

Name: <u>Key</u>	Date: _____
Topic: _____	Class: _____

Main Ideas/Questions	Notes/Examples
Solve by Elimination	① LINE UP the equations.
	② MULTIPLY one or both equations by a number to result in a variable with the same coefficient.
	③ ADD or SUBTRACT the equations to eliminate this variable.
	④ SOLVE for the remaining variable.
	⑤ SUBSTITUTE your answer from step 4 into either original equation to find the other variable.

Directions: Solve each system of equations below by elimination. Identify the solution.

1. $x + 7y = 17$ $-(x - y = -7)$ $8y = 24$ $y = 3$ $x - 3 = -7$ $x = -4$ (-4, 3)	2. $3x + 2y = 22$ $+ 5x - 2y = 42$ $8x = 64$ $x = 8$ $3(8) + 2y = 22$ $24 + 2y = 22$ $2y = -2$ $y = -1$ (8, -1)
3. $4x - 9y = -42$ $-4(x + 5y = 4)$ $4x - 9y = -42$ $+ -4x - 20y = -16$ $-29y = -58$ $y = 2$ $x + 5(2) = 4$ $x + 10 = 4$ $x = -6$ (-6, 2)	4. $7x - 6y = -53$ $(2x - 3y = -13) \cdot 2$ $7x - 6y = -53$ $+ -4x + 6y = 26$ $3x = -27$ $x = -9$ $2(-9) - 3y = -13$ $-18 - 3y = -13$ $-3y = 5$ $y = -\frac{5}{3}$ (-9, -$\frac{5}{3}$)
5. $(5x + 3y = -7) \cdot 2$ $(2x + 7y = 3) \cdot -5$ $10x + 6y = -14$ $+ -10x - 35y = -15$ $-29y = -29$ $y = 1$ $5x + 3(1) = -7$ $5x + 3 = -7$ $5x = -10$ $x = -2$ (-2, 1)	6. $(3x - 9y = 9) \cdot 4$ $(4x - 12y = 36) \cdot -3$ $12x - 36y = 36$ $+ -12x + 36y = -108$ $0 = -72$ No Solution

7. $5x - 6y = 3$ $7y = 2x + 8$ $\begin{array}{r} (5x - 6y = 3) \cdot 2 \\ (-2x + 7y = 8) \cdot 5 \\ \hline 10x - 12y = 6 \\ + -10x + 35y = 40 \\ \hline 23y = 46 \\ y = 2 \end{array}$ $5x - 6(2) = 3$ $5x = 15$ $x = 3$ (3, 2)	8. $10x + 18 = -8y$ $4 + 9x = 5y$ $\begin{array}{r} (10x + 8y = -18) \cdot 5 \\ (9x - 5y = -4) \cdot 8 \\ \hline 50x + 40y = -90 \\ + 72x - 40y = -32 \\ \hline 122x = -122 \\ x = -1 \end{array}$ $10(-1) + 18 = -8y$ $8 = -8y$ $-1 = y$ (-1, -1)
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Applications	①	DEFINE YOUR VARIABLES – What are you solving for?
	②	SET UP TWO EQUATIONS using the information given.
	③	SOLVE the system using your method of choice.

9. Marcie bought a total of 20 used books and CDs during a yard sale for a total of \$54.50. If books costs \$1.50 each and CDs cost \$5 each, how many of each did she buy?

$b = \text{books}$
 $c = \text{CD's}$

$$\begin{array}{r} b + c = 20 \\ 1.50b + 5c = 54.50 \\ \hline -5b - 5c = -100 \\ + 1.50b + 5c = 54.50 \\ \hline -3.5b = -45.50 \\ b = 13 \end{array}$$

13 books and 7 CDs

10. Landon babysits and works part time at the water park over the summer. One week, he babysat for 3 hours and worked at the water park for 10 hours and made \$109. The next week he babysat for 8 hours and worked at the water park for 12 hours and made \$177. How much does Landon make per hour at each job?

