

Solutions to Study Guide for Final Exam

simplify expressions & solve equations

1. Simplify the expression or solve the equation, as appropriate.

Unless otherwise specified, use integers or simplified fractions only in your answers.

a) $4(-8) = \left(\frac{4x}{7}\right)7$ equation

$$\frac{-56}{4} = \frac{4x}{4}$$

$$\boxed{x = -14}$$

b) $5(x-2) - (3x+6) = 6(5x+3)$ equation

$$5x - 10 - 3x - 6 = 30x + 18$$

$$2x - 16 = 30x + 18$$

$$\frac{-30x \quad -30x}{-28x - 16 = 18}$$

$$\frac{\quad +16 \quad +16}{-28x = 34}$$

$$\frac{-28}{-28} \quad \frac{34}{-28}$$

$$\boxed{x = \frac{-17}{14}}$$

c) $-5.5 + 4.6(3.5x - 9.1)$ expression
Round your answer to the nearest tenth.

$$-5.5 + 16.1x - 41.86$$

$$16.1x - 47.36$$

$$\boxed{16.1x - 47.4}$$

d) $\frac{5}{6} + 2x + 5 - \frac{7}{9}x$ expression

$$\frac{5}{6} + 5 + 2x - \frac{7}{9}x$$

$$\begin{matrix} \uparrow & \uparrow \\ \frac{5 \cdot 6}{6} - \frac{30}{6} & \frac{2 \cdot 9}{9} - \frac{18}{9} \end{matrix}$$

$$\frac{5}{6} + \frac{30}{6} + \frac{18}{9}x - \frac{7}{9}x$$

$$\boxed{\frac{35}{6} + \frac{11}{9}x}$$

e) $\frac{2}{9}(15x + 6)$ expression

$$\frac{2}{9} \cdot 15x + \frac{2}{9} \cdot 6$$

$$\frac{10x}{3} + \frac{4}{3}$$

$$\boxed{\frac{10x}{3} + \frac{4}{3}}$$

f) $\left(\frac{7x}{8} + \frac{1}{2} - \frac{3x}{4}\right)(0)8$ equation
LCD = 8

$$7x + 4 - 6x = 0$$

$$x + 4 = 0$$

$$\frac{-4 \quad -4}{\boxed{x = -4}}$$

2. Solve the inequality. Describe the solution set as in inequality, in interval notation, and in a graph.

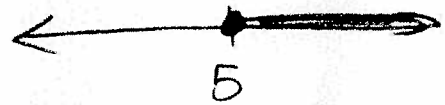
a) $5(x - 2) \geq 15$

$$\begin{array}{r} 5x - 10 \geq 15 \\ +10 \quad +10 \\ \hline 5x \geq 25 \\ \frac{5x}{5} \geq \frac{25}{5} \\ x \geq 5 \end{array}$$

Inequality $x \geq 5$

Interval notation $[5, \infty)$

Graph



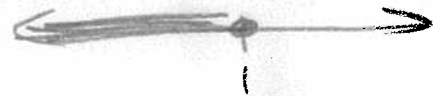
4 b) $\left(\frac{3}{4}t - \frac{1}{2}\right) \leq \frac{1}{4}$

$$\begin{array}{r} 3t - 2 \leq 1 \\ +2 \quad +2 \\ \hline 3t \leq 3 \\ \frac{3t}{3} \leq \frac{3}{3} \quad t \leq 1 \end{array}$$

Inequality $t \leq 1$

Interval notation $(-\infty, 1]$

Graph



* 12 c) $\left(\frac{2b-4}{3}\right) < \left(\frac{3b-4}{4}\right)$ LCD = 12

$$\begin{array}{r} 4(2b-4) < 3(3b-4) \\ 8b - 16 < 9b - 12 \\ +16 \quad +16 \\ \hline 8b < 9b + 4 \\ -9b \quad -9b \\ \hline -b < 4 \quad b > -4 \end{array}$$

Inequality $b > -4$

Interval notation $(-4, \infty)$

Graph



3. Determine whether the pair of lines is parallel, perpendicular, or neither.

$y = \frac{6}{7}x + 10$ and $y = -\frac{7}{6}x - 10$

perpendicular



4. A country's oil exports decreased approximately linearly from 1070 million barrels in 1996 to 530 million barrels in 2000. Find the average rate of change of the country's oil exports per year. Write your answer in a complete sentence in the context of the problem.

$$\frac{530 - 1070}{2000 - 1996} = -\frac{540}{4} = -135$$

Each year the country's oil exports decreased by 135 million barrels.

