



Algebra 2 Workbook

Systems of equations

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MATH

SYSTEMS OF EQUATIONS WITH SUBSCRIPTS

- 1. Solve the system of equations using any method.

$$d_t = x_t - 3$$

$$d_t = \frac{1}{2}x_t + 2$$

- 2. Solve the system of equations using any method.

$$y_t = 2x_t + 5$$

$$y_t = -10x_t - 7$$

- 3. Solve the system of equations using any method.

$$4A_x - B_y = 15$$

$$B_y = 12 - 5A_x$$

- 4. Solve the system of equations using any method.

$$2T_x + 5T_y = 120.8$$

$$T_y = 17T_x + 17.2$$



- 5. Solve the system of equations using any method.

$$T_U W_U = 396$$

$$W_D = 2W_U$$

$$T_D W_D = 132$$

$$T_D = 3 - T_U$$

- 6. Solve the system of equations using any method.

$$T_u R_u = 480$$

$$R_d = \frac{1}{2} R_u$$

$$T_d R_d = 320$$

$$T_d = 2 + T_u$$

- 7. Solve the system of equations using any method.

$$2X_1 + 3Y_1 = 1$$

$$X_2 = 4X_1$$

$$X_2 + Y_2 = 9$$



$$Y_2 = Y_1 + 2$$

- 8. Solve the system of equations using any method.

$$6X_1 + 12Y_1 = 78$$

$$X_2 = 2X_1$$

$$2X_2 - 3Y_2 = -24$$

$$Y_2 = 3Y_1 - 3$$



UNIFORM MOTION

- 1. A train leaves Station 1 at a constant speed and arrives at Station 2 in 5 hours. A second train leaves Station 1 at a constant speed of 45 mph and arrives at Station 2 in 6 hours. What was the constant speed of the first train?

- 2. A train leaves Union Station at a constant speed and arrives at Georgetown Station in 3 hours. A second train leaves Union Station at a constant speed of 45 mph and arrives at Georgetown Station in 4 hours. What was the constant speed of the first train?

- 3. Kaitlyn is driving at a constant rate of 55 mph on the highway. 1 hour later, her friend Charlotte starts from the same point and drives at a constant rate of 65 mph. How many hours will each woman need to travel before Charlotte catches Kaitlyn. At that point, how far have each of them traveled?

- 4. Sam walked 4 mph from the bus stop to the school. John walked 5 mph from the same bus stop to the school and it took him 1 hour to get there. How long did it take Sam to get to the school?



- 5. McKenzie and Daisy plan a trip to the mountains together. McKenzie travels at 45 mph and Daisy travels at 60 mph. Daisy's trip took 3 hours less than McKenzie's. How far did each of them travel?
- 6. A bus leaves Bus Stop *A* at a constant speed of 40 mph and arrives at Bus Stop *B* in 2 hours. A second bus leaves Bus Stop *A* at a constant speed of 25 mph. How long does it take the second bus to reach Bus Stop *B*?
- 7. Jason and Brittany participate in a race together. Jason runs at a rate of 8 mph and it takes him 45 minutes to complete the race. It took Brittany 1 hour to complete the race. What was Brittany's average speed?
- 8. Talan and Emily participate in a race together. Talan runs 10 mph and finishes 1 hour and 18 minutes before Emily does. If Emily runs 5 mph, how long does it take each person to finish the race and how far did they run?



SYSTEMS OF TWO EQUATIONS WITH A NON-LINEAR EQUATION

- 1. Solve the system of equations.

$$y = x - 1$$

$$x^2 + y^2 = 1$$

- 2. Solve the system of equations.

$$y = 3x - 2$$

$$(x - 1)^2 + (y + 1)^2 = 4$$

- 3. Solve the system of equations.

$$y - 2x = 0$$

$$(x - 2)^2 + (y - 1)^2 = 9$$

- 4. Solve the system of equations.

$$y = 2x + 5$$

$$4x^2 + y^2 = 25$$



■ 5. Solve the system of equations.

$$y + \frac{5}{2} = -\frac{9}{2}x$$

$$9x^2 + 4y^2 = 25$$

■ 6. Solve the system of equations.

$$2y - x = -2$$

$$(x - 6)^2 + 4(y - 4)^2 = 16$$

■ 7. Solve the system of equations.

