

1. $y - 9x$
 y is a **term**

3. $5yz^2$
 y is a **factor**

5. $y - 4z$
 y is a **term**

Write each polynomial in standard form and give the degree.
 Identify those that are monomials, binomials and trinomials.

7. $5x - 2$
 It is already in standard form. Since it has two separate, it is a binomial. The highest power is 1, namely $5x^1$, so the degree of the polynomial is 1.

9. To write $2 + z^2 - 6z$ in standard form, write the term with the highest power first, and work down to the lowest power.
 Standard form: $z^2 - 6z + 2$
 There are three separate terms, so it is a trinomial. Since the highest power is 2, the trinomial is of degree 2.

11. $x^2 - 3x^3 + 3x^5$ in standard form is:
 $3x^5 - 3x^3 + x^2$
 Since it has three separate terms, it is a trinomial. The degree is 5.

13. $3y^{12} - 7z^{14}$
 Since the z term has the **highest** power, we write that term first.
 $-7z^{14} + 3y^{12}$. There are two terms, so it is a binomial with degree **14**.

15. $-9k^2 - k^4$
 Standard form: $-k^4 - 9k^2$
 Binomial with degree **4**.

17. $8a + 3b - 6ab + 7a - 10b$
 Combine like terms:
 $(8a + 7a) + (3b - 10b) - 6ab$
 $15a - 7b - 6ab$

19. $6x^3 - 4x^2 + 6x^3 - 4x^2$
 $(6x^3 + 6x^3) + (-4x^2 - 4x^2)$
 $12x^3 - 8x^2$

21. $x^2 + x^2$
 $1x^2 + 1x^2$
 $2x^2$

$$23. -3x^6 + 7x^5 - 4x^6 + x^5$$

$$(-3x^6 - 4x^6) + (7x^5 + x^5)$$

$$-7x^6 + 8x^5$$

$$25. (-2xy + 3x - 7y) - (5xy - 20x + y)$$

Before you can group like terms together, you must clear the parenthesis. Distribute the negative sign in front of the parentheses.

$$-2xy + 3x - 7y - 5xy + 20x - y$$

$$(-2xy - 5xy) + (3x + 20x) + (-7y - y)$$

$$-7xy + 23x - 8y$$

$$27. x^8 - x^8 = 0$$

Any number minus itself is 0.

$$29. x^2 + x^2 = 2x^2$$

$$31. 3(x^2 - 2x + 1) + 2(x^2 + 4x - 6)$$

Distribute to remove the parentheses.

$$3x^2 - (3)(2)x + (3)(1) + 2x^2 + (2)(4)x - (2)(6)$$

$$3x^2 - 6x + 3 + 2x^2 + 8x - 12$$

$$3x^2 + 2x^2 - 6x + 8x + 3 - 12$$

$$5x^2 + 2x - 9$$

$$33. x^{20} - x^{20}$$

$$1x^{20} - 1x^{20}$$

$$0$$

$$35.$$

$$5(-4y^2 + 7y + 2) - 4(-3y^2 - 2y - 8)$$

$$-20y^2 + 35y + 10 + 12y^2 + 8y + 32$$

$$-20y^2 + 12y^2 + 35y + 8y + 10 + 32$$

$$-8y^2 + 43y + 42$$

$$37.$$

$$-2(-4x^2 + 7x - 7) - 12(-x^2 - 8x - 2)$$

$$8x^2 - 14x + 14 + 12x^2 + 96x + 24$$

$$8x^2 + 12x^2 - 14x + 96x + 14 + 24$$

$$20x^2 + 82x + 38$$

$$39. \begin{array}{l} a^2b^2(a + b) \\ (a^2b^2)(a) + (a^2b^2)(b) \\ a^3b^2 + a^2b^3 \end{array}$$

These are not **like** terms, so they may not be simplified any further. Remember, they must match EXACTLY to be like terms!

$$41. \begin{array}{l} x - (3x^3 + x) \\ x - 3x^3 - x \\ -3x^3 + x - x \\ -3x^3 + 0 \\ -3x^3 \end{array}$$

43. If the revenue is in terms of the number of software packages sold, and the cost is in number of software packages sold, then profit is also in the number of packages sold. Let the x represent the number of software packages.

The **revenue** equation: $-x^2 + 20x$

The **cost** equation: $5x + 1000$

Profit = **Revenue** - **Cost**

Profit = $-x^2 + 20x - (5x + 1000)$

Profit = $-x^2 + 20x - 5x - 1000$

Profit = $-x^2 + 15x - 1000$

$$45. \begin{array}{l} \text{Rocket 1: } -18t^2 + 74t + 10 \\ \text{Rocket 2: } -13t^2 + 36t + 8 \end{array}$$

Different in the height of the two rockets:

