

**Example 10 Application: Calculating an Average**

On an English exam, two students scored 95, five scored 86, one scored 82, one scored 78, and six scored 75. What was the average score for the class?

**Solution**

There were fifteen students in the class. We can multiply as follows rather than add all fifteen scores.

$$\begin{array}{r}
 \overset{1}{95} \\
 \times 2 \\
 \hline
 190
 \end{array}
 \quad
 \begin{array}{r}
 \overset{3}{86} \\
 \times 5 \\
 \hline
 430
 \end{array}
 \quad
 \begin{array}{r}
 82 \\
 \times 1 \\
 \hline
 82
 \end{array}
 \quad
 \begin{array}{r}
 78 \\
 \times 1 \\
 \hline
 78
 \end{array}
 \quad
 \begin{array}{r}
 \overset{3}{75} \\
 \times 6 \\
 \hline
 450
 \end{array}$$

Next, we add the five products to find the sum of all of the scores.

$$\begin{array}{r}
 \overset{3}{1} \\
 190 \\
 430 \\
 82 \\
 78 \\
 + 450 \\
 \hline
 1230 \quad \text{Sum}
 \end{array}$$

Finally, divide by 15 because the total represents 15 scores.

$$\begin{array}{r}
 \overset{82}{82} \quad \text{Average} \\
 15 \overline{)1230} \\
 \underline{-1200} \\
 30 \\
 \underline{-30} \\
 0
 \end{array}$$

The average score for the class was 82.

**Now work margin exercise 10.**

**Margin Exercise Answers**

1. 1001 visitors 2. 322 pounds 3. 120 pencils 4. \$25,125 5. \$868 6. 28 square inches 7. 21  
 8. a. Season 2 b. Season 5 c. 34 home runs 9. 29,000 people 10. 12 points

# 1.6 Exercises

## Concept Check

**Fill-in-the-Blank.** Complete each sentence using information found in this section.

- The words “product” or “double” indicate that the operation of \_\_\_\_\_ is involved.
- To find the average of a set of numbers, the first step is to \_\_\_\_\_ the given numbers.
- When solving word problems, the very first thing to do is to \_\_\_\_\_ the problem carefully.

- The words “sum” and “increased by” are keywords to indicate the problem requires \_\_\_\_\_.
- In solving word problems you should always \_\_\_\_\_ your work. Then make sure that the answer seems \_\_\_\_\_.
- “Difference” and “less than” indicate that \_\_\_\_\_ will be involved in the problem.

**True/False.** Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

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- Averages are found by performing addition and then division.
- The sum of 312 and 4 is 1248.
- The word “quotient” indicates multiplication.
- After reading a problem carefully, the next step might be to make a diagram or draw a figure.

## Applications

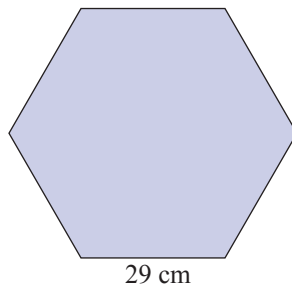
Solve.

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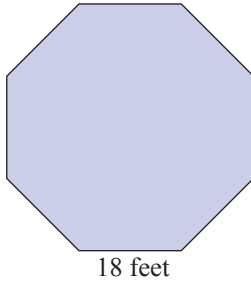
- Steven is calculating how many calories are in his lunch. He has a hamburger that has 354 calories, a medium fry that has 365 calories, and a chocolate milk shake that has 384 calories. How many total calories is his meal?
- Shawna is refurbishing her living room. She buys a sofa and loveseat set for \$1549, a coffee table for \$245, an end table for \$99, and a rug for \$479. How much did she pay for all of the items to redecorate her living room?
- Meghan is taking inventory of syringes at a clinic. She finds 240 in the first supply closet, 115 in the second supply closet, and 65 in the third supply closet. How many syringes does the clinic have in these three closets?
- Omar is filling out tax forms and needs to total his charitable donations. During the year, he donated \$234 to Goodwill, \$345 to the Red Cross, and \$260 to Child’s Play. What is the total amount of donations that Omar will report on his taxes?
- Marcus is moving from Cleveland, Ohio, to Houston, Texas, which is a 1299 mile drive. In one day, he drives 651 miles. How many more miles must he drive to reach Houston, Texas?
- Sahar is at an arcade and wins 3483 tickets. She spends 2975 of the tickets on prizes from the redemption area. How many tickets does Sahar have left?
- Tommy and Liz invited 250 people to their wedding. So far, 186 people have returned their RSVP. How many people have not sent in their RSVP?
- Kyle is reading a book that has 978 pages. He has read 382 pages so far. How many pages does Kyle need to read to finish the book?

