Final Review Key

Thursday, May 29, 2014
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Algebra 1 Final Review, spring 2014 Name _____

Show *all* work to receive full credit. Good luck!

For numbers 1-2, *simplify* the expressions

1. $-3^2 - 4 \cdot 2 + (6 + 4 \div 2)$

$-9 - 4 \cdot 2 + 8$

$-9 - 8 + 8$

$-17 + 8$

$\boxed{-9}$

2. $2(3x + 7) - 4(7x - 2) + 3x$

$6x + 14 - 28x + 8 + 3x$

$6x - 28x + 3x + 14 + 8$

$-22x + 3x + 14 + 8$

$\boxed{-19x + 22}$

For numbers 3-8, *solve* the equations

3. $4x - 2 = 22$

$+2 \quad +2$

$4x = 24$

$\div 4 \quad \div 4$

$\boxed{x = 6}$

4. $\frac{2x+7}{3} = 9$

$\cdot 3 \quad \cdot 3$

$2x + 7 = 27$

$-7 \quad -7$

$2x = 20$

$\div 2 \quad \div 2$

$\boxed{x = 10}$

5. $5x - 12 = 7x + 8$

$-7x \quad -7x$

$-2x - 12 = 8$

$+12 \quad +12$

$-2x = 20$

$\div -2 \quad \div -2$

$\boxed{x = -10}$

6. $\frac{3}{2}x + 4 = \frac{1}{3}$

$-4 \quad -4 \qquad -\frac{4 \cdot 3}{1 \cdot 3}$

$\frac{1}{3} - \frac{12}{3} = \frac{-11}{3}$

$\left(\frac{2}{3}\right)\frac{3}{2}x = -\frac{11}{3}\left(\frac{2}{3}\right)$

$\boxed{x = -\frac{22}{9}}$

7. $\frac{3x+2}{5} = \frac{8x}{12}$

$5(8x) = 12(3x+2)$

$40x = 36x + 24$

$-36x \quad -36x$

$4x = 24$

$\div 4 \quad \div 4$

$\boxed{x = 6}$

8. $3x + 7 = 2(x - 4) + x$

$3x + 7 = 2x - 8 + x$

$3x + 7 = 3x - 8$

$-3x \quad -3x$

$7 \stackrel{?}{=} -8$

Is this true? NO!!!

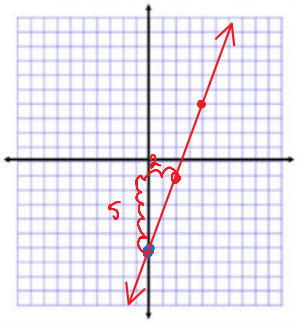
There is no solution

For numbers 9-10, *graph* the linear equations

9. $y = \frac{5}{2}x - 6$

$m = \frac{5}{2}$

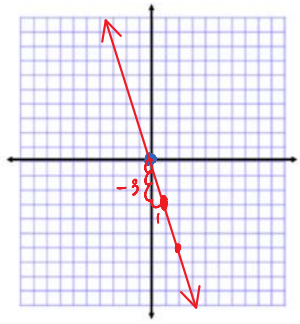
$b = -6$



10. $y = -3x$

$m = \frac{-3}{1}$

$b = 0$



For numbers 11-14, *identify* the *slope* and *y-intercept* of the linear equations

11. $y = -2x + 4$

$m = -2$

$b = 4$

12. $y = -5$

$m = 0$

$b = -5$

13. $y = -\frac{1}{3}x$

$m = \frac{-1}{3}$

$b = 0$

14. $3x - 3y = -12$

$-3x \quad -3x$

$\frac{-3y}{-3} = \frac{-3x}{-3} \quad \frac{-12}{-3}$

$y = 1x + 4$

$m = 1$

$b = 4$

For numbers 15-18, *write* the equation of the line in *slope-intercept* form using the given information

