

Coordinate Algebra Unit 1 Review:

Dimensional Analysis

- 1) Bob travels 16 km/sec. To break the speed record for a race, he needs to travel at least 961,000 meters per minute. Did he break the speed record?  $960,000 \text{ m/min} \rightarrow \text{NO}$
- 2) Kate eats 12 hot dogs in 15 minutes. To qualify for a hot dog eating contest, she needs to eat 47 hot dogs in an hour. Does she meet this contest requirement?  $48 \text{ hotdogs/h} \rightarrow \text{YES}$
- 3) To travel 80 miles, it will cost \$15 in gas. What is this rate in yards per Euros? One dollar is equivalent to 0.765 Euros.  $12270.15 \text{ yd/E}$
- 4) Yem travels at a rate of 20 yards per 3 minutes. Flem travels at a rate of 1250 feet per hour. Who is faster?  $\text{YEM} = 1200 \text{ ft/hr}$  **FLEM IS FASTER**
- 5) 7 Ogs cost \$5 dollars. How much do the 7 Ogs cost in Euros if one dollar is equivalent to 0.765 Euros?  $3.825 \text{ E for Ogs}$
- 6) Zoe drinks 40 cups of coffee. Zany drinks 22 pints of coffee. Zelly drinks 9 quarts of coffee. Who drank the most coffee?  $\text{ZOE: } 20 \text{ pt}$   $\text{Zany: } 22 \text{ pt}$   $\text{Zelly: } 18 \text{ pt}$  **Zany**
- 7) A car can travel 23 miles per gallon. A traveler pays \$3 per gallon in the United States. This traveler has traveled a total of 100 km in the UK. If 0.621371192 miles is equal to one kilometer, what is the approximate price (to the nearest dollar) of what the traveler will spend in gas as it relates to the price of gas in the United States?  $\$8$
- 8) A pharmacist uses 5 Tbl of a medicine that is equivalent to 12 doses. If the pharmacist needs to add 14 teaspoons to the prescription, what is the total amount of the medicine in the prescription?  $29 \text{ tsp}$

Interpreting Expressions

Use the problem to answer questions 9 – 12.

An electrician charges a service fee of \$100 plus an hourly rate for the number of hours it takes him to complete the job. The total cost of any job can be modeled by the equation  $y = 100 + 45x$ .

- 9) What does the constant term in the expression represent in this situation? **Service fee \$100**
- 10) What does the independent variable in the expression represent in this situation? **# of hours to complete the job**
- 11) What does the dependent variable in the expression represent in the situation? **Total cost**
- 12) What does the coefficient of the variable represent in the situation? **Hour rate to complete a job.**
- 13) A particular bacteria triples in number every hour. The expression  $400(3)^h$  shows the number of bacteria after h hours. What does 400 represent in this situation? **Starting # of bacteria**
- 14) Carmen rides his motorcycle at a constant speed from his work place to his house. His distance from his house in miles per hour after leaving work can be modeled by the equation  $y = 40 - 5x$ . What do x, y, 40, and 5 represent in the equation? Label your units!  $X = \text{hours}$   $y = \text{Distance from WORK}$   
 $40 \rightarrow \text{Distance from WORK to HOME}$   $5 \rightarrow \text{Rate}$
- 15) A box is in the form of a rectangular prism. If you find the volume of this prism, you should use  $V = lwh$  or  $V = (lw)h$ . What does lw represent in the second equation?

**Area of the base of the prism.**

**Writing, Graphing, & Interpreting Linear Equations and Inequalities**

16) The sum of two consecutive numbers is 117. What are the two numbers?

~~sum~~  $x + x + 1 = 117$  58, 59

17) The difference of two consecutive even numbers is 54. What are the two numbers?

$x + x + 2 = 54$  26, 28

18) Kelly raised a number 2 to a power and then added 4 to the result. She obtained a sum of 68. To what power did she raise 2?

$2^x + 4 = 68$   $x = 6$

19) A mechanic charges a \$40 fee for looking at a vehicle, then he charges an hourly service rate for each hour or portion of an hour. The sign below shows the prices for up to 3 hours of service. Write and solve a linear equation to find the hourly service rate.

Up to 1 hour	\$200
Up to 2 hours	\$375
Up to 3 hours	\$550

$m = 175$   
 $b = 40$

$y = 175x + 40$

20) Sam pays a \$40 fee each month to own a cell phone. Sam also has to pay \$0.10 per minute of cell phone usage. Based on his cell phone plan, there is a limit of 4 hours of cell phone usage. So, how much will Sam's cell phone be each month?

