

Systems of Equations Practice Test

Multiple Choice

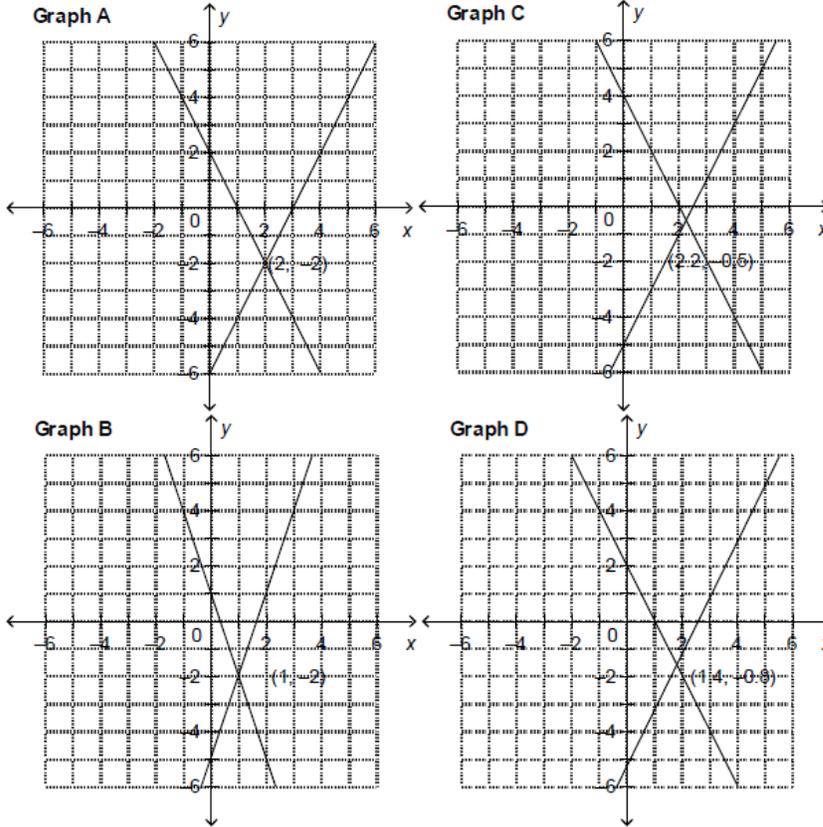
Identify the choice that best completes the statement or answers the question.

- _____ 1. Which linear system has the solution $x = -2$ and $y = 6$?
- | | |
|------------------|------------------|
| a. $x + 3y = 16$ | c. $x + 2y = -2$ |
| $4x + 4y = 16$ | $2x + 4y = -4$ |
| b. $x + 3y = 17$ | d. $2x + y = -2$ |
| $2x + y = 15$ | $x + y = 16$ |
- _____ 2. Which linear system has the solution $x = 4$ and $y = -2$?
- | | |
|------------------|------------------|
| a. $x + 4y = 15$ | c. $4x + y = 14$ |
| $4x - 2y = -17$ | $-2x + 4y = -16$ |
| b. $2x + 4y = 4$ | d. $x + 4y = 4$ |
| $-2x + y = 14$ | $2x + 4y = 8$ |
- _____ 3. Create a linear system to model this situation:
A woman is 3 times as old as her son. In thirteen years, she will be 2 times as old as her son will be.
- | | |
|----------------------|----------------------|
| a. $w = s + 3$ | c. $w = 3s$ |
| $w + 13 = 2s$ | $w = 2s$ |
| b. $w = 3s$ | d. $w = 3s$ |
| $w + 13 = 2(s + 13)$ | $s + 13 = 2(w + 13)$ |
- _____ 4. Create a linear system to model this situation:
A length of outdoor lights is formed from strings that are 5 ft. long and 11 ft. long. Fourteen strings of lights are 106 ft. long.
- | | |
|--------------------|----------------------|
| a. $5x + 11y = 14$ | c. $x + y = 14$ |
| $x + y = 106$ | $5x + 11y = 106(14)$ |
| b. $x + y = 14$ | d. $x + y = 14$ |
| $5x + 11y = 106$ | $x + 2y = 106$ |
- _____ 5. Create a linear system to model this situation:
A rectangular field is 35 m longer than it is wide. The length of the fence around the perimeter of the field is 290 m.
- | | | | |
|-----------------|-----------------|-----------------|-----------------|
| a. $l + 35 = w$ | b. $l = w + 35$ | c. $l = w + 35$ | d. $l = w + 35$ |
| $2l + 2w = 290$ | $2l + 2w = 290$ | $l + w = 290$ | $lw = 290$ |
- _____ 6. Which graph represents the solution of the linear system:
 $y = -2x + 2$
 $y + 6 = 2x$