15. Slope: $-\frac{3}{2}$

y-intercept: 2

$y = \frac{-3}{2}x + 2$

16. Slope: 4 (m)

Passes through the point: (-2 , -13) (x , y)

$y = mx + b$

$(-13) = (4)(-2) + b$

$-13 = -8 + b$

$+8 \quad +8$

$b = -5$

$y = 4x - 5$

17. Passes through the points (-6 , -8) and (3 , -2) (x_1 y_1) (x_2 y_2)

① $m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{-2 + 8}{3 + 6}$

$m = \frac{6}{9} = \frac{2}{3}$

② $y = mx + b$

$(-2) = \frac{2}{3}(3) + b$

$-2 = \frac{6}{3} + b$

$-2 = 2 + b$

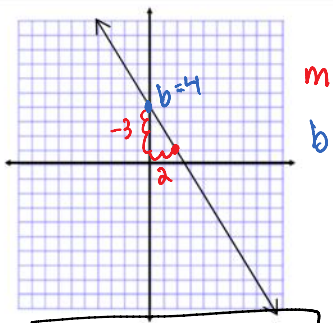
$-2 \quad -2$

$-4 = b$

③ $y = mx + b$

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

18. Has the given graph



$m = \frac{-3}{2}$

$b = 4$

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

For numbers 19-20, *solve* the inequality, then *graph* the solution range on the number line

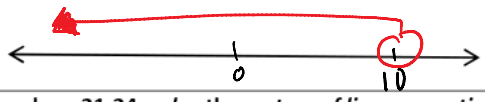
19. $6 - x > -4$

$-6 \quad -6$

$-x > -10$

$\div -1 \quad -1$

$x < 10$

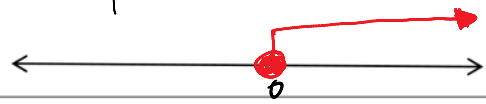


20. $\frac{1}{2}x + 2 \geq 2$

$-2 \quad -2$

$\left(\frac{2}{1}\right)\frac{1}{2}x \geq 0\left(\frac{2}{1}\right)$

$x \geq 0$



For numbers 21-24, *solve* the *system of linear equations*

21. $x + y = 4$

$2x - 3y = 13$

$-2(x + y = 4)$

① $-2x - 2y = -8$

$+ \quad 2x - 3y = 13$

$-5y = 5$

$-5 \quad -5$

$y = -1$

② $x + y = 4$

$x + (-1) = 4$

$+1 \quad +1$

$x = 5$

③ $(5, -1)$

22. $y = 2x - 3$

$3x - 2y = 10$

$3x - 2(2x - 3) = 10$

$3x - 4x + 6 = 10$

$-x + 6 = 10$

$-6 \quad -6$

$-x = 4$

$-1 \quad -1$

$x = -4$

23. $-5x + 3y = 11$

$5(x - 2y = 2)$

① $-5x + 3y = 11$

$+ \quad 5x - 10y = 10$

$-7y = 21$

$-7 \quad -7$

$y = -3$

② $x - 2y = 2$

$x - 2(-3) = 2$

$x + 6 = 2$

$-6 \quad -6$

$x = -4$

24. $y = 2x + 4$

$3y - 6x = 12$

$3(2x + 4) - 6x = 12$

$6x + 12 - 6x = 12$

$6x - 6x + 12 = 12$

$0x + 12 = 12$

Is this true?

Yes!!

