

Algebra 201-007-50 C 1

Test 1

September 25, 2008

Name: SOLUTIONS

Student Number:

1. (10 marks). Solve the following linear inequalities. Give the solution graph and solution set (indicate which is which for marks).

a)  $3(x - 2) + 1 > 5x + 40$

$$3x - 6 + 1 > 5x + 40$$

$$3x - 5 > 5x + 40$$

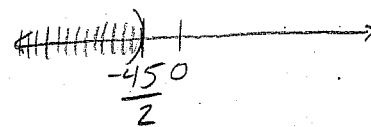
$$3x - 5x > 40 + 5$$

$$-2x > 45$$

$$\frac{-2x}{-2} < \frac{45}{-2}$$

$$x < \frac{-45}{2}$$

SOLUTION GRAPH:



SOLUTION SET:

$$\left(-\infty, \frac{-45}{2}\right)$$

2. (8 marks). Solve for  $x$  in the following equations:

$$\text{a) } 2(x-2) - 5(x-1) = -6 - 11$$

$$2x - 4 - 5x + 5 = -6 - 11$$

$$-3x + 1 = -17$$

$$-3x = -17 - 1$$

$$-3x = -18$$

$$x = 6$$

$$\text{b) } \frac{1}{4}(x+6) + 2 = 2x$$

$$4 \left[ \frac{1}{4}(x+6) + 2 \right] = 4(2x)$$

$$4 \cdot \frac{1}{4}(x+6) + 4 \cdot 2 = 8x$$

$$x + 6 + 8 = 8x$$

$$x + 14 = 8x$$

$$14 = 8x - x$$

$$14 = 7x$$

$$2 = x$$

3. (5 marks). Find 3 consecutive odd integers such that 3 times the middle one is 1 more than the sum of the other two.

LET  $x$  BE THE FIRST INTEGER  
THEN  $x+2$  IS THE SECOND INTEGER AND  
 $x+4$  IS THE THIRD INTEGER

$$\therefore 3(x+2) = (x) + (x+4) + 1$$

$$3x+6 = 2x+5$$

$$3x-2x = 5-6$$

$$x = -1$$

$\therefore$  THE THREE NUMBERS ARE  $-1, 1, 3$

4. (3 marks). Solve for  $q$  in the following formula:

$$P = q(1-B) + 5$$

$$P-5 = q(1-B)$$

$$\frac{P-5}{1-B} = q$$

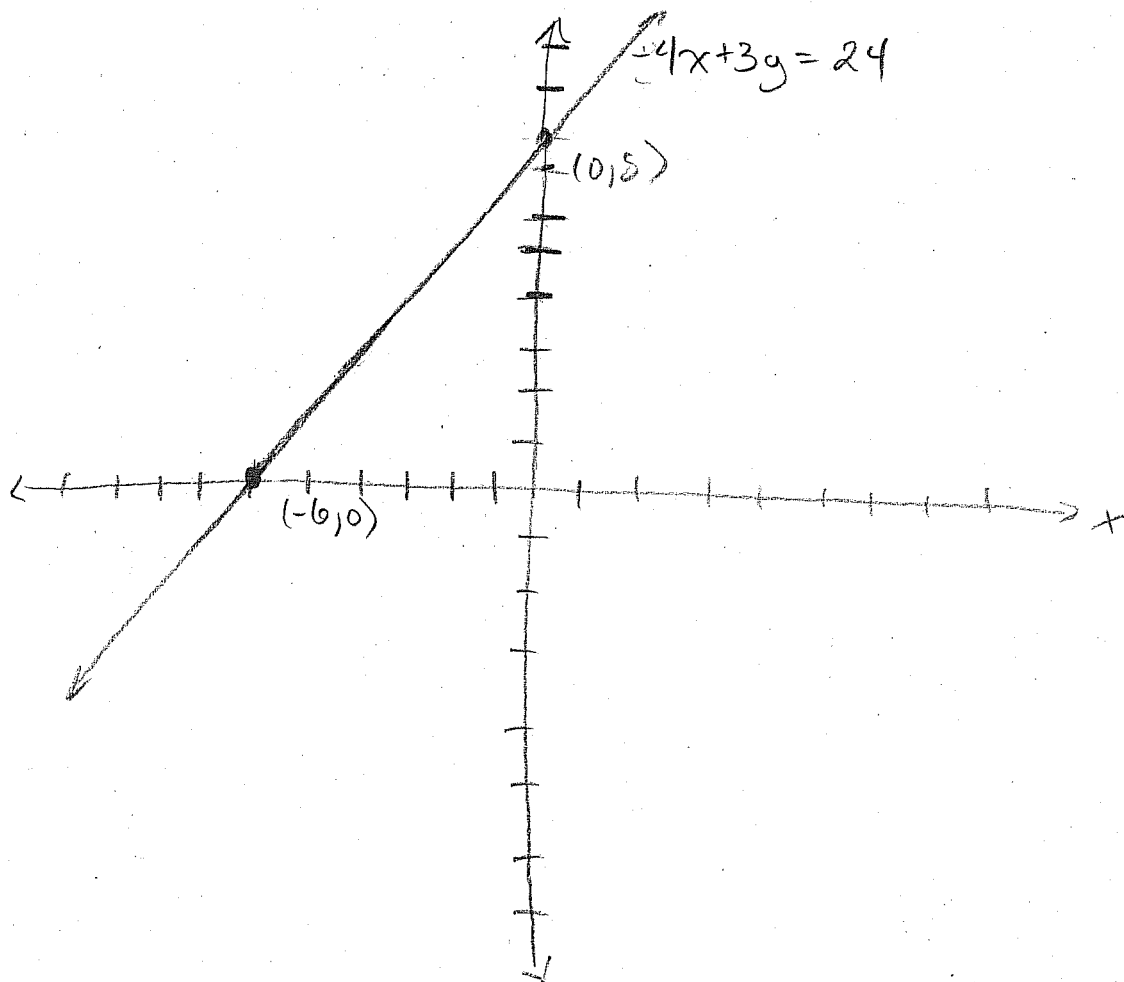
5. (6 marks). Find the  $x$ -intercept and  $y$ -intercept of the linear equation  $-4x + 3y = 24$  (indicate which is which for marks). Use the intercepts to graph this equation.

