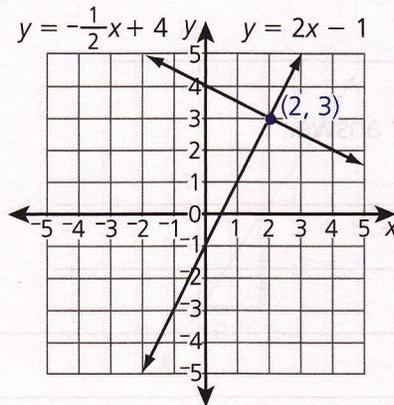


LESSON 20 Systems of Equations

To solve a **system of equations**, graph both lines on the same coordinate plane. If a point lies on both lines, it is a **solution** to the system of equations.

$$\begin{cases} y = -\frac{1}{2}x + 4 \\ y = 2x - 1 \end{cases}$$

The lines $y = -\frac{1}{2}x + 4$ and $y = 2x - 1$ intersect at $(2, 3)$, the solution to the system of equations. Both equations are true when $x = 2$ and $y = 3$.



A system of equations is a set of two or more linear equations.

If the two lines are parallel, the system has **no** solution. If they are the same line, the system has infinitely many solutions.

Read each problem. Circle the letter of the best answer.

- 1 How many solutions are there to this system of equations?

$$\begin{cases} y = 3x + 5 \\ -6x + 2y = 10 \end{cases}$$

- A 0 C 2
B 1 D Infinitely many

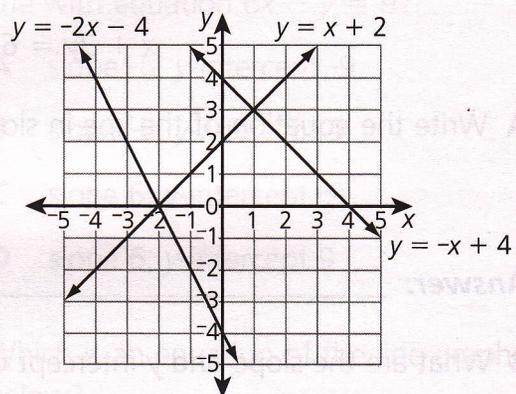
Solve the second equation for y : $-6x + 2y = 10 \rightarrow 2y = 6x + 10 \rightarrow y = 3x + 5$. The two equations describe the same line, so the system has infinitely many solutions. The correct answer is D.

- 2 How many solutions are there to this system of equations?

$$\begin{cases} y = -2x + 3 \\ y = -2x + 7 \end{cases}$$

- A 0 C 2
B 1 D Infinitely many

Use this diagram to answer questions 3 and 4.



- 3 What is the solution to this system?

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

- A $(-2, 0)$ C $(0, 2)$
B $(0, -4)$ D $(1, 3)$

- 4 Which values satisfy both equations below?

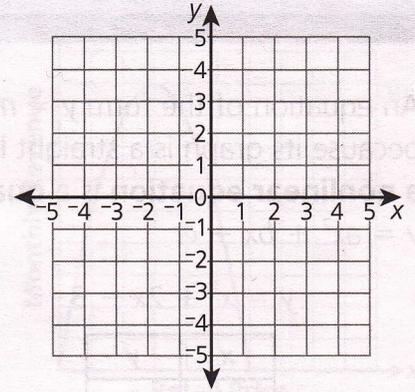
$$\begin{cases} y = x + 2 \\ y = -x + 4 \end{cases}$$

- A $x = -2, y = 0$ C $x = 0, y = 4$
B $x = 0, y = 2$ D $x = 1, y = 3$

Read each problem. Write your answers.

5 Look at this system of equations.

$$\begin{cases} y = \frac{1}{2}x + 3 \\ y = -x - 3 \end{cases}$$



A Graph this system of equations on the coordinate plane at the right.

B What is the solution to the system of equations? Explain how you used your graph to find out.

6 The costs of two computer rental plans are described by the equations below where x = number of weeks, and y = cost in dollars.

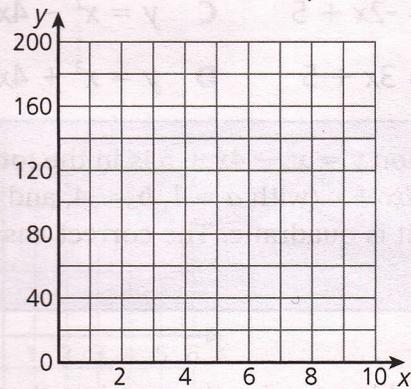
Plan 1: $y = 10x + 60$

Plan 2: $y = 20x$

A Graph this system of equations on the coordinate plane at the right.

B At what point do the two lines intersect?

Answer: _____



C Explain the meaning of the point of intersection in terms of the costs of the two computer rental plans.
