

Name: KEY

Score: _____ / 100

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

	1	2	3	4	5	6	7	8	9	10	11	12	Total
✓													
Score													

INSTRUCTIONS FOR STUDENTS

- Questions are on both sides of the paper. This is an 11 question exam (One extra credit problem can be attempted for a total of 12 questions).
- Students have 2 hours and 15 minutes to complete the exam.
- **PLEASE SHOW ALL WORK.** Any unjustified claims will receive no credit. Clearly box your final answer.
- You **MUST** complete 11 problems for credit. In the above table in the row with the ✓, please mark with a ✓ which problems you want to be graded. If you wish to do a 12th problem for extra credit, please write *EC* in the ✓ row for the problem you wish to be counted for extra credit.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- Each of the 11 questions you choose to do will be graded out of 3 points. The score will then be totaled and multiplied by 3 to get a raw score out of 99 points. One point will be given for clearly writing your name on the exam sheet. This will get you to 100 points. If you choose to do a 12th problem for extra credit, the most that will be awarded for that question will be 3 points. So, the highest possible score on this examination is 103 points out of 100.
- The back of the test can be used for scratch work.

GOOD LUCK!

1) Solve the following equation for x : $\frac{5}{6}(-\frac{3}{4}x+1) = -\frac{2}{3}(\frac{1}{2}x-1)$

$$\frac{5}{6}(-\frac{3}{4}x+1) = -\frac{2}{3}(\frac{1}{2}x-1)$$

$$\Rightarrow 5(-\frac{3}{4}x+1) = -4(\frac{1}{2}x-1) \quad \text{Multiply by LCM} = 6$$

$$\Rightarrow -\frac{15}{4}x+5 = -2x+4$$

$$\Rightarrow \begin{array}{r} -15x+20 \\ +15x \end{array} = \begin{array}{r} -8x+16 \\ +15x \end{array}$$

Multiply by LCM = 4

$$\begin{array}{r} 20 = 7x+16 \\ +16 \quad \quad -16 \end{array}$$

$$4 = 7x$$

$$\boxed{\frac{4}{7} = x}$$

2) Solve the following equation for q : $\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$
$$-\frac{1}{p} \quad -\frac{1}{p}$$

$$\frac{1}{f} - \frac{1}{p} = \frac{1}{q}$$

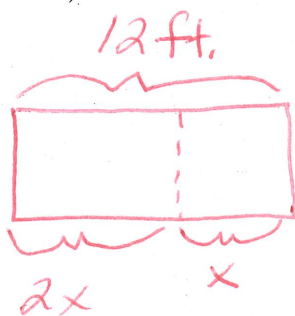
$$\Rightarrow \frac{p-f}{fp} = \frac{1}{q}$$

Common denominator
is fp .

$$\Rightarrow \boxed{q = \frac{fp}{p-f}}$$

Cross multiply.

3) A 12 ft. board has been cut into 2 sections, one is twice as long as the other. How long is each section?



$x =$ shorter side of board
 \Rightarrow picture to the left

$$\Rightarrow 2x + x = 12$$

$$3x = 12$$

$$x = 4 \Rightarrow 2x = 8$$

So the lengths are
4 ft and 8 ft.

4) Solve the inequality and write the answer in interval notation: $3 \leq -\frac{1}{4}(x+4) < 7$

$$3 \leq -\frac{1}{4}(x+4) < 7$$

$$-4 \cdot 3 \geq -4 \left(-\frac{1}{4}\right)(x+4) > -4 \cdot 7$$

$$\begin{array}{r} -12 \geq x+4 > -28 \\ -4 \quad \quad -4 \quad \quad -4 \end{array}$$

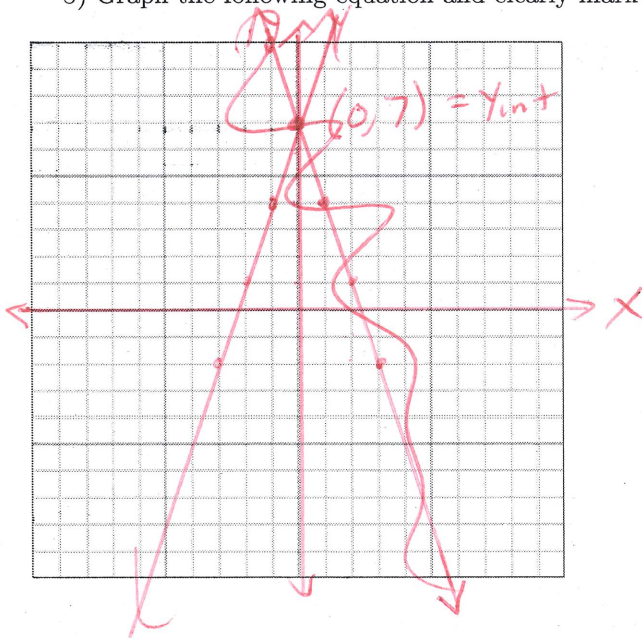
$$-16 \geq x > -32$$

$$\Rightarrow \boxed{(-32, -16]}$$

Multiply by -4
and flip inequality
signs

$]$, $[\Leftrightarrow \geq$ or \leq
 $)$, $(\Leftrightarrow >$ or $<$

5) Graph the following equation and clearly mark the x and y -intercepts: $9x - 3y = -21$



