# **NORTH THURSTON PUBLIC SCHOOLS**



# **END OF COURSE**

# ALGEBRA I

# **PRACTICE TEST**

Name:

Date: \_\_\_\_\_

\*\* Video Tutorial Edition\*\*

Most questions below are linked to a video tutorial on the internet. To access a video, hold the control button while clicking on the link of the video you wish to watch.

1. Order the following numbers from least to greatest:  $3\pi$ ,  $\sqrt{62}$ ,  $8.7 \times 10^{\circ}$ ,  $\frac{19}{2}$ 

0 A. 
$$\frac{19}{2}$$
,  $3\pi$ ,  $8.7 \times 10^{\circ}$ ,  $\sqrt{62}$   
**0** B.  $\sqrt{62}$ ,  $8.7 \times 10^{\circ}$ ,  $3\pi$ ,  $\frac{19}{2}$   
**0** C.  $8.7 \times 10^{\circ}$ ,  $3\pi$ ,  $\frac{19}{2}$ ,  $\sqrt{62}$   
0 D.  $3\pi$ ,  $\sqrt{62}$ ,  $\frac{19}{2}$ ,  $8.7 \times 10^{\circ}$ 

(Related Tutorial Videos: Video 1, Video 2)

2. Solve the equation for a

$$3\pi \approx 9.42$$
  
 $\sqrt{62} \approx 7.87$   
 $8.7 \times 10^{0} = 8.7$   
 $\frac{19}{2} = 9.5$ 

Use the approximate decimal value to order the values given from the original question.

| ve the equation for a                   | $d = vt + \frac{1}{2}at^2$     |  |
|---|--------------------------------|--|
| 0 A. $a = \frac{2d}{vt^3}$              | $d = vt + \frac{1}{2}at^2$     | • Begin by subtracting the quantity <i>vt</i> from both sides of the equation  |
| $0 \text{ B. } a = \frac{d - vt}{t^2}$  | $d-vt=\frac{1}{2}at^2$         | <ul> <li>Multiply both sides of the equation by 2<br/>(make sure you are multiplying the entire<br/>inheaf the spatial hand the straight in the state of the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatial straight in the spatial straight is spatial straight in the spatia</li></ul> |
| 0 C. $a = \frac{2(d - vt)}{t^2}$        | $2(d - vt) = at^2$ $2(d - vt)$ | side of the equation by putting it in parenthesis)   |
| $0 \text{ D. } a = \frac{2d - vt}{t^2}$ | $\frac{2(a-bb)}{b^2} = a$      | • Divide both sides of the equation by $t^2$   |

(Related Tutorial Videos: <u>Video 1; Video 2; Video3</u>)

3. Determine what values of x the expression  $\sqrt{5-x}$  is defined for. Express your answer with an inequality.

Write your answer on the line.

(Related Tutorial Video: Video 1)

The quantity (5 - x) must always be positive in order to take the square root of it (You can only take the square root of a positive number in order to get real roots). If x > 5, then the quantity of (5 - x) will be a negative value. Since x values bigger than 5 result in negative values, we must use x values smaller than or equal to 5.

What are the defined values of x?  $x \le 5$ 

Day 2  
4. Solve: 
$$\frac{3x-1}{5} = -8$$
  
 $0 \text{ A.} \frac{41}{5}$   
 $0 \text{ B.} -\frac{41}{5}$   
 $0 \text{ C.} -13$   
 $0 \text{ D.} 13$   
 $\frac{3x-1}{5} = -8$   
 $3x - 1 = -40$   
 $3x = -39$   
 $x = -13$ 

(Related Tutorial Videos: <u>Video 1; Video 2</u>)

5. Which equation is 
$$y = \frac{1}{3}x - 5$$
 in standard form?  
0 A.  $-\frac{1}{3}x + y = -5$   
0 B.  $\frac{1}{3}x - y = 5$   
0 C.  $x - 3y = 15$   
0 D.  $-x + 3y = -15$   
• Since the coefficients must be integers, begin by multiplying the entire function by 3 to get rid of the fraction.  
• Subtract 3y from each side, then add 15 to each side in order to get the variables on one side and the constant on the other.

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(Related Tutorial Video: <u>Video 1</u>---Note: in standard form all coefficients are integers, and the leading integer for x must be positive---this is not taught in the video lesson)

6. Fred, Thomas, and Zachary worked at the ice cream store in the mall. Last week, Fred earned more money than Thomas, but less than Zachary. The graph shows the money earned by Zachary and Thomas.



#### WEEKLY PAY VS. NUMBER OF HOURS WORKED

Which area of the graph represents Fred's possible weekly pay?