$b = 40$   
 $m = .10 \rightarrow \$6 \text{ hr.}$

$y = 6x + 40$   
 $0 \leq x \leq 4$

$\$40 \leq y \leq \$64$

21) Candace is going to a mall where she buys a candle for \$5 and some toys for \$8 each. She has a gift card for \$45 that she wants to use, but she can spend no more than \$70 in total, including the gift card. Write and solve a pair of inequalities to determine the number of toys she can buy.

$8x + 5 \geq 45$   $8x + 5 \leq 70$

$5 \leq x \leq 8$

22) A scientist studies a plant that is 5 cm tall. He measures this plant each week and found an average growth of 0.5 cm each week. Write a linear equation to represent this situation, and graph this situation.

$y = \frac{1}{2}x + 5$

23) Sadie has a Web site that sells toys for \$15 each and movies for \$20 each. Kacie wants to buy some toys and movies, and she plans to spend a total of \$260. Write and graph an equation to represent this situation.

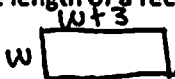
$15x + 20y = 260$

24) The sum of two consecutive integers is greater than 83.

$x + x + 1 > 83$

40, 41

25) The length of a rectangle is 3 inches more than its width, and the perimeter of this rectangle is no more than 64 inches.



$w + w + w + 3 + w + 3 \leq 64$   $w = 14$   $l = 17$

26) Kasey has earned the following scores on her test: 60, 82, and 79. She needs an average of 85 to be able to play sports. What grades can she make on the following test to meet this average?

$\frac{60 + 82 + 79 + x}{4} = 85$

27) Shannon works at a job that pays \$6 per hour. She has already saved \$50. She wants to earn at least \$200 to go on a rafting trip with her friends. How many hours should she work?

$x = 25$

$6x + 50 \geq 200$

28) Katie earns \$5 per hour for babysitting and \$10 per hour for cutting lawns. She wants to earn at least \$40. How many hours should she work at either job to meet this goal?

$5x + 10y \geq 40$

$0 \leq x \leq 8$

$0 \leq y \leq 4$

## Literal Equations

29) Solve for b:  $\frac{a+b+c}{3} = A$

$$b = 3A - a - c$$

30) Solve for y:  $3x - 4y = 10$

$$y = \frac{3}{4}x - \frac{5}{2}$$

31) Ohm's law uses the formula  $V = IR$  where  $V$  = voltage,  $I$  = current, and  $R$  = resistance. What is this equation solved for  $R$ ? If  $V = 12$  volts and  $I = 0.4$  amperes, what is the value of  $R$  in ohms?

$$R = \frac{V}{I} \quad R = 30 \text{ ohms}$$

32) A worker charges \$300 plus \$50 per hour for a job. The equation  $T = 50x + 300$  describes the total cost for a job. Isolate  $x$ . If the job costs \$650, how many hours did it take.

$$x = \frac{T}{50} - 6; 7 \text{ hrs.}$$

33) If distance = rate  $\times$  time ( $d = rt$ ), what is an equivalent equation written in terms of  $r$ ?

$$r = d/t$$

34) An animal sitter charges the following prices to "pet-sit" (per animal): \$25 for a dog, \$40 for a cat, and \$60 for a snake. Her total income is described by the equation

$$t = 25d + 40c + 60s$$

Last week, the animal sitter's income was \$395. The animals she pet sat included 3 dogs and 2 snakes. If she wants to find out how many animals were cats, which variable should she solve the equation for? Solve the equation for that variable, and find out how many cats she pet sat for.

$$c; c = \frac{t}{40} - \frac{5}{8}d - \frac{3}{2}s; 5 \text{ cats}$$

## Exponents

35) Simplify:  $(4x^2y^3)^3$   $64x^6y^9$

36) Simplify:  $-5x^{-2}y^4$   $-\frac{5y^4}{x^2}$

37) Simplify:  $\frac{x^4}{x} \cdot \left(\frac{x}{x^5}\right)^0$   $x^3$

38) Simplify:  $\left(\frac{xy^3}{y^5}\right)^4$   $\frac{x^4}{y^8}$

39)  $x^5yz^{-8}x^6z^6$   $\frac{x^{11}y}{z^2}$

40) Simplify:  $\frac{b^{-5}}{b^5}$   $\frac{1}{b^{10}}$

## Graphing Exponential Functions

41) Graph:  $f(x) = 3^x$

42)  $f(x) = \left(\frac{1}{2}\right)^{x-1}$

43)  $f(x) = 2 + \left(\frac{1}{4}\right)^x$

44)  $f(x) = \frac{1}{3} + 2^{x-2}$

## Writing & Solving Exponential Equations & Inequalities

45) A colony of rabbits triples every 3 years. The initial population of rabbits was 3. After  $x$  years, there were 27 rabbits. Find the number of years that have passed for the population of rabbits to reach 27.

