

Solutions

1.1 Order of Operations and Sign Rules

1.1.1. Evaluate $18 \div 3 \cdot 2 - 5$.

Solution. Division and multiplication have equal precedence: $18 \div 3 = 6$, then $6 \cdot 2 = 12$. The result is $12 - 5 = 7$.

1.1.2. Simplify $4(2x - 3) - 3(x + 1)$.

Solution. Distribute: $8x - 12 - 3x - 3 = 5x - 15$.

1.1.3. Evaluate $(-4)^2 - 4^2$.

Solution. The first term is 16 and the second is 16, so the difference is 0.

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1.2 Exponent Rules

1.2.1. Simplify $\frac{x^7}{x^3}$ and state a restriction.

Solution. For $x \neq 0$, subtract exponents: $x^{7-3} = x^4$. The original denominator still excludes 0.

1.2.2. Simplify $(3a^2b)^2$.

Solution. Square every factor: $3^2a^4b^2 = 9a^4b^2$.

1.2.3. Write $5x^{-2}$ using positive exponents.

Solution. $5x^{-2} = 5/x^2$, with $x \neq 0$.

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1.3 Rational and Irrational Numbers

1.3.1. Classify $\sqrt{49}$ and $\sqrt{50}$ as rational or irrational.

Solution. $\sqrt{49} = 7$ is rational. $\sqrt{50} = 5\sqrt{2}$ is irrational.

1.3.2. Simplify $\sqrt{48} + \sqrt{12}$.

Solution. $\sqrt{48} = 4\sqrt{3}$ and $\sqrt{12} = 2\sqrt{3}$, giving $6\sqrt{3}$.

1.3.3. Between which consecutive integers does $\sqrt{30}$ lie?

Solution. Since $25 < 30 < 36$, taking square roots gives $5 < \sqrt{30} < 6$.