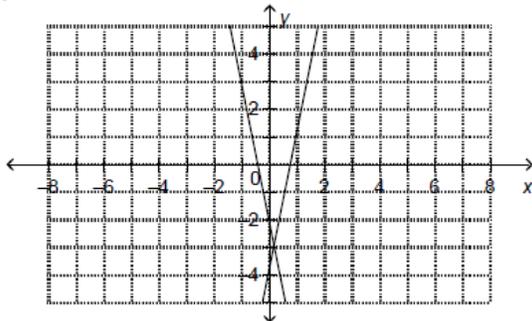
Answers

1. ANS: A PTS: 1 DIF: Easy
REF: 7.1 Developing Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
2. ANS: C PTS: 1 DIF: Easy
REF: 7.1 Developing Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
3. ANS: B PTS: 1 DIF: Moderate
REF: 7.1 Developing Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
4. ANS: B PTS: 1 DIF: Easy
REF: 7.1 Developing Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
5. ANS: B PTS: 1 DIF: Easy
REF: 7.1 Developing Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding

6. Which graph represents the solution of the linear system:
 $y = -2x + 2$
 $y + 6 = 2x$



- a. Graph B
 b. Graph A
 c. Graph C
 d. Graph D
7. Use the graph to approximate the solution of the linear system:
 $y = -5x - 2$
 $y = 5x - 4$



- a. (-3, 0.2)
 b. (0, -2.8)
 c. (0.2, -3)
 d. (-2.8, 0)

Answers

6. ANS: B PTS: 1 DIF: Easy
REF: 7.2 Solving a System of Linear Equations Graphically LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
7. ANS: C PTS: 1 DIF: Easy
REF: 7.2 Solving a System of Linear Equations Graphically LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding

8. ANS: D PTS: 1 DIF: Easy
REF: 7.2 Solving a System of Linear Equations Graphically LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding
9. ANS: B PTS: 1 DIF: Easy
REF: 7.2 Solving a System of Linear Equations Graphically LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding

