Regular Advanced Algebra w/ Trig Semester 1 Final Review
Chapters 1-3, Glawe

Name: Key
Period:

1. Tell whether the lines or parallel, perpendicular, or neither. (2.2)

Line 1: through (4, -2) and (5, -7)

Line 2: through (2, 3) and (1, 8)

$m_1 = \frac{-7-(-2)}{5-4} = \frac{-7+2}{5-4} = \frac{-5}{1} = -5$

$m_2 = \frac{8-3}{1-2} = \frac{5}{-1} = -5$

same slope; $\boxed{\text{parallel}}$

2. What is the y-intercept and x-intercept of $7x - 4y = 9$? (2.3)

y-intercept:
$7(0) - 4y = 9$
$0 - 4y = 9$
$-4y = 9$
$\boxed{y = -9/4}$
$(0, -9/4)$

x-intercept:
$7x - 4(0) = 9$
$7x - 0 = 9$
$7x = 9$
$\boxed{x = 9/7}$
$(9/7, 0)$

3. Write an equation of a line in slope-intercept form, point-slope form, and standard form that passes through the point (-4, 3) and has a slope of 2. (2.4)

a) slope-intercept form:

$y = mx + b$ $\quad y = 2x + b$
$3 = 2(-4) + b$
$3 = -8 + b$
$+8 \quad +8$
$b = 11$
$\boxed{y = 2x + 11}$

b) point-slope form:

$y - y_1 = m(x - x_1)$
$\boxed{y - 3 = 2(x + 4)}$

c) standard form:

$Ax + By = C$

$y = 2x + 11$
$-2x \quad -2x$
$(-2x + y = 11)-1 \rightarrow \boxed{2x - y = -11}$

can't be negative

4. Solve the system algebraically (3.2)

a) $\begin{cases} 3x - 11y = 16 \\ x + y = 3 \end{cases}$

$\hookrightarrow x = 3 - y$
$3(3-y) - 11y = 16$
$9 - 3y - 11y = 16$
$-9 \quad\quad -9$
$-14y = 7$ $\quad y = -1/2$

$x = 3 - (-1/2)$
$= 3 + 1/2$
$= 6/2 + 1/2$
$x = 7/2$
$\boxed{(7/2, -1/2)}$

b) $\begin{cases} 6x - 12y = 16 \rightarrow \\ (3x - 6y = 8)-2 \rightarrow \end{cases}$

$\cancel{6x} - \cancel{12y} = \cancel{16}$
$+ \cancel{-6x} + \cancel{12y} = \cancel{-16}$
$0 = 0$

$\boxed{\text{infinitely many solutions (same lines)}}$

5. Write equations for the situations below: (2.4)

a) (1, -4); parallel to $y = -3x + 8$

$\hookrightarrow$ same slope

$y = -3x + b$ $\quad b = -1$
$-4 = -3(1) + b$
$-4 = -3 + b$
$+3 \quad +3$
$\boxed{y = -3x - 1}$

b) (9, -1); perpendicular to $y = \frac{1}{4}x - 7$

$\hookrightarrow$ opposite reciprocal slope

$y = -4x + b$ $\quad b = 35$
$-1 = -4(9) + b$
$-1 = -36 + b$
$+36 \quad +36$
$\boxed{y = -4x + 35}$

6. $ax + by = 12$
$2x + 8y = 60$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of $\frac{a}{b}$? (3.2)

$\hookrightarrow 0 = 0$ (need all terms to cancel out)

$(ax + by = 12)-5 \rightarrow -5ax - 5by = -60$
$2x + 8y = 60 \rightarrow 2x + 8y = 60$

$\frac{-5ax}{-5x} = \frac{2x}{-5x} \rightarrow a = -\frac{2}{5}$

$\frac{-5by}{-5y} = \frac{8y}{-5y} \rightarrow b = -\frac{8}{5}$

$\frac{a}{b} = \frac{-2/5}{-8/5} = -2/\cancel{5} \cdot \cancel{5}/-8 = -2/-8 = \boxed{1/4}$

7. $A = \frac{1}{2}bh$

The area of a triangle depends on the base and height of the triangle. The formula above shows the relationship between A, the area of a triangle, b, the length of the base of a triangle, and h, the length of the height of a triangle. Rewrite the expression so that the height is in terms of the area and base. (1.4)

↳ solve the formula for h.