$$\begin{array}{r} 9x - 3y = -21 \\ -9x \qquad -9x \\ \hline \end{array}$$

$$\frac{-3y}{-3} = \frac{-9x - 21}{-3} \quad \frac{-9x}{-3} \quad \frac{-21}{-3}$$

$$y = 3x + 7$$

$$\text{Slope} = m = 3$$

$$y_{\text{int}} = (0, 7)$$

$$\Rightarrow 0 = 3x + 7$$

$$\Rightarrow x =$$

6) Determine whether the lines through each pair of points are parallel, perpendicular, or neither: $(8, -3)$ and $(8, -8)$; $(11, 3)$ and $(22, 3)$

$$\begin{aligned} (8, -3) \text{ and } (8, -8) &\Rightarrow m_1 = \frac{\Delta y}{\Delta x} = \frac{-8 - (-3)}{8 - 8} \\ &= \frac{-5}{0} = \text{undef.} \end{aligned}$$

$$(11, 3) \text{ and } (22, 3) \Rightarrow m_2 = \frac{\Delta y}{\Delta x} = \frac{3 - 3}{22 - 11} = \frac{0}{11} = 0$$

perp

7) Find the slope, y -intercept, and x -intercept of the following line: $\frac{1}{3}x - \frac{2}{9}y = -\frac{1}{18}$

$$\frac{1}{3}x - \frac{2}{9}y = -\frac{1}{18}$$

LCM = 18

$$\Rightarrow \frac{18}{3}x - \frac{18 \cdot 2}{9}y = -\frac{18}{18}$$

$$\Rightarrow 6x - 4y = -1$$

$$\Rightarrow \frac{-4y}{-4} = \frac{-6x-1}{-4}$$

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

Solution

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

$$y_{\text{int}} = (0, \frac{1}{4})$$

$$x_{\text{int}} = (-\frac{1}{6}, 0)$$

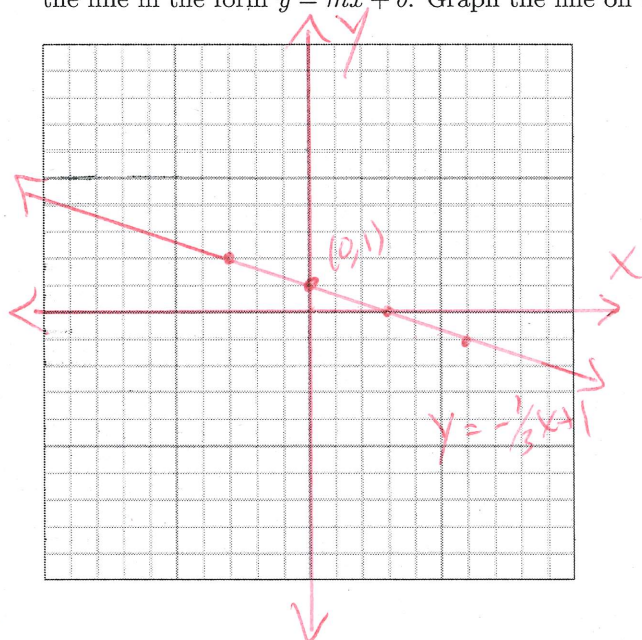
$$\Rightarrow 0 = \frac{3}{2}x + \frac{1}{4}$$

LCM = 4

$$0 = 6x + 1$$

$$x = -\frac{1}{6}$$

8) Use the point slope formula to find the equation of the line passing through $(3, 0)$ and $(-3, 2)$. Write the line in the form $y = mx + b$. Graph the line on the plot below.



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 0}{-3 - 3} = \frac{2}{-6} = -\frac{1}{3}$$