0 A.P 0 B.R

0 C. S

<mark>0 D.T</mark>

7. Write an equation of the line that passes through the pair of points.

| (-5, -2), (3, -1)   | $(-5, -2) (3, -1);  \Delta y = 1, \Delta x = 8 \ Slope = \frac{\Delta y}{\Delta x} = \frac{1}{8}$ |
|---|---|
| 0 A. $y = \frac{1}{8}x + \frac{11}{8}$<br>0 B. $y = \frac{1}{8}x - \frac{11}{8}$<br>0 C. $y = -\frac{1}{8}x - \frac{11}{8}$ | $y = \frac{1}{8}x + b -1 = \left(\frac{1}{8}\right)(3) + b -\frac{11}{8} = b$                     |
| $0 \text{ C. } y = -\frac{1}{8}x - \frac{1}{8}$ $0 \text{ D. } y = \frac{1}{8}x + \frac{8}{11}$                             | $-1 = \frac{3}{8} + b \qquad \qquad y = \frac{1}{8}x - \frac{11}{8}$                              |

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

8. Look at the list of numbers.

| 5                         | 1 ,                      | 4                  |
|---------------------------|--------------------------|--------------------|
| <del>-</del> ,0.75,1<br>4 | $2\frac{1}{2}, \sqrt{1}$ | $10, -\frac{1}{3}$ |

Which number line represents the list of numbers?



Using a calculator, the following numbers have the approximate decimal values:

```
\frac{5}{4} = 1.25
.75
2\frac{1}{2} = 2.5
\sqrt{10} \approx 3.16
-\frac{4}{3} \approx -1.33
```

Use the approximate decimal value to order (and place on the number line) the values given from the original question.

(Related Tutorial Video: <u>Video 1</u>)

9. A 1,500-gallon tank contains 200 gallons of water. Water begins to run into the tank at the rate of 75 gallons per hour. When will the tank be full but not overflowing?

0 A. 7 hours, 8 minutes

0 B.17 hours, 20 minutes

0 C. 20 hours

0 D.22 hours, 40 minutes

There are already 200 gallons of the 1500 gallon capacity filled, leaving only 1300 gallons of additional water left to fill. Dividing the capacity left to fill by the rate of 75 gallons per hour gives us:

$$\frac{1300 \text{ gallons}}{75 \frac{\text{gallons}}{\text{hour}}} = 17\frac{1}{3} \text{ hours (note } \frac{1}{3} \text{ of an hour is 20 minutes)}$$

10. According to the graph, which statement *best* describes the slope?



0 A. The amount of gas in the tank decreases by 3, as the distance traveled increases by 20.

- 0 B. The amount of gas in the tank increases by 20, as the distance traveled decreases by 3.
- 0 C. The amount of gas in the tank increases by 2, as the distance traveled increases by 30.
- 0 D. The amount of gas in the tank decreases by 3, as the distance traveled decreases by 20.

(Related Tutorial Video: <u>Video 1</u>)

11. Brad and Tom are comparing their classes' scores on a math test. Both of their classes had mean scores of 80 on the test, but Brad's class had a range of 6 while Tom's class had a range of 30. If the highest possible score was 100, which class had the LOWEST score in it?

0 A.Brad's class had the lowest score in it.

0 B. Tom's class had the lowest score in it.

0 C. The lowest score occurred in both classes.

0 D.It cannot be determined from the information.

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

Range is the difference between the highest and lowest scores. Since Tom's class has a range of 30 and the highest score possible was 100, that means the lowest score was at most 70. Since Brad's class had a range of 6, the lowest score possible had to be larger than 74.

#### Day 4

12. Only chocolate and vanilla ice cream cones are sold at an ice cream store. In one day, the number of chocolate cones sold was 1 more than 4 times the number of vanilla cones sold. A total of 121 cones were sold that day.

Let c = the number of chocolate cones sold. Let v = the number of vanilla cones sold.

- Write equations to determine the number of chocolate cones sold that day.
- Use the equations to determine the number of chocolate cones sold that day.

Show your work using words, numbers, and/or diagrams.

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

| C + V = 121         | This equation comes from the statement: " <u>A total of 121 cones were sold that</u><br><u>day</u> ."                                 |  |
|---------------------|---|--|
| C=4V+1              | This equation comes from the statement: "the number of chocolate cones sold was 1 more than 4 times the number of vanilla cones sold" |  |
| (4V + 1) + V = 121  | Since $C = 4V + 1$ , we can substitute $4V + 1$ in place of the C for the 1 <sup>st</sup> equation                                    |  |
| 5V + 1 = 121        | giving us an equation with only one variable to solve.  |  |
| 5V = 120            |   |  |
| V = 24              | Once we've found the value for V, we can replace V with that number (in either equation) and solve for C.                             |  |
| C + 24 + 121        |   |  |
| <mark>C = 97</mark> |   |  |
|                     |   |  |
|                     |   |  |
|                     |   |  |

13. The chart shows the amount of total salary (commission plus base salary) paid to employees of a store that specializes in big screen televisions.



Which equation best represents the total salary (T) that an employee makes for selling any number of television sets (n)?

0 A. T = 50n + 100 0 B. T = 100(n + 50) 0 C. T = 100n + 500 D. T = 50(n + 100) By connecting the points with a line, we can see from inspection that the vertical intercept is 100 and the slope is  $\frac{50}{1}$ .