$b = \text{babysits}$
 $w = \text{waterpark}$

$$\begin{array}{r} (3b + 10w = 109) \cdot 8 \\ (8b + 12w = 177) \cdot -3 \\ \hline 24b + 80w = 872 \\ + -24b - 36w = -531 \\ \hline 44w = 341 \\ w = 7.75 \end{array}$$

$3b + 10(7.75) = 109$
 $3b = 31.5$
 $b = 10.5$

\$10.50/hr babysitting
and \$7.75/hr at the water park.

11. Kent has a collection of pennies and nickels with a value of \$1.98. The number of pennies he has is five less than twice the number of nickels. How many of each coin does Kent have?

$p = \text{pennies}$
 $n = \text{nickels}$

$$\begin{array}{r} .01p + .05n = 1.98 \\ p = 2n - 5 \\ \hline .01(2n - 5) + .05n = 1.98 \\ .02n - .05 + .05n = 1.98 \\ .07n = 2.03 \\ n = 29 \end{array}$$

$p = 2(29) - 5$
 $p = 53$

53 pennies +
29 nickels

MORE APPLICATIONS PRACTICE *with* SYSTEMS

Directions: For each problem- define your variables, set up a system of equations, and solve.

1. At the fast food restaurant, four cheeseburgers and five small fries have a total of 2,310 calories. Three cheeseburgers and two small fries have a total of 1,330 calories. How many calories does each item contain?

C = cheeseburgers
 f = french fries

$$\begin{array}{r} 3(4C + 5f = 2310) \\ -4(3C + 2f = 1330) \\ \hline 12C + 15f = 6930 \\ + -12C - 8f = -5320 \\ \hline 7f = 1610 \\ f = 230 \end{array}$$

$$\begin{array}{r} 3C + 2(230) = 1330 \\ 3C = 870 \\ C = 290 \end{array}$$

290 calories in a
Cheeseburger + 230
calories in fries

2. One month, a homeowner used 150 units of gas and 520 units of electric for a total cost of \$84.20. The next month, 210 units of gas and 405 units of electric were used for a total cost of \$82.35. Find the cost per unit of gas and electric.

g = gas
 e = electric

$$\begin{array}{r} 7(150g + 520e = 84.20) \\ -5(210g + 405e = 82.35) \\ \hline 1050g + 3640e = 589.4 \\ + -1050g - 2025e = -411.75 \\ \hline 1615e = 177.65 \\ e = 0.11 \end{array}$$

$$\begin{array}{r} 150g + 520(0.11) = 84.20 \\ 150g + 57.2 = 84.2 \\ 150g = 27 \\ g = .18 \end{array}$$

Electric costs 0.11/unit
and gas costs 0.18/unit

3. Kym is renovating the first floor of her home. She bought 750 square feet of laminate flooring and 525 square feet of carpet and paid \$2717.25. She went back to the store and bought an additional 100 square feet of laminate flooring and 75 square feet of carpet and paid \$374.75. Find the cost per square foot of each type of flooring.

l = laminate
 c = carpet

$$\begin{array}{r} 750l + 525c = 2717.25 \\ -7(100l + 75c = 374.75) \\ \hline 750l + 525c = 2717.25 \\ + -700l - 525c = -2623.25 \\ \hline 50l = 94 \\ l = 1.88 \end{array}$$

$$\begin{array}{r} 100(1.88) + 75c = 374.75 \\ 75c = 186.75 \\ c = 2.49 \end{array}$$

Carpet costs \$2.49/sq ft
and laminate is \$1.88/sq ft

4. Sean bought 1.8 pounds of gummy bears and 0.6 pounds of jelly beans and paid \$10.26. He went back to the store the following week and bought 1.2 pounds of gummy bears and 1.5 pounds of jelly beans and paid \$15.09. What is the price per pound of each type of candy?