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

$$y - 0 = -\frac{1}{3}(x - 3)$$

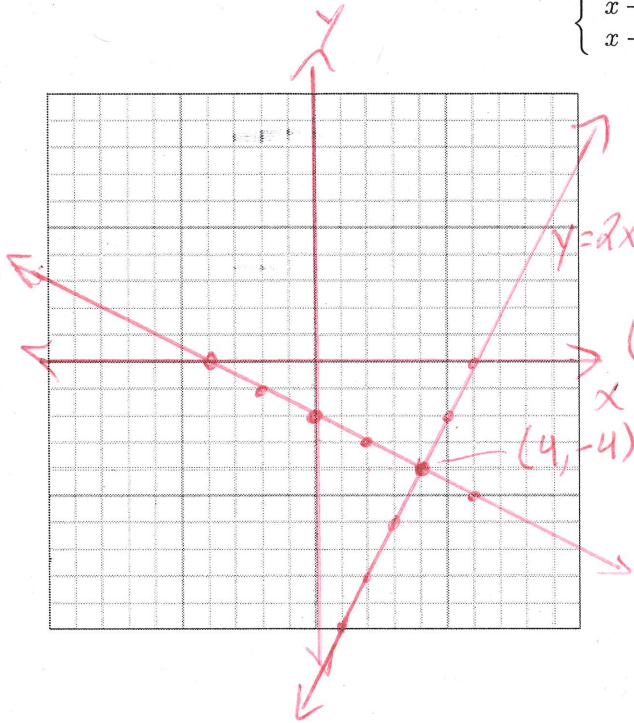
$$y = -\frac{1}{3}x + 1$$

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

$$y_{\text{int}} = (0, 1)$$

9) Solve the system of equations by graphing:

$$\begin{cases} x + 2y = -4 \\ x - \frac{1}{2}y = 6 \end{cases}$$



$$\begin{aligned} \textcircled{1} &\Rightarrow x + 2y = -4 \\ &2y = -x - 4 \\ &y = -\frac{1}{2}x - 2 \end{aligned}$$

$$\begin{aligned} \textcircled{2} &\Rightarrow x - \frac{1}{2}y = 6 \\ &-\frac{1}{2}y = -x + 6 \\ &y = 2x - 12 \end{aligned}$$

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

Solution is point of intersection

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

10) Use either the substitution method or the elimination method to solve the following system of equations:

$$\begin{cases} 2x + 3y = 6 \\ 4x + 2y = 8 \end{cases}$$

Use Elimination

$$2x + 3y = 6$$

$$4x + 2y = 8$$

Multiply Egn 1 by -2

$$\begin{aligned} \Rightarrow & \begin{array}{r} -4x - 6y = -12 \\ 4x + 2y = 8 \\ \hline -4y = -4 \\ y = 1 \end{array} \end{aligned}$$

$$2x + 3y = 6$$

$$2x + 3 = 6$$

$$2x = 3$$

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

Plug in $y = 1$

$$\Rightarrow \boxed{\left(\frac{3}{2}, 1\right) \text{ is solution}}$$

11) At a theater, the rectangular movie screen has a width of 20 ft. less than its length. If its perimeter is 80 feet, find the length and width of the screen.

$L \rightarrow P = 80 \text{ ft} \quad w = l - 20 \leftarrow$

$P = 2l + 2w$

$\Rightarrow 80 = 2l + 2(l - 20)$

$80 = 2l + 2l - 40$

$80 = 4l - 40$

$+40 \qquad +40$

$\frac{120}{4} = \frac{4l}{4}$

$30 = l$

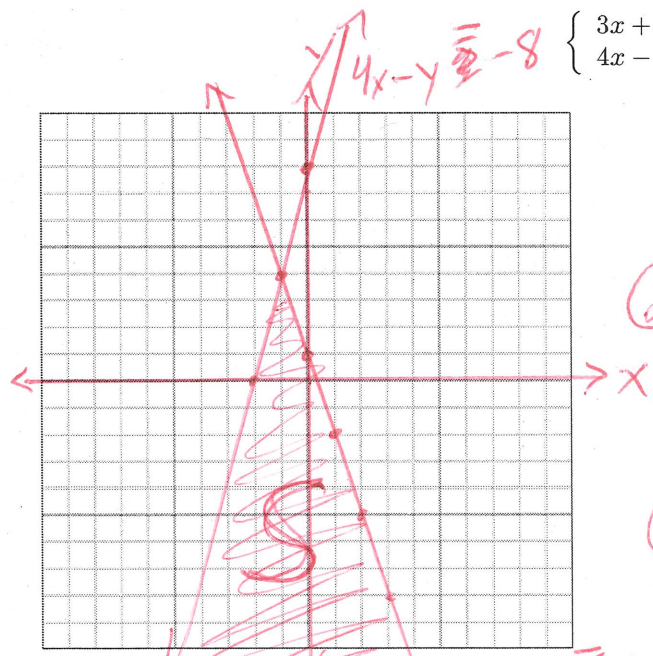
$\Rightarrow w = l - 20$

$w = 30 - 20 \Rightarrow w = 10$

$l = 30 \text{ ft}$
 $w = 10 \text{ ft}$

12) Graph the solution of the following system

$\begin{cases} 3x + y \leq 1 \\ 4x - y \geq -8 \end{cases}$



① $\Rightarrow 3x + y \leq 1$

$\Rightarrow y \leq -3x + 1$

$m = -3$
 $y_{int} = (0, 1)$

② $\Rightarrow 4x - y \geq -8$

$4x \geq y - 8$

$4x + 8 \geq y$

① Test (0, 0)

$3(0) + 0 \leq 1$

$0 \leq 1 \quad \checkmark \text{ True}$

② Test (0, 0)

$4(0) - 0 \geq -8$

$0 \geq -8 \quad \checkmark \text{ True}$

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST