Systems of Equations

Solve the system of equations by graphing

1. $\begin{cases} y = \dfrac{4}{5}x - 3 \\ y = -x + 6 \end{cases}$

Solution: **(5, 1)**

x	y
0	-3
5	1
-5	-7

$\frac{4}{5}(0) - 3 = -3$

$\frac{4}{5}(5) - 3 = 1$

$\frac{4}{5}(-5) - 3 =$

$-4 - 3 = -7$

x	y
0	6
1	5
2	4

(5, 1)
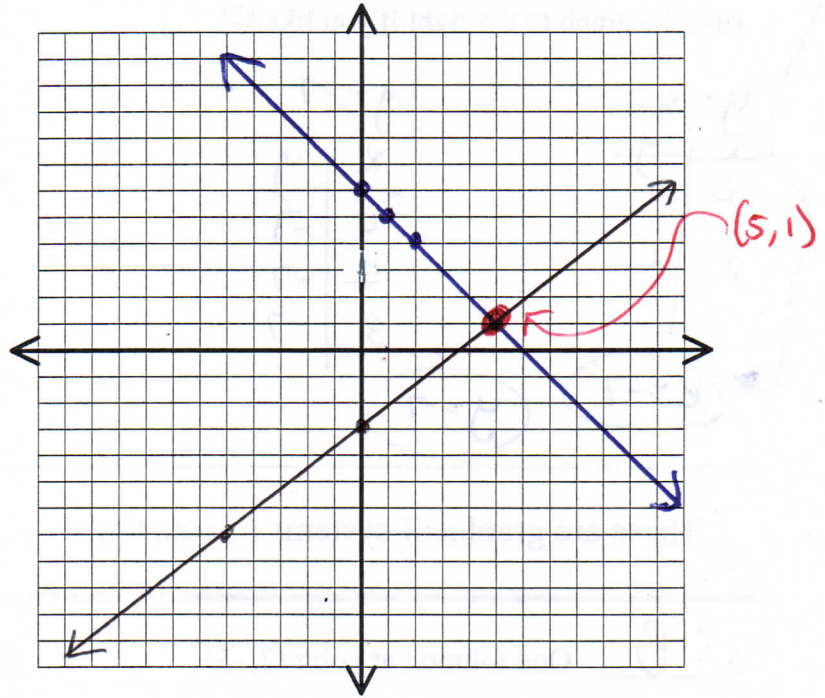
Solve the system of equations by Substitution

2. $\begin{cases} y = x + 3 \\ y = -\dfrac{1}{3}x + \dfrac{5}{3} \end{cases}$

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

$+\frac{1}{3}x \qquad +\frac{1}{3}x$

$1\frac{1}{3}x + 3 = \frac{5}{3}$

$\qquad -3 \quad -3$

$\frac{5}{3} - \frac{9}{3} = -\frac{4}{3}$

$\left(\frac{3}{4}\right)\frac{4}{3}x = -\frac{4}{3}\left(\frac{3}{4}\right)$

$x = \frac{-12}{12}$

$x = -1$

$y = x + 3$

$y = (-1) + 3$

$y = 2$

(-1, 2)

