hours to cook, how long will it take a 16 pound turkey to cook? 6.4 hours

31. A recipe calls for 2 eggs to make 10 pancakes. How many eggs will you need to make 35 pancakes? 7 eggs

32. An order of 5 paintbrushes costs $3.50. If each paintbrush costs the same amount, what is the cost for an order of 3 paintbrushes? $2.10

33. There are 3 instructors per 18 students at a tennis camp. At that rate, how many instructors are needed for 30 students? 5 instructors

Solve the following proportions.

34. $\frac{3}{4} = \frac{9}{n}$ 12 35. $\frac{6}{2} = \frac{21}{n}$ 7 36. $\frac{x}{55} = \frac{18}{22}$ 45

37. Of the 40 students in the marching band, 3 out of every 5 play the trumpet. How many students in the marching band play the trumpet? 24 students

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Part C:
Solving Percent Problems

38. What percent of 36 is 9? 25%

39. 15 is 30% of what number? 50

40. What percent of 20 is 4? 20%

41. 70% of what number is 91? 130

42. What is 72% of 325? 234

43. Emma has already read 7 of the 20 books on her summer reading list. Express the percent of books she has read as a decimal and a percent. .35 35%

44. Kathleen earned $820 working a summer job. If she saved 55% of her money, how much did she save? $451

45. Of the 100 students who went on the picnic, 62 had fruit in their lunch boxes. Express the percent of students with fruit as a decimal and as a fraction in simplest form. .62 31/50

46. A pet store's shipment of tropical fish was delayed. Forty percent of the 1,500 fish died. How many fish died? 600 fish

47. During the summer Rosa earns $950. She saved 40%, how much did she save? $380

48. A dance club printed 400 tickets for its annual show and sold 85% of them. How many they sell? 340 tickets

49. The Lions won 75% of their 28 games this year. How many games did they win? 21 games

50. 56 percent = 56 out of __100____

51. In a survey, two in every 25 people said they watched TV last night. What is this figure as a percentage? 8%

52. The class treasury totals $210. Forty percent of this was earned from the art show. How much money was earned from the art show? $84

Part D:

Function Tables/Graphing

53. Complete the function table. What is the rule? _y = 60x___

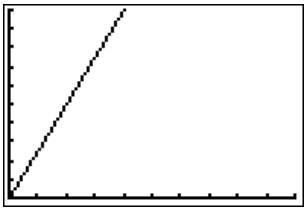
INPUT (X)	OUTPUT (Y)
1	60
2	120
3	180
4	240
5	300

54. Movies are rented for $2.50 at Video-Rama. What is the charge to rent *x* number of movies?
First, write the function. _y = 2.50x__

Second, create a function table.

# of Movies	Cost
1	2.50
2	5.00
3	7.50
4	10.00

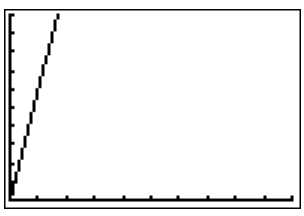
Third, graph the function



55. The table below shows the total number of pencils in different numbers of packages.
Write an equation that could be used to find the total number of pencils, *y*, in *x* packages. _y = 6x_

NUMBER OF PACKAGES (X)	NUMBER OF PENCILS (Y)
2	12
3	18
5	30
6	36

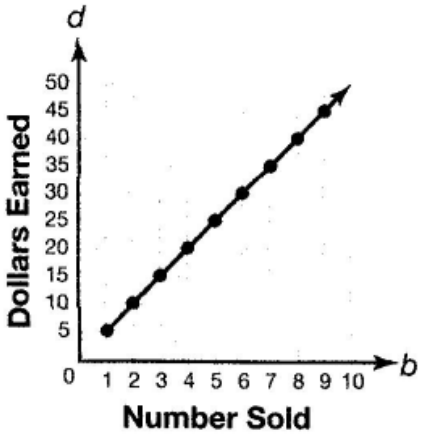
Then graph the function



56. **Write the equation that represents the relationship shown in the table.** **y = 2x + 3**

X	Y
0	3
1	5
2	7
3	9

57. Eric makes wooden puzzle boxes. The graph shows the number of dollars, d, Eric earns for each puzzle box, b, he sells. List the ordered pairs shown on the graph. Which is the independent variable? Which is the dependent variable? Write an equation that expresses the relationship between the number of puzzle boxes sold and the amount Eric earns.