Infinitely many solutions

25. *Graph* the *linear inequality*

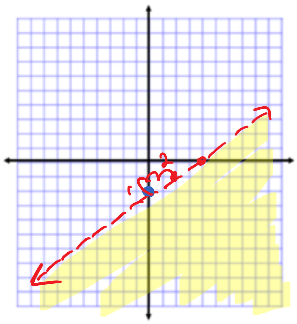
$2x - 4y > 8$

$-2x \quad -2x$

$-4y > -2x + 8$

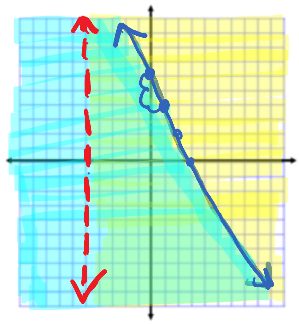
$\div -4 \quad -4 \quad -4$

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



26. *Graph* the *system of linear inequalities*

- $y \leq -2x + 6$
- $x > -5$



For numbers 27-28, *find the zeroes* of the quadratic function by *factoring*

27. $0 = x^2 - 8x - 20$

shortcut

$a=1$, $b=-8$, $c=-20$

$0 = (x+2)(x-10)$

$x+2=0$ $\quad x-10=0$

$x=-2$ and $x=10$

$a \cdot c$: -20; $+2$, -10; $+$, -8; b

28. $0 = 2x^2 + 5x - 12$

$a=2$, $b=5$, $c=-12$

① $0 = 2x^2 + 8x - 3x - 12$

② $0 = (2x^2+8x) + (-3x-12)$

⑤ $0 = 2x(x+4) - 3(x+4)$

⑥ $0 = (2x-3)(x+4)$

$a \cdot c$: -24; $+8$, -3; 5; b

$2x-3=0$ $\quad x+4=0$

$+3 \; +3$ $\quad -4 \; -4$

$\frac{2x}{2} = \frac{3}{2}$

$x = \frac{3}{2}$ and $x=-4$

For numbers 29-30, *find the zeroes* of the quadratic function by using the *quadratic formula*

29. $0 = -x^2 + 2x + 8$

$a=-1$, $b=2$, $c=8$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(-1)(8)}}{2(-1)}$ $\quad \sqrt{4+32} = \sqrt{36} = 6$

$x = \frac{-2 \pm 6}{-2}$ $\quad x = \frac{-2+6}{-2}$ $\quad x = \frac{-2-6}{-2}$

$x=-2$ and 4

30. $0 = 3x^2 - 10x + 5$

$a=3$, $b=-10$, $c=5$

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)}$ $\quad \sqrt{100-60} = \sqrt{40} = 6.32$

$x = \frac{-10 \pm 6.32}{6}$

$x = \frac{-10+6.32}{6}$ $\quad x = \frac{-10-6.32}{6}$

$x=-0.61$ and $x=2.72$

For numbers 31-32, *graph* the quadratic functions

31. $y = x^2 + 4x - 5$

$a=1$, $b=4$, $c=-5$

① $x = \frac{-b}{2a}$

$x = \frac{-(4)}{2(1)}$

$x=-2$

② $y = (-2)^2 + 4(-2) - 5$

$y = 4 - 8 - 5$

$y=-9$

vertex: $(-2,-9)$

③ $1(a) = 1$, $3(a) = 3$, $5(a) = 5$

32. $y = -2x^2 - 12x - 10$

$a=-2$, $b=-12$, $c=-10$

① $x = \frac{-b}{2a} = \frac{-(-12)}{2(-2)}$

$x = \frac{12}{-4}$

$x=-3$

② $y = -2(-3)^2 - 12(-3) - 10$

$y = -2(9) + 36 - 10$

$y = -18 + 36 - 10$

$y=8$

vertex: $(-3,8)$

③ $1(a) = -2$, $3(a) = -6$, $5(a) = -10$

For numbers 33-36, *simplify* using only positive exponents

33. $(3x+2)(x-6)$

$3x(x-6)+2(x-6)$

$3x^2-18x+2x-12$

$3x^2-16x-12$

34. $(x-3)^2$

$(x-3)(x-3)$

$x(x-3)-3(x-3)$

$x^2-3x-3x+9$

x^2-6x+9

35. $\frac{-2x^5y^3}{4x^7y^{-2}}$ $= \frac{-1 \cdot 2 \cdot x^5 \cdot y^3 \cdot y^2 \cdot y^5}{4 \cdot x^7}$ $= \frac{-1y^5}{2x^2}$

