

A.A.7: Writing Linear Systems 4: Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables

- 1 A ribbon 56 centimeters long is cut into two pieces. One of the pieces is three times longer than the other. Find the lengths, in centimeters, of both pieces of ribbon.
- 2 Mary and Amy had a total of 20 yards of material from which to make costumes. Mary used three times more material to make her costume than Amy used, and 2 yards of material was not used. How many yards of materials did Amy use for her costumer?
- 3 Arielle has a collection of grasshoppers and crickets. She has 561 insects in all. The number of grasshoppers is twice the number of crickets. Find the number of *each* type of insect that she has.
- 4 Ramón rented a sprayer and a generator. On his first job, he used each piece of equipment for 6 hours at a total cost of \$90. On his second job, he used the sprayer for 4 hours and the generator for 8 hours at a total cost of \$100. What was the hourly cost of *each* piece of equipment?
- 5 Sharu has \$2.35 in nickels and dimes. If he has a total of thirty-two coins, how many of each coin does he have?
- 6 Ben had twice as many nickels as dimes. Altogether, Ben had \$4.20. How many nickels *and* how many dimes did Ben have?
- 7 A total of 600 tickets were sold for a concert. Twice as many tickets were sold in advance than were sold at the door. If the tickets sold in advance cost \$25 each and the tickets sold at the door cost \$32 each, how much money was collected for the concert?
- 8 The owner of a movie theater was counting the money from 1 day's ticket sales. He knew that a total of 150 tickets were sold. Adult tickets cost \$7.50 each and children's tickets cost \$4.75 each. If the total receipts for the day were \$891.25, how many of *each* kind of ticket were sold?
- 9 The tickets for a dance recital cost \$5.00 for adults and \$2.00 for children. If the total number of tickets sold was 295 and the total amount collected was \$1,220, how many adult tickets were sold? [Only an algebraic solution can receive full credit.]
- 10 There were 100 more balcony tickets than main-floor tickets sold for a concert. The balcony tickets sold for \$4 and the main-floor tickets sold for \$12. The total amount of sales for both types of tickets was \$3,056. Write an equation or a system of equations that describes the given situation. Define the variables. Find the number of balcony tickets that were sold.
- 11 The ninth graders at a high school are raising money by selling T-shirts and baseball caps. The number of T-shirts sold was three times the number of caps. The profit they received for each T-shirt sold was \$5.00, and the profit on each cap was \$2.50. If the students made a total profit of \$210, how many T-shirts *and* how many caps were sold?

- 12 When Tony received his weekly allowance, he decided to purchase candy bars for all his friends. Tony bought three Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$4.25 without tax. Then he realized this candy would not be enough for all his friends, so he returned to the store and bought an additional six Milk Chocolate bars and four Creamy Nougat bars, which cost a total of \$6.50 without tax. How much did *each* type of candy bar cost?
- 13 Tanisha and Rachel had lunch at the mall. Tanisha ordered three slices of pizza and two colas. Rachel ordered two slices of pizza and three colas. Tanisha's bill was \$6.00, and Rachel's bill was \$5.25. What was the price of one slice of pizza? What was the price of one cola?
- 14 Alexandra purchases two doughnuts and three cookies at a doughnut shop and is charged \$3.30. Briana purchases five doughnuts and two cookies at the same shop for \$4.95. All the doughnuts have the same price and all the cookies have the same price. Find the cost of one doughnut and find the cost of one cookie.
- 15 Using only 32-cent and 20-cent stamps, Charlie put \$3.36 postage on a package he sent to his sister. He used twice as many 32-cent stamps as 20-cent stamps. Determine how many of *each* type of stamp he used.
- 16 The cost of a long-distance telephone call is determined by a flat fee for the first 5 minutes and a fixed amount for each additional minute. If a 15-minute telephone call costs \$3.25 and a 23-minute call costs \$5.17, find the cost of a 30-minute call.
- 17 At the local video rental store, José rents two movies and three games for a total of \$15.50. At the same time, Meg rents three movies and one game for a total of \$12.05. How much money is needed to rent a combination of one game and one movie?
- 18 Seth has one less than twice the number of compact discs (CDs) that Jason has. Raoul has 53 more CDs than Jason has. If Seth gives Jason 25 CDs, Seth and Jason will have the same number of CDs. How many CDs did *each* of the three boys have to begin with?
- 19 A total of 800 votes were cast in an election. The table below represents the votes that were received by the candidates. Candidate *D* got at least 30 votes more than Candidate *E*. What is the *least* number of votes that Candidate *D* could have received? Show how you arrived at your answer.

