

MATD 0390 - INTERMEDIATE ALGEBRA - MIKE HUFF Test 1 Spring 2009

Name _____

Key

1. Write using positive exponents.

$$\begin{aligned} \text{a. } \left(\frac{x^4}{-2y^{-5}} \right)^2 &= \frac{x^8}{4y^{-10}} \\ &= \frac{x^8 y^{10}}{4} \end{aligned}$$

$$\begin{aligned} \text{b. } (-2x^{-3}y^2)^{-2} &= (-2)^{-2} x^6 y^{-4} \\ &= \frac{x^6}{(-2)^2 y^4} = \frac{x^6}{4y^4} \end{aligned}$$

2. If $a=1$, $b=-3$, and $c=-4$, evaluate $\frac{-b + \sqrt{b^2 - 4ac}}{2a}$.

$$\frac{-(-3) + \sqrt{(-3)^2 - 4(1)(-4)}}{2} = \frac{3 + \sqrt{9+16}}{2} = \frac{3 + \sqrt{25}}{2} = \frac{3+5}{2} = 4$$

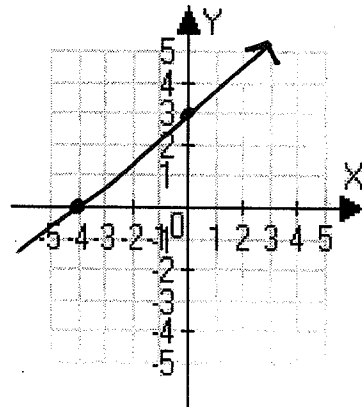
3. Find the intercepts of the following linear equation, and graph the line:

$$3x - 4y = -12$$

x-intercept $(-4, 0)$

y-intercept $(0, 3)$

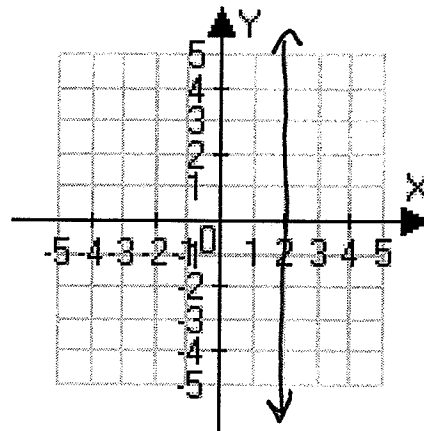
What is the slope of the line? Slope = $\frac{3}{4}$



$$\begin{aligned} 3x - 4y &= -12 \\ -4y &= -3x - 12 \\ \frac{-4y}{-4} &= \frac{-3x}{-4} - \frac{12}{-4} \\ y &= \frac{3}{4}x + 3 \end{aligned}$$

4. Find the slope of the following linear equation, and graph the line: $x = 2$

Slope undefined



5. Find an equation for the line containing the point $(-4, -3)$ and having slope

$$m = \frac{1}{2}$$

$$y - y_1 = m(x - x_1)$$

$$y + 3 = \frac{1}{2}(x + 4)$$

or

$$y + 3 = \frac{1}{2}x + 2$$

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

6. Solve the following system of linear equations:

$$x - 6y = -20$$

$$2x + 6y = 14$$

$$3x = -6$$

$$x = -2$$

$$x - 6y = -20$$

$$-2 - 6y = -20$$

$$-6y = -18$$

$$y = 3$$

solutions $(-2, 3)$

7. Solve for x : $by + cx = dx$

$$by + cx = dx$$

Get x terms on same side.

$$by = dx - cx$$

$$by = (d - c)x$$

factor out x

$$x = \frac{by}{d - c}$$

divide to solve for x

8. Mike purchased a new car. What was the cost of the car before tax if the total cost including an 8% tax was \$25,380?

Let x = original cost of car

$$.08x = \text{tax}$$

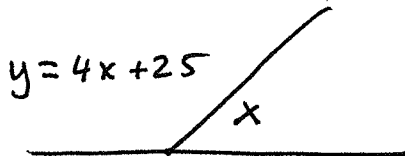
The car cost \$23,500.