Solve the system of equations by Elimination

3. $\begin{cases} 9x - 6y = -12 \\ 3(x + 2y = 0) \end{cases} \rightarrow$

$9x - 6y = -12$

$3x + 6y = 0$

$12x = 12$

$\frac{12x}{12} = \frac{12}{12}$

$x = 1$

$x + 2y = 0$

$(1) + 2y = 0$

$-1 \qquad -1$

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

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

$\left(1, -\dfrac{1}{2}\right)$

Solve the following system of equations by any method of your choice

4. $\begin{cases} y = x \\ y = -7 \end{cases}$ $(-7, -7)$

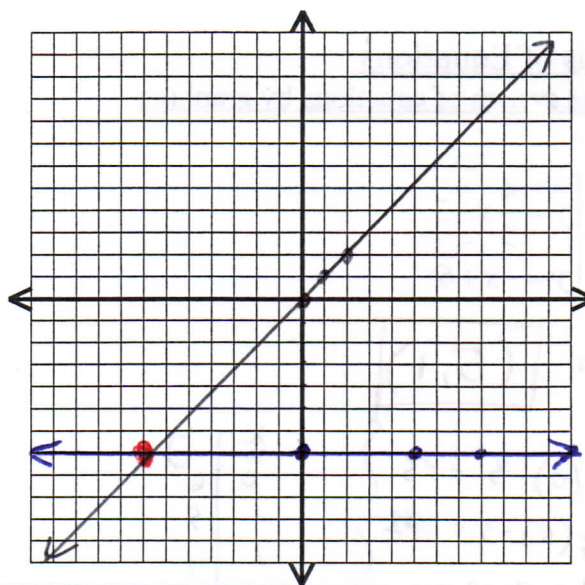(use the graph to the right if you like ☺)

$y = x$

x	y
0	0
1	1
2	2

$y = -7$

x	y
0	-7
5	-7
9	-7

$x = -7$ $y = -7$

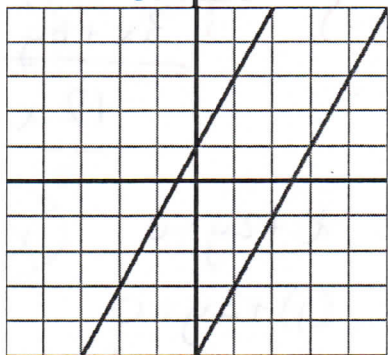
These are graphs of systems of equations

Match the graph with the appropriate description
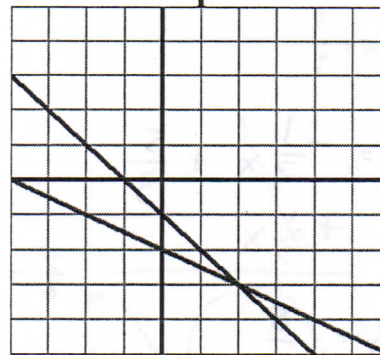
5. __B__ One solution at point (2, -3)

7. __D__ One solution at point (0, 1)

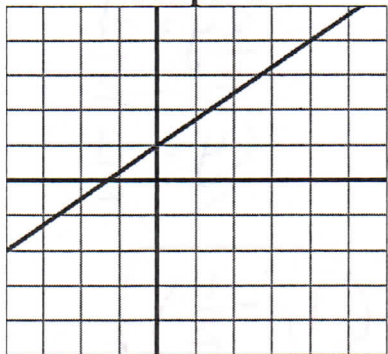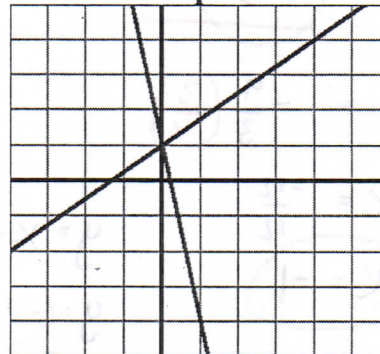6. __A__ No solutions

Graph A

Graph B

Graph C

Graph D

8. Elaine claims that (1, -2) is a solution to the following system of inequalities: $\begin{cases} 3x-2y \le 7 \\ 6x+y > 2 \end{cases}$

Jane insists that it is not a solution.
Who is correct? For credit, please justify with mathematics and explain using words.

$3(1) - 2(-2) \le 7$

$3 - 4 \le 7$

$-1 \le 7$ ✓

$6(1) + (-2) > 2$

$6 - 2 > 2$

$4 > 2$ ✓

Since the point (1,-2) is a solution to both inequalities, the point (1,-2) is a solution to the system of inequalities

Solve by any method of your choice. Please show your work clearly.

9.
Matt and Ming are selling fruit for a school fundraiser. Customers can buy small boxes of oranges and large boxes of oranges. Matt sold 3 small boxes of oranges and 14 large boxes of oranges for a total of $203. Ming sold 11 small boxes of oranges and 11 large boxes of oranges for a total of $220. Find the cost each of one small box of oranges and one large box of oranges.