$$3(3)^x = 27 \quad x = 2$$

46) Solve the equation  $5^x = \frac{1}{625}$ .

$$x = -4$$

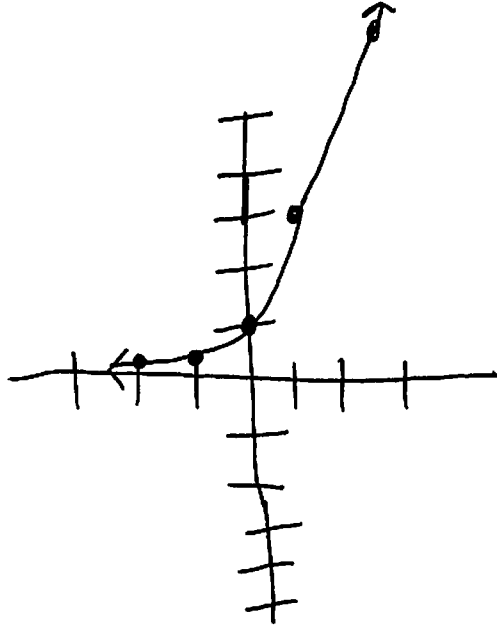
47) Solve the equation  $2^x - 1 = 7$ .

$$x = 3$$

6 years for Rabbits to reach 27

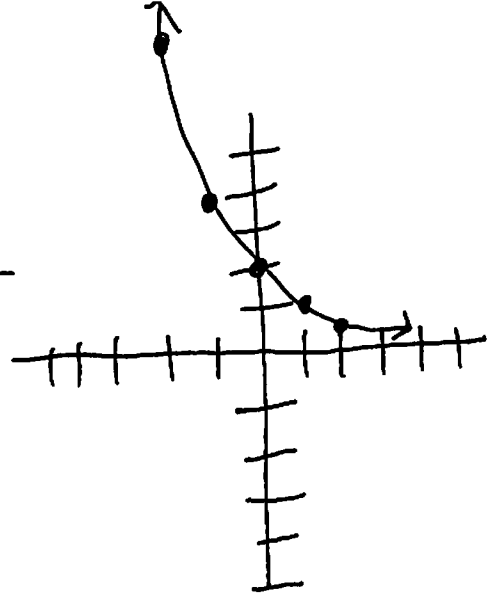
41

x	y
-2	.11
-1	.33
0	1
1	3
2	9



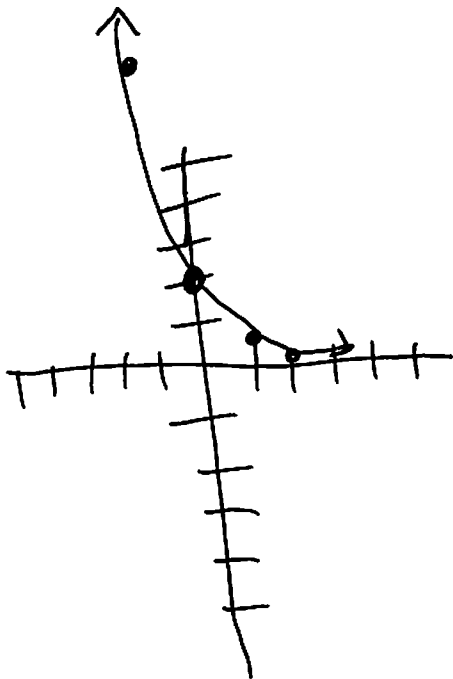
42

x	y
-2	8
-1	4
0	2
1	1
2	1/2



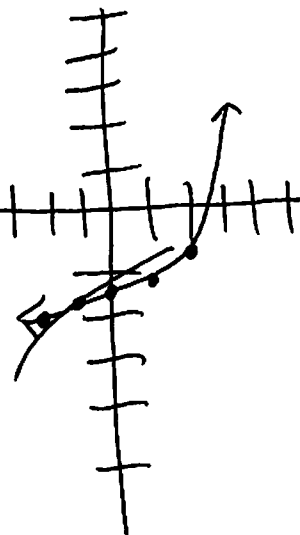
43

x	y
-2	32
-1	8
0	2
1	1/2
2	1/8



44

x	y
-2	-1.92
-1	-1.83
0	-1.67
1	-1.33
2	-.67



48) At 7:30 AM, a petri dish containing 100 bacteria starts to double every half hour. At what time will there be at least 3,000 bacteria in the petri dish?

