

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 : $-3(3x + 10) + 5(5x + 10) = 9(x + 3)$

$$\Rightarrow -9x - 30 + 25x + 50 = 9x + 27$$

$$\Rightarrow$$

$$16x + 20 = 9x + 27$$

$$7x + 20 = 27$$

$$\begin{array}{r} -20 \\ -20 \end{array}$$

$$\hline 7x = 7$$

$$\boxed{x = 1}$$

2) Solve the following equation for h : $S = 2\pi(r^2 + rh)$

$$S = 2\pi(r^2 + rh)$$

$$\Rightarrow \frac{S}{2\pi} = r^2 + rh$$

$$\Rightarrow \frac{S}{2\pi} - r^2 = rh$$

$$\Rightarrow \frac{1}{r} \left(\frac{S}{2\pi} - r^2 \right) = \frac{1}{r} \cdot rh$$

$$\Rightarrow h = \frac{S}{2\pi r} - \frac{r^2}{r}$$

$$\Rightarrow \boxed{h = \frac{S}{2\pi r} - r}$$

3) Kevin's Cell Phone company sells a group cell phone plan. The plan has a one time fee of \$20, and the cost per each member is \$12.50 per person.

- Write a linear function for the cost of cell phone plan depending upon the number of members.
- How much does the plan cost for a 4 people?
- If the cost of the group plan was \$95, how many people were on the plan?

$$a) \begin{array}{l} C = \text{cost} \\ p = \text{number of members} \end{array} \Rightarrow \boxed{C = 12.5p + 20}$$

$$b) \begin{array}{l} C = 12.5(4) + 20 \\ C = 50 + 20 \\ C = 70 \end{array} \Rightarrow \boxed{\$70 \text{ for 4 people}}$$

$$c) \begin{array}{r} 95 = 12.5p + 20 \\ -20 \quad \quad -20 \\ \hline 12.5p = 75 \\ \frac{12.5p}{12.5} = \frac{75}{12.5} \Rightarrow p = 6 \end{array} \quad \boxed{6 \text{ members}}$$

4) Solve the inequality and write the answer in interval notation: $-3x + 25 \geq -4x + 16$

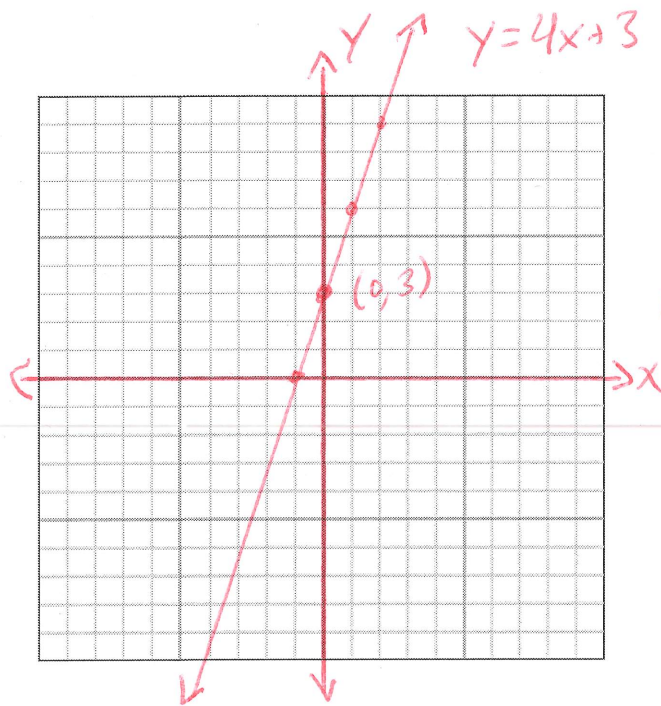
$$\begin{array}{r} -3x + 25 \geq -4x + 16 \\ +4x \quad \quad +4x \\ \hline \end{array}$$

$$\begin{array}{r} x + 25 \geq 16 \\ -25 \quad -25 \\ \hline \end{array}$$

$$x \geq -9$$

$$\Rightarrow \boxed{[-9, \infty)}$$

5) Graph the following equation and clearly mark the x and y -intercepts: $12x - 3y = -9$



$$\Rightarrow \frac{-3y}{-3} = \frac{-12x - 9}{-3}$$

$$y = 4x + 3$$

$$y_{\text{int}} = (0, 3)$$

$$m = \frac{\text{rise}}{\text{run}} = \frac{4}{1}$$

$$0 = 4x + 3$$

$$4x = -3$$

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

$$x_{\text{int}} = \left(-\frac{3}{4}, 0\right)$$

6) Determine whether the lines through each pair of points are parallel, perpendicular, or neither: $(2, 3)$ and $(6, 3)$; $(3, 0)$ and $(3, 5)$