$11(3s + 14L = 203) \rightarrow 33s + 154L = 2,233$

$-3(11s + 11L = 220) \rightarrow -33s + -33L = -660$

$\dfrac{121L}{121} = \dfrac{1,573}{121}$

$3s + 14L = 203$

$3s + 14(13) = 203$

$3s + 182 = 203$

$\dfrac{-182 \quad -182}{}$

$\dfrac{3s}{3} = \dfrac{21}{3}$

$L = 13$

$(7, 13)$

$S = 7$

small box = $7
large box = $13

Solve and Graph (on number line)

10. $-3x + 15 > 30$

$\dfrac{-15 \quad -15}{}$

$-3x > 15$

$\dfrac{-3x}{-3} \quad \dfrac{15}{-3}$

$\boxed{x < -5}$
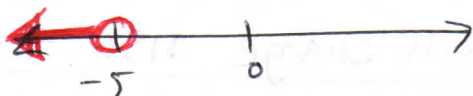
11. $15 + 25x \le 13x - 150$

$\dfrac{-13x \quad -13x}{}$

$15 + 12x \le -150$

$\dfrac{-15 \qquad -15}{}$

$\dfrac{12x}{12} \le \dfrac{-165}{12}$

$\boxed{x \le -13.75}$
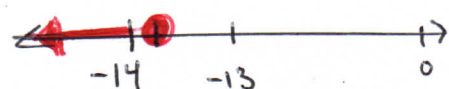
Solve the System of Inequalities by Graphing

12. $\begin{cases} y > \dfrac{4}{5}x - 3 \\ y \geq -x + 6 \end{cases}$

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

x	y
0	-3
5	1
-5	-7

$y = \dfrac{4}{5}(0) - 3$
$y = -3$
$y = \dfrac{4}{5}(5) - 3$
$y = 4 - 3 = 1$

$y = \dfrac{4}{5}(-5) - 3$
$y = -4 - 3$

x	y
0	6
1	5
2	4
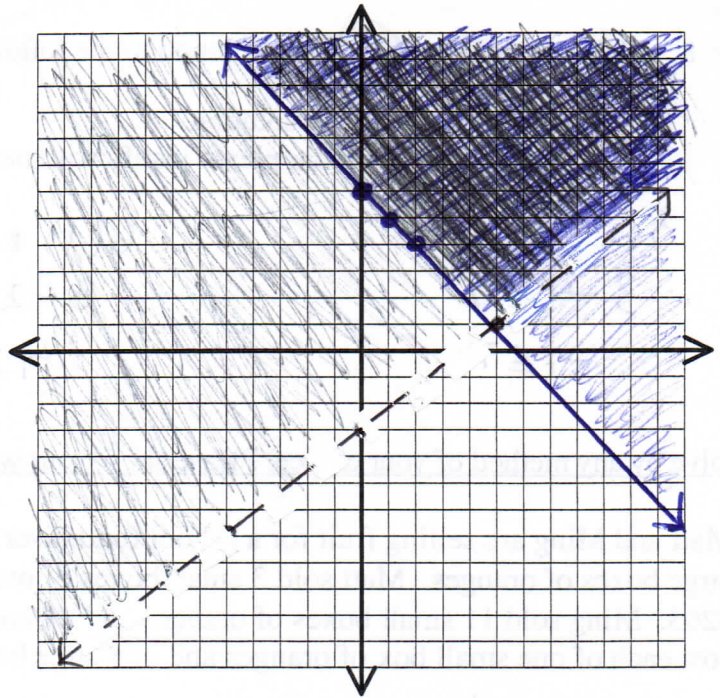
Real-World system of equations PJ's Garage and Will's Fix-it Cheaper will both fix your car for a price.

- **PJ's Garage charges $36 to look at your car plus $40 per hour of service**

- **Will's Fix-it Cheaper does not charge to look at your car, but charges $52 per hour of service**

Write the equation for cost (C) with *h* hours of service using PJ's Garage.

$C = 36 + 40h$

Write the equation for cost (C) with *h* hours of service using Will's Fix-it Cheaper.

$C = 52h$

Solve for how many hours of service the the cost will be the same. What is the cost?

$36 + 40h = 52h$
$\quad -40h \quad -40h$

$\dfrac{36}{12} = \dfrac{12h}{12}$

$\boxed{h = 3}$

$C = 52h$
$C = 52(3)$
$\boxed{C = \$156}$

At 3 hours of service, both companies will charge $156