Ordered Pairs: (1,5)(2,10)(3,15)(4,20)(5,25)(6,30)(7,35)(8,40)(9,45)

Independent: b: # of puzzle boxes

Dependent: d: dollars earned

Equation: d = 5b

Part E:

Direction Proportions/Variation

Tell whether the following tables are examples of direct variation. If so, write the equation and identify the constant of proportionality

58.

X	1	2	3	4
Y	2	4	6	8

Yes, y = 2x

59.

X	1	2	3	4
Y	5	7	9	11

No

60.

X	1	2	3	4
Y	60	30	20	15

No

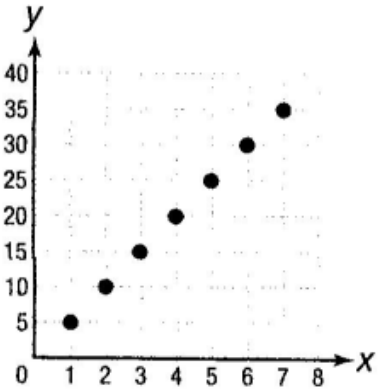
61.

X	1	2	3	4
Y	3	6	9	12

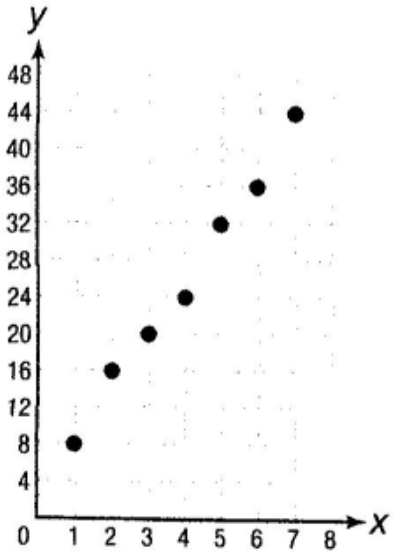
Yes, y = 3x

State whether or not the plotted points could show a direct proportion relationship. **If they could, write the equation and identify the constant of proportionality.**

62.



63.



_yes, y = 5x k = 5_____

no, graph is not linear_____

64. **There are 47 skittles in a bag. Complete the table below.**

# of Bags	Total # of Skittles
1	47
2	94
3	141
4	188
5	235
6	282
7	329
8	376
9	423

Using the table, write an equation using y = kx. __y = 47x_____

What is the constant of proportionality? ___47_____

Use the formula to determine how many skittles there would be in 50 bags. _____2350_____

Part: F
Open Ended

65. Javier has a new job designing websites. He is paid at a rate of $700 for every 3 pages of web content that he builds. Create a ratio table to show the total amount of money Javier has earned in ratio to the number of pages he has built.

Total Pages Built	3	6	9	12	15	18	21	24
Total Money Earned	700	1400	2100	2800	3500	4200	4900	5600

Javier is saving up to purchase a used car that costs $4,300. How many web pages will Javier need to build before he can pay for the car? 21 pages, and he will still have $600 left over

66. Susan and John are buying cold drinks for a neighborhood picnic. Each person is expected to drink one can of soda. Susan says that if you multiply the unit price for a can of soda by the number of people attending the picnic, you will be able to determine the total cost of the soda. John says that if you divide the cost of a 12-pack of soda by the number of sodas, you will determine the total cost of the sodas. Who is right and why? Susan is correct, because John is describing finding the unit rate which is the cost for only one drink not the total.

67. Josie took a long multiple-choice, end-of-year vocabulary test. The ratio of the number of problems Josie got incorrect to the number of problems she got correct is 2:9. If Josie missed 8 questions, how many did she get right? 36 questions

68. The grocery store is selling lettuce at a cost of 5 pounds for $4.00.

Part A
Carol needs 2 pounds of lettuce and can buy it at the advertised price. If there is no tax on food, is $2.00 enough to buy the lettuce she needs? Show your work.
Yes, because 2 lbs. = $1.60

Part B
What is the unit rate for lettuce at this grocery store? Show your work and state your answer in a complete sentence.