Rocket 1 - **Rocket 2**

$$-18t^2 + 74t + 10 - (-13t^2 + 36t + 8)$$

$$-18t^2 + 74t + 10 + 13t^2 - 36t - 8$$

$$-18t^2 + 13t^2 + 74t - 36t + 10 - 8$$

$$-5t^2 + 38t + 2$$

$$47. \begin{array}{l} (5x^3 - 9x^2 + 2x - 8) - 3(2x^3 - 8x^2 - 3x + 4) \\ 5x^3 - 9x^2 + 2x - 8 - 6x^3 + 24x^2 + 9x - 12 \\ 5x^3 - 6x^3 - 9x^2 + 24x^2 + 2x + 9x - 8 - 12 \\ -x^3 + 15x^2 + 11x - 20 \end{array}$$

$$49. \begin{array}{l} 2(x^3 + x^2 - x + 1) - 5(x^3 + x^2 - x + 1) \\ 2x^3 + 2x^2 - 2x + 2 - 5x^3 - 5x^2 + 5x - 5 \\ 2x^3 - 5x^3 + 2x^2 - 5x^2 - 2x + 5x + 2 - 5 \\ -3x^3 - 3x^2 + 3x - 3 \end{array}$$

51.

$$\frac{1}{2}x^2 + \frac{1}{4}x + \frac{2}{3}x^2 + \frac{3}{5}x$$

$$(\frac{1}{2}x^2 + \frac{2}{3}x^2) + (\frac{1}{4}x + \frac{3}{5}x)$$

$$((\frac{3}{3})\frac{1}{2}x^2 + (\frac{2}{2})\frac{2}{3}x^2) + ((\frac{5}{5})\frac{1}{4}x + (\frac{4}{4})\frac{3}{5}x)$$

$$(\frac{3}{6}x^2 + \frac{4}{6}x^2) + (\frac{5}{20}x + \frac{12}{20}x)$$

$$(\frac{3+4}{6}x^2) + (\frac{5+12}{20}x)$$

$$\frac{7}{6}x^2 + \frac{17}{20}x$$

53.

$$\frac{3}{4}y^3 + \frac{3}{8}z + \frac{1}{8}y^3 - \frac{1}{6}z$$

$$= \frac{3}{4}y^3 + \frac{1}{8}y^3 + \frac{3}{8}z - \frac{1}{6}z$$

$$= (\frac{3}{4})(\frac{8}{8})y^3 + (\frac{1}{8})(\frac{4}{4})y^3$$

$$+ (\frac{3}{8})(\frac{6}{6})z - (\frac{1}{6})(\frac{8}{8})z$$

$$= (\frac{24}{32})y^3 + (\frac{4}{32})y^3 + (\frac{18}{48})z - (\frac{8}{48})z$$

$$= (\frac{28}{32})y^3 + (\frac{10}{48})z$$

$$= (\frac{2 \cdot 2 \cdot 7}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2})y^3 + (\frac{2 \cdot 5}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3})z$$

$$= \frac{7}{8}y^3 + \frac{5}{24}z$$

55.

$$\begin{aligned}
 & \left(\frac{1}{9}\right)r^4 - \left(\frac{3}{18}\right)r^4 - \left(\frac{1}{2}\right)r^2 + \left(\frac{3}{4}\right)r^2 \\
 &= \left(\frac{1}{9}\right)\left(\frac{2}{2}\right)r^4 - \left(\frac{3}{18}\right)r^4 - \left(\frac{1}{2}\right)\left(\frac{2}{2}\right)r^2 \\
 &\qquad\qquad\qquad + \left(\frac{3}{4}\right)r^2 \\
 &= \left(\frac{2}{18}\right)r^4 - \left(\frac{3}{18}\right)r^4 - \left(\frac{2}{4}\right)r^2 + \left(\frac{3}{4}\right)r^2 \\
 &= \left(\frac{-1}{18}\right)r^4 + \left(\frac{1}{4}\right)r^2 \\
 &= -\frac{1}{18}r^4 + \frac{1}{4}r^2
 \end{aligned}$$

57.

$$\begin{aligned}
 & \left(\frac{5}{12}\right)z^2 + \left(\frac{7}{15}\right)z - 3z^2 + 4z \\
 &= \left(\frac{5}{12}\right)z^2 - 3\left(\frac{12}{12}\right)z^2 + \left(\frac{7}{15}\right)z + 4\left(\frac{15}{15}\right)z \\
 &= \left(\frac{5-3\cdot 12}{12}\right)z^2 + \left(\frac{7+4\cdot 15}{15}\right)z \\
 &= \left(\frac{5-36}{12}\right)z^2 + \left(\frac{7+60}{15}\right)z \\
 &= \left(\frac{-31}{12}\right)z^2 + \left(\frac{67}{15}\right)z \\
 &= -\frac{31}{12}z^2 + \frac{67}{15}z
 \end{aligned}$$

59.

$$7x + 8y - 7z - \frac{2}{5}x - \frac{1}{2}y + 4z$$

$$= 7x - \frac{2}{5}x - \frac{1}{2}y + 8y + 4z - 7z$$

$$= 7\left(\frac{5}{5}\right)x - \frac{2}{5}x - \frac{1}{2}y + 8\left(\frac{2}{2}\right)y + 4z - 7z$$

$$= \left(\frac{35}{5}\right)x - \frac{2}{5}x - \frac{1}{2}y + \left(\frac{16}{2}\right)y + 4z - 7z$$

$$= \frac{33}{5}x + \frac{15}{2}y - 3z$$