Factoring Word Problems

Math 10 · Mr. Merrick · November 17, 2025

Directions. Translate each problem into an equation and solve *by factoring*.

A. One-Number Quadratics

1. Find a number whose square is 16 more than 6 times the number.

2. Find a number whose square is 30 less than 11 times the number.

3. The square of a number is 18 more than 7 times the number.

4. The sum of a number and its square is 56.

5. The product of a number and 9 more than itself is 136.

6. A number *subtracted from its square* equals 72.

7. Twice a number equals 3 less than its square.

8. The square of a number is 63 more than 2 times the number.

9. The square of a number is 9 less than 10 times the number.

10. The product of a number and 10 less than itself equals 56.

B. Consecutive Integers

11. Find two consecutive integers whose product is 306.

12. The sum of the squares of two consecutive integers is 421.

13. Find two consecutive even integers whose product is 528.

14. Find two consecutive odd integers whose product is 399.

15. The larger of two consecutive integers has a square 61 more than the square of the smaller. Find the integers.

16. Two consecutive even integers have sum 74. Find them.

17. Two consecutive odd integers have sum 116. Find them.

18. The product of three consecutive integers is 990. Find them. (You *do not* need to be able to factor a degree 3 polynomial at this time.)

C. Two-Number (Sum/Difference/Product)

19. The product of two numbers is 180, and their sum is 27. Find the numbers.

20. The product of two numbers is 128, and their difference is 8.

21. The product of two numbers is 168, and their sum is 29.

22. Two numbers differ by 4, and their product is 320.

23. The product of two consecutive even integers is 288. Find them.

24. The product of two consecutive odd integers is 483. Find them.

25. The sum of two numbers is 26, and the sum of their squares is 340. Find the numbers.

26. The sum of two numbers is 31, and their product is 210. Find the numbers.

D. Rectangles (Area and Perimeter)

27. The length of a rectangle is 5 m more than its width. If the area is 204 m^2, find its dimensions.

28. The area of a rectangle is 252 cm^2, and the length is 9 cm more than the width.

29. A rectangle has area 336 m^2. The length is 4 m greater than twice the width.

30. The length is 3 m less than twice the width. The area is 135 m^2.

31. The length is 6 m more than the width. The perimeter is 52 m.

32. A rectangle has perimeter 70 m. The length is 9 m more than the width.

33. The length is 4 m less than three times the width. The area is 532 m^2.

34. The area is 168 m^2, and the length is 2 m greater than the width.

E. Frames, Borders, and Walkways (Uniform Width)

35. A photo 18 cm $\times$ 12 cm is mounted with a uniform border of width x. If the total area is 432 cm^2, find x.

36. A poster 24 in $\times$ 16 in has a frame of width x; the outside dimensions are 30 in $\times$ 22 in. Find x.

37. A garden 20 m $\times$ 16 m has a walkway of width x so that the walkway area equals 252 m^2. Find x.

38. A rectangular pool is 12 m $\times$ 8 m. A deck of width x surrounds it. If the deck area equals the pool area, find x.

39. A picture 25 cm $\times$ 20 cm is framed with uniform width x so that the frame alone has area 306 cm^2. Find x.

40. A square patio of side s is surrounded by a uniform border of width x so that the border area equals *three times* the patio area. Express x in terms of s and evaluate for $s = 10$ m.

41. A rectangular lawn 18 m $\times$ 15 m is bordered by a strip of width x so that the border area is 148 m^2. Find x.

42. A rug 12 ft $\times$ 9 ft sits centered in a room; the uncovered floor (uniform margin) has area 162 ft^2. Find the margin width x.

F. Area Change by Adding/Removing Strips

43. A square garden's side is increased by 3 m, and the area increases by 129 m^2. Find the original side.

44. A square's side is decreased by 5 cm, and the area decreases by 95 cm^2. Find the original side.

45. A rectangular field 24 m $\times$ 10 m is reduced by fencing off a strip of width x along one long side and one short side. The remaining area is 176 m^2. Find x.

46. A rectangle 30 m $\times$ 20 m is enlarged by adding x to *each dimension* so that the new area is 936 m^2. Find x.

G. Triangles (Base–Height Relationships)

47. The base of a triangle is 3 cm more than twice its height. If the area is 76 cm^2, find base and height.

48. The base exceeds the height by 7 cm, and the area is 99 cm^2.

49. The base is 5 cm less than three times the height. The area is 56 cm^2.

50. The height is 4 cm more than the base; the area is 96 cm^2.

H. Numbers with Reciprocals (Factorable)

51. The sum of a number and its reciprocal is $\frac{13}{6}$. Find the number(s).

52. A number equals its reciprocal. Find the number(s).

53. The sum of a number and its reciprocal is $\frac{5}{2}$. Find the number(s).

I. Mixed Quick Practice (All Factorable)

54. The square of a number is 48 more than twice the number.

55. A number times 7 more than itself is 120.

56. The square of a number is 100 less than 25 times the number.

57. The product of two consecutive integers is 380.

58. The product of two consecutive even integers is 960.

59. The product of two consecutive odd integers is 783.

60. The area of a rectangle is 308 m^2. The length is 8 m more than the width.

61. A park 40 m $\times$ 24 m is expanded by a uniform strip x so the new area is 1380 m^2. Find x.

62. A kiosk 12 ft $\times$ 10 ft is surrounded by a walkway of width x so that the walkway area equals 168 ft^2. Find x.

63. Two positive numbers differ by 5, and their product is 234. Find the numbers.