Candidate	Number of Votes
<i>A</i>	213
<i>B</i>	328
<i>C</i>	39
<i>D</i>	<i>x</i>
<i>E</i>	<i>y</i>

- 20 A group of 148 people is spending five days at a summer camp. The cook ordered 12 pounds of food for each adult and 9 pounds of food for each child. A total of 1,410 pounds of food was ordered. Write an equation or a system of equations that describes the above situation and define your variables. Find the total number of adults in the group and the total number of children in the group.

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Answer Section

1 ANS:

$$\begin{array}{l}
 s + l = 56 \quad s + l = 56 \\
 14 \text{ and } 42. \quad s + l = 56 \quad s + 3s = 56 \quad 14 + l = 56 \\
 \quad \quad \quad l = 3s \quad \quad \quad s = 14 \quad \quad \quad l = 42
 \end{array}$$

PTS: 2 REF: 060531a

2 ANS:

$$\begin{array}{l}
 m + a = 20 - 2 \quad m + a = 20 - 2 \\
 4.5. \quad m + a = 20 - 2 \quad 3a + a = 18 \\
 \quad \quad \quad m = 3a \quad \quad \quad a = 4.5
 \end{array}$$

PTS: 2 REF: 010022a

3 ANS:

$$\begin{array}{l}
 g + c = 561 \quad g + c = 561 \quad g + c = 561 \\
 374 \text{ grasshoppers and } 187 \text{ crickets.} \quad g + c = 561 \quad 2c + c = 561 \quad g + 187 = 561 \\
 \quad \quad \quad g = 2c \quad \quad \quad c = 187 \quad \quad \quad g = 374
 \end{array}$$

PTS: 3 REF: 010327a

4 ANS:

$$\begin{array}{l}
 12s + 24g = 300 \quad 6s + 6(10) = 90 \\
 \$5 \text{ for sprayer and } \$10 \text{ for generator.} \quad 6s + 6g = 90 \quad 12s + 12g = 180 \quad 6s = 30 \\
 \quad \quad \quad 4s + 8g = 100 \quad \quad \quad 12g = 120 \quad \quad \quad s = 5 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad g = 10
 \end{array}$$

PTS: 4 REF: 060133a

5 ANS:

$$\begin{array}{l}
 10n + 10d = 320 \\
 17 \text{ nickels and } 15 \text{ dimes.} \quad n + d = 32 \quad 5n + 10d = 235 \quad 17 + d = 32 \\
 \quad \quad \quad .05n + .1d = 2.35 \quad \quad \quad 5n = 85 \quad \quad \quad d = 15 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad n = 17
 \end{array}$$

PTS: 4 REF: 060638a

6 ANS:

$$\begin{array}{rcl}
 & & 5n + 10d = 420 \\
 & n = 2d & \\
 42 \text{ nickels and 21 dimes.} & 5(2d) + 10d = 420 & n = 2(21) \\
 .05n + .1d = 4.2 & 20d = 420 & n = 42 \\
 & d = 21 &
 \end{array}$$

PTS: 2

REF: 060123a

7 ANS:

$$\begin{array}{rcl}
 & a + d = 600 & a + d = 600 \\
 \$16,400. & a + d = 600 & \\
 & a = 2d & 2d + d = 600 \quad a + 200 = 600 \quad 200(32) + 400(25) = 16,400 \\
 & & d = 200 \quad a = 400
 \end{array}$$

PTS: 3

REF: 010228a

8 ANS:

$$\begin{array}{rcl}
 & & 7.5a + 7.5c = 1125 \\
 & a + c = 150 & a + c = 150 \\
 65 \text{ adult and 85 children.} & 7.5a + 4.75c = 891.25 & 7.5a + 4.75c = 891.25 \quad a + 85 = 150 \\
 & & 2.75c = 233.75 \quad a = 65 \\
 & & c = 85
 \end{array}$$

PTS: 4

REF: 060031a

9 ANS:

$$\begin{array}{rcl}
 & 5a + 2c = 1220 & \\
 210. & 5a + 2c = 1220 & 2a + 2c = 590 \\
 & a + c = 295 & 3a = 630 \\
 & & a = 210
 \end{array}$$

PTS: 4

REF: 010539a

10 ANS:

$$\begin{array}{rcl}
 & & 12b - 12m = 1200 \\
 b = \text{balcony} \quad m = \text{main-floor} & b - m = 100 \quad , 266. & b - m = 100 \quad 4b + 12m = 3056 \\
 & 4b + 12m = 3056 & 4b + 12m = 3056 \quad 16b = 4256 \\
 & & b = 266
 \end{array}$$