$$\begin{aligned}x\text{-int: } y &= 0 \\ -4x + 3(0) &= 24 \\ -4x &= 24 \\ x &= -6\end{aligned}$$

$\therefore (-6, 0)$  IS THE  
X-INTERCEPT

$$\begin{aligned}y\text{-int: } x &= 0 \\ -4(0) + 3y &= 24 \\ 3y &= 24 \\ y &= 8\end{aligned}$$

$\therefore (0, 8)$  IS THE  
Y-INTERCEPT



6. (6 marks). Find the equation of the line through the point (9, 6) perpendicular to the line  $12x - 4y = 13$ .

SLOPE!  $12x - 4y = 13$

$$-4y = -12x + 13$$

$$y = \frac{-12}{-4}x + \frac{13}{-4}$$

$$y = 3x - \frac{13}{4}$$

$$\therefore m_1 = 3$$

LINES ARE PERPENDICULAR

$$\therefore m_1 \cdot m_2 = -1$$

$$3m_2 = -1$$

$$m_2 = -\frac{1}{3}$$

SCOPE OF  
LINE WE  
ARE LOOKING  
FOR

$$y = mx + b$$

$$6 = -\frac{1}{3}(9) + b$$

$$6 = -3 + b$$

$$6 + 3 = b$$

$$9 = b$$

$$\therefore \boxed{y = -\frac{1}{3}x + 9}$$

7. (3 marks). Find the midpoint of the line segment between the points (-2, 3) and (5, 7).

$$(x_m, y_m) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left( \frac{-2 + 5}{2}, \frac{3 + 7}{2} \right)$$

$$= \left( \frac{3}{2}, \frac{10}{2} \right) = \left( \frac{3}{2}, 5 \right)$$

8. (5 marks). The slope of the line through the points  $(-3, k)$  and  $(6, 5)$  is  $-\frac{2}{3}$ . Find  $k$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$-\frac{2}{3} = \frac{5 - k}{6 - (-3)}$$

$$-\frac{2}{3} = \frac{5 - k}{9}$$

$$9\left(-\frac{2}{3}\right) = 9 \cdot \frac{5 - k}{9}$$

$$-6 = 5 - k$$

$$-6 - 5 = -k$$

$$-11 = -k$$

$$\boxed{11 = k}$$

9. (6 marks). A car rental agency charges \$120 dollars to rent a car for 1 day and \$300 to rent a car for 3 days.

a) Express the cost,  $y$ , in a linear equation with the number of days rented,

$$\text{slope } m = \frac{300 - 120}{3 - 1} = \frac{180}{2} = 90$$

$$y = mx + b$$

$$120 = 90(1) + b$$

$$120 = 90 + b$$

$$120 - 90 = b$$

$$30 = b$$

$$\therefore \boxed{y = 90x + 30}$$

b) How many days can you rent the car for if you have \$660?