10. Express each equation in slope-intercept form.

$$-2x + 4y = 68$$

$$13x + 4y = 284$$

a. $y = \frac{1}{2}x - 17$

$$y = -\frac{13}{4}x - 71$$

b. $y = -\frac{284}{13}x + 17$

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

c. $y = \frac{1}{2}x + 17$

$$y = -\frac{13}{4}x + 71$$

d. $y = \frac{4}{13}x - \frac{284}{13}$

$$y = \frac{1}{2}x - \frac{284}{13}$$

11. Use substitution to solve this linear system:

$$x - y = 18$$

$$\frac{3}{4}x + \frac{3}{4}y = -\frac{15}{2}$$

a. $x = 4; y = 18$

b. $x = -14; y = -14$

c. $x = 4; y = -14$

d. $x = 4; y = 4$

12. Use an elimination strategy to solve this linear system.

$$3x - 2y = 5$$

$$2x + 7y = 20$$

a. $x = 3$ and $y = -2$

c. $x = 3$ and $y = 2$

b. $x = \frac{1}{5}$ and $y = \frac{14}{5}$

d. $x = -3$ and $y = -2$

13. Write an equivalent linear system where both equations have the same x -coefficients.

$$2x + 6y = 5$$

$$8x - 6y = 12$$

a. $8x + 6y = 20$ and $8x - 6y = 12$

c. $8x + 24y = 20$ and $8x - 6y = 12$

b. $24x + 8y = 20$ and $6x + 8y = 12$

d. $12x + 24y = 20$ and $12x - 6y = 12$

14. Determine the number of solutions of the linear system:

$$14x - 5y = 123$$

$$14x - 5y = 73$$

a. no solution

c. two solutions

b. infinite solutions

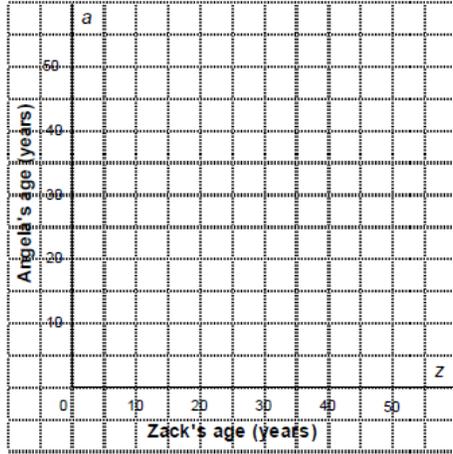
d. one solution

Answers

10. ANS: C PTS: 1 DIF: Moderate
REF: 7.3 Using Graphing Technology to Solve a System of Linear Equations
LOC: 10.RF9 TOP: Relations and Functions KEY: Conceptual Understanding
11. ANS: C PTS: 1 DIF: Moderate
REF: 7.4 Using a Substitution Strategy to Solve a System of Linear Equations
LOC: 10.RF9 TOP: Relations and Functions KEY: Conceptual Understanding
12. ANS: C PTS: 1 DIF: Easy
REF: 7.5 Using an Elimination Strategy to Solve a System of Linear Equations
LOC: 10.RF9 TOP: Relations and Functions KEY: Procedural Knowledge
13. ANS: C PTS: 1 DIF: Easy
REF: 7.5 Using an Elimination Strategy to Solve a System of Linear Equations
LOC: 10.RF9 TOP: Relations and Functions KEY: Procedural Knowledge
14. ANS: A PTS: 1 DIF: Easy
REF: 7.6 Properties of Systems of Linear Equations LOC: 10.RF9
TOP: Relations and Functions KEY: Conceptual Understanding

Short Answer

15. a) Write a linear system to model this situation:
Angela is 24 years older than her cousin Zack. In 13 years, she will be double his age.
- b) Use a graph to solve this problem:
How old are Angela and Zack now?



16. Create a linear system to model this situation. Then use substitution to solve the linear system to solve the problem.

At the local fair, the admission fee is \$8.00 for an adult and \$4.50 for a youth. One Saturday, 209 admissions were purchased, with total receipts of \$1304.50. How many adult admissions and how many youth admissions were purchased?

Answers

15. ANS:

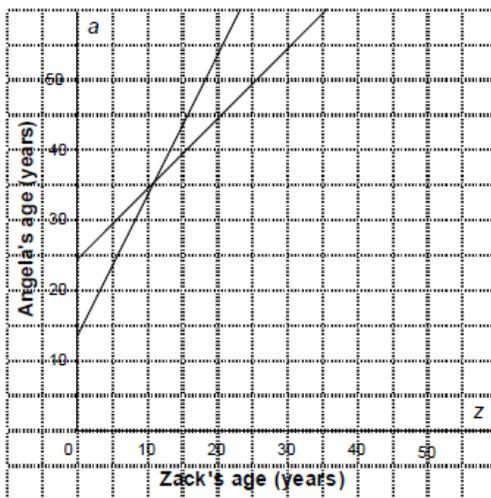
a)

$$a = z + 24$$

$$a + 13 = 2(z + 13)$$

b)

Zack is approximately 11 years old and Angela is approximately 35 years old.



PTS: 1

DIF: Moderate

REF: 7.2 Solving a System of Linear Equations Graphically

LOC: 10.RF9

TOP: Relations and Functions

KEY: Conceptual Understanding

16. ANS:

Let a represent the number of adult admissions, and y represent the number of youth admissions purchased.

$$a + y = 209$$

$$8a + 4.5y = 1304.5$$

104 adult admissions and 105 youth admissions were purchased.

PTS: 1

DIF: Moderate

REF: 7.4 Using a Substitution Strategy to Solve a System of Linear Equations

LOC: 10.RF9

TOP: Relations and Functions

KEY: Conceptual Understanding

17. In a piggy bank, the number of nickels is 8 more than one-half the number of quarters. The value of the coins is \$21.85.
- Create a linear system to model the situation.
 - If the number of quarters is 78, determine the number of nickels.
18. a) Write a linear system to model this situation:
A large tree removes 1.5 kg of pollution from the air each year. A small tree removes 0.04 kg each year. An urban forest has 1650 large and small trees. Together, these trees remove 1818 kg of pollution each year.
- Use graphing technology to solve this problem:
How many of each size of tree are in the forest?
 - Verify the solution.
19. a) Model this situation with a linear system:
To rent a car, a person is charged a daily rate and a fee for each kilometre driven. When Chena rented a car for 15 days and drove 800 km, the charge was \$715.00. When she rented the same car for 25 days and drove 2250 km, the charge was \$1512.50.
- Determine the daily rate and the fee for each kilometre driven. Verify the solution.
20. Use an elimination strategy to solve this linear system. Verify the solution.
- $$2s - 2c = 10$$
- $$6s + 6c = 50$$