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

#### Day 5

- 14. Mr. Shindler begins traveling east on Interstate 90 from Spokane with a full tank of gasoline. His car has a 15-gallon gas tank and gets 30 miles per gallon during highway travel.
  - Let m = the number of miles Mr. Shindler has driven Let g = the number of gallons of gas remaining in his tank
  - Select and justify in the answer box which equation describes the relationship between the number of miles Mr. Shindler has traveled and the number of gallons remaining in his gas tank.

0 A. g = 15 - 30m0 B. m = 30g - 150 C.  $g = 15 - \frac{m}{30}$ 0 D.  $m = \frac{30}{g} - 15$ 

Show your work using words, numbers, and/or diagrams.

We know that the tank holds 15 gallons (this will be our starting value). Also, we know that as we increase the distance we drive, the amount of gas in the tank will decrease. Since we want to write an equation relating the amount of gas remaining in the tank, we know the equation will be of the form: g = 15-?m.

The slope will have to be of the format:  $\frac{gallons}{mile}$  for this equation since the dependent variable is gallons. We were given the rate of  $\frac{30 \text{ miles}}{1 \text{ gallon}}$ . The rate can be re-written to the format of  $\frac{1 \text{ gallon}}{30 \text{ miles}}$  (which means we use 1 gallon of gas every 30 miles. The correct equation is choice C or  $g = 15 - \frac{1}{30}m$ 

- 15. You are a full time employee at a marketing firm. In order to maintain fulltime status you must work a minimum of 25 hours a week, and you cannot work more than 45 hours in a week. You make \$20 per hour.
  - Define the domain and range in the context of the problem.
  - Write your answer on the line.

### **Domain:** $25 \le hours \le 45$ **Range:** $500 \le Pay \le 900$

(Related Tutorial Video: Video 1)

Domain is the set of possible inputs. In this case, you can put in between 25 and 45 hours of work or:  $25 \le x \le 45$ 

Range is the set of possible outputs. In this case, the output is your pay. If you work the minimum number of hours (25 hours), the output would be \$500. If you work the maximum number of hours (45 hours), the output would be \$900. The range, therefore is between \$500 and \$900 or  $500 \le y \le 900$ .

16. Look at the function:

$$f(x) = 2x^2 - 4x + 5$$

- Evaluate f(x) at f(-3).
- Write your answer on the line.

value (-3) and evaluate the expression.  

$$f(x) = 2x^{2} - 4x + 5$$

$$f(-3) = 2(-3)^{2} - 4(-3) + 5$$

$$f(-3) = 2(9) + 12 + 5$$

$$f(-3) = 18 + 12 + 5$$

To find f(-3), take the function f(x) and replace each x with the



#### (Related Tutorial Video: Video 1)

17. Which table represents the recursive formula:



The recursive formula tells us the common difference is (-6). The only table that shows a common difference of (-6) is table D.

(Related Tutorial Video: <u>Video 1</u>)

18. This graph shows the relationship between the age of a planet in millions of years and the number of moons the planet has.

Which of these statements is true about the graph?



#### **0** A. The dependent variable is the number of moons.

0 B. The independent variable is the number of moons.

0 C. Since the number of moons is staying the same, there is no dependent variable.

0 D.Since the number of moons is staying the same, there is no independent variable.

(Related Tutorial Video: <u>Video 1</u>)

#### Day 7

19. Solve the equation for x. 4x + 14 = 7x + 5

| 4x + 14 = 7x + 5           | 9 = 3x                   |
|----------------------------|--------------------------|
| 4x - 4x + 14 = 7x + 5 - 4x | $9 \div 3 = (3x) \div 3$ |
| 14 = 3x + 5                | 3 = x                    |
| 14 - 5 = 3x + 5 - 5        |                          |

(Related Tutorial Video: Video 1)

20. At a particular company, every employee receives a 4% cost-of-living increase to their salary.

What impact does this cost-of-living increase have on the mean and on the range of employee salaries at the company?

- 0 A. The mean increases but the range does not change.
- 0 B. The mean does not change but the range increases.
- 0 C. The mean and range both increase.
- 0 D. The mean and range do not change.
- 21. The graph shows the stock value for a technology company from 2002 to 2005. From this graph, draw a line that fits the data and determine what is the most likely value of the stock for the year 2000?



(Related Tutorial Video: Video 1)

### Day 8

22. Choose the correct solution to the equation  $\frac{3x-1}{2} = 4$ 0 A. x = 30 B.  $x = \frac{7}{3}$ 0 C. 1 0 D.  $\frac{5}{3}$ 

(Related Tutorial Videos: See question 4)

| $\frac{3x-1}{2} = 4$ | • Multiply both sides of the equation by 2 |
|----------------------|--|
| 3x - 1 = 8           | • Add 1 to both sides                      |
| 3x = 9               | • Divide both sides by 3                   |
| x = 3                |  |
|                      |  |
|                      |  |
|                      |  |

Since the amount being added is a RATE and not a constant amount, both the range and mean will increase

23. Which of the following lines is parallel to the line represented by the equation?  $y = \frac{1}{2}x + 10$ 

 $0 \text{ A.} y = -\frac{1}{2}x + 10$   $0 \text{ B.} y = \frac{1}{2}x + 8$  0 C. y = 2x + 100 D. y = -2x + 8 Since the lines are parallel, they will have the same slope, so we can write the equation:  $y = \frac{1}{2}x + b$ . The only choice with a slope of  $\frac{1}{2}$  is choice B.