36. $(3ab^3c^{-2}d^0)^3 = \left(\frac{3ab^3 \cdot 1}{c^2}\right)^3$

$\left(\frac{3ab^3}{c^2}\right)\left(\frac{3ab^3}{c^2}\right)\left(\frac{3ab^3}{c^2}\right)$

$\frac{3 \cdot 3 \cdot 3 \cdot a \cdot a \cdot a \cdot b^3 \cdot b^3 \cdot b^3}{c^2 \cdot c^2 \cdot c^2} = \frac{27a^3b^9}{c^6}$

Use the given senario to answer questions 37-40.
You have a bag of marbles. There are 5 red, 3 blue, 6 green, and 2 black marbles.

37. What is the probability of choosing a red marble at random from the bag?

5 red
Total = 16

Prob $= \frac{5}{16}$

38. What is the probability of choosing a black marble or a green marble at random from the bag?

black = 2
green = 6

Prob (black or green)

$\frac{2}{16} + \frac{6}{16} = \frac{8}{16} = \frac{1}{2}$

39. What is the probability of picking a blue marble, setting it aside, and then picking another blue marble?

1st and 2nd

$\frac{3}{16} \cdot \frac{2}{15} = \frac{6}{240} = \frac{1}{40}$

40. What is the probability of picking a white marble out of the bag at random?

white = 0

Probability (white) $= \frac{0}{16} = 0$

41. Fair Problem: It costs \$12 for admission into the fair. It costs \$3 per ride. (a) How much wil it cost (total) to ride on three rides? (b) How much would it cost to go on *x* number of rides? (c) If you had \$42 to spend at the fair, how many rides could you go on?

a. $C = 12 + 3(3) = 12 + 9 = \$21$

b. $C = 12 + 3x$

c. $42 = 12 + 3x$

$-12 \quad -12$

$30 = 3x$

$\frac{30}{3} = \frac{3x}{3}$

$x = 10$

You can ride on 10 rides

42. Archery: Katniss Everdeen wants to know if she can shoot an aarow over the top of a tree. The equation of the arrow's height after t seconds can be modled with this equation $h = -16t^2 + 64t + 3$. If the tree is 66 feet tall, wil Katniss be able to clear the top of the tree?

* Need to know the max height
* This is a vertex question

① $x = \frac{-b}{2a}$

$x = \frac{-(64)}{2(-16)}$

$x = 2$

② $h = -16(2)^2 + 64(2) + 3$

$h = -16(4) + 128 + 3$

$h = -64 + 128 + 3$

max height = 67 feet

Since the tree is 66 feet tall, and the maximum height of the aarow is 67ft, yes, she will clear the tree

43. Baseball game: Mr Marcus went to the Giant's game. While he was there, he bought a soda and an order of garlic fries and spent $14. Later that night, he went back and ordered a soda and two orders of garlic fries and spent $22. How much did each soda cost Mr Marcus at the game?

s = price of soda

g = price of garlic fries

$-1(1s + 1g = \$14)$

$1s + 2g = \$22$

$-1s - 1g = -14$

$+ \quad 1s + 2g = 22$

$g = \$8$

$1s + 1g = 14$

$s + (8) = 14$

$-8 \quad -8$

$s = \$6$

Each soda cost $6

44. T-shirt Business: The HHS leadership class is considering purchasing a printing machine for $3,500. It would cost the class $4 to make each shirt, and they can sell them for $10 each. How mnay shirts would they need to sell to cover the cost of purchasing the machine?

x = # of shirts sold

$3,500 = (10 - 4) \cdot x$

$3,500 = 6 \cdot x$

$6 \quad 6$

$x = 583.\overline{3}$

we make $6 off of each shirt

They would need to sell 584 shirts in order to cover the cost of the machine