5. Evaluate the following expressions for $a = 2$, $b = -5$, $c = -4$, and $d = 10$. Show all work for credit. Unless otherwise specified, write your answers as integers or simplified fractions.

a) $\frac{a}{d} \div \frac{b}{c}$

$$\frac{2}{10} \div \frac{(-5)}{(-4)} = \frac{2}{10} \cdot \frac{4}{5} = \frac{4}{25}$$

b) $b^2 - 4ac$

$$(-5)^2 - 4(2)(-4) = 25 + 32 = 57$$

c) $\frac{-b-c^2}{2a}$

$$\frac{-(-5) - (-4)^2}{2(2)} = \frac{5 - 16}{4} = \frac{-11}{4}$$

d) $2c^2 - 5c + 3$

$$2(-4)^2 - 5(-4) + 3 = 2(16) + 20 + 3 = 32 + 23 = 55$$

6. Find the equation of the line that fits the description. Write your answer in slope-intercept form (if appropriate). Use integers or simplified fractions for any numbers in your answer.

a) Passes through $(-2, -3)$ and $(-8, -7)$

$$m = \frac{(-7) + (-3)}{(-8) + (-2)} = \frac{-10}{-10} = 1$$

$$y = 1x + b$$

$$3(y) = (1x + b)3$$

$$3y = 3x + 3b$$

$$3(-3) = 3(-2) + 3b$$

$$\begin{array}{r} -9 = 3 + 3b \\ +4 \quad +4 \\ \hline -5 = 3b \end{array}$$

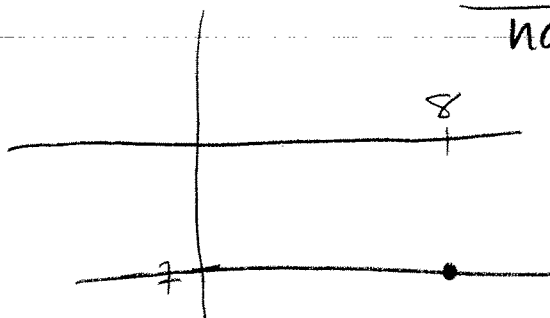
$$\frac{-5}{3} = \frac{3b}{3}$$

$$b = -\frac{5}{3}$$

$$y = 1x - \frac{5}{3}$$

b) Passes through $(8, -7)$ and has zero slope.

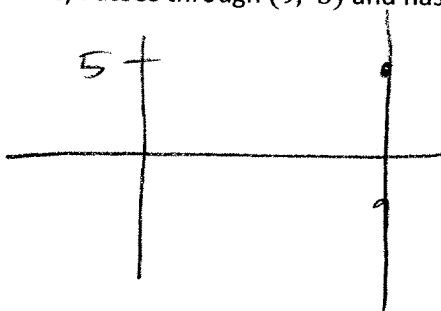
horizontal



$$y = -7$$

c) Passes through $(9, 5)$ and has undefined slope.

vertical



$$x = 9$$

d) Passes through $(5, -3)$ and has slope $\frac{4}{5}$

$$y = \frac{4}{5}x + b$$

$$5(y) = (\frac{4}{5}x + b)5$$

$$5y = 4x + 5b$$

$$5(-3) = 4(5) + 5b$$

$$\begin{array}{r} -15 = 20 + 5b \\ -20 \quad -20 \\ \hline -35 = 5b \end{array}$$

$$\frac{-35}{5} = \frac{5b}{5}$$

$$b = -7$$

$$y = \frac{4}{5}x - 7$$

7. The percentage of mothers who smoke cigarettes during pregnancy has declined approximately linearly from 13.9% in 1995 to 12.0% in 2000. Let t be the number of years since 1995 and p be the percentage of mothers who smoke cigarettes during pregnancy.

a) Which variable is the independent variable?

t

$$p = mt + b$$

(t, p)

p = percentage of mothers who smoke during preg
 t = # yrs since 1995

b) What is the slope? What does it mean in this situation?