(Related Tutorial Video: <u>Video 1</u>)

24. Lucy did a study on the number of hours students spend on the internet each day and their grades in math class. She found that there was a negative correlation between the two.

Which scatterplot shows a strong, negative correlation of her data?



(Related Tutorial Video: <u>Video 1</u>)

25. Given the points (5, 9) and (-6, -13) find the graph of the equation of the line:



- 26. Write and graph an equation for a line given the slope and the y-intercept, the slope and a point on the line, or two points on the line, and translate between forms of linear equations
  - A) Write the equation of the line with y-intercept equal to 5 and a slope equal to 3.
  - B) Write the equation of the line with a slope of 2 that goes through the point (1,1).
  - C) Write the equation of the line that goes through the points (-3,5) and (-1,-3) without graphing.

| y = mx + b | y = mx + b   | (-1, -3)& (-3, 5)<br>$\Delta y = 8, \Delta x = -2$ |
|------------|--------------|--|
| y = 3x + 5 | y = 2x + b   | $\Delta y = 8$                                     |
|            | 1 = 2(1) + b | $Slope = \frac{1}{\Delta x} = \frac{1}{-2} = -4$   |
|            | 1 = 2 + b    | Equation: $y = -4x + b$                            |
|            | -1 = b       | <i>Equation</i> : $5 = -4(-3) + b$                 |
|            | y = 2x - 1   | 5 = 12 + b $-7 = b$                                |
|            |              | y = -4x - 7  |
| A)         | B)           | C)   |

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

27. Which of the following are functions (Mark all that apply)?



(Related Tutorial Video: Video 1)

28. Which of these is the equation of a line with y-intercept (0, 2) and slope  $\frac{1}{3}$ ?

0 A. 
$$y = \frac{1}{3}x + 2$$
  
0 B.  $y = 2x + \frac{1}{3}$   
0 C.  $\frac{1}{3}y = 2x$   
0 D.  $2y = \frac{1}{3}x$ 

(Related Tutorial Videos: See question 26)

29. Look at the list of numbers.

$$-\frac{3}{2}, -1.6, -2.0, -\frac{16}{7}, -\frac{16}{9}, -\sqrt{9}$$

Which list shows the numbers in order from least to greatest?

 $\begin{array}{l} \circ \quad \mathbf{A.} \quad -\sqrt{9}, -\frac{16}{7}, -2.0, -\frac{16}{9}, -1.6, -\frac{3}{2} \\ \circ \quad \mathbf{B.} \quad -\sqrt{9}, -\frac{16}{7}, -\frac{16}{9}, -2.0, -1.6, -\frac{3}{2} \\ \circ \quad \mathbf{C.} \quad -\sqrt{9}, -\frac{16}{9}, -2.0, -\frac{16}{7}, -1.6, -\frac{3}{2} \\ \circ \quad \mathbf{D.} \quad -\sqrt{9}, -2.0, -\frac{16}{9}, -1.6, -\frac{16}{7}, -\frac{3}{2} \end{array}$ 

(Related Tutorial Videos: See question 1)

30. For what values of *a* is  $a > a^2$ ?

When you square a fraction, the answer is a smaller fraction.

$$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$$
$$\frac{1}{2} > \frac{1}{4}$$

When you square a negative number, the answer is always positive, so no negative number will ever be larger than its square. Choice C includes all of the positive fractions.

Using a calculator, the following numbers have the approximate decimal values:

$$-\frac{3}{2} = -1.5$$
  
-1.6  
-2.0  
$$-\frac{16}{7} \approx -2.29$$
  
$$-\frac{16}{9} \approx -1.78$$
  
$$-\sqrt{9} = -3$$
  
Use the approximate decimal value to order the values given from the original question

31. Evaluate the expression for x = -2.

| $3x^2 + 10$                          | $3x^2 + 10$    |
|--------------------------------------|----------------|
| What is the value of the expression? | $3(-2)^2 + 10$ |
| <b>O A.</b> 46                       | 3(4) + 10      |
| <b>O B.</b> 22                       | 12 + 10        |
| 0 C2                                 | 22             |
| 0 <b>D.</b> -26                      |                |
|                                      |                |

(Related Tutorial Video: <u>Video 1</u>)

32. Find the  $21^{st}$  term of the arithmetic sequence: 18, 23, 28, 33, ...

The first term is  $a_1 = 18$  and the common difference is d = 5, so the explicit formula for the arithmetic sequence is:  $a_n = a_1 + d(n-1)$  $a_{n} = 18 + 5(n-1)$  $a_{21} = 18 + 5(21 - 1)$  $a_{21} = 18$ 

(Related Tutorial Video: Video 1)

33. Write an equation of the line that is perpendicular to  $y = \frac{1}{2}x + 8$  and goes through (-4, 5). 0 A.  $y = -\frac{1}{2}x + 3$ 0 B.  $y = \frac{1}{2}x + 7$ 0 C. y = -2x + 80 D. y = -2x - 3(Related Tutorial Video: Video 1) The slope of the line perpendicular to  $y = \frac{1}{2}x + 8$  is -2 (slopes of perpendicular lines are opposite reciprocals) The equation of the line is: y = -2x + b 5 = -2(-4) + b 5 = 8 + b b = -3Equation: y = -2x - 3

34. The assistant can make 8 pizzas in an hour. The master pizza maker can make 10 pizzas in an hour but starts baking 2 hours later than his assistant. Together, they must make 106 pizzas. How many hours will the assistant make pizzas before they are done making 106 pizzas? Show your work using words, numbers, and/or pictures.