$$y = \frac{1}{2}x + 1$$

$$x^2 - y^2 = 4$$

■ 8. Solve the system of equations.

$$y + 4x = 2$$

$$4y^2 - 16x^2 = 16$$

■ 9. Solve the system of equations.



$$y = -\frac{1}{2}x - 3$$

$$\frac{(x-3)^2}{9} - \frac{(y+3)^2}{9} = 1$$

■ 10. Solve the system of equations.

$$2y - 3x = 14$$

$$\frac{(y+2)^2}{9} + \frac{(x+4)^2}{4} = 1$$



NUMBER WORD PROBLEMS

- 1. The sum of two consecutive integers is 37. What are the two numbers?

- 2. The sum of two consecutive odd integers is -8 . What are the two numbers?

- 3. The product of two consecutive even integers is 168. What are the two numbers if they are both positive?

- 4. The product of two consecutive integers is 182. What are the two numbers if they are both negative?

- 5. The sum of the digits of a two-digit counting number is 11. When the digits are reversed, the new number is 63 greater than the original number. What was the original number?

- 6. The sum of the digits of a two-digit counting number is 7. When the digits are reversed, the new number is 27 less than the original number. What was the original number?



- 7. The sum of the digits of a two-digit counting number is 14. The ratio of the units digit to the tens digit is 3 to 4. What is the number?
- 8. The sum of the digits of a two-digit counting number is 8. The ratio of the tens digit to the units digit is 3 to 1. What is the number?
- 9. Find three positive consecutive even integers such that the sum of the first and second is 22 less than the product of the first and third.
- 10. Find three negative consecutive odd integers such that the sum of the first and third is 49 less than the product of the second and third.



AGE WORD PROBLEMS

- 1. In 16 years, Thorin will be nine times older than he is now. How old is he now?
- 2. In 18 years, Danica will be three times older than she is now. How old is she now?
- 3. In eight years, Aaron will be twice as old as he was six years ago. How old is he now?
- 4. In 12 years, Jake will be four times as old as he was nine years ago. How old will he be in 12 years?
- 5. In 16 years, Erica will be six times as old as she was 14 years ago. How old was she four years ago?
- 6. May is 6 years older than Hazel. In two years, May will be twice as old as Hazel. How old are May and Hazel now?



- 7. Ellie is 20 years older than Clay. In four years, Ellie will be five times as old as Clay. How old are Ellie and Clay now?
- 8. 10 years ago, Tim was three years younger than twice Sally's age. 17 years from now Sally will be seven years older than $\frac{5}{8}$ of Tim's age. How old are Sally and Tim now?
- 9. Jessica is five years younger than Ryan. 12 years ago, Jessica was half the age Ryan will be in three years. How old is Jessica now?
- 10. Kate is five times older than Sam. Five years ago, Kate was 15 times older than Sam. How old will Sam be in three years?



SYSTEMS OF THREE EQUATIONS

- 1. Find the unique solution to the system of equations.

$$2x + y - z = 3$$

$$x - y + z = 0$$

$$x - 2y - 3z = 4$$

- 2. Find the unique solution to the system of equations.

$$3x + y - z = -2$$

$$x - 2y + 3z = 23$$

$$2x + 3y + 2z = 5$$

- 3. Find the unique solution to the system of equations.

$$5x - 3y + z = -8$$

$$2x + y - 2z = -6$$

$$-3x + 2y + 4z = 19$$

- 4. Find the unique solution to the system of equations.



$$-2x + 3y - 4z = 10$$

$$4x + 3y + 2z = 4$$

$$x - 6y + 4z = -19$$

- 5. Find the unique solution to the system of equations.

$$2x - y + z = 9$$

$$4x - 2y + 2z = 18$$

$$-2x + y - z = -9$$

- 6. Find the unique solution to the system of equations.

$$x + 2y - z = 9$$

$$3x + y - z = 5$$

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

- 7. Find the unique solution to the system of equations.

$$x - y - z = \frac{15}{2}$$

$$2x + 3y - z = 14$$



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

- 8. Find the unique solution to the system of equations.

$$-x + y - z = 12$$

$$x - y + z = 2$$

$$2x - 2y + 2z = 9$$

- 9. Find the unique solution to the system of equations.

$$2x - 5y + z = 12$$

$$-3x + 10y - z = -11$$

$$x - y + 2z = 21$$



