Name: _____

Recitation Instructor and Time: _____

Studio College Algebra – Exam 1
February 3, 2009

Directions: There are 16 problems on this exam. Please show all your work.

1. Complete the following function table for $f(x) = 2x^3 - 4x$.

x	-2	-1	0	1	2
$f(x)$	-8	2	0	-2	8.

$f(-2) = 2(-2)^3 - 4(-2)$
$= 2(-8) + 8$
$= -16 + 8 = -8$

$f(-1) = 2(-1)^3 - 4(-1)$
$= -2 + 4 = 2$

$f(0) = 0$

$f(1) = 2(1)^3 - 4(1)$
$= 2 - 4 = -2$

$f(2) = 2(2)^3 - 4(2)$
$= 16 - 8 = 8$

2. Rewrite the formula $A(g) = \frac{2b+g}{7b}$ at $g = 5b$, and simplify completely.

$A(5b) = \frac{2b+5b}{7b} = \frac{7b}{7b} = \boxed{1}$

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3. Solve for x: $-2x-15=13x+30$.

$\frac{-15x}{-15} = \frac{45}{-15}$

$x=-3$

4. Suppose $x=4$ solves $\square x-9=4x-\square$. Solve for $\square$.

$\square(4)-9=4(4)-\square$

$4\square-9=16-\square$

$+\square \qquad +\square$

$5\square-9=16$

$5\square=25$

$\square=5$

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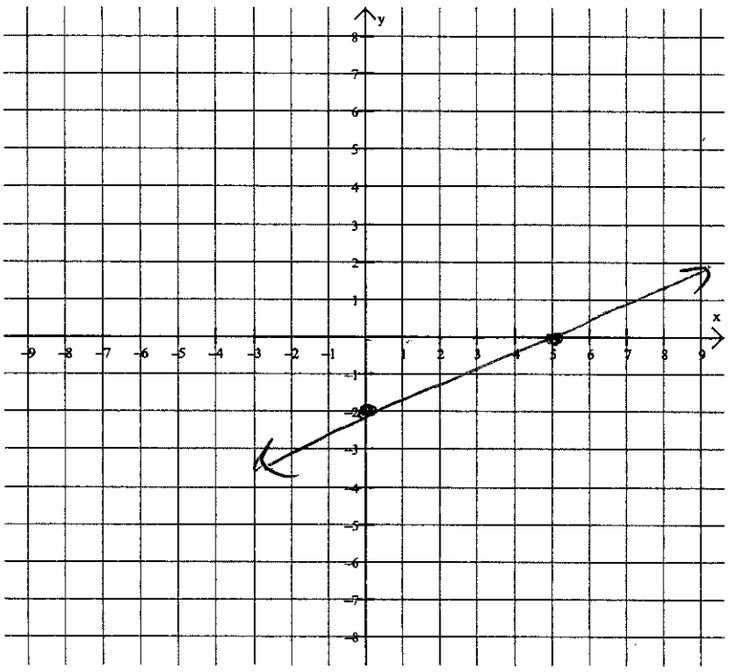
5. Graph $2x - 5y = 10$ on the grid given below.

$\frac{-5y}{-5} = \frac{-2x}{-5} + \frac{10}{-5}$

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



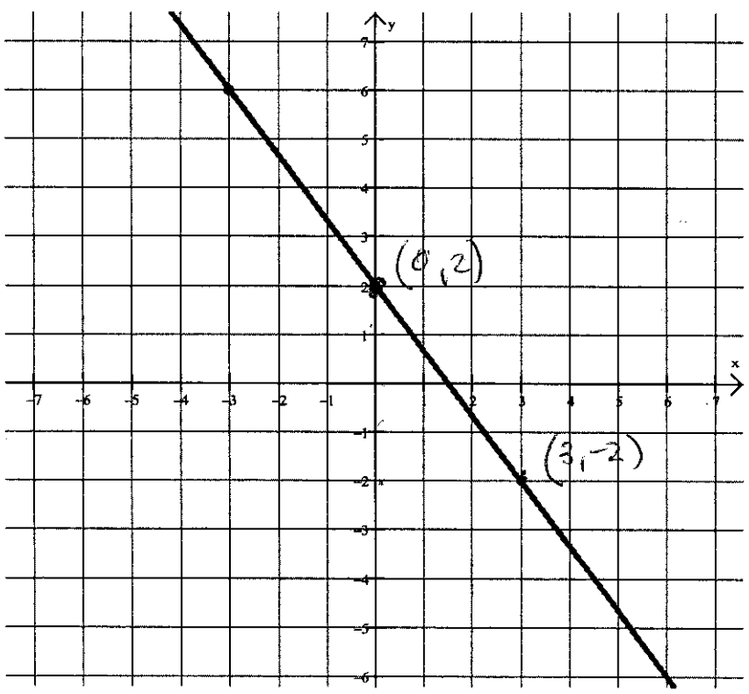
6. Find the equation of the line given below. $m = \left(\frac{2 - -2}{0 - 3}\right) = \frac{4}{3}$