PTS: 4

REF: 010134a

11 ANS:

$$\begin{array}{rcl}
 & & 5(3c) + 2.5c = 210 \\
 36 \text{ T-shirts and 12 caps.} & t = 3c & 17.5c = 210 \quad t = 3(12) \\
 & 5t + 2.5c = 210 & c = 12 \quad t = 36
 \end{array}$$

PTS: 4

REF: 080132a

12 ANS:

$$\begin{array}{rcl} \text{Milk Chocolate, \$0.75 and Creamy Nougat, \$0.50.} & \begin{array}{l} 6m + 4n = 6.5 \\ 3m + 4n = 4.25 \end{array} & \begin{array}{l} 3m = 2.25 \\ m = .75 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} 6(.75) + 4n = 6.5 \\ 4.5 + 4n = 6.5 \\ n = .50 \end{array} \end{array}$$

PTS: 4

REF: 010232a

13 ANS:

$$\begin{array}{rcl} \text{\$1.50 for pizza and \$0.75 for cola.} & \begin{array}{l} 9p + 6c = 18 \\ 3p + 2c = 6 \end{array} & \begin{array}{l} 3p + 2c = 6 \\ 4p + 6c = 10.5 \\ 3(1.5) + 2c = 6 \\ 2p + 3c = 5.25 \\ 5p = 7.5 \\ p = 1.50 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} 2c = 1.5 \\ c = .75 \end{array} \end{array}$$

PTS: 4

REF: 080233a

14 ANS:

$$\begin{array}{rcl} \text{doughnut = \$0.75, cookie = \$0.60.} & \begin{array}{l} 10d + 15c = 16.5 \\ 2d + 3c = 3.3 \end{array} & \begin{array}{l} 10d + 4c = 9.9 \\ 5d + 2c = 4.95 \\ 11c = 6.6 \\ c = .60 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} 2d + 3(.6) = 3.3 \\ 2d = 1.5 \\ d = .75 \end{array} \end{array}$$

PTS: 4

REF: 010332a

15 ANS:

$$\begin{array}{rcl} \text{Four 20-cent and eight 32-cent stamps.} & \begin{array}{l} 32x + 20y = 336 \\ .32x + .20y = 3.36 \\ x = 2y \end{array} & \begin{array}{l} 32(2y) + 20y = 336 \\ 84y = 336 \\ y = 4 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} x = 2y \\ x = 2(4) \\ x = 8 \end{array} \end{array}$$

PTS: 3

REF: 010436a

16 ANS:

$$\begin{array}{rcl} \text{\$6.85.} & \begin{array}{l} f + 18v = 5.17 \\ f + 10v = 3.25 \end{array} & \begin{array}{l} 8v = 1.92 \\ v = .24 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} f + 10(.24) = 3.25 \\ f = .85 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} f + 10v = 3.25 \\ .85 + .24(30 - 5) = 6.85 \end{array} \end{array}$$

PTS: 2

REF: 060123b

17 ANS:

$$\begin{array}{rcl} \text{\$6.15.} & \begin{array}{l} 9m + 3g = 36.15 \\ 3m + g = 12.05 \end{array} & \begin{array}{l} 2m + 3g = 15.5 \\ 7m = 20.65 \\ m = 2.95 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} 3(2.95) + g = 12.05 \\ g = 3.20 \end{array} \end{array}$$

$$\begin{array}{rcl} & & \begin{array}{l} 2.95 + 3.20 = 6.15 \end{array} \end{array}$$

PTS: 4

REF: 010228b

18 ANS:

$$\begin{array}{rclcl}
 s = 2j - 1 & s - 25 = j + 25 & r = j + 53 & s = 2j - 1 \\
 \text{Seth}=101, \text{ Jason}=51, \text{ Raoul}=104. & r = j + 53. & (2j - 1) = j + 50. & r = (51) + 53. & s = 2(51) - 1 \\
 s - 25 = j + 25 & j = 51 & r = 104 & s = 101
 \end{array}$$

PTS: 3

REF: 060326a

19 ANS:

$$\begin{array}{rclcl}
 213 + 328 + 39 + (E + 30) + E = 800 & D = E + 30 \\
 125. \quad A + B + C + D + E = 800 & 610 + 2E = 800 & D = 95 + 30 \\
 D = E + 30 & 2E = 190 & D = 125 \\
 E = 95
 \end{array}$$

PTS: 3

REF: spring9828a

20 ANS:

$$\begin{array}{rclcl}
 12a + 9c = 1410 & a + c = 148 \\
 a = \text{adults } c = \text{children} & 9a + 9c = 1332 & 26 + c = 148 \\
 a + c = 148, 26, 122. & 3a = 78 & c = 122 \\
 12a + 9c = 1410 & a = 26
 \end{array}$$

PTS: 4

REF: 010033a