6.7 Exercises

Concept Check

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

1. Once an application problem has been read and understood, you should assign a _____ to the _____ quantities.
2. After an application problem has been solved, it is important to _____ the solution with the problem to make sure the answer makes sense.
3. Even integers are _____ if each is 2 more than the previous even integer.
4. The formula (or equation) related to the Pythagorean Theorem is _____.
5. Integers are consecutive if each is ___ more than the previous integer.
6. Two consecutive odd integers can be represented by n and ____.

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.)

7. The Pythagorean Theorem states that if the two legs of a right triangle are added, the sum will equal the hypotenuse.
8. The expressions n, $n + 1$, and $n + 2$ can represent three consecutive integers.
9. The Pythagorean Theorem can be used with any triangle.
10. The three numbers -10, -8, and -6 are consecutive even integers.

Applications

Write a quadratic equation for each of the following word problems. Then solve the word problem. Remember to check each solution with the wording of the original problem to make sure it is reasonable. See Examples 1 through 7.

1. One number is eight more than another. Their product is -16. What are the numbers?
2. One number is 10 more than another. If their product is -25, find the numbers.
3. The square of an integer is equal to seven times the integer. Find the integer.
4. The square of an integer is equal to twice the integer. Find the integer.
5. If the square of a positive integer is added to three times the integer, the result is 28. Find the integer.
6. If the square of a positive integer is added to three times the integer, the result is 54. Find the integer.
7. One number is three more than another. Their product is 40. Find the numbers.
8. One positive number is three more than twice another. If the product is 27, find the numbers.

9. One positive number is five more than another. The sum of their squares is 53. What are the numbers?

10. One number is five less than another. The sum of their squares is 97. Find the numbers.

11. The difference between two positive integers is 4. If the smaller is added to the square of the larger, the sum is 38. Find the integers.

12. One positive number is 3 more than twice another. If the square of the smaller is added to the larger, the sum is 51. Find the numbers.

13. The product of a negative integer and 5 less than twice the integer equals the integer plus 56. Find the integer.

14. Find a positive integer such that the product of the integer with a number three less than the integer is equal to the integer increased by 32.

15. The product of two consecutive positive integers is 72. Find the integers.

16. Find two consecutive integers whose product is 110.

17. Find two consecutive positive integers such that the sum of their squares is 85.

18. Find two consecutive positive integers such that the sum of their squares is 145.

19. The product of two consecutive odd integers is 63. Find the integers.

20. The product of two consecutive even integers is 80. Find the integers.

21. Find two consecutive positive integers such that the square of the second integer added to four times the first is equal to 41.

22. Find two consecutive negative integers such that 6 times the first plus the square of the second equals -14.

23. Find three consecutive positive integers such that twice the product of the two smaller integers is 88 more than the product of the two larger integers.

24. Find three consecutive odd integers such that the product of the first and third is 1 more than 4 times the second.

25. Four consecutive integers are such that, if the product of the first and third is multiplied by 6, the result is equal to the sum of the second and the square of the fourth. What are the integers?

26. Find four consecutive even integers such that the square of the sum of the first and second is equal to 60 less than twice the product of the third and fourth.

27. The length of a rectangle is twice the width. The area is 72 square inches. Find the length and width of the rectangle.

28. The length of a rectangle is three times the width. If the area is 147 square centimeters, find the length and width of the rectangle.

29. The length of a rectangle is four times the width. If the area is 64 square feet, find the length and width of the rectangle.

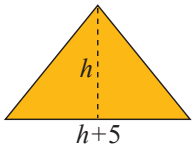
30. The length of a rectangle is five times the width. If the area is 180 square inches, find the length and width of the rectangle.

31. The width of a rectangle is 4 feet less than the length. The area is 45 square feet. Find the length and width of the rectangle.

32. The length of a rectangular yard is 3 meters greater than the width. If the area of the yard is 54 square meters, find the length and width of the yard.

33. The height of a triangle is 4 feet less than the base. The area of the triangle is 16 square feet. Find the length of the base and the height of the triangle.

34. The base of a triangle exceeds the height by 5 meters. If the area is 12 square meters, find the length of the base and the height of the triangle.



35. The base of a triangle is 6 inches greater than the height. If the area is 20 square inches, find the length of the base.

36. The base of a triangle is 3 feet less than the height. The area is 9 square feet. Find the height.

37. The perimeter of a rectangle is 32 inches. The area of the rectangle is 48 square inches. Find the dimensions of the rectangle.

38. The area of a rectangle is 24 square centimeters. If the perimeter is 20 centimeters, find the length and width of the rectangle.

39. An orchard has 140 apple trees. The number of rows exceeds the number of trees per row by 13. How many trees are there in each row?

40. One formation for an army drill team is rectangular. The number of members in each row exceeds the number of rows by 3. If there is a total of 108 members in the formation, how many rows are there?

41. A theater can seat 144 people. The number of rows is 7 less than the number of seats in each row. How many rows of seats are there?

42. An empty field on a college campus is being used for overflow parking for a football game. It currently has 187 cars in it. If the number of rows of cars is six less than the number of cars in each row, how many rows are there?