9. A secretary is making an inventory of office supplies. She finds 12 full boxes of blue pens which have 25 pens in each box. How many pens will she indicate on the inventory?
10. Sean has a part-time job as a data entry clerk. He earns \$11 per hour and works for 22 hours each week. How much money does Sean make per week?
11. A jeweler makes a necklace that requires 128 beads. He receives an order for 6 necklaces. How many beads will he need to fulfill the order?
12. A juice bar sells fresh squeezed orange juice. To make an 8 ounce glass of orange juice, they use 4 oranges. The juice bar typically sells 86 glasses of orange juice per day. How many oranges do they typically use each day?
13. During a food drive, people donated 208 cans of baked beans. The cans of baked beans will be equally distributed to 8 food kitchens in the area. How many cans of baked beans will each food kitchen receive?
14. Isabella took out a 6 month loan for \$2700 to cover car repairs. If she makes equal monthly payments, how much will she pay towards the loan each month?
15. Sixteen families want to raise money to build a playground on an empty lot for the neighborhood children. The total cost to buy the empty lot and build the playground is \$18,800. How much money will each family need to raise if they all raise the same amount of money?
16. A homeless shelter is holding a fundraising event with a goal of \$8250 to make repairs to their building. There are 11 companies participating in the fundraiser and each company plans to raise the same amount of money. How much money does each team need to raise to reach the goal?
17. Mark bought a new bicycle for \$950. He also paid an additional \$61 in sales tax. If he traded in his old bicycle for \$320 and contributed that amount to the total for the new bicycle, how much does he owe?
18. To purchase a new dining room set for \$1200, Mrs. Steel had to pay an additional \$72 in sales tax. If she made an initial payment of \$486, how much did she still owe?
19. Jorge bought a new phone for \$250. The store had a deal that gave him \$10 off. He also bought 3 video games for \$48 each. What did he pay total for the phone and video games?
20. Vivian is shopping for groceries. She estimates that the total of the groceries will be \$140. She has \$8 worth of coupons to cash in. While in the checkout line, she also decides to purchase two magazines, which cost \$3 each. How much will Vivian pay upon checkout?
21. To purchase a new refrigerator for \$1200 including tax, Mr. Kline paid \$240 down and the remainder in six equal monthly payments. What were his monthly payments?
22. To purchase a new 47-inch LED flat screen tv with a surround sound system that sells for \$1300 including tax, Mr. Daley paid \$200 down and the remainder in five equal monthly payments. How much were his monthly payments?

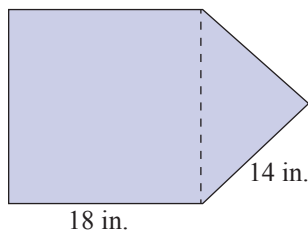
23. For a class in statistics, Anthony bought a new graphing calculator for \$95, special graphing paper for \$8, a USB flash drive for \$10, a textbook for \$105, and a workbook for \$37. How much did he spend for this class?
24. Lynn decided to take up surfing. She bought a new surfboard for \$675, a wet suit for \$130, a beach towel for \$12, and a new swimsuit for \$57. How much money did she spend? (Sales tax was included in the prices.)
25. Pat needed art supplies for a new course at the local community college. She bought a portfolio for \$32, a zinc plate for \$44, etching ink for \$12, and three sheets of rag paper for a total of \$6. She received a student discount of \$9. How much did she spend on art supplies?
26. Michael is purchasing supplies for his upcoming classes. He buys a textbook for \$180, a calculator for \$90, a pack of pens for \$5, and four notebooks for a total of \$11. The bookstore is offering a discount of \$20 off when students spend at least \$200. How much did Michael's supplies cost?
27. Paula is training for a marathon and decided to buy some new clothes. She bought a pair of running shoes for \$84, two pairs of socks for \$5 a pair, one pair of shorts for \$26, and two shirts for \$15 each. If taxes are included in the prices, how much did she spend?
28. Miguel decided to go shopping for school clothes before college started in the fall. How much did he spend if he bought four pairs of pants for \$21 per pair, five shirts for \$18 each, three pairs of socks for \$4 a pair, and two pairs of shoes for \$38 a pair?
29. Alan wants to buy a new car. He could buy a red one for \$8500 plus \$510 in sales tax and \$135 in fees, or he could buy a blue one for \$8700 plus \$522 in sales tax and \$140 in fees. If the manufacturer is giving a \$250 rebate on the blue model, which car would be cheaper for Alan? How much cheaper would it be?
30. Alexis is looking to join a gym with classes and personal training for one year. Gym 1 charges \$90 to activate the membership, then charges \$350 for the year for membership (including classes and personal training), and an additional \$28 in taxes and fees. Gym 2 has no membership activation charge, but costs \$380 for membership for the year, \$75 for classes and personal training, and \$21 in taxes and fees. Which gym membership will be cheaper for Alexis? How much cheaper will it be for the year-long membership?
31. A regular hexagon is a six-sided figure with all six sides equal and all six angles equal. Find the perimeter of a regular hexagon with one side of 29 centimeters.



