ACC. Coordinate Algebra Name _____ ID: 1

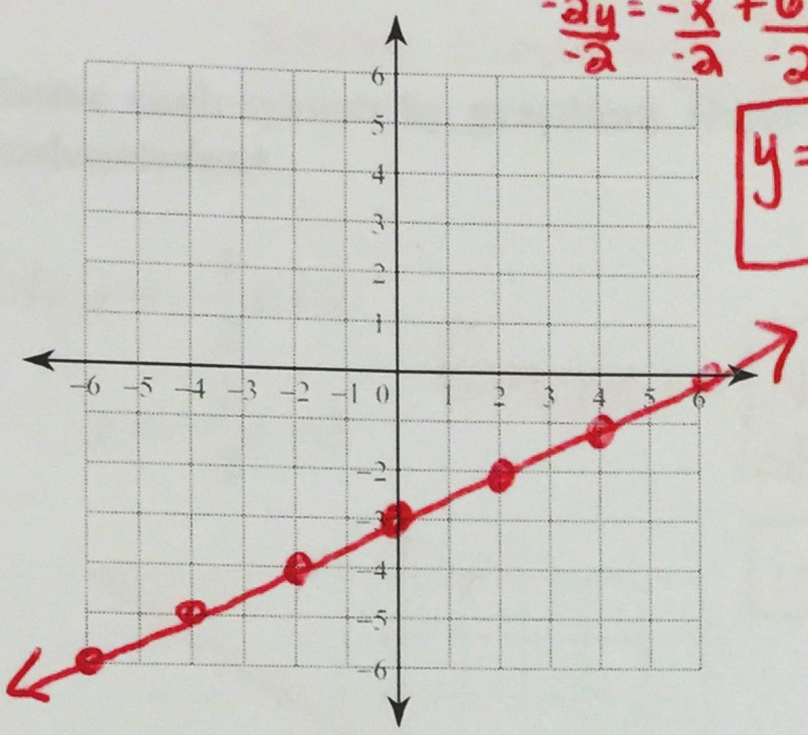
Study Guide--Systems of Linear Equations and Inequalities

Sketch the graph of each line.

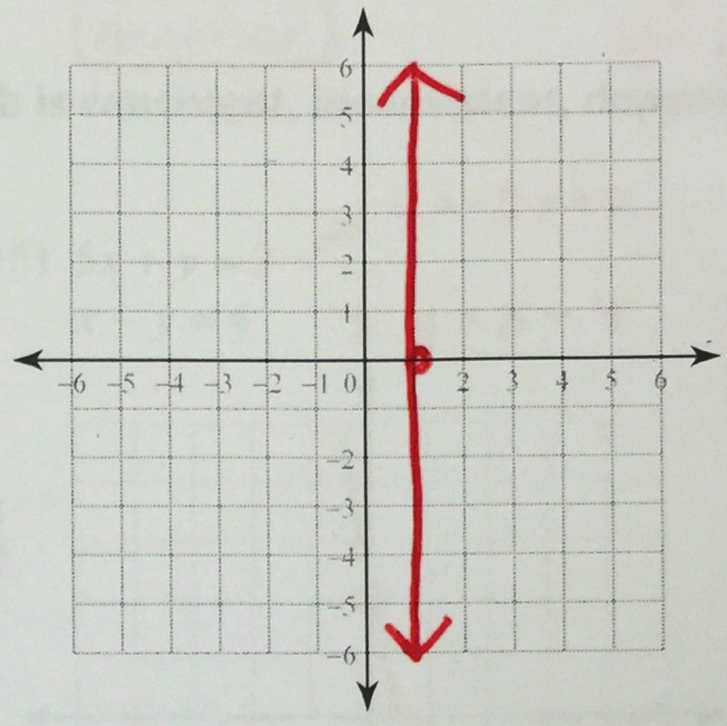
1) $x - 2y = 6$

$x - 2y = 6$
$-x \quad -x$
$\frac{-2y}{-2} = \frac{-x}{-2} + \frac{6}{-2}$

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



2) $x = 1$



Find the slope of each line.