$$660 = 90x + 30$$

$$660 - 30 = 90x$$

$$630 = 90x$$

$$7 = x$$

$\therefore$  THE CAR CAN BE RENTED  
FOR 7 DAYS

10. (6 marks.) Graph  $2x - 7y < 14$ .

$$2x - 7y = 14$$

x-int:  $y = 0$

$$2x - 7(0) = 14$$

$$2x = 14$$

$$x = 7$$

$$\therefore (7, 0)$$

y-int:  $x = 0$

$$2(0) - 7y = 14$$

$$-7y = 14$$

$$y = -2$$

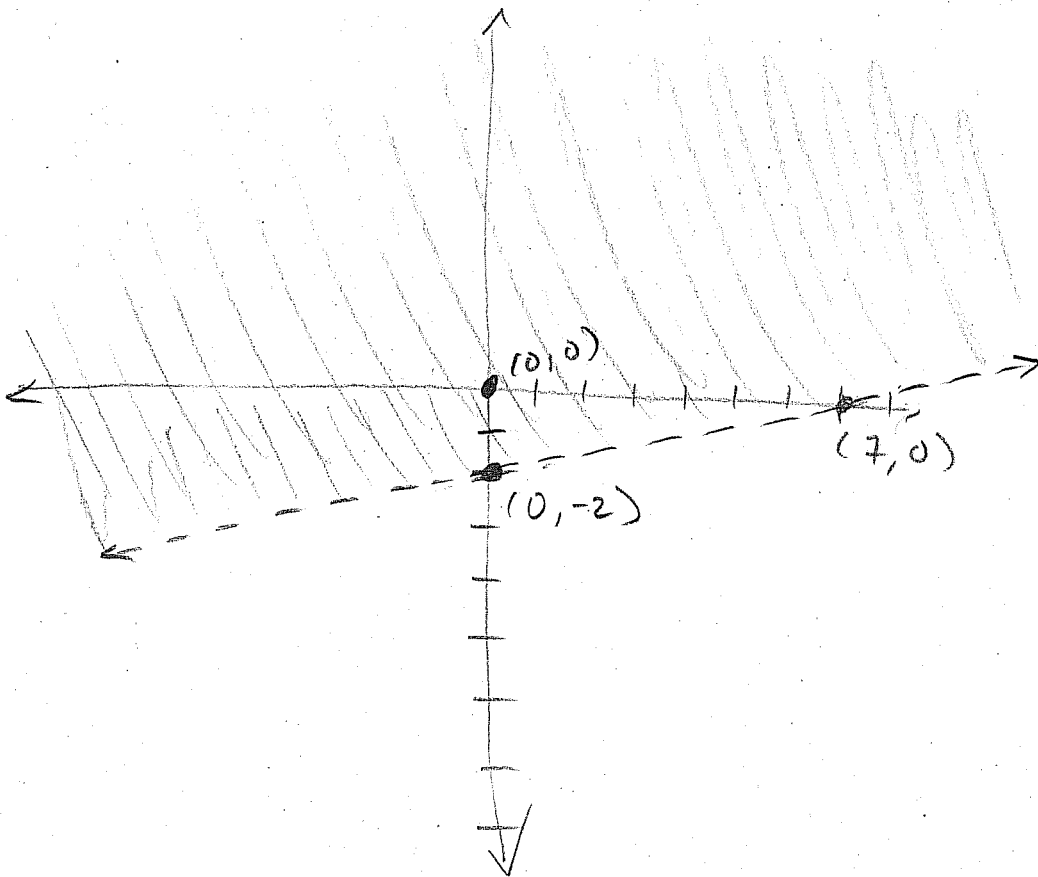
$$\therefore (0, -2)$$

TEST POINT  $(0, 0)$

$$2(0) - 7(0) < 14$$

$$0 < 14$$

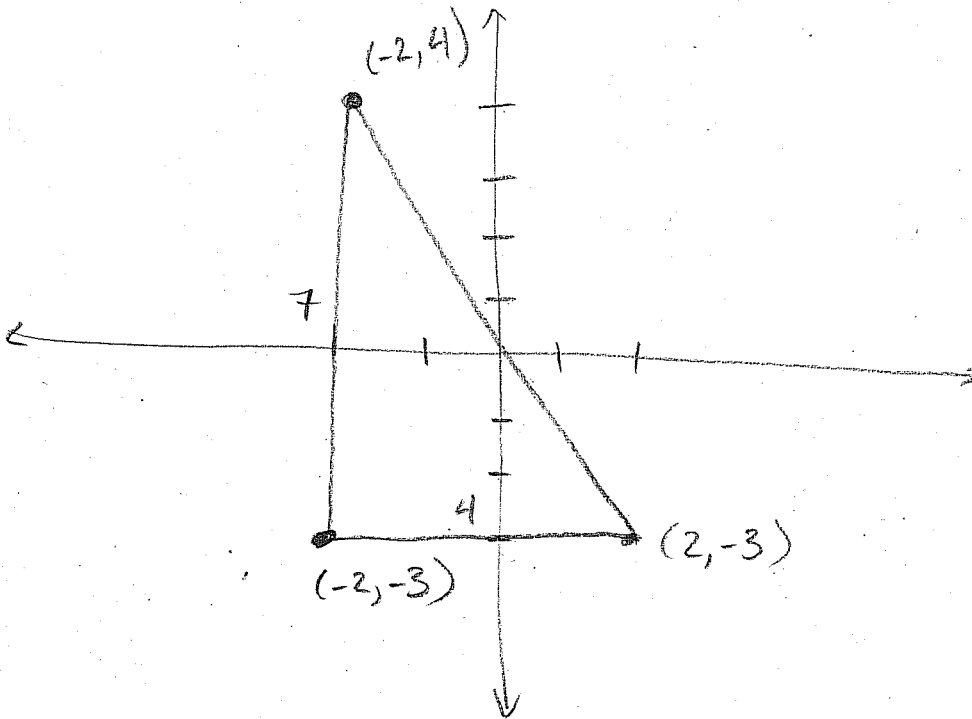
TRUE





11. (5 marks.) The points  $(-2, -3)$ ,  $(-2, 4)$  and  $(2, -3)$  are three vertices (corners) of a triangle.

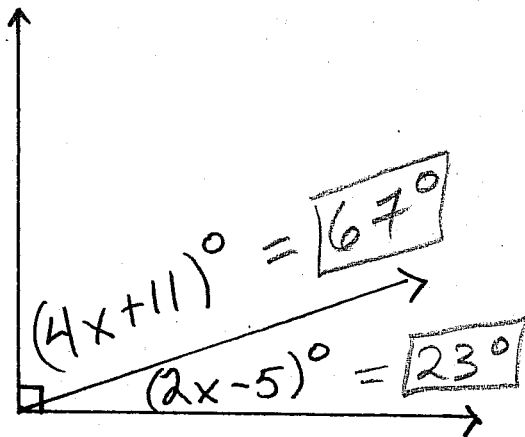
a) Draw the triangle on the rectangular coordinate system.



b) Find the area of the triangle.

$$A = \frac{7 \cdot 4}{2} = 14$$

12. (5 marks.) Find each angle:



$$(4x+11) + (2x-5) = 90$$

$$6x + 6 = 90$$

$$6x = 90 - 6$$

$$6x = 84$$

$$x = 14$$

$$4(14) + 11 = 67$$

$$2(14) - 5 = 23$$

13. (6 marks.) Solve the following system:

$$\textcircled{1} \quad 3y - 2x = -13$$

