


Distribution

Directions: Answer each question to the best of your ability, Show ALL of your work for EACH problem in three or more steps. Circle your final answer. You will have to REDO each problem you do not show your work for. If you do not know how to do a problem, circle the number, don't guess. **DO NOT USE A CALCULATOR**

Multiply each polynomial by its corresponding monomial. Show your steps like in the example.

Example: $3x(4x^2 - 2x + 1)$

- Distribute the term in front
- Coefficients get multiplied
- Powers of exponents get added



$$3x(4x^2 - 2x + 1) = (3 \cdot 4)(x^{1+2}) + (3 \cdot -2)(x^{1+1}) + (3 \cdot 1)(x) = 12x^3 - 6x^2 + 3x$$

Your turn!

$$1. 4x(2x^2 - x + 7)$$

$$= (4 \cdot 2)x^{(1+2)} + (4 \cdot -1)x^{(1+1)} + (4 \cdot 7)x^{(0+1)}$$

$$= 8x^3 - 4x^2 + 28x$$

$$2. 2x^2(4x^2 - 10x + 6)$$

$$= (2 \cdot 4)x^{(2+2)} + (2 \cdot -10)x^{(2+1)} + (2 \cdot 6)x^{(0+2)}$$

$$= 8x^4 - 20x^3 + 12x^2$$

$$3. 12x(12x + 11)$$

$$= (12 \cdot 12)x^{(1+1)} + (12 \cdot 11)x^{(0+1)}$$

$$= 144x^2 + 132x$$

$$\frac{12}{11}$$

$$\frac{12}{12}$$

$$\frac{12}{132}$$

$$4. x(9x^2 + 4x + 3)$$

$$= (9 \cdot 1)x^{(1+2)} + (1 \cdot 4)x^{(1+1)} + (1 \cdot 3)x^{(0+1)}$$

$$= 9x^3 + 4x^2 + 3x$$

$$5. 11x(-5x^3 + 8x^2 + 9x + 8)$$

$$= (-5 \cdot 11)x^{(3+1)} + (8 \cdot 11)x^{(2+1)} + (9 \cdot 11)x^{(1+1)} + (8 \cdot 11)x^{(0+1)}$$

$$= -55x^4 + 88x^3 + 99x^2 + 88x$$

$$6. -9x(-3x^2 + 9x + 11)$$

$$= (-9 \cdot -3)x^{(2+1)} + (9 \cdot 9)x^{(1+1)} + (11 \cdot -9)x^{(0+1)}$$

$$= 27x^3 + 81x^2 - 99x$$

$$7. (2x + 7)8x$$

$$= (2 \cdot 8)x^{(1+1)} + (7 \cdot 8)x^{(0+1)}$$

$$= 16x^2 + 56x$$

$$8. -2x(11x^3 - 10x^2 + 4x + 6)$$

$$= (-2 \cdot 11)x^{(3+1)} + (-2 \cdot -10)x^{(2+1)} + (-2 \cdot 4)x^{(1+1)} + (-2 \cdot 6)x^{(0+1)}$$

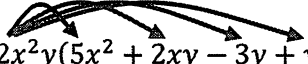
$$= -22x^4 + 20x^3 - 8x^2 - 12x$$

Distribution

Now try some with more than one variable! You should take the same steps as before.

Example: $2x^2y(5x^2 + 2xy - 3y + y^2)$

- Distribute the term in front
- Coefficients get multiplied
- Powers of exponents get added



$$\begin{aligned}
 & 2x^2y(5x^2 + 2xy - 3y + y^2) \\
 &= (2 \cdot 5)(x^{2+2})(y^{0+1}) + (2 \cdot 2)(x^{1+2})(y^{1+1}) + (2 \cdot -3)(x^{0+2})(y^{1+1}) + (2 \cdot 1)(x^{0+2})(y^{2+1}) \\
 &= 10x^4y + 4x^3y^2 - 6x^2y^2 + 2x^2y^3
 \end{aligned}$$

Your turn!

$$\begin{aligned}
 9. & 9v^2(u^3 + uv - 5v^5) \\
 &= (9 \cdot 1)u^3v^2 + (9 \cdot 1)uv^{1+2} + (9 \cdot -5)u^{(0+2)}v^{(2+5)} \\
 &= 9u^3v^2 + 9uv^3 - 45v^7
 \end{aligned}$$

$$\begin{aligned}
 10. & 9(x^2 + xy - 8y^2) \\
 &= (9 \cdot 1)x^2 + (9 \cdot 1)xy + (9 \cdot -8)y^2 \\
 &= 9x^2 + 9xy - 72y^2
 \end{aligned}$$

$$\begin{aligned}
 11. & 2u(6u^2 - 9uv + v^2) \\
 &= (2 \cdot 6)u^{(2+1)} + (2 \cdot -9)u^{(1+1)}v^1 + (2 \cdot 1)u^1v^{(2+1)} \\
 &= 12u^3 - 18u^2v + 2uv^2
 \end{aligned}$$

$$\begin{aligned}
 12. & 8rq(4r^3q^{-4} - 5r + 12rq - 9q^4) \\
 &= (8 \cdot 4)r^{3+1}q^{(-4)} + (8 \cdot -5)r^{(1+1)}q^0 + (8 \cdot 12)r^{(1+1)}q^{(1+1)} + (8 \cdot -9)r^1q^{(1+1)} \\
 &= 32r^4q^{-3} - 40r^2q + 96r^2q^2 - 72rq^2
 \end{aligned}$$

$$\begin{aligned}
 13. & -9x^2y^3(6x + 4y + 10) \\
 &= (-9 \cdot 6)x^{1+2}y^{0+3} + (-9 \cdot 4)x^2y^{3+1} + (-9 \cdot 10)x^2y^3 \\
 &= 54x^3y^3 - 36x^2y^4 - 90x^2y^3
 \end{aligned}$$

$$\begin{aligned}
 14. & 10a^{-8}b^5(3a^2 - a^8b^{-5} + b^2) \\
 &= (3 \cdot 10)a^{(2-8)}b^5 - (10 \cdot 1)a^{(8-8)}b^{(5-5)} + 10a^{-8}b^{(5+2)} \\
 &= 30a^{-6}b^5 + 10a^{-8}b^7 - 10
 \end{aligned}$$

$$\begin{aligned}
 15. & 6k^3n(2k^2n^2 - 6kn + 20) \\
 &= (6 \cdot 2)k^{2+3}n^{1+2} + (6 \cdot -6)k^{(3+1)}n^{(1+1)} + (6 \cdot 20)k^3n \\
 &= 12k^5n^3 - 36k^4n^2 + 120k^3n
 \end{aligned}$$

$$\begin{aligned}
 16. & \frac{1}{2}s^2t(4t^2 - 10st + 6s^2) \\
 &= \left(\frac{1}{2} \cdot 4\right)s^2t^{(2+1)} + \left(\frac{1}{2} \cdot -10\right)s^{(1+2)}t^{(1+1)} + \left(\frac{1}{2} \cdot 6\right)s^{(2+2)}t \\
 &= 2s^2t^3 - 5s^3t^2 + 3s^4t
 \end{aligned}$$