

Unit 4 test tomorrow!!

Show all work! No work, no credit ☹

1) Solve the following problem. Be sure to justify each step as you do it.

- ① Distributive POE
- ② Subtraction POE
- ③ Division POE

$$\begin{aligned}
 -3(x-3) &= -27 \\
 -3x+9 &= -27 \\
 -3x-9 &= -36 \\
 -3x &= -36 \\
 x &= 12
 \end{aligned}$$

Solve the following inequalities. Be sure to graph them on a number line.

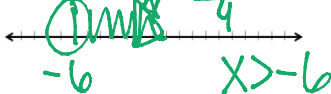
2) $-3x - 22 \leq 20$

$$\begin{aligned}
 -3x - 22 + 22 &\leq 20 + 22 \\
 -3x &\leq 42 \\
 \frac{-3x}{-3} &\leq \frac{42}{-3} \\
 x &\geq -14
 \end{aligned}$$



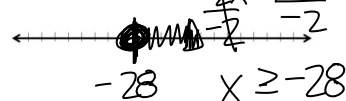
3) $4(x+3) > -12$

$$\begin{aligned}
 4x+12 &> -12 \\
 4x-12 &> -24 \\
 4x &> -12 \\
 x &> -3
 \end{aligned}$$



4) $\frac{-2x}{7} - 2 \leq 6$

$$\begin{aligned}
 \frac{-2x}{7} - 2 + 2 &\leq 6 + 2 \\
 \frac{-2x}{7} &\leq 8 \\
 \frac{-2x}{7} \cdot 7 &\leq 8 \cdot 7 \\
 -2x &\leq 56 \\
 \frac{-2x}{-2} &\leq \frac{56}{-2} \\
 x &\geq -28
 \end{aligned}$$



Solve the following equations for the specified variable.

5) Solve for x: $\frac{ax-by}{c} = d$

$$\begin{aligned}
 ax-by &= d \cdot c \\
 ax-by &= dc \\
 ax-by + by &= dc + by \\
 ax &= dc + by \\
 x &= \frac{dc+by}{a}
 \end{aligned}$$

6) Solve for b: $a-b+c = 3d$

$$\begin{aligned}
 a-b+c &= 3d \\
 -b &= 3d-a-c \\
 b &= 3d-a-c \\
 b &= -3d+a+c
 \end{aligned}$$

7) Solve for y:

$$\begin{aligned}
 4(2x-7y) &= 2(3x+13y) \\
 8x-28y &= 6x+26y \\
 8x-28y-6x-26y &= 6x+26y-6x-26y \\
 2x-54y &= 0 \\
 2x &= 54y \\
 \frac{2x}{2} &= \frac{54y}{2} \\
 x &= 27y
 \end{aligned}$$

Kameron is driving on a race-trac. He just completed lap 45. The fastest he will drive is 175 miles per hour. He will finish the race when he hits lap 300.

8) What would be the inequality that represents his speed?

$$0 \leq x \leq 175$$

9) Given the following inequality, tell what each part represents.

$$45 + \frac{175x}{\text{speed mph}} \leq 300 \rightarrow \text{Last Lap}$$

$$\begin{aligned}
 2x &= 54y \\
 \frac{2x}{2} &= \frac{54y}{2} \\
 x &= 27y
 \end{aligned}$$

Amelia went on a road trip with some friends. She recorded the following information on the way to their destination:

- The trip took 3 hours
- The car they took gets 30 miles per gallon.
- 5 gallons of gas were used
- Her average speed was 50 miles per hour.
- The price of gas was \$3.00 per gallon

10) How far away was their destination? (show your work)

$$\frac{50 \text{ miles}}{1 \text{ hr}} \cdot 3 \text{ hrs} = 150 \text{ miles}$$

11) Are the following the same (equivalent)?

a. $\frac{4x+6}{2} + 3$ vs $2x+3$

$$\begin{aligned}
 \frac{4x}{2} + \frac{6}{2} + 3 &= 2x + 3 + 3 \\
 2x + 3 + 3 &= 2x + 6
 \end{aligned}$$

NO

b. $4(2x-5)$ vs $\frac{8x-20}{4}$

$$\begin{aligned}
 4(2x-5) &= 8x-20 \\
 \frac{8x-20}{4} &= 2x-5
 \end{aligned}$$

NO

c. $\frac{-3(3x+1)}{3}$ vs $-3x-1$

$$\begin{aligned}
 \frac{-3(3x+1)}{3} &= \frac{-9x-3}{3} \\
 \frac{-9x-3}{3} &= -3x-1
 \end{aligned}$$

yes

12) You are starting a business where you will pick up leaves in order to save up money to purchase yourself a new cell phone. The cell phone is \$800. You already have \$250 from last fall where you did the same thing. You charge \$10.50 an hour. Write and solve the inequality that shows how many hours you need to work to make at least \$800 so that you can afford the new phone.

$$\begin{aligned} \cancel{250} + 10.50x &\geq 800 \\ -250 & \\ \hline 10.50x &\geq 550 \\ \frac{10.50x}{10.50} &\geq \frac{550}{10.50} \\ x &\geq 52.38 \text{ hrs} \end{aligned}$$

13) You want to know what you need to make on your next Algebra test in order to pass the class with at least a B. The averages that you have so far on the first 4 tests are 76, 73, 83 and a 91. What would be the average that you have to make on the 5th test to complete this task?

$$\begin{aligned} \frac{76+73+83+91+x}{5} &\geq 80 \\ \frac{323+x}{5} &\geq 80 \cdot 5 \\ \frac{323+x}{5} &\geq 400 \\ -323 & \\ \hline x &\geq 77 \end{aligned}$$

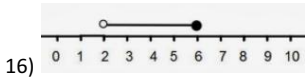
Write the inequalities and intervals that go with these number lines.