(0, 13.9) (5, 12.0)

$$m = \frac{12 - 13.9}{5 - 0} = \frac{-1.9}{5} = -.38$$

Each year the percentage of mothers who smoke during pregnancy decreases by .38%.

c) What is the p -intercept as an ordered pair? What does it mean in this situation?

(0, 13.9) In 1995, 13.9% of mothers smoked during pregnancy

d) Find the equation of a linear model to describe the data.

$$p = -.38t + 13.9$$

make sure you use the variables defined in the problem

e) What is the t -intercept as an ordered pair? What does it mean in this situation?

$$p = -.38t + 13.9$$

$$0 = -.38t + 13.9$$

$$+.38t \quad +.38t$$

$$.38t = 13.9$$

$$\frac{.38t}{.38} = \frac{13.9}{.38}$$

$$t = 36.58 \rightarrow 37$$

$$1995 + 37 = 2032$$

t -int (36.58, 0)

In 2032, no mothers will smoke during pregnancy

f) Predict the percentage of mothers who smoke cigarettes during pregnancy in 2010. Show all work and write your answer in a complete sentence.

2010 is $t = 15$

$$p = -.38(15) + 13.9$$

$$p = -5.7 + 13.9 = 8.2$$

In 2010, 8.2% of mothers will smoke during pregnancy

g) When did the percentage of mothers who smoked cigarettes during pregnancy reach 5%? Show all work and write your answer in a complete sentence. Round your answer to the nearest year.

$$5 = -.38t + 13.9$$

$$+.38t \quad +.38t$$

$$.38t + 5 = 13.9$$

$$-5 \quad -5$$

$$.38t = 8.9$$

$$\frac{.38t}{.38} = \frac{8.9}{.38}$$

$$t = 23.42 \rightarrow 23$$

$$1995 + 23 = 2018$$

In 2018 the percentage of mothers who smoked during pregnancy will reach 5%.

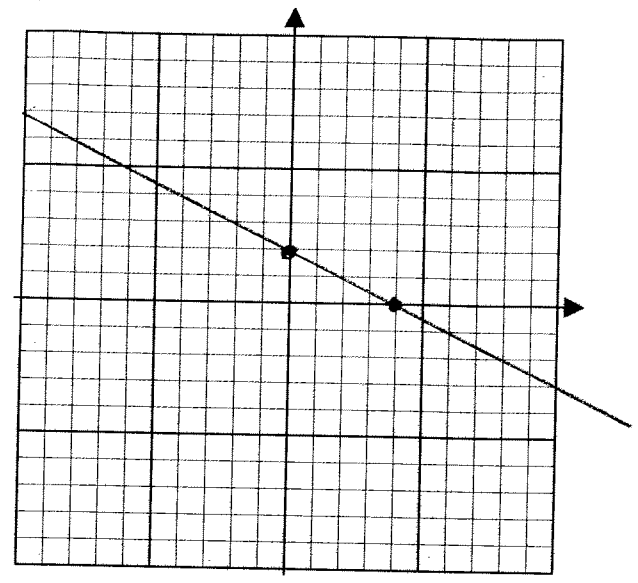
(5)