3) $y = 5$ slope = 0

4) $6x - 5y = 5$
$-6x \quad -6x$
$\frac{-5y}{-5} = \frac{-6x}{-5} + \frac{5}{-5}$
$y = \frac{6}{5}x - 1$
slope = $\frac{6}{5}$

Find the slope of the line through each pair of points. $\frac{y-y}{x-x}$

5) $(-19, -9), (8, 5)$ $\frac{5-(-9)}{8-(-19)} = \frac{14}{27}$

6) $(9, -19), (9, 8)$ $\frac{8-(-19)}{9-9} = \frac{27}{0}$ ← zero in denominator means slope is undefined

Write the slope-intercept form of the equation of the line described.

7) Slope = $\frac{7}{5}$, y-intercept = -2

$y = \frac{7}{5}x - 2$

8) through: $(-2, 1)$, slope = $\frac{1}{2}$ (x y; m)

$y = mx + b$
$1 = \frac{1}{2}(-2) + b$
$1 = -1 + b$
$2 = b$

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

9) through: $(3, -2)$ and $(2, 3)$ (x y)

① m
$\frac{-2-3}{3-2} = \frac{-5}{1} = -5$

② b
$-2 = -5(3) + b$
$-2 = -15 + b$
$13 = b$

$y = -5x + 13$

10) through: $(3, -3)$, parallel to $y = \frac{2}{3}x + 4$ (x y; m)

parallel → same slope

$-3 = \frac{2}{3}(3) + b$
$-3 = 2 + b$
$-5 = b$

$y = \frac{2}{3}x - 5$

11) through: $(2, -5)$, perp. to $y = \frac{2}{9}x - 1$ (x y; m)

perp → opp. sign reciprocal slope

$-5 = -\frac{9}{2}(2) + b$
$-5 = -9 + b$
$4 = b$

$y = \frac{-9}{2}x + 4$

check slopes!

Decide if each pair of lines is parallel, perpendicular, or neither. Your work should support your answers.

12) $-4x + 2y = 6$
$-2x + y = -1$

$-4x+2y=6$
$2y = 4x+6$
$y = 2x+3$

$-2x+y=-1$
$y = 2x-1$

same slope → parallel

13) $12x + 2y = -14$
$-12x + 2y = 4$

$12x+2y=-14$
$2y = -12x-14$
$y = -6x-7$

$-12x+2y=4$
$\frac{2y}{2} = \frac{12x}{2} + \frac{4}{2}$
$y = 6x+2$

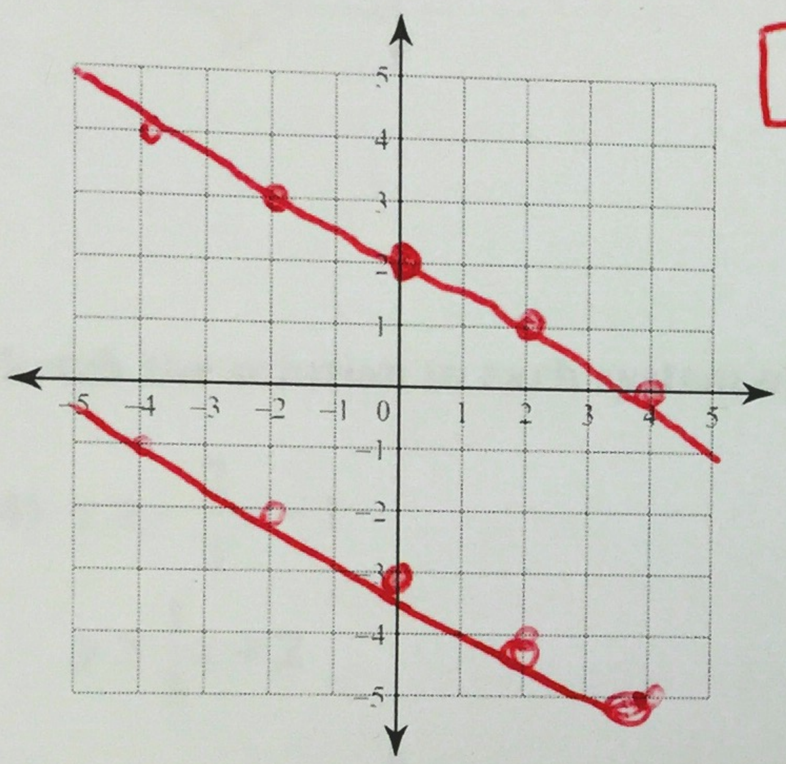
neither

Solve each system by graphing. Determine of the graph is consistent, inconsistent, dependent, or independent.