$$x + .08x = 25380$$

$$1.08x = 25380$$

$$x = \frac{25380}{1.08} = \$23,500$$

9. Find the measures of two supplementary angles if the larger of the two angles is 25° more than four times the smaller angle.



$$x + 4x + 25 = 180$$

$$5x = 155$$

$$x = \frac{155}{5} = 31^\circ$$

$$y = 149^\circ$$

The angles are 31° and 149° .

$$\begin{aligned}
 10. \text{ Simplify: } & -2(-x + 7) - [4(3 - 2x) + 11] \\
 & = +2x - 14 - [12 - 8x + 11] \\
 & = 2x - 14 - (23 - 8x) \\
 & = 2x - 14 - 23 + 8x \\
 & = 10x - 37
 \end{aligned}$$

11. Solve:

$$14 \left(\frac{1}{2}x + \frac{2}{7} = \frac{4}{14} + \frac{3}{7}x - \frac{1}{2} \right)$$

$$x = -7$$

$$7x + 4 = 4 + 6x - 7$$

$$\begin{aligned}
 7x + 4 &= 6x - 3 \\
 -6x + 4 &= -6x - 4 \\
 x &= -7
 \end{aligned}$$

12. Translate to algebraic expressions:

a. Five less than twice a number

$$\underline{2x - 5}$$

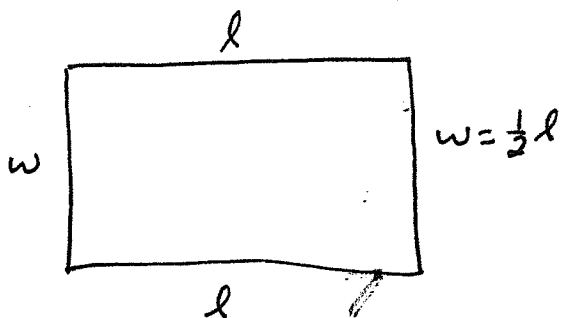
b. Four less than twice the sum of five and a number.

$$\underline{2(5+x) - 4}$$

c. One half the product of eight and a number.

$$\underline{\frac{1}{2}(8x)}$$

13. The perimeter of a rectangle is 180 meters. The width of the rectangle is one half the length. Find the length and the width.



$$2w + 2l = P$$
$$2\left(\frac{1}{2}l\right) + 2l = 180$$

$$l + 2l = 180$$

$$3l = 180$$

$$l = 60$$

$$w = \frac{1}{2}l = \frac{1}{2}(60) = 30$$

The length is 60m and the width is 30m.

14. Let $f(x) = -2x^2 - 4x + 5$, find:

a. $f(2) = -2(2^2) - 4(2) + 5$
 $= -8 - 8 + 5$
 $= -11$

b. $f(-3) = -2(-3)^2 - 4(-3) + 5$
 $= -2 \cdot 9 + 12 + 5$
 $= -18 + 12 + 5$

c. $f(t) = -1$

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

15. If $f(x) = 5x + 9$ and $g(x) = 2x^2 - 5x + 4$ find the following:

$$\begin{aligned} \text{a. } (f+g)(2) &= f(2) + g(2) \\ &= 19 + 2 \\ &= 21 \end{aligned}$$

$$\begin{aligned} f(2) &= 5(2) + 9 = 19 \\ g(2) &= 2 \cdot 4 - 10 + 4 \\ &= 8 - 10 + 4 = 2 \end{aligned}$$

$$\begin{aligned} \text{b. } (f-g)(-3) &= f(-3) - g(-3) \\ &= -6 - 37 \\ &= -43 \end{aligned}$$

$$\begin{aligned} f(-3) &= 5(-3) + 9 = -6 \\ g(-3) &= 2 \cdot 9 - 5(-3) + 4 \\ &= 18 + 15 + 4 = 37 \end{aligned}$$

$$\begin{aligned} \text{c. } (fg)(2) &= f(2)g(2) \\ &= 19(2) = 38 \end{aligned}$$

$$\text{d. } \left(\frac{f}{g}\right)(-1) = \frac{f(-1)}{g(-1)} = \frac{5(-1) + 9}{2(-1)^2 - 5(-1) + 4} = \frac{4}{2 + 5 + 4} = \frac{4}{11}$$