After 2 hours, the assistant pizza maker will have made 16 pizzas, only leaving 90 pizzas left to be made. Together, they make 18 pizzas an hour. We can write the equation:

18h = 90

Dividing each side by 18, we get: h = 5

It will take 5 hours after the master pizza maker begins to help. The question, however, asks for how many hours the assistant pizza maker will have worked before they are done. Since he began two hours before the master pizza maker began to help (and it took 5 hours after the master pizza maker began to help), the assistant worked a total of 7 hours.

#### How many hours will the assistant make pizzas? 7 hours

35. Look at the function.

| $x -6 \le x \le 4$ , Range: $-3 \le y \le 3$ |
|--|
| $x -3 \le x \le 3$ , Range: $-6 \le y \le 4$ |
| $-2 \le x \le 4$ , Range: $0 \le y \le 3$    |
| $x -2 \le x \le 3$ , Range: $-6 \le y \le 3$ |
| ?<br>.::                                     |



(Related Tutorial Videos: Video 1, Video 2)

By drawing a rectangle around the function, we can clearly see that the domain (x-values for which the function is defined) is:  $-6 \le x \le 4$  and that the range (y-values for which the function is defined) is  $-3 \le y \le 3$ 

```
36. Solve the equation for x.
                                             -3(x-8) = -12
                                                                             Distribute the -3
                                                                         •
                                            -3x + 24 = -12
-3x = -36
                          -3(x-8) = -12
                                                                             Subtract 24 from both sides of the equation
        What is the value of x?
            O A. -4
                                                                             Divide both sides of the equation by -3
             O B. 4
             <mark>о С.</mark> 12
             O D. 6
```

(Related Tutorial Video: Video 1)

#### **Day 13**

37. Look at the system of linear equations.

0 A. 0 B. 0 C.

k at the system of linear equations.  

$$\begin{cases}
3x + y = 13 \\
x + 6y = -7
\end{cases}$$
Solve the system of linear equations.  

$$0 \quad A. \quad (-5, 28) \\
0 \quad B. \quad (-2, 19) \\
0 \quad C. \quad (7, 2) \\
0 \quad D. \quad (5, -2)
\end{cases}$$
able to use "elimination"  

$$\begin{cases}
3x + y = 13 \\
-3(x + 6y = -7)
\end{cases}$$
Now add the two equations  

$$\begin{cases}
3x + y = 13 \\
+(-3x - 18y = 21)
\end{cases}$$
Substitute  $y = -2$  into either equation to solve for x  

$$3x + y = 13 \\
-17y = 34 \\
y = -2
\end{cases}$$
Substitute  $y = -2$  into either equation to solve for x  

$$3x + y = 13 \\
x + (-2) = 13 \\
3x = 15 \\
x = 5
\end{cases}$$

• Multiply the entire 2<sup>nd</sup>

equation by -3 in order to be

 $\begin{cases} 3x + y = 13\\ x + 6y = -7 \end{cases}$ 

0 D.

(Related Tutorial Videos: Video 1, Video 2)

38. After solving the following system of equations Sarah claimed that the system has no solution. Colton disagreed and said that the system actually has an infinite number of solutions. Who is correct and why? Show all work to justify your conclusion.

$$\begin{cases} y = 2x - 5\\ 4x - 2y = 10 \end{cases}$$

Since y = 2x - 5, we can substitute the quantity (2x - 5) in place of the y in the 2<sup>nd</sup> equation giving us: 4x - 2(2x - 5) = 10

4x - 4x + 10 = 10

0 + 10 = 10

10 = 10

\*\*\*\*When both sides of the equation are identical, that means every value of x will result in a solution. There are infinite solutions to this system! Colton is correct.

