Name:_____ Block:___

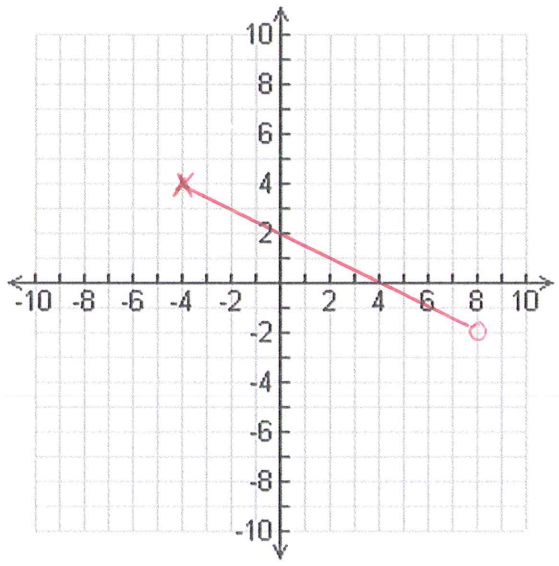
Quiz: Unit4.
Systems of equations.

Practice

There are 7 questions in this quiz, each of equal value.
Standard time for the quiz is 30 minutes .
Four operations calculator is allowed.

Question 1:
For each of the following, complete the missing elements as needed (including the graph).

a.

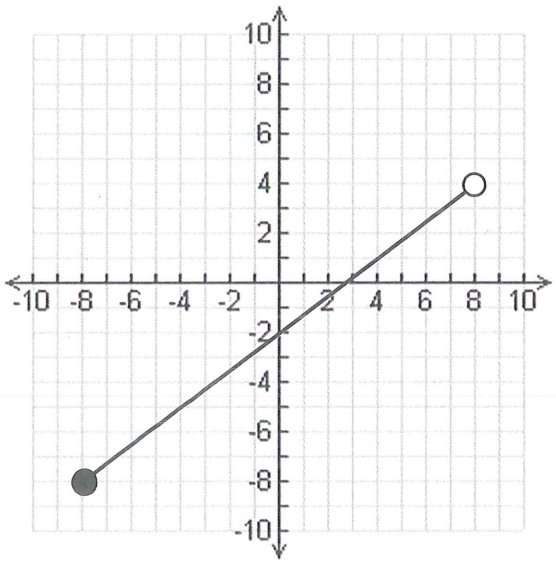


Function: $2y + x = 4$

Domain: $[-4, 8)$

Range: $[4, -2)$

b.



Function: $y = \frac{3}{4}x - 2$

Domain: $[-8, 8)$

Range: $[-8, 4)$

Question 2:

a. Solve algebraically:

$$\begin{cases} 3x + 2y = 10 \\ x + y = 3 \end{cases}$$

$y = 3 - x$

$3x + 2(3 - x) = 10$

$3x + 6 - 2x = 10$

$x = 4 \rightarrow y = -1$

check: $12 - 2 = 10$ ✓

$4 - 1 = 3$ ✓

b. Solve algebraically:

$$2 \times \begin{cases} 3x + 2y = 10 \\ 6x + 4y = 20 \end{cases}$$

$$- \begin{cases} 6x + 4y = 20 \\ 6x + 4y = 20 \end{cases}$$

$0 = 0$ ✓

Infinite many solutions.

$3x + 2y = 10$

Question 3:

a. Solve:

$$2 \times \begin{cases} 2x + 3y = 10 \\ 4x + 6y = 3 \end{cases}$$

$$- \begin{cases} 4x + 6y = 20 \\ 4x + 6y = 3 \end{cases}$$

$0 = 17$

No solution

b. Solve:

$$\begin{cases} 2x = 10 - 3y \\ 4x + 2y = 4 \end{cases}$$

$$2 \times \begin{cases} 2x + 3y = 10 \\ 4x + 2y = 4 \end{cases}$$

$$- \begin{cases} 4x + 6y = 20 \\ 4x + 2y = 4 \end{cases}$$

$0 + 4y = 16 \Rightarrow y = 4, x = -1$

check:

$-2 \stackrel{?}{=} 10 - 12$ ✓

$-4 + 8 \stackrel{?}{=} 4$ ✓

Question 4:

a. Given the line $x + 2y = 14$, find the perpendicular line that goes through the point $(0,2)$.

$2y = 14 - x$

$y = -\frac{1}{2}x + 7$

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

$m_{\perp} = 2$

$(0,2)$

$\boxed{y = 2x + 2}$

b. Find the intersection point of these two lines.

$\begin{cases} y = 2x + 2 \\ y = -\frac{1}{2}x + 7 \end{cases} \rightarrow 2x + 2 = -\frac{1}{2}x + 7$

$2\frac{1}{2}x = 5 \rightarrow \boxed{\begin{matrix} x = 2 \\ y = 6 \end{matrix}}$

check

$6 \stackrel{?}{=} 2 \cdot 2 + 2$ ✓

$6 \stackrel{?}{=} -\frac{1}{2}2 + 7$ ✓

Question 5:

a) Word problem I

The freshmen class at Kehillah is having a fundraiser. On the first day, they sold 6 'we carry your backpack' packages and 4 'we bring you lunch' packages, for a total of $80. On the second day, after being featured on the announcements, they sold 10 of each, for a total of $150. How much each package costs?