$$\textcircled{2} \quad 5y + 7x = -1$$

$$\begin{array}{l} \textcircled{1} \times 5 \\ \textcircled{2} \times 3 \end{array} \left| \begin{array}{l} 15x - 10x = -65 \\ -(15x + 21x = -3) \end{array} \right.$$
$$= -31x = -62$$
$$\boxed{x = 2}$$

$$3y - 2(2) = -13$$

$$3y - 4 = -13$$

$$3y = -13 + 4$$

$$3y = -9$$

$$\boxed{y = -3}$$

14. (7 marks.) At a movie theater, admission for 2 children and 5 adults is \$74. Admission for 3 children and 4 adults is \$69. What is the price of admission for each?

LET  $x$  BE THE PRICE OF CHILDRENS' TICKETS  
LET  $y$  BE THE PRICE OF ADULTS TICKETS

$$\textcircled{1} \quad 2x + 5y = 74$$

$$\textcircled{2} \quad 3x + 4y = 69$$

$$\textcircled{1} \times 3: \quad 6x + 15y = 222$$

$$\textcircled{2} \times 2: \quad \underline{-(6x + 8y = 138)}$$

$$7y = 84$$

$$y = 12$$

$$\therefore 2x + 5(12) = 74$$

$$2x + 60 = 74$$

$$2x = 74 - 60$$

$$2x = 14$$

$$x = 7$$

\therefore THE PRICE OF CHILDRENS' TICKETS IS \$7  
AND THE PRICE OF ADULTS' TICKETS IS \$12