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

Parallel = No solution

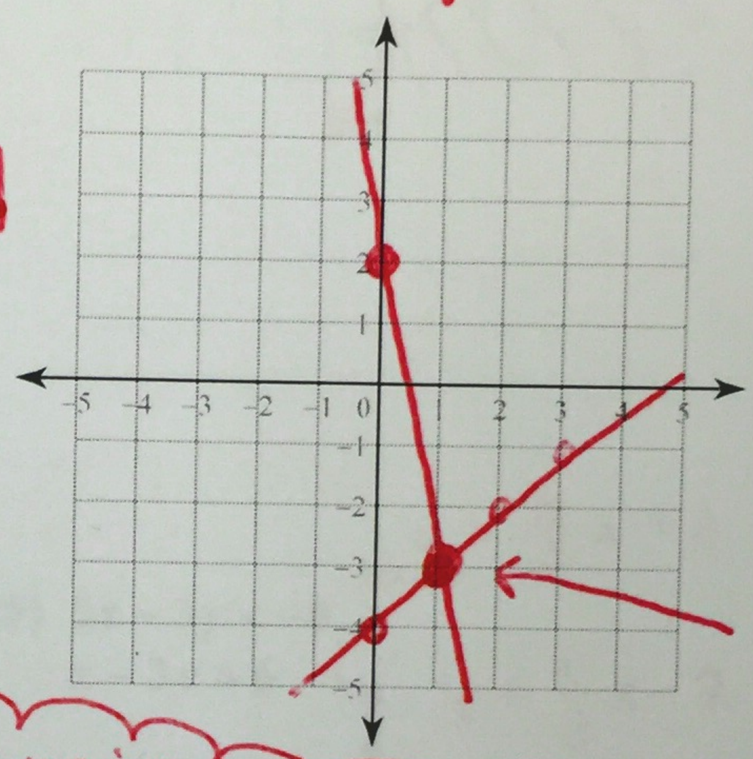
inconsistent



15) $5x + y = 2$
$x - y = 4$

$y = -5x+2$
$y = x-4$

(1, -3)



Solution → where they intersect

Answer is:
No Solution → inconsistent
Infinite Solution → dependent, consistent
One Solution → independent, consistent

Solve each system by substitution.

16) $7x + y = -15$
$4x + 3y = -11$

$y = -7x-15$

$4x+3(-7x-15)=-11$
$4x-21x-45=-11$
$-17x = 34$
$x = -2$

$7x+y=-15$
$7(-2)+y=-15$
$-14+y=-15$
$y=1$

Answer (-2, 1)

17) $-7x - 4y = -3$
$x + 2y = -1$

$x = -2y-1$

$x+2(-1)=-1$
$x-2=-1$
$x=1$

$-7(-2y-1)-4y=-3$
$14y+7-4y=-3$
$10y=-10$
$y=-1$

Answer (1, -1)

Solve each system by elimination.

18) $18x + 4y = -14$
$2(-9x - 6y = 3)$

$18x+4y=-14$
$-18x-12y=6$
$-8y=-8$
$y=1$

$18x+4(1)=-14$
$18x=-18$
$x=-1$

(-1, 1)

19) $-14x + 8y = 0$
$-2(-7x + 4y = 0)$

$-14x+8y=0$
$14x-8y=0$

everything cancels

Infinite Solution

Solve the system using the method you prefer.