$2 \cdot A = \cancel{\frac{1}{2}} bh \cdot \cancel{2}$

$\frac{2A}{b} = \frac{bh}{b}$ $\boxed{h = \frac{2A}{b}}$

8. Jeremiah bought a pair of pants and a briefcase at a department store. The sum of the prices before sales tax was $130.00. There was no sales tax on the pants and a 9% sales tax on the briefcase. The total Jeremiah paid, including the sales tax, was $136.75. What was the price, in dollars, of the pants? (3.2)

x = price of pants y = price of briefcase

$x + y = 130 \rightarrow y = 130 - x$

$x + 1.09y = 136.75 \rightarrow x + 1.09(130 - x) = 136.75$

↳ 9% = .09 and need the full price of briefcase, so 1.09

$x + 141.70 - 1.09x = 136.75$

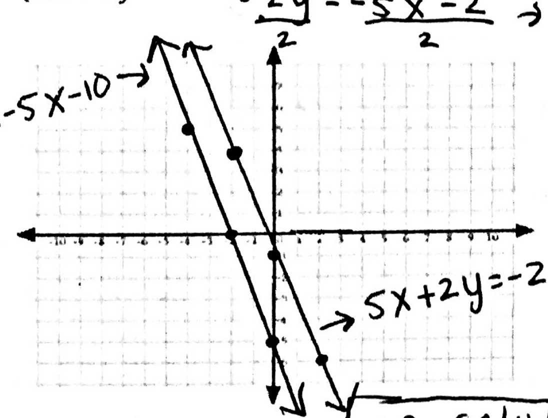
$\frac{-.09x}{-.09} = \frac{-4.95}{-.09}$

$x = 55$

$\boxed{\text{pants are \$55}}$

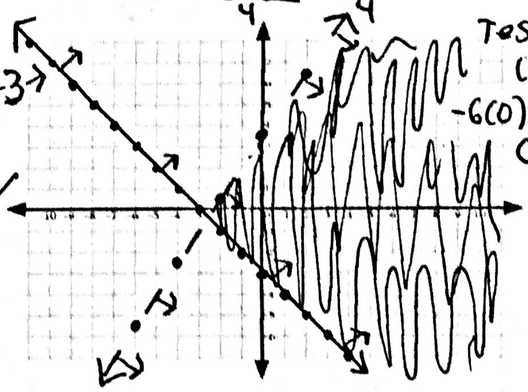
9. Solve the system of equations graphically: (3.1), (3.3)

a) $\begin{cases} 2y = -5x - 10 \rightarrow y = \frac{-5}{2}x - \frac{10}{2} \rightarrow y = \frac{-5}{2}x - 5 \\ 5x + 2y = -2 \rightarrow \frac{2y}{2} = \frac{-5x - 2}{2} \rightarrow y = \frac{-5}{2}x - 1 \end{cases}$



parallel lines; $\boxed{\text{no solution}}$

b) $\begin{cases} x + y \geq -3 \rightarrow y \geq -x - 3 \\ -6x + 4y < 14 \rightarrow \frac{4y}{4} < \frac{6x + 14}{4} \rightarrow y < \frac{3}{2}x + \frac{7}{2} \end{cases}$



Test: (0,0)
$0 + 0 \geq -3$
$0 \geq -3$ ✓

Test: (0,0)
$-6(0) + 4(0) < 14$
$0 < 14$ ✓

10. Solve for c in the equation $a = \frac{b}{c} - 1$. (1.4)

$a = \frac{b}{c} - 1$
$+1 \qquad +1$

$c \cdot a + 1 = \frac{b}{c} \cdot c$

$\frac{c(a+1)}{a+1} = \frac{b}{a+1}$

$\boxed{c = \frac{b}{a+1}}$

11. Solve for y in the equation $\frac{1}{x} + \frac{1}{y} = 1$. (1.4)

$\left(\frac{1}{x} + \frac{1}{y} = 1\right)y \rightarrow \frac{y}{x} + \frac{y}{y} = y \rightarrow$

$\left(\frac{y}{x} + 1 = y\right)x \rightarrow \frac{xy}{x} + x = xy \rightarrow$

$y + x = xy \rightarrow x = xy - y \rightarrow$
$-y \qquad -y$

$\frac{x}{x-1} = \frac{y(x-1)}{x-1} \rightarrow$

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

12. Solve the following inequalities, write the solution in interval notation: (1.6)

a) $2 \leq 3x - 1 < 6$
$+1 \qquad +1 \quad +1$

$\frac{3}{3} \leq \frac{3x}{3} < \frac{7}{3}$

$1 \leq x < 7/3$

$\boxed{[1, 7/3)}$

b) $-x - 4 \geq 1$ or $2 - 5x < -8$
$+4 \quad +4 \qquad -2 \qquad -2$

$\frac{-x}{-1} \geq \frac{5}{-1}$ or $\frac{-5x}{-5} < \frac{-10}{-5}$

$x \leq -5$ or $x > 2$

$\boxed{(-\infty, -5] \cup (2, \infty)}$