43. The parking garage at Baltimore-Washington International Airport contains 8400 parking spaces. The number of cars that can be parked on each floor exceeds the number of floors by 1675. How many floors are there in the parking garage?

44. One bookshelf in the public library can hold 175 books. The number of books on each shelf exceeds the number of shelves by 18. How many books are on each shelf?

45. The length of a rectangle is 7 centimeters greater than the width. If 4 centimeters are added to both the length and width, the new area would be 98 square centimeters. Find the dimensions of the original rectangle.

46. The width of a rectangle is 5 meters less than the length. If 6 meters are added to both the length and width, the new area will be 300 square meters. Find the dimensions of the original rectangle.

47. Susan is going to fence in a rectangular flower garden in her back yard. She has 50 feet of fencing, and she plans to use the house as the fence on one side of the garden. If the area is 300 square feet, what are the dimensions of the flower garden?

48. A rancher is going to build a corral with 52 yards of fencing. He is planning to use the barn as one side of the corral. If the area is 320 square yards, what are the dimensions?

49. A telephone pole is to have a guy wire attached to its top and anchored to the ground at a point that is at a distance 34 feet less than the height of the pole from the base. If the wire is to be 2 feet longer than the height of the pole, what is the height of the pole?

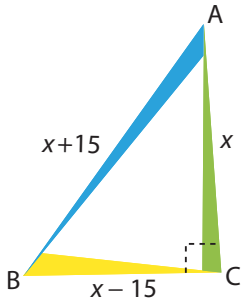
50. Lucy is standing next to the the General Sherman tree in Sequoia National Park, home of some of the largest trees in the world. The distance from Lucy to the base of the tree is 71 meters less than the height of the tree. If the distance from Lucy to the top of the tree is 1 meter more than the height of the tree, how tall is the General Sherman?

51. A Christmas tree is supported by a wire that is 1 foot longer than the height of the tree. The wire is anchored at a point whose distance from the base of the tree is 49 feet shorter than the height of the tree. What is the height of the tree?

52. An architect wants to draw a rectangle with a diagonal of 13 inches. The length of the rectangle is to be 2 inches more than twice the width. What dimensions should she make the rectangle?

53. Incline mats, or triangle mats, are offered with different levels of incline to help gymnasts learn basic moves. As the name may suggest, two sides of the mat are right triangles. If the height of the mat is 28 inches shorter than the length of the mat and the hypotenuse is 8 inches longer than the length of the mat, what is the length of the mat?

54. Bill uses mirrors to augment the "laser experience" at a laser show. At one show, he places three mirrors, A, B, C, in a right triangular form. If the distance between A and B is 15 m more than the distance between A and C, and the distance between B and C is 15 m less than the distance between A and C, what is the distance between mirror A and mirror C?



55. A support wire is attached x feet from the top of a 17-foot pole to protect the pole during a blizzard. The other end of each wire is attached to a stake x feet from the base of the pole. The wire used is 13 feet long.

a. Draw a diagram to describe the situation. Be sure to label the figure with the known information.

b. Use the Pythagorean Theorem to write an equation that describes the situation. Do not simplify.

c. Simplify the equation from part b. and solve for x.

d. Do both solutions from part b. make sense in this situation? That is, do they both result in a positive distance on the pole and a positive distance from the pole?

e. What do the answers from part b. mean? (You should have two answers.)

f. Which answer from part d. seems like the better option? Write an explanation for your choice.

56. A family wants to fence in a rectangular area of their yard next to the house so their dog can play outside without being on a leash. One side of the fenced-in area will be along the side of the house, so they will only need to fence in three sides. The family decides to fence in an area of 4000 square feet and they purchase 180 feet of fencing. What are the dimensions of the fenced in area?

- **a.** Draw a diagram to represent the situation. Use the variable x to label the two sides of the fence which will have the same length.
- **b.** Write an expression involving x to represent the length of the third side of the fence.
- **c.** Write an equation to represent the area of the fenced-in yard.
- **d.** Solve the equation from part c.
- **e.** Do both solutions make sense in the context of the problem?
- **f.** What are the possible dimensions of the fenced-in yard?

The **demand** for a product is the number of units of the product x that consumers are willing to buy when the market price is p dollars. The consumers' **total expenditure** for the product S is found by multiplying the price times the demand. $(S = px)$ Solve the following consumer demand questions.

57. During the summer at a local market, a farmer will sell $8p + 588$ pounds of peaches at p dollars per pound. If he sold \$900 worth of peaches this summer, what was the price per pound of the peaches?

58. On a hot afternoon, fans at a stadium will buy $490 - 40p$ drinks for p dollars each. If the total sales after a game were \$1225, what was the price per drink?

59. When fishing reels are priced at p dollars, local consumers will buy $36 - p$ fishing reels. What is the price if total sales were \$320?

60. A manufacturer can sell $100 - 2p$ lamps at p dollars each. If the receipts from the lamps total \$1200, what is the price of the lamps?

Writing & Thinking

61. The pattern in Kara's linoleum flooring is in the shape of a square 8 inches on a side with right triangles (with legs whose lengths are x inches) placed on each side of the original square so that a new larger square is formed. What is the area of the new square? Explain why you do not need to find the value of x.