

Find two integers with the given sum and product.

	Example	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Sum	$5 = 4 + 1$	5	7	-6	-6	8	10	-9	-11	-10	12
Product	$4 = 4 \cdot 1$	6	6	8	9	15	16	18	24	24	32

For each trinomial tell which two factors of the constant term have a sum equal to the coefficient of the linear term.

Sample $x^2 - 13x + 22$

Solution $(-2)(-11) = 22$ and $-2 + (-11) = -13$
 $\therefore -2$ and -11 are the correct factors. **Answer**

14. $x^2 + 8x + 7$

15. $z^2 - 6z + 5$

16. $p^2 - 5p + 6$

17. $y^2 + 7y + 12$

18. $c^2 - 15c + 14$

19. $u^2 + 11u + 18$

20. $r^2 + 9r + 20$

21. $s^2 - 12s + 20$

22. $x^2 - 14x + 24$

23. $y^2 + 25y + 24$

24. $x^2 + 11x + 28$

25. $n^2 - 17n + 30$

Written Exercises

Factor. Check by multiplying the factors. If the polynomial is not factorable, write *prime*.

A 1. $x^2 + 5x + 4$

2. $z^2 + 9z + 8$

3. $r^2 - 6r + 8$

4. $c^2 - 10c + 16$

5. $y^2 - 9y + 14$

6. $p^2 - 14p + 13$

7. $q^2 + 16q + 15$

8. $n^2 + 10n + 21$

9. $a^2 - 15a + 26$

10. $s^2 - 12s + 40$

11. $x^2 + 20x + 36$

12. $z^2 + 16z + 39$

13. $u^2 + 12u + 28$

14. $x^2 - 22x + 72$

15. $42 - 23k + k^2$

16. $64 - 20s + s^2$

17. $75 + 20r + r^2$

18. $75 + 27u + u^2$

Sample $x^2 - 10xy + 21y^2$

Solution $x^2 - 10xy + 21y^2 = (x - ?)(x - ?)$
 $= (x - 3y)(x - 7y)$

Check: $(x - 3y)(x - 7y) = x^2 - 3xy - 7xy + 21y^2$
 $= x^2 - 10xy + 21y^2$

19. $p^2 + 19pq + 34q^2$

20. $a^2 + 10ab + 24b^2$

21. $c^2 - 16cd + 48d^2$

22. $x^2 - 15xy + 72y^2$

23. $u^2 - 50uv + 49v^2$

24. $h^2 - 14hk + 49k^2$

25. $x^2 - 16xy + 45y^2$

26. $m^2 + 20mn + 51n^2$

27. $a^2 + 17ab + 52b^2$

28. $p^2 + 20pq + 50q^2$

29. $r^2 - 15rs + 54s^2$

30. $a^2 - 12ab + 27b^2$

Factor. Check by multiplying the factors.

- B** 31. $y^2 + 20yz + 91z^2$ 32. $w^2 + 20wm + 96m^2$ 33. $124 - 35y + y^2$
34. $108 - 24y + y^2$ 35. $112a^2 - 22ab + b^2$ 36. $117x^2 - 22xy + y^2$

Find all the integral values of k for which the trinomial can be factored.

Sample $x^2 + kx + 28$

Solution 28 can be factored as a product of two integers in these ways:

(1)(28)	(-1)(-28)
(2)(14)	(-2)(-14)
(4)(7)	(-4)(-7)

The corresponding values of k are 29, 16, 11, -29, -16, and -11. **Answer**

37. $y^2 + ky + 14$ 38. $x^2 + kx + 10$ 39. $z^2 + kz + 12$
40. $p^2 + kp + 18$ 41. $n^2 + kn + 9$ 42. $r^2 + kr + 20$

Find all *positive* integral values of k for which the trinomial can be factored.

43. $n^2 + 6n + k$ 44. $z^2 + 7z + k$
45. $y^2 + 8y + k$ 46. $x^2 + 9x + k$

Factor completely.

- C** 47. $(y + 2)^2 - 6(y + 2) + 5$ 48. $(t + 3)^2 + 8(t + 3) + 15$
49. $(y + 3)^2 + 6(y + 3) + 9$ 50. $z^6 - 17z^4 + 16z^2$
51. $x^4 - 5x^2 + 4$ 52. $r^4 - 29r^2 + 100$
53. $t^5 - 20t^3 + 64t$ 54. $(a - 4)^2 + 5(a - 4)(a + 2) + 6(a + 2)^2$
55. Factor $a^{2n} - 30a^n b^{2n} + 209b^{4n}$, where n is a positive integer.
56. Factor $p^{4n} - 30p^{2n}q^n + 221q^{2n}$, where n is a positive integer.

Mixed Review Exercises

Solve.

- | | | |
|-------------------------|--------------------------|--------------------|
| 1. $-13 + x = -9$ | 2. $d + (-5) = -6$ | 3. $-15 + b = 8$ |
| 4. $n + 2 = 3 - 6 $ | 5. $19m = 76$ | 6. $3p + 18 = -72$ |
| 7. $-\frac{1}{2}x = 12$ | 8. $\frac{r}{3} - 4 = 5$ | 9. $-21x = 252$ |

Simplify.

10. $(5y + 7)(5y - 7)$ 11. $(2xy^3)^3$ 12. $(2x^2)^6$