Lettuce costs .80 per pound

Part C
How many pounds of lettuce can you buy for $12.00? Show your work.

15 lbs.

69. Devon is trying to find the unit price on a 6-pack of drinks on sale for $2.99. His sister says that at that price, each drink would cost just over $2.00. Is she correct, and how do you know? If she is not, how would Devon's sister find the correct price? She is incorrect because $2.99 ÷ 6 would give you the unit rate and that is .50 per can

70. The Sparkling House Cleaning Company has cleaned 28 houses this week. If this number represents 40% of the total number of houses they are contracted to clean, how many total houses will the company clean by the end of the week? 70 houses

71.

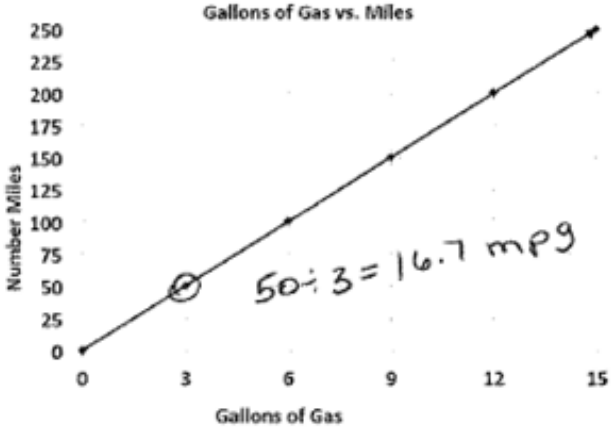
. Victor was having a hard time deciding which new vehicle he should buy. He decided to make the final decision based on the gas efficiency of each car. A car that is more gas efficient gets more miles per gallon of gas. When he asked the manager at each car dealership for the gas mileage data, he received two different representations, which are shown below.

Vehicle 1: Legend

Gallons of Gas	4	8	12
Number of Miles	72	144	216

72÷4= 18 mpg

Vehicle 2: Supreme



a. If Victor based his decision only on gas efficiency, which car should he buy? Provide support for your answer. Vehicle 1: The Legend b/c when finding the unit rate it get 18 mpg where the Supreme only gets 16.7 mpg. See work above. The Legend can go further on a single gallon of gas.

After comparing the Legend and the Supreme, Victor saw an advertisement for a third vehicle, the Lunar. The manager said that the Lunar can travel about 289 miles on a tank of gas. If the gas tank can hold 17 gallons of gas, is the Lunar Victor's best option? Why or why not?

289÷17=17 mpg No, b/c it can only travel 17mpg and the Legend can still travel further at 18 mpg.

72.

Joshua spends 25 minutes of each day reading. Let d be the number of days that he reads, and let m represent the total minutes of reading. Determine which variable is independent and which is dependent. Then, write an equation that will model the situation. Make a table showing the number of minutes spent reading over 7 days.

Independent # of days (d)	Dependent # of minutes (m)
1	25
2	50
3	75
4	100
5	125
6	150
7	175

25d = m

73.

The table below shows the relationship between the number of cans and the weight of those cans in ounces.

Number of Cans c	Weight (in ounces) w
4	128
8	256
12	384

a. What are the dependent and independent variables of this relationship?

Dependent variable weight

Independent variable # of cans

b. Write an equation to represent the weight (W) for any number of cans (c).

$32c = w$

c. Use your equation to determine how much will 10 cans weigh (in ounces).

$32(10) = w$

$320 = w$

74.

In Katya's car, the number of miles driven is proportional to the number of gallons of gas used. Find the missing value in the table.

The Number of Gallons g	The Number of Miles Driven m
0	0
4	112
6	168
8	224
10	280

a. Write an equation that will relate the number of miles driven to the number of gallons of gas.

$28g = m$

b. What is the constant of proportionality? 28

c. How many miles could Katya go if she filled her 22-gallon tank?

$28(22) = 616$ miles

d. If Katya takes a trip of 600 miles, how many gallons of gas would be needed to make the trip?

$\frac{28g}{28} = \frac{600}{28} \approx 21.4$ or 22 whole gallons

e. If Katya drives 224 miles during one week of commuting to school and work, how many gallons of gas would she use? see table 8 gallons