Who is correct? \_\_\_\_\_

39. If y = |x| + 3, then when is y a positive number?

0 A. always
0 B. when x > -3
0 C. when x > 3
0 D. never

(Related Tutorial Video: <u>Video 1</u>)

|x| is said "absolute value of x" Absolute value refers to the distance away from 0 on a number line. Distance is always measured in positive values, therefore |x| will always result in a positive number, no matter what value we use for x. When we add three to this positive value, the answer will always be positive.

| <b>Day 14</b> 40. Simplify $\sqrt{20}$                       | $\sqrt{20} = \sqrt{(4)(5)} = \sqrt{4} * \sqrt{5} =$ | 2√5                                       |
|--|---|---|
| 0 A.10   |   |   |
| 0 В. 4 <del>√5</del>   |   |   |
| 0 C. <mark>2√5</mark>  |   | 13 - 2 x + 3  = 5                         |
| 0 D. $5\sqrt{2}$   |   | -2 x+3  = -8                              |
| (Related Tutorial Video: <u>Video</u>                        | <u>L</u> )  | x + 3  = 4<br>x + 3 = 4 or $-(x + 3) = 4$ |
| 41. The equation $13 - 2 x + 3  = 5$ has two real solutions. |   | x + 3 = -4                                |
| Determine the negative                                       | solution of the equation.                           | x = -7                                    |
| Write your answer on th                                      | e line.   |   |
|  |   |   |

What is the negative solution of the equation? -7

(Related Tutorial Video: Video 1)

12.

42. Solve for x:  $-4 < 3x + 2 \le 14$ .

$$-4 < 3x + 2 \le 14$$
$$-6 < 3x \le 12$$
$$-2 < x \le 4$$

Solving a compound inequality is the same as solving an equation, however whatever you do to solve for x on the inside, must also be done to EACH side of the inequality!

Display the set of solutions that makes the compound inequality true by graphing them on the number line below.



(Related Tutorial Video: <u>Video 1</u>)

#### Day 15

43. Which is the graph of the solution set of the system of inequalities?  $x - 2y \le 10$ 

$$2x + y > 0$$



(Related Tutorial Videos: Video 1, Video 2)

44. In 2000, 5500 people attended the State B basketball tournament. The enrollment has been increasing 2% annually. Select the equation that would determine the total number of people who attend t years after 2000.

0 A.  $y = 5500(.02)^{x}$ 0 B.  $y = 5500(0.2)^{x}$ 0 C.  $y = 5500(1.02)^{x}$ 0 D.  $y = 5500(1.2)^{x}$  Since the 2% is based on a different enrollment each year, this is an example of exponential growth:  $y = ab^n$ , where a is the initial value and b is the growth rate. Since the 2% is being added to the previous amount, our multiplier needs to be (1.02) The 1.00 keeps the original amount and the .02 adds the 2% growth.

(Related Tutorial Videos: Video 1, Video 2, Video 3)

45. Which function best represents the values in the table below?

| x  | f(x) |
|----|------|
| -3 | -27  |
| -1 | -1   |
| 0  | 0    |
| 2  | 8    |
| 5  | 125  |

0 A. 
$$f(x) = x^{3}$$
  
0 B.  $f(x) = \sqrt{x}$   
0 C.  $f(x) = \frac{1}{x}$   
0 D.  $f(x) = |x|$ 

Hint: Plug the x-values into each function to see which function gives you the outputs shown in the table. In this case, the first function:  $f(x) = x^3$  gives the desired outputs.

#### Day 16

46. Which best describes the difference(s) between the graphs of  $f(x) = -5x + \frac{3}{4}$  and

$$g(x) = -10x + \frac{3}{4}?$$

0 A. The graph of f(x) is twice as steep as the graph of g(x).

0 B. The graph of f(x) is half as steep as the graph of g(x).

0 C. The graph of f(x) has a y-intercept of 5 while g(x) has a y-intercept of 10.

0 D. Both A and C are true.

(Related Tutorial Video: Video 1)

47. Graph A is the graph of  $y = 2(3)^x$  and graph B is the graph of  $y = 3(2)^x$ .

Which statement about the two graphs is true?

0 A.Both graphs A and B rise at the same rate.

0 B. Graph B rises at a faster rate than graph A.

0 C. Graph A rises at a faster rate than graph B.

0 D. The y-intercept of graph A is above the y-intercept of graph B.

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(Related Tutorial Videos: Video 1, Video 2)
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48. Solve the equation  $3^x = 729$ . 0 A. x = 5 0 B. x = 6 0 C. x = 243 0 D. x = 726 (Related Tutorial Video: Video 1)

Day 17

This question can be solved by guess and check with a calculator. Try different powers of 3 to find out what power it must be raised to in order to get 729 as an answer.

Write 729 as a power of 3:

$$3^x = 3^6$$

Since the bases are equal, the powers they are raised to must be equal, therefore x=6



(Related Tutorial Videos: Video 1, Video 2, Video 3, Video 4)

50. Look at the expression.

$$\frac{-16m^{10}}{8m^5}$$

Simplify the expression and write it without negative exponents.



The growth rate in graph A is larger than graph B  $(3^x \text{ grows faster than } 2^x)$ 

51. Evaluate the expression.

∛−27

Write your answer on the line.

What is the cube root of -27? -3

(Related Tutorial Video: <u>Video 1</u>)

#### Day 18

52. Graph A is the graph of y = |x| + 2 and graph B is the graph of y = |2x| + 8.

Which statement about the two graphs is true?

- **O A.** Graph A and B have the same vertex.
- **O B.** Graph A is less steep than graph B.
- O C. Graph B has a y-intercept that is 8 units above the y-intercept of Graph A.
- **O D.** Graph B has a vertex that is 8 units above the vertex of Graph A.