Line 1: $(2, 3)$ and $(6, 3) \Rightarrow m_1 = \frac{3-3}{6-2} = \frac{0}{4} = 0$

Line 2: $(3, 0)$ and $(3, 5) \Rightarrow m_2 = \frac{5-0}{3-3} = \frac{5}{0} = \text{undefined}$

Line 1 \rightarrow horizontal
Line 2 \rightarrow vertical

\Rightarrow Lines are perpendicular

7) Find the slope, y -intercept, and x -intercept of the following line: $3x + 4y = 12$

$$\begin{array}{r} 3x + 4y = 12 \\ -3x = 0 \\ \hline 4y = -3x + 12 \\ y = -\frac{3}{4}x + 3 \end{array}$$

$$m = -\frac{3}{4}$$

$$y_{int} = (0, 3)$$

$$0 = -\frac{3}{4}x + 3$$

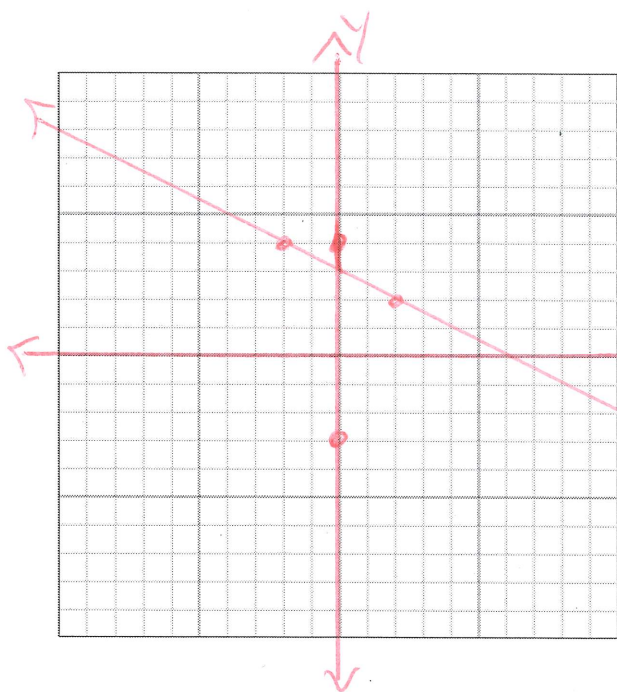
$$\frac{3}{4}x = 3$$

$$3x = 12$$

$$x = 4$$

$$\Rightarrow x_{int} = (4, 0)$$

8) Use the point slope formula to find the equation of the line passing through $(6, 0)$ and $(-2, 4)$. Write the line in the form $y = mx + b$. Graph the line on the plot below.



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

$$m = \frac{4 - 0}{-2 - 6} = -\frac{4}{8} = -\frac{1}{2}$$

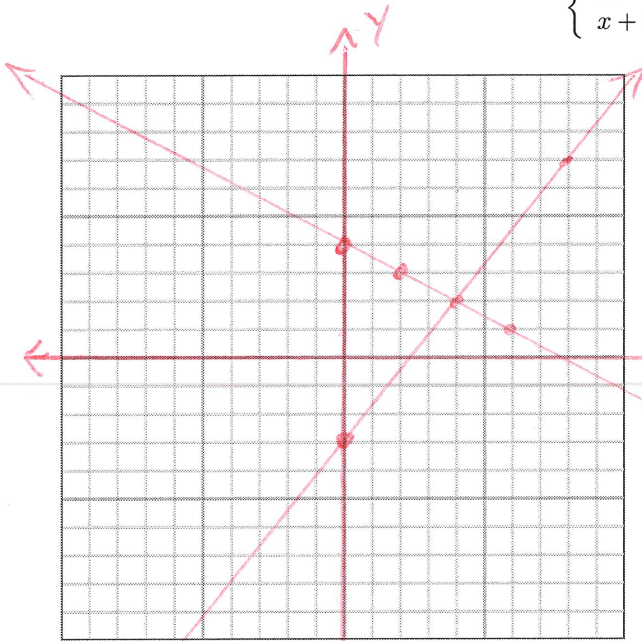
$$y - 0 = -\frac{1}{2}(x - 6)$$

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

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

9) Solve the system of equations by graphing:

$$\begin{cases} 5x - 4y = 12 \\ x + 2y = 8 \end{cases}$$



$$5x - 4y = 12 \Rightarrow \frac{-4y}{-4} = \frac{-5x + 12}{-4}$$

$$y = \frac{5}{4}x - 3$$

$$x + 2y = 8 \Rightarrow \frac{2y}{2} = \frac{-x + 8}{2}$$

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

$$y = \frac{5}{4}x - 3$$

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

$$\begin{cases} \text{LCM}=6 & \frac{1}{3}x - \frac{1}{6}y = -\frac{2}{3} \\ \text{LCM}=12 & \frac{2}{3}x - \frac{1}{4}y = \frac{3}{2} \end{cases} \quad \text{Use LCM}$$