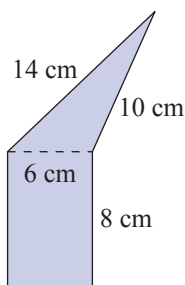
32. A regular octagon is an eight-sided figure with all eight sides equal and all eight angles equal. Find the perimeter of a regular hexagon with one side of 18 feet.



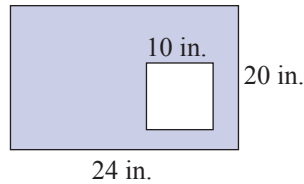
33. An isosceles triangle (two sides equal) is placed on one side of a square as shown in the figure. If each of the two equal sides of the triangle is 14 inches long and the square is 18 inches on each side, what is the perimeter of the figure?



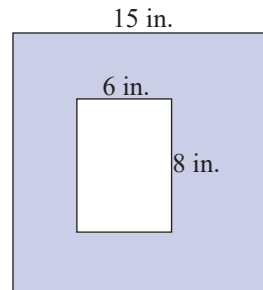
34. A scalene triangle (no sides equal) is placed on one side of a rectangle. The three sides of the triangle are 6 centimeters, 10 centimeters, and 14 centimeters, and the rectangle has a width of 6 centimeters and a length of 8 centimeters. Find the perimeter of the figure.



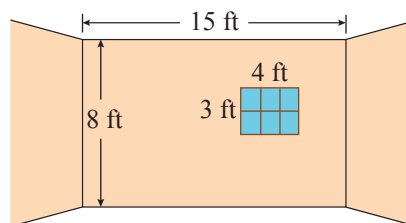
35. A square that is 10 inches on a side is placed inside a rectangle that has a width of 20 inches and a length of 24 inches. What is the area of the region inside the rectangle that surrounds the square? (Find the area of the shaded region in the figure.)



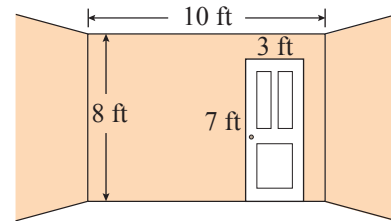
36. A rectangle that has a width of 6 inches and a height of 8 inches is placed inside of a square that has a side length of 15 inches. What is the area of the region inside the square that surrounds the rectangle? (Find the area of the shaded region in the figure.)



37. Except for the window space that is cut into the wall, one wall in a room is to be painted a light tan color. The wall is 8 feet by 15 feet and the window is 3 feet by 4 feet. There are two other walls that are 8 feet by 15 feet that are to be painted the same color. What is the total area of the three walls that are to be painted?



38. One wall of a room is 8 feet by 10 feet and a rectangular door 3 feet by 7 feet is to be cut in the wall. The remainder of the wall is to be wallpapered. There are three other walls in the room that are 8 feet by 10 feet and these are also to be wallpapered. What is the total area that is to be wallpapered?



Find the average of each set of numbers. See Example 7.