16. Find the domain of each function:

a. $f(x) = \frac{2x^2 + 3}{x + 4}$ domain of f is $x \neq -4$

b. $g(x) = x + 4$ domain of g is \mathbb{R}

17. Match the formula to its correct name:

D $y = mx + b$

A $m = \frac{y_2 - y_1}{x_2 - x_1}$

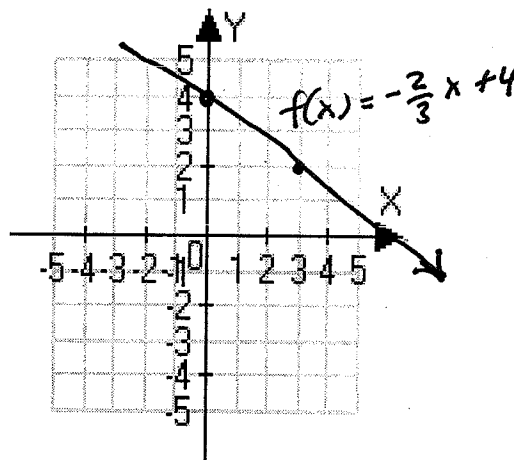
C $y - y_1 = m(x - x_1)$

H $x = a$

G $y = b$

- A. Slope
- B. Standard Form
- C. Point-Slope
- D. Slope-Intercept
- E. Point-Intercept
- F. General Form
- G. Horizontal Line
- H. Vertical Line

18. Graph the function: $f(x) = -\frac{2}{3}x + 4$



19. a. Find the slope of the line through the points $(-3, 2)$ and $(-4, -5)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5 - 2}{-4 - (-3)}$$

$$= \frac{-7}{-4 + 3} = \frac{-7}{-1} = 7$$

- b. Find the slope-intercept equation of the line through the points $(-3, 2)$ and $(-4, -5)$.

x_1, y_1

$$y - y_1 = m(x - x_1)$$

$$y - 2 = 7(x + 3)$$

$$y - 2 = 7x + 21$$

$$y = 7x + 23$$

- c. Find the function of the line through the points $(-3, 2)$ and $(-4, -5)$.

$$f(x) = 7x + 23$$

20. Find the slope-intercept equation of the line through the point $(-3, 2)$ that is

- a. parallel to the line $4x - 2y = -12$

$$4x - 2y = -12$$

$$-2y = -4x - 12$$

$$y = 2x + 6$$

$$m = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = 2(x + 3)$$

$$y - 2 = 2x + 6$$

$$y = 2x + 8$$

- b. perpendicular to the line $4x - 2y = -12$

$$m = 2$$

$$m_{\perp} = -\frac{1}{2}$$

$$y - y_1 = -\frac{1}{2}(x - x_1)$$

$$y - 2 = -\frac{1}{2}(x + 3)$$

$$y - 2 = -\frac{1}{2}x - \frac{3}{2} + 2$$

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

Extra Credit: (5 points)

21. Texas Coffee Traders mixes Ethiopian coffee worth \$16 per lb with a more expensive Columbian coffee worth \$21 per lb. How much of each type of coffee should be used to make 240 lb of mixture worth \$17 per lb?

$$\begin{aligned} E + C &= 240 \\ 16E + 21C &= 240(17) \end{aligned}$$

192 lbs of Ethiopian
and

48 lbs of Columbian