$$\Rightarrow 2x - y = -4 \quad \text{--- 3 on } \textcircled{1}$$

$$8x - 3y = 18 \quad \Rightarrow$$

$$\begin{array}{r} -6x + 3y = 12 \\ 8x - 3y = 18 \\ \hline \end{array}$$

$$2x = 30$$

$$x = 15$$

$$2x - y = -4$$

$$30 - y = -4$$

$$y = 34$$

$$\boxed{\begin{array}{l} x = 15 \\ y = 34 \end{array}}$$

11) A boat traveled 56 miles downstream in 4 hours and made the return trip in 7 hours. Find the speed of the boat in still water and the speed of the current.

	total speed rate	time	distance $d=rt$
down stream	$s+c$	4	$4(s+c)$
Upstream	$s-c$	7	$7(s-c)$

$$\Rightarrow \begin{cases} 4(s+c) = 56 \\ 7(s-c) = 56 \end{cases}$$

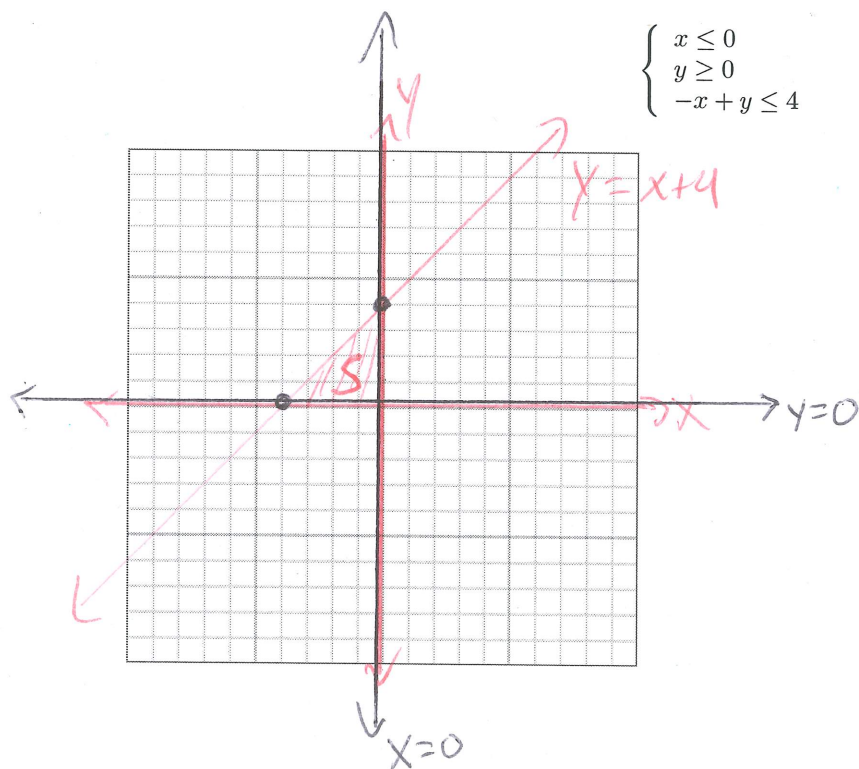
$$\Rightarrow \begin{aligned} 4s + 4c &= 56 \rightarrow 4s + 4c = 56 \\ 7s - 7c &= 56 \rightarrow s - c = 8 \end{aligned}$$

$$\begin{array}{r} 4s + 4c = 56 \\ 4s - 4c = 32 \\ \hline 8s = 88 \\ s = 11 \end{array}$$

$$\begin{aligned} s - c &= 8 \\ 11 - c &= 8 \\ -c &= -3 \\ c &= 3 \end{aligned}$$

boat is 11 mi/hr
river is 3 mi/hr

12) Graph the solution of the following system



$$\begin{cases} x \leq 0 \\ y \geq 0 \\ -x + y \leq 4 \end{cases}$$

$$-x + y \leq 4$$

$$y \leq x + 4$$

Try (0,0)

$$0 \leq 0 + 4$$

$$0 \leq 4 \checkmark \text{ True}$$

Test S area

(-1,1)

$$-1 \leq 0 \checkmark$$

$$1 \geq 0 \checkmark$$

$$-(-1) + 1 \leq 4$$

$$1 + 1 \leq 4$$

$$2 \leq 4 \checkmark$$

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST