

EXAMPLE 1

Evaluate the expression $22 + (11 - 5)^2 \div 3 \times 2 - 5$.

Step 1: Operate inside parentheses.

$$22 + (11 - 5)^2 \div 3 \times 2 - 5 = 22 + (6)^2 \div 3 \times 2 - 5$$

Step 2: Evaluate exponents.

$$= 22 + 36 \div 3 \times 2 - 5$$

Step 3: Multiply and divide from left to right.

$$= 22 + 12 \times 2 - 5$$

$$= 22 + 24 - 5$$

Step 4: Add and subtract from left to right.

$$= 46 - 5$$

$$= 41$$

Solution: $22 + (11 - 5)^2 \div 3 \times 2 - 5 = 41$

TRY THESE A

Evaluate each expression.

a. $17 + 4 \times 2^3 \div 8$

b. $28 - 3(2 + [10 - 6]^2)$

Before evaluating an expression, it can sometimes be helpful to estimate the answer by using rounded numbers. Then evaluate the expression and compare your result with your estimate to decide if your answer is reasonable.

EXAMPLE 2

A school has a \$20,000 budget to buy technology supplies. The school decides to buy 21 computers at \$599 each and 28 computer-software packages at \$79 each. How much will be left in the budget after the purchases are made?

Step 1: Write an expression for solving the problem.

$$20,000 - (21 \times 599 + 28 \times 79)$$

Step 2: Round the numbers.

$$21 \approx 20 \quad 599 \approx 600 \quad 28 \approx 30 \quad 79 \approx 80$$

Step 3: Use the order of operations to evaluate the expression with the rounded numbers.

$$\begin{aligned} 20,000 - (20 \times 600 + 30 \times 80) &= 20,000 - (12,000 + 2,400) \\ &= 20,000 - 14,400 \\ &= \$5,600 \end{aligned}$$

So, an estimate of the amount left in the budget is \$5,600.

Step 4: Use the order of operations to compute the actual amount.

$$\begin{aligned} 20,000 - (21 \times 599 + 28 \times 79) &= 20,000 - (12,579 + 2,212) \\ &= 20,000 - 14,791 \\ &= \$5,209 \end{aligned}$$

READING MATH

The symbol \approx means "is approximately equal to."

EXAMPLE 2 (continued)

Step 5: Compare the computed value with the estimate.
\$5,209 is fairly close to the estimate of \$5,600, so the
computed value is reasonable.

Solution: The amount left in the budget is \$5,209.

TRY THESE B

Write a numerical expression for each situation. Estimate the
value and then compute to determine the answer. Use your
estimate to check the reasonableness of your answer.

- a. At Conway Middle School, 4 classes of 28 students each take Spanish and 2 classes of 23 students each take French. There are 390 students enrolled in Conway Middle School. How many students do not take Spanish or French?
- b. The theater club spent \$719 to put on its holiday show. The club sold 104 tickets at \$12 each and 195 tickets \$9 each. What was the theater club's profit for the holiday show?

PRACTICE A

Evaluate each expression.

1. $13 - 2 \times 4$
2. $24 \div 2 \div 4$
3. $24 - 30 \div 6$
4. $2(7^2 - 25) - 12 \div 4$
5. $5 + 2(10 - 2^2) \div 3$
6. $15 - (3 - 5)^2 - 11$
7. $8 - 5 \times ([8 - 6] + 4) \div 3$
8. $21 + 2 \times ([4 - 2^2] + 6) \div 6$
9. Cheryl bought 16 CDs for \$9 each and 2 DVDs for \$19 each. All prices included tax. She paid with four \$50 bills. Write a numerical expression for this situation. Then determine the amount of change she received.

10. How do you know your answer to item 9 is reasonable?

PRACTICE B

Evaluate each expression.

1. $9 + 3 \times 5$
2. $10 + 8 \div 2$
3. $45 - 20 - 10$
4. $18 - (2^4 - 13)^2 - 9$
5. $9 + 2(12 - 3^2) \div 2$
6. $8 - (3 + 4^2) + 5$
7. $18 - 4 \times ([7 - 5] + 4) \div 2$
8. $27 + 4 \times ([9 - 2^2] + 6) \div 4$
9. Sal was given \$350 to buy box lunches and beverages for a school field trip. He bought 32 box lunches at \$8 each and 8 six-packs of spring water for \$9 dollars each. All prices included tax. How much change did he receive from the purchases?

10. How do you know your answer to item 9 is reasonable?