Lesson 1–1

Example 1 Simplify an Expression

Find the value of $8 - 2\{20 \div [1 + (3)^2]\}$.

$8 - 2\{20 \div [1 + (3)^2]\}$	$= 8 - 2[20 \div (1 + 9)]$	First square 3.
	$= 8 - 2(20 \div 10)$	Then add 1 and 9.
	$= 8 - 2(2)$	Divide 20 by 10.
	$= 8 - 4$	Multiply 2 by 2.
	$= 4$	Finally, subtract 4 from 8.

The value is 4.

Example 2 Evaluate an Expression

Evaluate $a^3 + b(c - 1)^2 - c^2$ if $a = -2$, $b = 2.5$, and $c = 3$.

$a^3 + b(c - 1)^2 - c^2$	$= (-2)^3 + 2.5(3 - 1)^2 - 3^2$	Replace a with –2, b with 2.5, and c with 3.
	$= -8 + 2.5(3 - 1)^2 - 3^2$	Find $(-2)^3$.
	$= -8 + 2.5(2)^2 - 3^2$	Subtract 1 from 3.
	$= -8 + 2.5(4) - 9$	Find 2^2 and 3^2.
	$= -8 + 10 - 9$	Multiply 2.5 and 4.
	$= -7$	Do all additions and subtractions from left to right.

The value is –7.

Example 3 Expression Containing a Fraction Bar

Evaluate $\dfrac{n^2 - 5ap}{6 - p^2}$ if $a = 5$, $n = -2$, and $p = -1$.

The fraction bar acts as both an operation symbol, indicating division, and as a grouping symbol. Evaluate the expressions in the numerator and denominator separately before dividing.

$\dfrac{n^2 - 5ap}{6 - p^2}$	$= \dfrac{(-2)^2 - 5(5)(-1)}{6 - (-1)^2}$	$a = 5$, $n = -2$, and $p = -1$
	$= \dfrac{4 - 5(-5)}{6 - 1}$	Evaluate the numerator and the denominator separately.
	$= \dfrac{4 - (-25)}{6 - 1}$	Multiply 5 and –5 in the numerator.
	$= \dfrac{29}{5}$ or $5\dfrac{4}{5}$	Simplify the numerator and the denominator. Then divide.

The value is $5\dfrac{4}{5}$.

Example 4 Use a Formula

SPACE The formula for the orbital period T of a satellite is $T = \frac{2\pi r}{v}$, where π is approximately 3.14, r is the radius of the orbit of the satellite, and v is the velocity of the satellite. Find the period of a satellite in orbit above Earth if the radius of the orbit is 4268 miles and the velocity is 4.4 miles per second. Express the orbital period in hours.

Substitute each value given into the formula. Then evaluate the expression using the order of operations.

$$T = \frac{2\pi r}{v}$$ Orbital period of a satellite

$$= \frac{2(3.14)(4268)}{4.4}$$ Replace π with 3.14, r with 4268, and v with 4.4.

$$= \frac{26,803.04}{4.4}$$ Simplify the numerator.

$$= 6091.6 \approx 6092$$ Divide 26,803.4 by 4.4 and round.

The orbital period is about 6092 seconds. To express in hours, divide by 3600. $6092 \div 3600 \approx 1.7$ hours.

The orbital period of the satellite is about 1.7 hours.