

Applications of Linear Systems (ALG.SYS.05)

For each word problem, define necessary variables, then write and solve a system of linear equations.

1. The sum of two numbers is 171. Also, the difference of twice the first number and the second number is 117.

The two numbers are 96 and 75.

2. The sum of two numbers is 253; their difference is 79. Determine the two numbers.

The two numbers are 166 and 87.

3. Twice the first number, decreased by twenty-nine is three times the second number. Furthermore, three times the sum of the two numbers is 216.

The two numbers are 49 and 23.

4. The difference of four times the first number and three times the second number is five. Also, twice the first number decreased by three is six more than the second number. Determine the two numbers.

The two numbers are 13 and 11.

5. A boat traveling downstream travels at 23 kilometers per hour. However, the boat only travels 9 kilometers per hour upstream. Determine both the speed of the boat in still water and the speed of the current.

The boat travels 16 kilometers per hour and the current is 7 kilometers per hour.

6. Traveling downstream, a certain boat traveled 28 kilometers per hour; however, traveling back upstream the boat only traveled 12 kilometers per hour. Determine the speed of the current and the speed of the boat in still water.

The boat travels 20 kilometers per hour and the current is 8 kilometers per hour.

7. Flying with the wind, an airplane travels at 620 miles per hour. However, traveling against the wind, the plane only travels at 570 miles per hour. Determine both the speed of the plane and the speed of the wind.

The plane flies at 595 mph and the wind blows at 25 mph.

8. Traveling with the wind, a plane can fly at 610 mph; however, traveling against the wind, a plane can only fly at 564 mph. Determine the speed of the plane and the speed of the wind.

The plane flies at 587 mph and the wind blows at 23 mph.

9. A local high school is selling tickets to the spring musical. On the first day, Julia sells 62 adult tickets and 27 student tickets for a total of \$631. On the second day, she sells 48 adult tickets and 18 student tickets for a total of \$474. Determine the price of both an adult ticket and a student ticket.

Student tickets cost \$5 and adult tickets cost \$8.

10. George Washington High School is selling tickets to their spring musical. On the first day of ticket sales the school sold 13 adult tickets and 10 student tickets for a total of \$141. On the second day of ticket sales the school sold 10 adult tickets and 16 student tickets for a total of \$150. What is the price of one adult ticket and one student ticket?

Student tickets cost \$5 and adult tickets cost \$7.

11. Jordan and Marci each improved their yards by planting grass sod and geraniums. They bought their supplies from the same store. Jordan spent \$151 on 3 ft² of grass sod and 11 geraniums. Marci spent \$272 on 14 ft² of grass sod and 12 geraniums. Determine the cost of one ft² of grass sod and the cost of one geranium.

A square foot of sod costs \$10 and geraniums cost \$11.

12. Olga and Maria are each improving their yards by planting geraniums and hibiscus plants. They purchased their supplies from the same store. Olga spent \$225 on four geraniums and seven hibiscus plants. Maria spent \$326 on six geraniums and ten hibiscus plants. Determine the cost of each plant.

One geranium costs \$16 and one hibiscus plant costs \$23.

13. Lisa and Shanice are selling cookie dough for a school fundraiser. Customers can buy packages of sugar cookie dough and packages of chocolate chip cookie dough. Lisa sold 5 packages of sugar cookie dough and 6 packages of chocolate chip cookie dough for a total of \$118. Shanice sold 9 packages of sugar cookie dough and 14 packages of chocolate chip cookie dough for a total of \$254. What is the cost each of one package of sugar cookie dough and one package of chocolate chip cookie dough?

One package of sugar cookie dough costs \$8 and one package of chocolate chip cookie dough costs \$13.

14. The senior classes at High School A and High School B planned separate trips to the state fair. The senior class at High School A rented and filled 13 vans and 12 buses with 540 students. High School B rented and filled 3 vans and 4 buses with 164 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

A van can carry 12 students and a bus can carry 32 students.

15. Bill and Emily are selling wrapping paper for a school fundraiser. Customers can buy rolls of plain wrapping paper and rolls of holiday wrapping paper. Bill sold 6 rolls of plain wrapping paper and 11 rolls of holiday wrapping paper for a total of \$180. Emily sold 12 rolls of plain wrapping paper and 3 rolls of holiday wrapping paper for a total of \$132. What is the cost each of one roll of plain wrapping paper and one roll of holiday wrapping paper?

One roll of plain wrapping paper costs \$8 and one roll of holiday wrapping paper costs \$12.

16. Lea and Julia each improved their yards by planting rose bushes and ivy. They bought their supplies from the same store. Lea spent \$114 on 6 rose bushes and 6 pots of ivy. Julia spent \$180 on 6 rose bushes and 12 pots of ivy. What is the cost of one rose bush and the cost of one pot of ivy?

One rose bush costs \$8 and one pot of ivy costs \$11.

17. Gerardo and Carlos are selling chocolate bars and cookies for a school fundraiser. Gerardo sold 48 chocolate bars and 120 cookies for a total of \$192. Carlos sold 60 chocolate bars and 90 cookies for a total of \$180. Determine the cost of both the chocolate bars and the cookies.

A chocolate bar costs \$1.50 and a cookie costs \$1.00.

18. The school that Kali attends is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 4 adult tickets and 4 child tickets for a total of \$64. The school took in \$179 on the second day by selling 9 adult tickets and 14 child tickets. What is the price each of one adult ticket and one child ticket?

One child ticket costs \$7 and one adult ticket costs \$9.

19. A boat traveled 72 miles each way downstream and back. The trip downstream took 4 hours. The trip back took 9 hours. What is the speed of the boat in still water? What is the speed of the current?

The speed of the boat is 13.5 mph and the speed of the current is 4.5 mph.

20. A boat traveled 84 miles each way downstream and back. The trip downstream took 4 hours. The trip back took 28 hours. What is the speed of the boat in still water? What is the speed of the current?

The speed of the boat is 12 mph and the speed of the current is 9 mph.

21. A boat traveled 220 miles each way downstream and back. The trip downstream took 11 hours. The trip back took 22 hours. Find the speed of the boat in still water and the speed of the current.

The speed of the boat is 15 mph and the speed of the current is 5 mph.

22. When you reverse the digits in a certain two-digit number you increase its value by 54. Find the number if the sum of its digits is 10.

The number is 28.

23. When you reverse the digits in a certain two-digit number you decrease its value by 27. Find the number if the sum of its digits is 15.

The number is 96.

24. When you reverse the digits in a certain two-digit number you decrease its value by 54. Find the number if the sum of its digits is 6.

The number is 60.