- |                        |                            |
|------------------------|----------------------------|
| 39. 56, 64, 38, 58     | 42. 436, 520, 630, 422     |
| 40. 102, 113, 97, 100  | 43. 6, 7, 8, 4, 4, 5, 8, 6 |
| 41. 512, 618, 332, 478 | 44. 5, 4, 5, 6, 5, 8, 9, 6 |

Solve.

45. The Lee family spent the following amounts for groceries: \$338 in June; \$307 in July; \$318 in August. What was the average amount they spent for groceries in these three months?
46. If Rina's cell phone bills for the past five months have been \$56, \$63, \$52, \$85, and \$49, what was her average cell phone bill for the past 5 months?
47. In one month, an airline pilot spent the following number of hours in preparation for and flying each of 12 flights: 6, 8, 9, 6, 7, 7, 7, 5, 6, 6, 6, and 11 hours. What was the average amount of time the pilot spent per flight?
48. Over one week, a hospital had the following number of patients in the ICU (intensive care unit) each day: 22, 19, 23, 19, 17, 21, 19. What was the average number of patients in the ICU each day during the week?
49. Bill wanted to compare car insurance rates to find out the average amount he should pay for car insurance. If he looked at four different companies and the monthly rates were \$164, \$107, \$131, and \$98, what is the average monthly rate of car insurance?
50. A salesman sold items from his sales list for \$972, \$834, \$1005, \$1050, and \$799. What was the average price per item?
51. During a sports trivia game, one team scored 35 points, three teams scored 23 points, two teams scored 18 points, and two teams scored 14 points. What was the average score of the teams?
52. On a history exam, two students scored 95, six scored 90, three scored 80, and one scored 50. What was the class average?
53. Ms. Lee bought 150 shares of stock at \$75 per share. Two months later, she bought another 100 shares at \$79 per share. What average price per share did she pay? If she sold all 250 shares at \$77 per share, what was her profit?
54. Three families, each with two children, had incomes of \$56,000. Two families, each with four children, had incomes of \$62,000. Four families, each with two children, had incomes of \$45,000. One family had no children and an income of \$37,000. What was the average income per family?

55. Lacie owns a shoe store. During the first week of a month, Lacie sold 41 pairs of shoes and received two shipments, one with 26 pairs of shoes and one with 10 pairs of shoes. During the second week of the month, Lacie received a shipment of 20 pairs of shoes and sold 35 pairs of shoes. During the third week of the month, Lacie sold 38 pairs of shoes and received two shipments, one with 22 pairs of shoes and one with 19 pairs of shoes. During the final week of the month, Lacie received three shipments, one with 16 pairs of shoes, one with 24 pairs of shoes, and one with 14 pairs of shoes, and she sold 29 pairs of shoes.
- What was the average weekly difference between Lacie's shipments and her sales?
  - What was Lacie's inventory at the end of the month if she began the month with an inventory of 246 pairs of shoes?
56. During July, Mr. Rodriguez made deposits in his checking account of \$400 and \$750 and wrote checks totaling \$625. During August, his deposits were \$632, \$322, and \$798, and his checks totaled \$978. In September, his deposits were \$520, \$436, \$200, and \$376, and his checks totaled \$836.
- What was the average monthly difference between his deposits and his withdrawals?
  - What was his bank balance at the end of September if he had a balance of \$500 on July 1?
57. The five longest rivers in the world are given in the following table. What is the average length of these rivers?

Five Longest Rivers  
in the World

River	Length (miles)
Nile	4132
Amazon	3980
Yangtze	3917
Mississippi/Missouri	3902
Yenisei	3434

58. The 10 largest cities in South Carolina have the following approximate populations. What is the average population of these cities?

10 Largest Cities in South Carolina

City	Population
Charleston	141,931
Columbia	128,386
North Charleston	122,297
Mount Pleasant	97,129
Rock Hill	76,818
Greenville	75,993
Summerville	54,993
Goose Creek	46,194
Hilton Head Island	39,930
Sumter	39,768

Source: "Cities in South Carolina by Population (2022)",  
World Population Review, Accessed 5 April 2022,  
[worldpopulationreview.com](http://worldpopulationreview.com).

## Writing & Thinking

59. State the basic strategy for solving word problems.
60. Make up three word problems that include keywords to indicate operations such as addition, subtraction, multiplication, and division. Underline the keywords.
61. Give an example where you might use average (other than in a class).
62. Discuss how you used mathematics to solve some problem in your life this week. (You know you did!)