

Name: _____

Date: _____



MODELING WITH SYSTEMS OF EQUATIONS

N-GEN MATH[®] 8



Many real-world scenarios can be modeled with systems of equations. As you move on in math classes you will solve increasingly more complicated problems using systems. In this lesson, we will model some simple situations with these systems and then solve them.

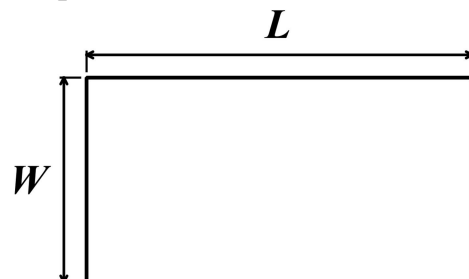
Exercise #1: The sum of two numbers, a and b , is equal to 19. The number a is 4 more than twice the number b .

- (a) Write a system of equations that models the information given. (b) Solve this system by substitution.

Geometry gives us many situations where we can use a system to determine dimensions of shapes.

Exercise #2: The rectangle pictured below has a length given by L and a width given by W . Its perimeter is 84 feet. Its length is 6 feet less than three times its width.

- (a) Model the information given in this problem with a system of equations.



- (b) Find the length and width of this rectangle.

Exercise #3: A different rectangle has a perimeter of 144 feet. The difference between its length and width is 12 feet. Set up a system of equations based on this information and solve it by elimination. Assume that the length is the longer dimension.



We can have other types of system problems arise when a situation involves two quantities that vary and two pieces of known information.

Exercise #4: A cafeteria has tables that sit four people and tables that sit six people. There are a total of 12 tables and enough room for 56 people to sit. Let f be the number of four person tables and let s represent the number of six person tables.

- (a) Could there be 10 four person tables and 2 six person tables? Justify.
- (b) Model the information given using the variables s and f .
- (c) Solve the system of equations in (b) using elimination. Check the reasonableness of your answer.

Exercise #5: At a pool concession stand, Alex buys two hamburgers and one soda and pays \$11.75. His friend Ryan then buys three hamburgers and two sodas and pays \$18.75. Let h represent the price of one hamburger and let s represent the cost of one soda.

- (a) Could one hamburger cost \$4.00 and one soda cost \$2.50? Justify.
- (b) Model the information given in this question using a system of equations.
- (c) Solve this system using elimination to find the price of one hamburger and the price of one soda.



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MODELING WITH SYSTEMS OF EQUATIONS

N-GEN MATH[®] 8 HOMEWORK

USING YOUR MATH

1. The sum of two numbers is 12. One of the numbers is 20 more than the other number. Let x and y be the two numbers with y being the larger of the two numbers.

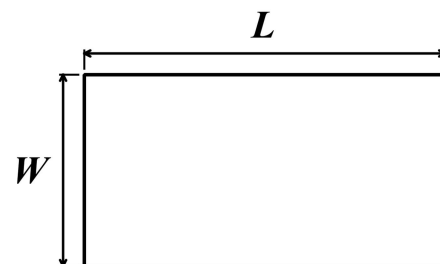
- (a) Model the information given in the problem using a system of equations. (b) Solve this system by substitution to find the two numbers (one will be negative).

2. The difference between two numbers is 8. When twice the larger is added to the smaller the sum is 46. Let the two numbers be a and b with a being the larger of the two numbers.

- (a) Model the information given in the problem using a system of equations. (b) Solve this system by elimination to find the two numbers.

3. In the rectangle shown with width of W and length of L the perimeter is 40 feet. The length is three times the width.

- (a) Model the information given in this problem using a system of equations involving W and L .



- (b) Solve the system above by substitution.



4. Elian and Alberto won tickets at an arcade. When they put their tickets together they had exactly 100. Alberto won 12 tickets less than Elian. Let a be the number of tickets Alberto won and let e be the number of tickets Elian won.
- (a) Model the information given in the problem using a system of equations. (b) Solve this system to find out how many tickets each of them won.
5. Kirk is 34 years older than his son Max. When they compare their ages, they also find that Kirk is 6 years older than three times Max's age. Let k be Kirk's age and let m be Max's age. Set up and solve a system to find both of their ages (at least in 2019).
- (a) Model the information given in the problem using a system of equations. (b) Solve this system to find both of their ages.
6. Nadia has a handful of coins, all of which are either dimes or quarters. She has a total of 23 coins in her hand and a total of \$3.65 worth of coins. Let d equal the number of dimes Nadia has and let q represent the number of quarters she has.
- (a) Could Nadia have 18 dimes and 5 quarters? Justify your answer. To make the problem easier, deal with all money in terms of pennies (or cents). (b) Write a system of equations (again in terms of cents) that models this situation.
- (c) Solve the system you wrote in (b). State a final conclusion that gives how many dimes and how many quarters Nadia has in her hand.

