

## Exercise Set 2.2: Applications

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For each of the following problems:

(a) Model the situation by writing appropriate equation(s).

(b) Solve the equation(s) and then answer the question posed in the problem.

- The sum of three consecutive integers is 171. Find the three integers.
- The sum of three consecutive integers is 366. Find the three integers.
- The sum of three consecutive odd integers is 273. Find the three integers.
- The sum of four consecutive even integers is 636. Find the four integers.
- Dillan needs a 90% average in order to receive an "A" in his English class. His semester grade consists of four exams, all weighted equally. If his first three exam scores are 86, 91, and 84, what minimum score does he need on the fourth exam in order to obtain an "A" for the course?
- Hope needs an average of 80% in her Math class in order to make a "B". The grading breakdown is as follows: Exams 1 and 2 are each worth 30% of her semester grade, and Exam 3 is worth 40% of her semester grade. If her scores on the first two exams are 74 and 81, what score does she need on Exam 3 in order to make a "B" for the course?
- Maria is twice as old as Jeff, and Jeff is nine years younger than Nicole. If the average of their ages is 19, how old is Nicole?
- Julia, Brian, and Scott are comparing the number of emails that they received on a given day. If Brian received three more emails than Julia, and Scott received four times as many emails as Brian, and the total number of emails between the three of them was 63, how many emails did Scott receive?
- One-fourth of Eric's age last year plus triple his age next year is 45. How old is Eric?
- In four years, Sara will be five years less than twice her age now. How old is Sara?
- A rectangle's length is twice its width. If the perimeter of the rectangle is 168 cm, find the length of the rectangle.
- A rectangle's length is 7 inches greater than its width. If the perimeter of the rectangle is 110 inches, find its length and width.
- A right triangle has a height that is 4 times longer than its base. If the area of the triangle is 392 square meters, find the height of the triangle.
- A dog pen is three times as long as it is wide. If the total area of the pen is 432 square feet, find the length and width of the pen.
- Kim is a waitress and works 40 hours per week. She is paid at a regular hourly rate in addition to any tips that she might receive. In a given week, she earns \$214 in tips, and her total earnings for the week are \$456. Determine her regular hourly rate.
- If Michael works more than 30 hours per week, he is paid at an overtime rate which is  $1\frac{1}{2}$  times his regular hourly rate. If he works 42 hours in a given week and earns a total of \$403.20, what is his regular hourly rate?
- Susan invested a total of \$15,000 in two different accounts exactly three years ago. The first account earned 3% simple interest per year, and the second account earned 5.5% interest per year. If the total interest earned in the three-year period was \$2,010, how much did Susan invest in each account?
- If Juan invests \$8,000 at 6% per year, and invests another sum of money at 9% per year. If the interest that he receives after one year is 8% of the total invested between the two accounts, how much did he invest in the second account?
- Lisa can paint a room in four hours, and it takes Thomas seven hours to do the same job. How long will it take them to paint the room if they work together?
- Lindsay can wash the family cars in two hours, and it takes Michelle three times as long to do the same job. How long will it take them if they wash the cars together?
- Thomas collects dimes and quarters in his change jar. If he has 6 more dimes than quarters, and the total amount of money in the jar is \$34.55, find the number of each type of coin in the jar.

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22. A piggy bank contains an equal number of pennies, nickels, dimes, and quarters. If the total amount of money in the piggy bank is \$7.79, find the number of each type of coin.
23. David has 27 coins, comprised of nickels, dimes, and quarters. If he has twice as many dimes as nickels, and he has 3 more quarters than he has nickels, how much money does David have in coins?
24. Sam makes a deposit at the bank which is comprised of \$5, \$10, and \$20 bills. If the number of \$5 bills is three more than the number of \$10 bills, the number of \$20 bills is half the number of \$5 bills, and his total deposit is \$270, how many bills of each type did he deposit?
25. A tortoise and a rabbit are in a race. The tortoise begins the race from the starting line, traveling at a rate of 5 ft/min. The rabbit waits at the starting line for 40 minutes before racing after the tortoise at a rate of 85 ft/min. How long does the rabbit run before he catches up to the tortoise? (Assume that the rabbit catches up with the tortoise before they reach the finish line.)
26. Two trains are traveling from Philadelphia to Chicago on parallel tracks. The first train leaves Philadelphia at 1:00PM and is traveling at a rate of 50 mi/hr. The second train leaves Philadelphia at 2:15PM and is traveling at a rate of 60 mi/hr. At what time will the second train catch up to the first?
27. Houston and Los Angeles are 1600 miles apart from each other. One plane leaves Houston at 10AM and travels toward Los Angeles at a rate of 500 mi/hr. At the same time, another plane leaves Los Angeles and travels toward Houston at a rate of 700 mi/hr. At what time will the planes cross each other in the air?
28. Jenny and Teri live 4000 yards apart from each other on the same road. They call each other and decide to leave their respective houses immediately and begin walking toward each other to meet. If Jenny walks at a rate of 90 yd/min, and Teri walks at a rate of 70 yd/min, how long will it take for them to meet each other on the road?
29. If a trip from Smallville to Bigtown at 40 mi/hr takes 30 minutes longer than the return trip at 50 mi/hr, how far apart are Smallville and Bigtown?
30. A bicyclist traveled 250 miles in 8 hours. The first leg of his trip was on a paved road, on which he traveled for 5 hours. He then traveled the remainder of the trip on a dirt road, at a speed 10 mi/hr slower than his rate on the paved road. Find the average velocity and distance traveled on each of the two parts of his trip.
31. Eric buys chocolates for \$4/lb and buys almonds for \$6/lb. How many pounds of each would he need to buy to create a 10-pound mixture which is worth \$5.30/lb?
32. A merchant sells two types of gourmet coffee beans. Brazilian coffee sells for \$4.25/lb, and Colombian coffee sells for \$5.75/lb. How many pounds of Colombian coffee must he add to 12 pounds of Brazilian coffee to create a mixture that sells for \$4.85/lb?
33. How much 40% acid solution should be mixed with 70ml of a 10% acid solution to obtain a solution that is 15% acid?
34. Solution A is 30% saline, and solution B is 10% saline. How much of each must be mixed together to obtain 12 liters of a 25% saline solution?
35. A jeweler has a 15-gram bracelet which is 80% gold. If he melts down the bracelet, how much alloy should he add to reduce the gold content to 75%?
36. How much pure sugar should be added to 20 ounces of a 30% sugar solution to increase its sugar concentration to 50%?