8. Find the x-intercept and y-intercept and then graph the equation.

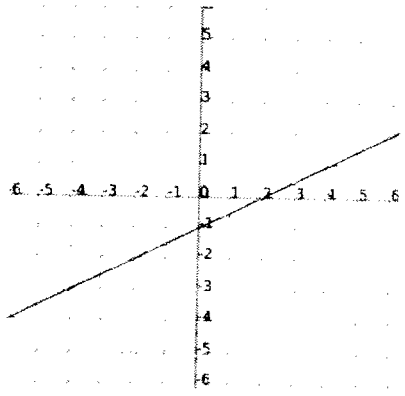
$$4x + 8y = 16$$

- a) Slope-intercept form: $y = -\frac{1}{2}x + 2$
- b) x-intercept as an ordered pair: $(4, 0)$
- c) y-intercept as an ordered pair: $(0, 2)$
- d) Graph.

$$\begin{array}{r} 4x + 8y = 16 \\ -4x \quad -4x \\ \hline 8y = -4x + 16 \\ \frac{8y}{8} = \frac{-4x + 16}{8} \\ \boxed{y = -\frac{1}{2}x + 2} \end{array} \quad \left| \quad \begin{array}{l} 0 = -\frac{1}{2}x + 2 \\ +\frac{1}{2}x + \frac{1}{2}x \\ \hline 2(\frac{1}{2}x) = (2)2 \\ x = 4 \end{array} \right.$$



9. Write the equation of the line in slope-intercept form. Simplify your answer and use integers or simplified fractions.



y-int = $(0, -1)$
 $m = \frac{1}{2}$
 $\boxed{y = \frac{1}{2}x - 1}$

10. Perform the indicated operations and simplify your answers. *Show all work for credit!*
 Unless otherwise specified, your answers should be integer or simplified fraction.

<p>a) $\frac{2}{11} \cdot \frac{3}{7}$</p> $\boxed{\frac{6}{77}}$	<p>b) $\frac{2}{3} \div 6$</p> $\frac{2}{3} \cdot \frac{1}{6} = \frac{1}{9}$ $\boxed{\frac{1}{9}}$	<p>c) $\frac{3}{14} + \frac{5}{4}$ LCD = 28</p> $\frac{3}{14} \cdot \frac{2}{2} = \frac{6}{28}$ $\frac{5}{4} \cdot \frac{7}{7} = \frac{35}{28}$ $\frac{6}{28} + \frac{35}{28} = \frac{41}{28}$ $\boxed{\frac{41}{28}}$
<p>d) $-\frac{1}{11} \div (+\frac{10}{11})$</p> $\boxed{\frac{9}{11}}$	<p>e) $(\frac{3}{5})^2 = (\frac{3}{5})(\frac{3}{5})$</p> $\boxed{\frac{9}{25}}$	<p>f) $\frac{3}{7}(-\frac{4}{5})$</p> $\boxed{-\frac{12}{35}}$

11. Perform the indicated operations and simplify your answers. Show all work for credit! No work means no credit! Unless otherwise specified, your answers should be an integers or simplified fractions.

<p>a) $2(5)^2 - 6 \div 2 + 1$</p> $2(25) - 3 + 1$ $50 - 2$ $\boxed{48}$	<p>b) $5[3 + 2(4 - 2)]$</p> $5[3 + 2(2)]$ $5[3 + 4]$ $5(7)$ $\boxed{35}$	<p>c) $9(4 - 6)^2 - 2(2 - 4)^3$</p> $9(-2)^2 - 2(-2)^3$ $9(4) - 2(-8)$ $36 + 16$ $\boxed{52}$
<p>d) $(-5)^2$ ← -5 is multiplied repeatedly</p> $(-5)(-5) = \boxed{25}$ <hr/> <p>note: -5^2 means 5 is mult. rep. $-5^2 = -5 \cdot 5 = -25$</p>	<p>e) $(\frac{3}{5})^2$</p> $= (\frac{3^2}{5^2}) = \boxed{\frac{9}{25}}$	<p>f) $\frac{-15(-8)}{10 - (-10)}$</p> $\frac{120}{20} = \boxed{6}$

12. In addition, there will be a problem that you have never seen before. Use what you have learned in this class in addition to your problem solving skills to solve it and explain.