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

$b = 2$ (since $(0,2)$ is on line)

Answer:

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



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7. Consider two different staircases, A and B. Staircase A rises vertically 7 inches for every 21 inches of horizontal increase. Staircase B rises vertically 10 inches for every 40 inches of horizontal increase. Which staircase is steeper, and how do you know you are correct?

Slope of Staircase A: $\frac{7}{21} = \frac{1}{3}$.

Staircase B: $\frac{10}{40} = \frac{1}{4}$

$\frac{1}{3} > \frac{1}{4}$, so Staircase A is steeper

8. Solve: $\frac{1}{3}x - 4 \leq \frac{7}{3}x - 6$

$\frac{1}{3}x - \frac{7}{3}x \leq -6 + 4$

$\frac{-6}{3}x \leq -2$

$\frac{-2x}{-2} \leq \frac{-2}{-2}$

$x \geq 1$

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9. Solve: $5x+2<8x+5<4x+9$

$5x+2<8x+5$ and $8x+5<4x+9$

$\frac{-3x}{-3} < \frac{3}{-3}$ $\qquad$ $\frac{4x}{4} < \frac{4}{4}$

$x > -1$ and $x < 1$

$\boxed{-1 < x < 1}$

10. Solve the system for x and y, if possible. $\begin{cases} 3x+4y=11 \\ 5x-6y=-7 \end{cases}$

$5(3x+4y=11)$

$-3(5x-6y=-7)$

$15x+20y=55$

$-15x+18y=21$

$38y=76$

$y=2$

$3x+4(2)=11$

$3x+8=11$

$3x=3$

$x=1$

$\boxed{(1,2)}$ Solution

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11. The total revenue from the sale of x units of a product is given by $R(x)=25.30x$, while the cost of producing x units is given by $C(x)=15.30x+250$. How many units must be sold in order to break even?

Break Even Point: Set $R(x) = C(x)$.

$$25.30x = 15.30x + 250$$
$$-15.30x \quad -15.30x$$

$$\frac{10x}{10} = \frac{250}{10}$$

$$x = 25 \text{ units}$$

12. The supply for a product is given by $3p - q = 230$, and the demand for the product is given by $2p + q = 170$. Find the equilibrium point.

$$3p - q = 230$$
$$2p + q = 170$$

$$5p = 400$$

$$p = \$80$$

$3(80) - q = 230$

$240 - 230 = q$

$q = 10$ units

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13. Suppose that a company's daily profit from the production and sale of a certain product is given by the function $P(x) = 5.5x - 1750$ dollars, where x is the number of units produced and sold. What level of production and sales will yield a daily profit of **more than** \$12,000? (*Hint: Set up an inequality that describes the situation and solve the inequality).*

$5.5x - 1750 > 12,000$

$\frac{5.5x}{5.5} > \frac{13750}{5.5}$

$x > 2500$ units

14. A rental car company depreciates its vehicles using a straight-line depreciation method. Suppose that a new vehicle is initially worth \$18,000, and 30 years later it is worth \$0. How much is the vehicle worth after 17 years?

$(0, 18,000)$

$(30, 0)$

$\frac{18,000}{-30} = -600/yr$

$y = -600x + 18,000$

Plug in $x = 17$.

$-600(17) + 18,000$

$= \$7800$

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15. The equation 5F-9C=160 gives the relationship between Fahrenheit and Celsius temperatures. What Celsius measurement is equivalent to a Fahrenheit measurement of 41°?

$5(41) - 9C = 160$

$205 - 9C = 160$

$-9C = -45$

$C = 5°$

16. The total cost of a dishwasher is $579.89, which includes a 7.4% sales tax. What was the price of the dishwasher **before** adding in the sales tax?

Let C = cost before tax.

Then $.074C$ = tax amount.

So $C + .074C = 579.89$

$1.074C = 579.89$

$C = \$539.93$