20) $-2(-4x - 8y = -20)$
$-8x - y = -25$

$8x+16y=40$
$15y=15$
$y=1$

$-8x-(1)=-25$
$-8x=-24$
$x=3$

(3, 1)

21) $x + 4y = 5$
$-2x + 3y = 1$

$x=-4y+5$

$-2(-4y+5)+3y=1$
$8y-10+3y=10$
$11y=11$
$y=1$

$x=-4(1)+5$
$x=1$

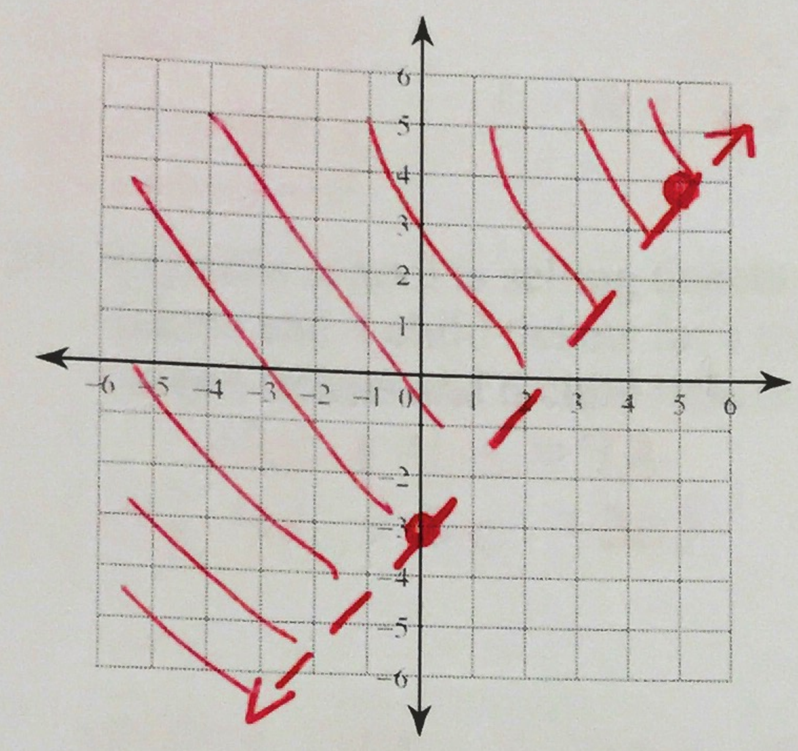
(1, 1)

shade: above >, ≥ ; below <, ≤

line: dotted >, < ; solid ≥, ≤

Sketch the graph of each linear inequality.