(Related Tutorial Videos: Video 1)

53. Graph A is the graph of  $y = 2(3)^{-x}$  and graph B is the graph of  $y = 2(3)^{x}$ .

Which statement about the two graphs is true?

- **O A.** Both graphs A and B rise at the same rate.
- **O B.** Graph B rises at a faster rate than Graph A.
- **O C.** Graph A rises at a faster rate than graph B.
- **O D.** The y-intercept of Graph A is above the y-intercept of graph B.

(Related Tutorial Videos: See question 47)

54. Look at the exponential equation.

 $y = 200(1.08)^x$ 

Determine the approximate value for x = 6. Round any decimals to two places.

| 0 | <b>A.</b> 222                 | $y = 200(1.08)^6$        |
|---|-------------------------------|--------------------------|
| 0 | <b>B.</b> 317.37              | $y \approx 200(1.58687)$ |
| 0 | <b>C.</b> 1,296               |                          |
| 0 | <b>D.</b> 101,559,956,668,416 | $y \approx 317.37$       |
|   |                               |                          |

<sup>(</sup>Related Tutorial Video: <u>Video 1</u>)

 $y = 2(3)^{-x}$  is the same as  $y = 2(\frac{1}{3})^{x}$ 

The multiplier in graph B (3) is larger than the multiplier in graph A  $\left(\frac{1}{3}\right)$ , thus graph B rises faster.

55. In the laboratory, a bacteria population doubles in size every 15 minutes. A new bacteria culture is started with 10 bacteria cells.

Which equation models the size of the bacteria population, p, at the end of t 15-minute intervals?

0 A.  $p = 2(10)^t$ 0 B.  $p = 10(2)^t$ 0 C.  $p = 10(2 + 15)^t$ 0 D.  $p = 2(10)^{t-15}$  This is a doubling (exponential) problem. The initial population is 10, so the equation will be:  $p = 10(2)^{t}$ 

(Related Tutorial Video: <u>Video 1</u>)

56. P and Q vary inversely. P is 10 when Q is 4. Find P, when Q is 8



(Related Tutorial Videos: Video 1, Video 2)

57. Vance graphed the relation between fund-raising profits for the chess club and the number of members.



Chess Club Fund-raising

Which equation represents a line that fits the data?

0 A. y = 29n + 1800 B. y = 60n + 1800 C.  $y = \frac{2}{3}n + 180$ 0 D.  $y = \frac{200}{3}n + 180$ 

$$Slope = \frac{\Delta y}{\Delta x} \approx \frac{200}{6} \approx 33$$

Choice A is the only choice with a slope close to 33 and a y-intercept of  $180\,$ 

(Related Tutorial Videos: See question 13)

58. Which equation or inequality has exactly ONE real solution?



60. If 
$$f(x) = 3x - 2$$
, then  $f(-2) = -8$ 

(Related Tutorial Videos: See question 16)

#### **Day 21**

- To find f(-2), take the function f(x) and replace each x with the value (-2) and evaluate the expression. f(x) = 3x - 2f(-2) = 3(-2) - 2
- 61. A company decides to give every one of its employees a \$1000 raise. What happens to the mean and median of the salaries as a result?
  - 0 A. Mean stays the same, Median increases by \$1000 0 B. Mean increases by \$1000, Median stays the same 0 C. Mean and Median are the same 0 D. Mean and Median both increase by \$1000.

(Related Tutorial Videos: Video 1, Video 2)

Since a fixed amount is being added to every employees pay, all of the statistical measurements (Mean, Median, and Mode) will increase by the same fixed amount (except for the **range** which will stay fixed)

62. Write a direct variation equation that relates x and y. Assume that y varies directly with x. Then solve. If y=5 when x = -10, then find y when x=1.



(Related Tutorial Videos: See question 56)

63. Translate the sentence into an equation: The sum of one-fifth p and 38 is as much as twice p

$$0 \text{ A.} \frac{1}{5}p + 38 = 2p$$
  

$$0 \text{ B.} \frac{1}{5}(p + 38) = 2p$$
  

$$0 \text{ C.} \frac{1}{5}p(2p + 38) = 2p$$
  

$$0 \text{ D.} \frac{1}{5} + p + 38 = 2p$$

#### Day 22

64. Write the equation is slope intercept form: y + 3 = 3(x - 1)

0 A.y = -3x - 60 B.y = 3x - 60 C.y = 3x + 40 D.y = 3x + 6



(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

- 65. Tara's cell phone plan costs \$39.00 a month, which includes 100 text messages. After she uses all of her text messages, it will cost her \$.15 per text message.
  - Write an equation or inequality that could be used to determine the total cost of her cell phone bill after her first 100 text messages.
  - If Tara only wants to spend \$43 on her cell phone bill, how many text messages can she send?