$$100(2)^x = 3,000 \quad 10:00$$

49) A new car depreciates 5% each year. The original price of a new car is \$40,000. What is the value of this car after 7 years?

$$40,000 (.95)^7 = \$27,933.49$$

Cumulative Review

50) A caiman can travel 1320 feet in 30 seconds. An anaconda can travel 5280 inches in  $\frac{1}{4}$  of a minute. A human can travel 176 yards in  $\frac{1}{180}$  of an hour. Would a human running at this speed be able to outrun either animal?

$C = 44 \text{ ft/sec}$     $A = 29.33 \text{ ft/sec}$     $H = 26.4 \text{ ft/sec}$    **NO**

51) Determine if the answer is exact, approximated, or estimated: Carol received 4 identical boxes of calculators at her store. The first box contained 20 calculators, so she determined that there was a total of 80 calculators within all of her boxes.

exact

52) Kate has 3 cats and 2 breeding pairs of dogs. The total number of animals Kate has after  $t$  years since the dogs were purchased is estimated by the expression  $4 \cdot 2^t + 3$ . Explain each part of the expression.

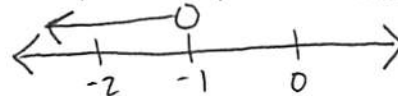
$4 \cdot 2^t + 3$   
 $2 \text{ pairs of dogs} \rightarrow \text{doubling} \rightarrow 3 \text{ cats} \rightarrow t \text{ years}$

53) Two consecutive even numbers have a sum of 14. What are these two numbers?

$$x + x + 2 = 14 \quad [6, 8]$$

54) A runner can travel 4mi per hour. He has already run 8 miles. Write an equation to represent this situation.

55) Graph on a number line:  $6 - 2x > 8$     $-2x > 2$     $x < -1$



56) Graph on a coordinate plane:  $x - 2y \leq 4$  \*on bottom of paper\*

57) Solve for  $j$ :  $\frac{r-3j}{6} = m$     $r - 3j = 6m$     $-3j = 6m - r$     $j = \frac{r}{3} - 2m$

58) The population of Florida increased by 23.5% from 1990 to 1998. The population in 1990 was 12,941,197 people. What is the total population of Florida in the year 1998?

$$12,941,197 (1.235)^8$$

$$700,341,890.85 \approx$$

$$700,341,900 \text{ people}$$

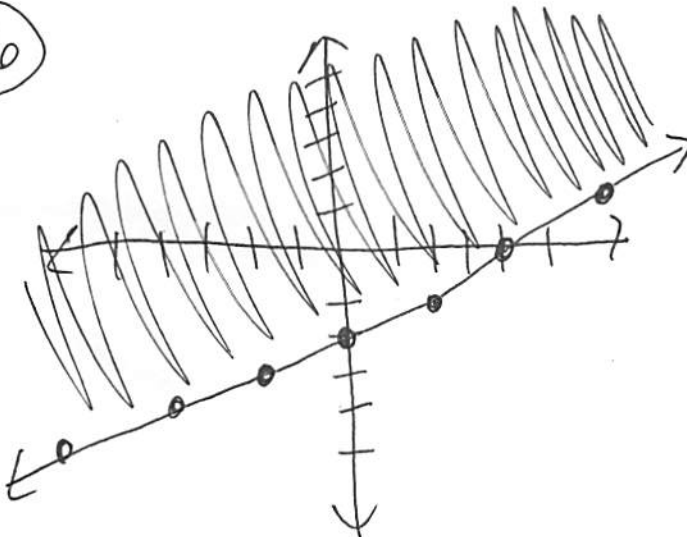
59) Solve for  $x$  in the equation  $3^x = 81$     $x = 4$

60) At 8 AM, a petri dish containing 50 bacteria starts to triple each hour. After what time, will there be at least 1,350 bacteria in the petri dish?

$$50(3)^x = 1,350$$

$$x = 3 \rightarrow 11:00 \text{ AM}$$

56



$$-2y \leq -x + 4$$

$$y \geq \frac{1}{2}x - 2$$

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