Answers

17. ANS:

- a) Let n represent the number of nickels and q represent the number of quarters.

$$n = \frac{1}{2}q + 8$$

$$0.05n + 0.25q = 21.85$$

- b) To determine the number of nickels when the number of quarters is 78:
Substitute $q = 78$ in one of the equations in part a, then use the other equation to verify.

$$n = \frac{1}{2}q + 8$$

$$n = \frac{1}{2}(78) + 8$$

$$n = 39 + 8$$

$$n = 47$$

The number of nickels is 47.

To verify, substitute $q = 78$ and $n = 47$ into $0.05n + 0.25q = 21.85$.

$$\begin{aligned} \text{L.S.} &= 0.05n + 0.25q \\ &= 0.05(47) + 0.25(78) \\ &= 2.35 + 19.5 \\ &= 21.85 \end{aligned}$$

$$\text{R.S.} = 21.85$$

Since the left side equals the right side, the number of nickels in the collection must be 47.

PTS: 1

DIF: Difficult

REF: 7.1 Developing Systems of Linear Equations

LOC: 10.RF9

TOP: Relations and Functions

KEY: Problem-Solving Skills

Answers

18. ANS:

- a) Let l represent the number of large trees. Let s represent the number of small trees.

An urban forest has a total of 1650 trees.

So, one equation is: $l + s = 1650$

Together, the trees remove 1818 kg of pollution. So, another equation is:

$$1.5l + 0.04s = 1818$$

Then, a linear system is:

$$l + s = 1650$$

$$1.5l + 0.04s = 1818$$

- b) $l + s = 1650$ (1)
 $1.5l + 0.04s = 1818$ (2)

Write each equation in the form $y = mx + b$.

Equation (1):

$$l + s = 1650 \quad \text{Subtract } l \text{ from each side.}$$

$$s = -l + 1650$$

Equation (2):

$$1.5l + 0.04s = 1818$$

$$0.04s = -1.5l + 1818$$

$$s = -37.5l + 45450$$

Divide each side by 0.04.

On a graphing calculator, input the expressions:

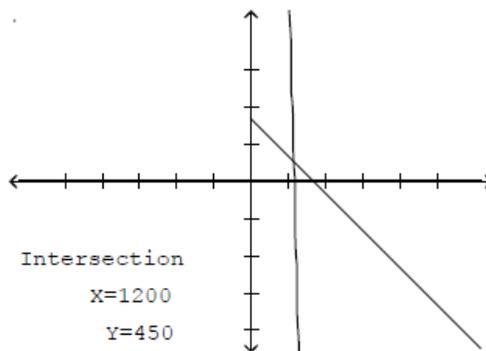
$$Y1 = (-)X + 1650 \text{ and}$$

$$Y2 = (-)37.5 * X + 45450$$

Adjust the window settings so the point of intersection appears in the window, then press graph.

From the calculator screen, the solution is:

$$x = 1200 \text{ and } y = 450$$



The value of x is the value of l , so the number of large trees is 1200.

The value of y is the value of s , so the number of small trees is 450.

Answers

- c) The total number of trees is: $1200 + 450 = 1650$; this is the same as the given information.
1200 large trees and 450 small trees remove $1.5(1200) + 0.04(450)$, or 1818 kg of pollution;
this is the same as the given information.
The solution is correct.

PTS: 1

DIF: Difficult

REF: 7.3 Using Graphing Technology to Solve a System of Linear Equations

LOC: 10.RF9

TOP: Relations and Functions

KEY: Problem-Solving Skills

19. ANS:

- a) Let d dollars represent the daily rate and let k dollars represent the fee for each kilometre driven.