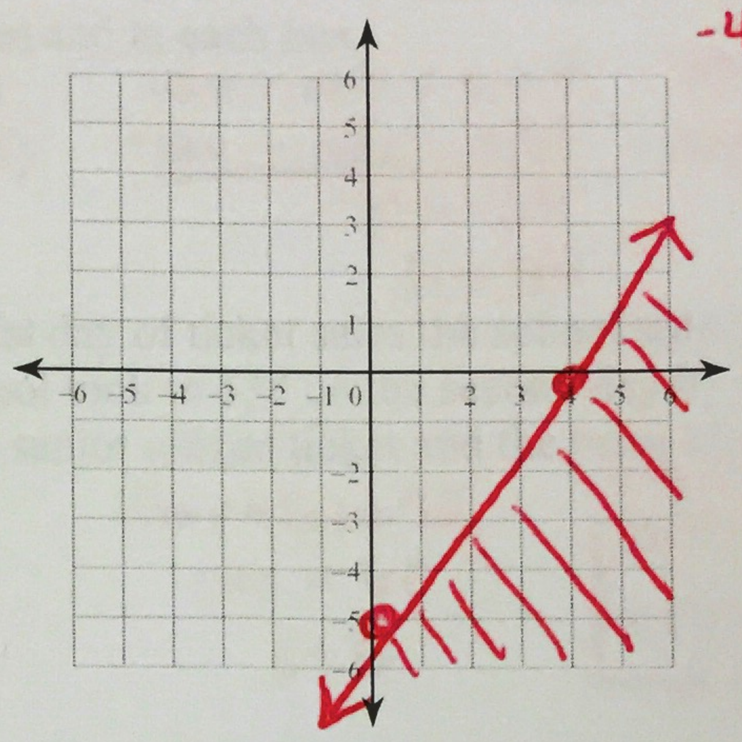
22) $y > \frac{7}{5}x - 3$



23) $5x - 4y \geq 20$

$-4y \geq -5x + 20$

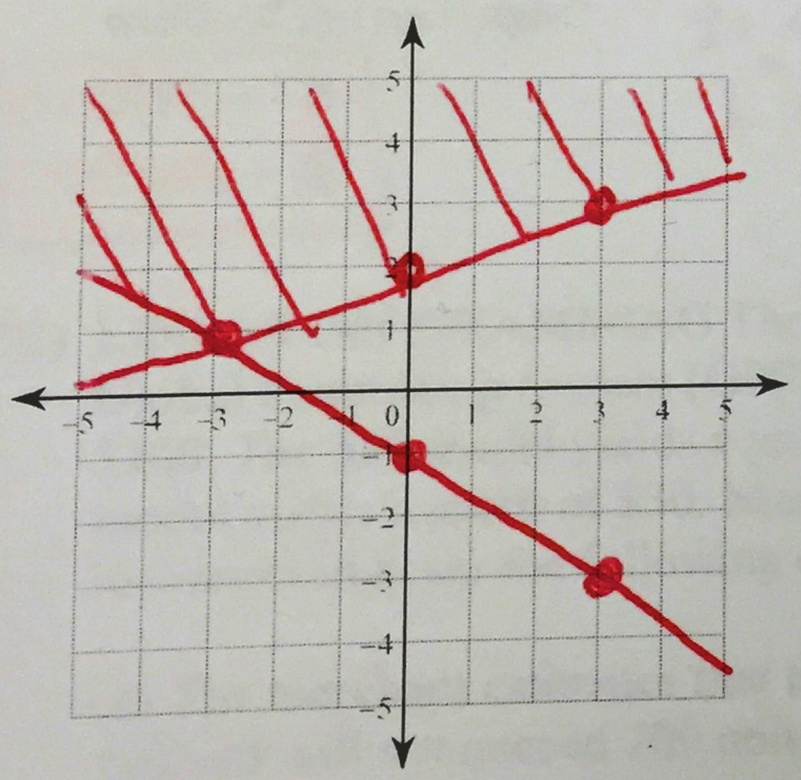
$y \leq \frac{5}{4}x - 5$



Sketch the solution to each system of inequalities.