g = gummy bears
 j = jelly beans

$$\begin{array}{r} (1.8g + 0.6j = 10.26) \times 5 \\ (1.2g + 1.5j = 15.09) \times -2 \\ \hline 9g + 3j = 51.30 \\ + -2.4g - 3j = -30.18 \\ \hline 6.6g = 21.12 \\ g = 3.20 \end{array}$$

$$\begin{array}{r} 1.8(3.2) + 0.6j = 10.26 \\ 0.6j = 4.50 \\ j = 7.50 \end{array}$$

Gummy bears cost
\$3.20/lb and jelly
beans cost \$7.50/lb.

5. Courtney has a total of 88 stamps worth \$15.56. Some are 25¢ stamps and some are 2¢ stamps. How many of each does she have?

$x = 25¢ \text{ stamps}$
 $y = 2¢ \text{ stamps}$

Courtney has 60-25¢
 Stamps and 28-2¢
 Stamps.

$$\begin{aligned} x + y &= 88 \rightarrow x = 88 - y \\ .25x + .02y &= 15.56 \\ .25(88 - y) + .02y &= 15.56 \\ 22 - .25y + .02y &= 15.56 \\ -.23y &= -6.44 \\ y &= 28 \end{aligned}$$

$$\begin{aligned} x + 28 &= 88 \\ x &= 60 \end{aligned}$$

6. Tom put 18 gallons of midgrade gas in his truck and filled up his empty five gallon gas tank with regular gas for his lawnmower at home. He spent \$59.91. The following week, he put 14 gallons of midgrade gas in his truck and topped off his five gallon tank with just one gallon of regular gas. If he paid \$39.75 and the prices remained the same, find the price per gallon of midgrade and regular gas.

$m = \text{midgrade}$
 $r = \text{regular}$

Regular costs \$2.37/gal
 and midgrade is
 \$2.67/gal.

$$\begin{aligned} 18m + 5r &= 59.91 \\ (14m + 1r = 39.75) \cdot 5 \\ 18m + 5r &= 59.91 \\ + -70m - 5r &= -198.75 \\ \hline -52m &= -138.84 \\ m &= 2.67 \end{aligned}$$

$$\begin{aligned} 14(2.67) + 1r &= 39.75 \\ 37.38 + r &= 39.75 \\ r &= 2.37 \end{aligned}$$

7. A total of \$12,000 was invested in two types of bonds. One pays 8% simple interest while the other pays 10.5%. Last year, the annual interest earned on the two investments was \$1,145. How much was invested at each rate?

$x = \text{account 1}$
 $y = \text{account 2}$

\$4600 was invested in
 the account with 8%
 interest and \$7400 was
 invested in an account
 with 10.5% interest.

$$\begin{aligned} x + y &= 12000 \rightarrow x = 12000 - y \\ .08x + .105y &= 1145 \\ .08(12000 - y) + .105y &= 1145 \\ 960 - .08y + .105y &= 1145 \\ .025y &= 185 \\ y &= 7400 \end{aligned}$$

$$\begin{aligned} x + 7400 &= 12000 \\ x &= 4600 \end{aligned}$$

8. A collection of dimes and quarters is worth \$9.55. If the quarters were dimes and the dimes were quarters, the total value would be \$7.60. Find the number of each coin.

$d = \text{dimes}$
 $q = \text{quarters}$

18 dimes and
 31 quarters

$$\begin{aligned} 5(.10d + .25q) &= 9.55 \\ -2(.25d + .10q) &= 7.60 \\ \hline .50d + 1.25q &= 47.75 \\ + -.50d - .20q &= -15.20 \\ \hline 1.05q &= 32.55 \\ q &= 31 \end{aligned}$$

$$\begin{aligned} .10d + .25(31) &= 9.55 \\ .10d &= 1.80 \\ d &= 18 \end{aligned}$$