The linear system is:

$$15d + 800k = 715 \quad \textcircled{1}$$

$$25d + 2250k = 1512.5 \quad \textcircled{2}$$

- b) Multiply equation $\textcircled{1}$ by 25 and equation $\textcircled{2}$ by 15, then subtract to eliminate d .

$$25 \times \text{equation } \textcircled{1}: 25(15d + 800k = 715)$$

$$375d + 20000k = 17875 \quad \textcircled{3}$$

$$15 \times \text{equation } \textcircled{2}: 15(25d + 2250k = 1512.5)$$

$$375d + 33750k = 22687.5 \quad \textcircled{4}$$

Subtract equation $\textcircled{4}$ from equation $\textcircled{3}$.

$$375d + 20000k = 17875 \quad \textcircled{3}$$

$$-(375d + 33750k = 22687.5) \quad \textcircled{4}$$

$$\hline -13750k = -4812.5$$

$$k = 0.35$$

Substitute $k = 0.35$ in equation $\textcircled{1}$.

Answers

$$15d + 800k = 715 \quad \textcircled{1}$$

$$15d + 800(0.35) = 715$$

$$15d + 280 = 715$$

$$15d = 435$$

$$d = 29$$

Verify the solution.

In each equation, substitute: $k = 0.35$ and $d = 29$

$$15d + 800k = 715 \quad \textcircled{1}$$

$$\text{L.S.} = 15d + 800k$$

$$= 15(29) + 800(0.35)$$

$$= 435 + 280$$

$$= 715$$

$$= \text{R.S.}$$

$$25d + 2250k = 1512.5 \quad \textcircled{2}$$

$$\text{L.S.} = 25d + 2250k$$

$$= 25(29) + 2250(0.35)$$

$$= 725 + 787.5$$

$$= 1512.5$$

$$= \text{R.S.}$$

So, the daily rate is \$29 and the fee for each kilometre driven is \$0.35.

PTS: 1

DIF: Difficult

REF: 7.5 Using an Elimination Strategy to Solve a System of Linear Equations

LOC: 10.RF9

TOP: Relations and Functions

KEY: Problem-Solving Skills

20. ANS:

$$2s - 2c = 10 \quad \textcircled{1}$$

$$6s + 6c = 50 \quad \textcircled{2}$$

Multiply equation $\textcircled{1}$ by 3, then add to eliminate c .

$3 \times$ equation $\textcircled{1}$: $3(2s - 2c = 10)$

$$6s - 6c = 30 \quad \textcircled{3}$$

Add:

$$\begin{array}{r} 6s - 6c = 30 \quad \textcircled{3} \\ + 6s + 6c = 50 \quad \textcircled{2} \\ \hline 12s \quad \quad = 80 \end{array}$$

$$s = \frac{80}{12}$$

$$s = \frac{20}{3}$$

Substitute $s = \frac{20}{3}$ in equation $\textcircled{1}$.

Answers

$$2s - 2c = 10$$

$$2\left(\frac{20}{3}\right) - 2c = 10$$

$$\frac{40}{3} - 2c = 10$$

$$-2c = 10 - \frac{40}{3}$$

$$-2c = \frac{30}{3} - \frac{40}{3}$$

$$-2c = -\frac{10}{3}$$

$$c = \frac{10}{6}$$

$$c = \frac{5}{3}$$

Verify the solution.

In each equation, substitute: $s = \frac{20}{3}$ and $c = \frac{5}{3}$

$$2s - 2c = 10$$

$$\text{L.S.} = 2s - 2c$$

$$= 2\left(\frac{20}{3}\right) - 2\left(\frac{5}{3}\right)$$

$$= \frac{40}{3} - \frac{10}{3}$$

$$= \frac{30}{3}$$

$$= 10$$

$$= \text{R.S.}$$

$$6s + 6c = 50$$

$$\text{L.S.} = 6s + 6c$$

$$= 6\left(\frac{20}{3}\right) + 6\left(\frac{5}{3}\right)$$

$$= 40 + 10$$

$$= 50$$

$$= \text{R.S.}$$

For each equation, the left side is equal to the right side, so the solution is: $s = \frac{20}{3}$ and $c = \frac{5}{3}$

PTS: 1

DIF: Difficult

REF: 7.5 Using an Elimination Strategy to Solve a System of Linear Equations

LOC: 10.RF9

TOP: Relations and Functions

KEY: Communication | Problem-Solving Skills