24) $y \geq -\frac{2}{3}x - 1$

$y \geq \frac{1}{3}x + 2$

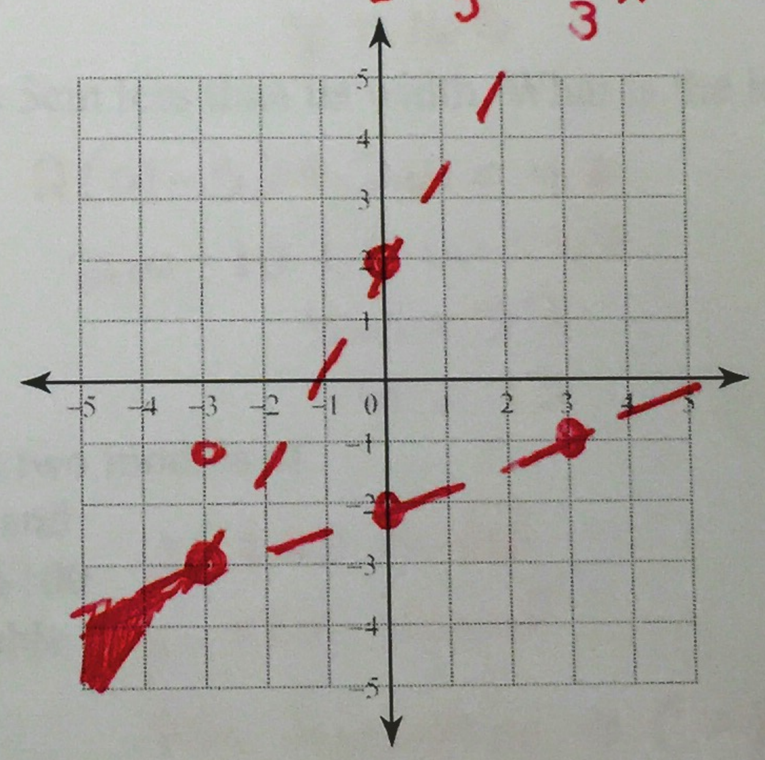


25) $5x - 3y < -6$

$x - 3y > 6$

$y > \frac{5}{3}x + 2$

$y < \frac{1}{3}x - 2$



26) A plane traveled 700 miles to Havana and back. The trip there was with the wind. It took 7 hours. The trip back was into the wind. The trip back took 14 hours. Find the speed of the plane in still air and the speed of the wind.

700 → 7 hrs → 100 mph

14 hrs → 50 mph

$x + y = 100$

$x - y = 50$

$2x = 150$

$x = 75$

$75 + y = 100$

$y = 25$

plane - 75 mph

wind - 25 mph

27) The senior classes at High School A and High School B planned separate trips to the indoor climbing gym. The senior class at High School A rented and filled 12 vans and 13 buses with 634 students. High School B rented and filled 6 vans and 7 buses with 334 students. Every van had the same number of students in it as did the buses. Find the number of students in each van and in each bus.

van = 16
bus = 34

$12v + 13b = 634$
$-2(6v + 7b = 334)$

$12v + 13b = 634$
$-12v - 14b = -668$
$-b = -34$
$b = 34$

$12v + 13(34) = 634$
$12v + 442 = 634$
$12v = 192$
$v = 16$

28) Krystal's school is selling tickets to a play. On the first day of ticket sales the school sold 12 senior citizen tickets and 4 child tickets for a total of $72. The school took in $38 on the second day by selling 4 senior citizen tickets and 6 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

$12s + 4c = 72$
$-3(4s + 6c = 38)$

$12s + 4c = 72$
$-12s - 18c = 114$
$-14c = -42$
$c = 3$

$12s + 4(3) = 72$
$12s = 60$
$s = 5$

senior - $5
child - $3

Write a system of linear inequalities.

29) Hillary needs markers and poster board for a project. The markers are $0.79 each and the poster board is $1.89 per sheet. She needs at least 4 sheets of poster board. Hillary has $15 to spend on project materials.

x - markers
y - poster board

$.79x + 1.89y \leq 15$
$y \geq 4$

30) The sum of two numbers is 214. The first number is 18 more than three times the second number. What are the two numbers?

x = 165
y = 49

$x + y = 214$
$x = 18 + 3y$
$x = 18 + 3(49)$
$x = 165$

$18 + 3y + y = 214$
$4y = 196$
$y = 49$

31) A rectangle has a perimeter of 42cm and its length is 5cm less than its width. What is the length and width of the rectangle?

width - 13
length - 8

$21 + 2w = 42$
$L = w - 5$

$2(w - 5) + 2w = 42$
$2w - 10 + 2w = 42$
$4w = 52$
$w = 13$

$L = w - 15$
$L = 13 - 5$
$L = 8$

32) LINEAR PROGRAMMING The costs to a store for two models of Global Positioning System (GPS) receivers are $80 and $100. The $80 model yields a profit of $25 and the $100 model yields a profit of $30. Market tests and available resources indicate the following constraints.

x - $80 model
y - $100 model

Obj. function → $C = 25x + 30y$ (this is your profit)

(a) The merchant estimates that the total monthly demand will not exceed 200 units. $x + y \leq 200$

(b) The merchant does not want to invest more than $18,000 in GPS receiver inventory. $80x + 100y \leq 18000$

What is the optimal inventory level for each model? 100 of each model
What is the optimal profit? $5500.00

Draw a graph to find your feasible area.

Constraints

$x + y \leq 200$

$80x + 100y \leq 18000$

Obj Func. $25x + 30y$

$(0,0) \rightarrow 25(0) + 30(0) = 0$

$(0,180) \rightarrow 25(0) + 30(180) = 5400$

$(200,0) \rightarrow 25(200) + 30(0) = 5000$

$(100,100) 25(100) + 30(100) = 5500$