Let y= total cost of the cell phone plan; let x=the number of text messages sent (after 100 text) Equation for cost after 100 text have been sent: y = .15x + 39 43 = 39 + .15x x = 26 text beyond the first 100 text (at 27 text you will be over the \$43) 4 = .15x Total number of text for \$43 is 126 texts  $26\frac{2}{3} = x$ 

- 66. A college professor at the University of Washington surveyed 150 students at the university. The students were asked if they prefer in class or take home tests. The professor drew the conclusion: "One out of four college students prefer take home tests." Explain why this conclusion is misleading.
  - 0 A. The professor surveyed a small sample of the population at one university but made the conclusion about the entire population of college students.
  - 0 B. The survey question was biased toward in class tests.
  - 0 C. The students were not selected randomly.
  - 0 D. The sample size was too small.

67. Give the domain and range of the relation. Tell whether the relation is a function.



By drawing a rectangle around the function, we can clearly see that the domain (x-values for which the function is defined) is:  $-3 \le x \le 3$  and that the range (y-values for which the function is defined) is  $-2 \le y \le 2$ 

- 0 a. D:  $-3 \le x \le 3$ ; R:  $-2 \le y \le 2$ The relation is not a function.
- 0 b. D:  $-2 \le x \le 2$ ; R:  $-3 \le y \le 3$ The relation is not a function.
- (Related Tutorial Video: Video 1)
- 0 c. D:  $-3 \le x \le 3$ ; R:  $-2 \le y \le 2$ The relation is a function.
- 0 d. D:  $-2 \le x \le 2$ ; R:  $-3 \le y \le 3$ The relation is a function.

68. Determine whether the sequence appears to be an arithmetic sequence. If so, find the common difference, write the explicit formula, and the next three terms in the sequence.

-5, -11, -17, -23, -29

Yes it is arithmetic, the common difference is: -6 Since the first term  $(a_1)$  is -5, and the common difference (d) is -6, we can plug those values into the formula for the explicit form which is:  $a_n = a_1 + d(n - 1)$  $a_n = -5 - 6(n - 1)$ The next three terms in the sequence are: -35, -41, -47

(Related Tutorial Video: Video 1

69. Find the slope of the line described by x - 3y = -6.

$$\begin{array}{c}
0 \text{ a.} & \frac{1}{3} \\
0 \text{ b.} & -3
\end{array}$$

(Related Tutorial Video: <u>Video 1</u>)

### Day 24

by -3.  $y = \frac{1}{2}x + 2$ 70. Which graph represents the function:  $f(x) = 3(2)^x$ 0 c. 0 a. Make a table of values for the function to see which graph matches the table of values. Х у 0 3 1 6 2 12 -1 1.5 х 0 b. 0 d.

x - 3y = -6

 $\frac{x-6}{-3}$ 

 $\begin{array}{c|cccc} 0 & c. & -\frac{1}{3} \\ 0 & d. & 3 \\ y = \frac{-x - 6}{2} \end{array}$ 

y = -

Get the equation of the line into slope intercept form by

Start by subtracting x from

both sides, then dividing

both sides (the entire side)

isolating the y-variable.



71. Which of the following statements is a generalization of the slope of the line below?



## Height vs. Weight of Adults

- 0 A. For every inch a person grows, he will gain one pound
- 0 B. For every inch a person grows, his weight will not change
- 0 C. For every inch a person grows, he will gain 8 pounds
- 0 D. For every inch a person grows, he will gain 20 pounds

(Related Tutorial Videos: See Question 10)

- 72. Write an equation or inequality for:
  - A) All numbers at least 3 units from 5
  - B) An equation with no real solutions

Day 25

73. Solve the equation for x:

$$|2x + 1| + 1 = -12$$

A) 
$$|x - 5| \ge 3$$
 (Since we are talking about pure distance,  
we need to use the **absolute value** function. The at  
least 3 units away tells us that we need to use an  
inequality!

B) There are lots of equations with no real solution. Here are some examples:

 $|x+3| = -5 \qquad \qquad 2x-5 = 2x+3$ 

 $\frac{5}{x} = 0$ 

### |2x + 1| + 1 = -12

|2x + 1| = -13

**No Solution!** No matter what we put in for x, when we take the absolute value of it, we will never get a negative number. It is impossible to take the absolute value of anything and get -13 as an answer.

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)

74. Look at the system of linear inequalities.

$$\begin{cases} y > -x - 3\\ y < -x + 8 \end{cases}$$

Which graph represents the solutions to the system of linear inequalities?



(Related Tutorial Video: Video 1)

75. Look at the geometric sequence.

$$t_1 = 5$$
$$t_n = 3 \cdot t_{n-1}$$

Which equation represents the geometric sequence in explicit form?

**A.**  $a_n = 3(5)^n$ **B.**  $a_n = 3(5)^{n-1}$ **C.**  $a_n = 5(3)^n$ **D.**  $a_n = 5(3)^{n-1}$  From the information given in the question, we know the first term  $(t_1)$  is 5 and that the common multiplier is 3 (look at the recursive formula). Since we know these two important facts, we can plug them directly into the explicit formula for a geometric sequence (where m is the common multiplier):  $a_n = a_1(m)^{n-1}$ 

 $a_n = 5(3)^{n-1}$ 

(Related Tutorial Videos: <u>Video 1</u>, <u>Video 2</u>)