Interval: $(-\infty, 9]$ Inequality: $x \leq 9$



Interval: $(-\infty, 1.2)$ Inequality: $x < 1.2$



Interval: $(2, 6]$ Inequality: $2 < x \leq 6$

Solve the following equations for y (slope intercept form)

17) $2(3x - 4y) = 17$
 $6x - 8y = 17$
 $-6x - 8y = -6x + 17$
 $-8y = -6x + 17$
 $\frac{-8y}{-8} = \frac{-6x + 17}{-8}$
 $y = \frac{3}{4}x - \frac{17}{8}$

18) $2y - 12x = 24$
 $+12x + 12x$
 $\frac{2y}{2} = \frac{12x + 24}{2}$
 $y = 6x + 12$

19) $x - 3y = 1$
 $-x - 3y = -x + 1$
 $\frac{-3y}{-3} = \frac{-x + 1}{-3}$
 $y = \frac{1}{3}x - \frac{1}{3}$

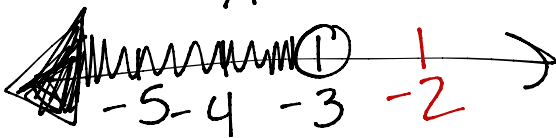
Which one is larger? How do you know?

18) Given: $-3x - y > -6$
 x or -2
 $+y + y$
 $-3x > 9$
 $\frac{-3x}{-3} > \frac{9}{-3}$
 $x < -3$

-2
larger

19) Given: $x < y$
 $x - y$ or $y - x$
 $9 - 21$ $21 - 9$
 -12 12

$x = 9$ $y = 21$
 $y - x$ larger
 b/c y is larger



20) Are the values given part of the solution set for the following: $-2x - 4 > -12$

a. $x = 2$ and $x = 3$

b. ~~$x = 4$ and $x = 10$~~

c. ~~$x = -2$ and $x = 14$~~

d. $x = 1$ and $x = 0$

$$\begin{aligned} -2x - 4 &> -12 \\ +4 & \quad +4 \\ -2x &> -8 \\ \frac{-2x}{-2} &> \frac{-8}{-2} \quad x < 4 \end{aligned}$$

21) Solve the following inequality and be sure you label what each step is.

① Multiplication POI

~~$$\frac{3(x-3)}{5} \leq 3$$~~

$$3(x-3) \geq -15$$

$$\begin{aligned} 3x - 9 &\geq -15 \\ +9 & \quad +9 \end{aligned}$$

② Distributive POI

③ Addition POI

④ Division POI

$$\frac{3x}{3} \geq \frac{-6}{3} \quad \boxed{x \geq -2}$$

22) Solve the following to see where the two lines intersect.

$$\begin{cases} 4x = -16 \\ 3x - 4y = 24 \end{cases} \quad \begin{cases} 4x = -16 \\ 3x - 4y = 24 \end{cases}$$

$$\frac{4x}{4} = \frac{-16}{4} \quad \rightarrow \quad 3(-4) - 4y = 24$$

$$x = -4 \quad \rightarrow \quad \begin{aligned} -12 - 4y &= 24 \\ +12 & \quad +12 \\ -4y &= 36 \\ \frac{-4y}{-4} &= \frac{36}{-4} \end{aligned}$$

$$y = -9$$

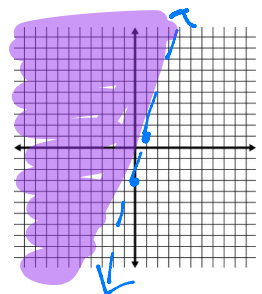
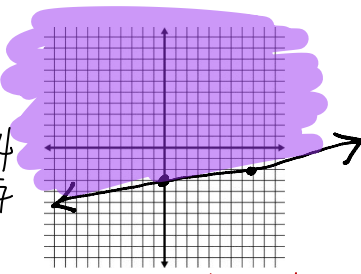
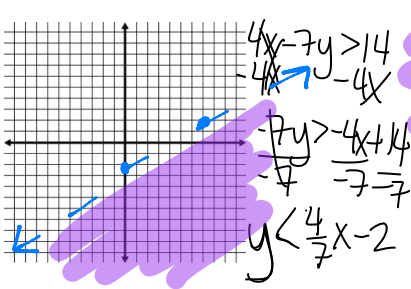
$$\boxed{(-4, -9)}$$

Graph and shade the following linear inequalities.

23) $4x - 7y > 14$

24) $x - 8y \leq 24$

25) $y > 4x - 3$



$$\begin{aligned} x - 8y &\leq 24 \\ -x & \quad -x \\ -8y &\leq -x + 24 \\ \frac{-8y}{-8} &\leq \frac{-x + 24}{-8} \\ y &\geq \frac{1}{8}x - 3 \end{aligned}$$