backpack $6 \cdot x + 4y = 80$

Lunch

$10x + 10y = 150$

$6x + 4(15 - x) = 80$

$2x = 80 - 60$

$x + y = 15 \rightarrow y = 15 - x$

$\boxed{\begin{matrix} x = 10 \\ y = 5 \end{matrix}}$

b) word problem II

Rowing up the river, the crew took 1.5 hours to cover the distance from the lake to the bridge. Rowing down stream, the crew took only 1 hour to cover the same distance. If the distance is 12Miles, how fast is the crew rowing?

hours → $1.5 \cdot (v - r) = 12$

Boat

River

$1 \cdot (v + r) = 12$

$v - r = 8$

$v + r = 12$ +

$2v = 20 \rightarrow \boxed{\begin{matrix} v = 10 \\ r = 2 \end{matrix}}$

Question 6:

a) Mixtures: You have 50 ounces of a 25% saline solution (a mixture of water and salt). How many ounces of a 10% saline solution must you add to make a new solution that is 15% saline?
(Hint 1: Make a table and solve)
(Hint 2: https://tinyurl.com/z-mixture-video)

lbs.		salt
50	25%	12.5
x	10%	0.1x
(50+x)	15%	0.15(50+x)

$12.5 + 0.1x = 0.15(50+x)$

$\times 10 \rightarrow 125 + x = 75 + 1.5x$

$50 = 0.5x$

$100 = x$ checks ✓

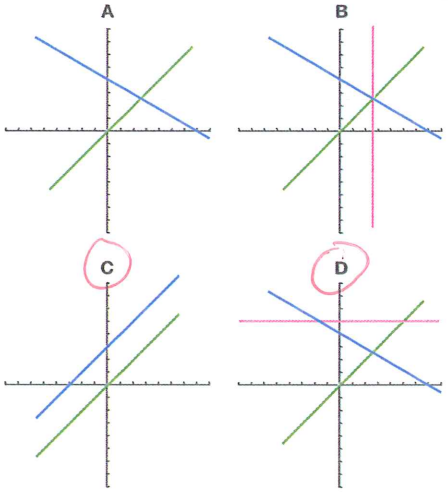
b) Mixtures: 9 lbs. of mixed nuts containing 55% peanuts were mixed with 6 lbs. of another kind of mixed nuts that contain 40% peanuts. What percent of the new mixture is peanuts?

lbs		peanuts
9	55%	$9 \cdot 0.55 = 4.95$
6	40%	$6 \cdot 0.4 = 2.4$
15		7.35

$= \frac{7.35}{15} = 0.49 = 49\%$

Question 7:

a) Which of the following could represent a system of equations with no solutions?



C → Parallel lines

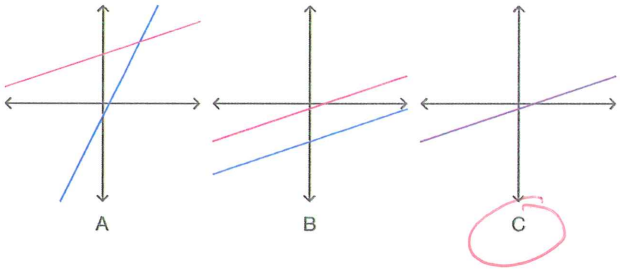
D → 3 equations, inconsistent

b) Which graph shows the solution set for this system of equations?

$$\begin{cases} 3x - 4y = 6 \\ -9x + 12y = -18 \end{cases}$$

$\times 3 \rightarrow \begin{cases} 9x - 12y = 18 \\ -9x + 12y = -18 \end{cases}$

$0 = 0$



c) The graphs of which set of equations will never intersect?

i. $3x + y = 6$ and $3x - y = 6$

ii. $x + 2y = 5$ and $x + 2y = 7$

iii. $2x - y = 4$ and $2x - 2y = 4$

$\begin{cases} 3x + y = 6 \\ 3x - y = 6 \end{cases}$ $\boxed{\begin{array}{l} y = 0 \\ x = 2 \end{array}}$

$\begin{cases} x + 2y = 5 \\ x + 2y = 7 \end{cases}$

$0 = -2$ x inconsistent

no solution

$\begin{cases} 2x - y = 4 \\ 2x - 2y = 4 \end{cases}$ $\boxed{\begin{array}{l} y = 0 \\ x = 2 \end{array}}$

d) Use Cramer's rule to solve the following equations:

$$\begin{cases} 1.2x - 3.2y = 6 \\ 2.3x + \frac{1}{3}y = -18 \end{cases}$$

Carmer's rule:

$$\begin{cases} aX + bY = c \\ dX + eY = f \end{cases} \rightarrow X = \frac{ce-bf}{ae-bd} \quad , \quad Y = \frac{af-cd}{ae-bd}$$

$$X = \frac{6 \cdot \frac{1}{3} - (-3.2)\cdot(-18)}{1.2 \cdot \frac{1}{3} - (-3.2)\cdot 2.3} = \frac{-55.6}{7.76} = 7.165$$

$$Y = \frac{1.2(-18) - 6 \cdot 2.3}{7.76} = -4.562$$

check:

$1.2X - 3.2Y \stackrel{?}{=} 6$ ✓

e) given the following definitions:

$f(x) = 4 - 2x \quad , \quad g(x) = x - 3$

Find:

i) $g(f(1)) = g(2) = -1$

ii) $f(g(x)) = f(x-3) = 4 - 2(x-3) = 4 - 2x + 6 = 10 - 2x$

iii) $f(g(2)) = f(-1) = 4 - 2(-1) = 6$

iv) $g(f(2)) = g(0) = -3$

=== End ====