

1. Evaluate  $15 + 3 \cdot 21$ .
2. Evaluate  $-3 + 7(-4)$ .
3. Evaluate  $-3(2) - 12 \div (-3)$ .
4. Evaluate  $-24 \div (-3)(5) \div 4$ .
5. Evaluate  $(-6)^2 - 4(5)(-2)$ .
6. Evaluate  $4 - 3[4 - 2(6 - 3)] \div 2$ .
7. Evaluate  $16 - 3(8 - 3)^2 \div 5$ .
8. Evaluate  $16 + 2[8 - 3(4 - 2)] + 1$ .
9. Evaluate  $1 - 2[3 - (6 + 2)]$ .
10. Evaluate  $2(-3) + 4[1 - 3(6 - 2)]$ .

## KEYS

**Remember**

- Numerical and algebraic expressions often contain more than one operation. A rule is needed to let you know which operation to perform first. The rule is called the order of operations:
- Simplify the expressions inside grouping symbols, such as parentheses ( ), Order of brackets [ ], and braces { }, and as indicated by fraction bars.
- Evaluate all powers.
- Do all multiplications and divisions from left to right.
- Do all additions and subtractions from left to right.

1. Evaluate  $15 + 3 \cdot 21$

$$\begin{aligned} 15 + 3 \cdot 21 &= 15 + 63 && \text{Multiply 3 by 21.} \\ &= 78 && \text{Add 15 and 63.} \end{aligned}$$

2. Evaluate  $-3 + 7(-4)$ .

$$\begin{aligned} -3 + 7(-4) &= -3 - 28 && \text{Multiply 7 by } -4. \\ &= -31 && \text{Add } -3 \text{ and } -28. \end{aligned}$$

3. Evaluate  $-3(2) - 12 \div (-3)$ .

$$\begin{aligned} -3(2) - 12 \div (-3) &= -6 + 4 && \text{Multiply } -3(2) \text{ and divide } -12 \div (-3). \\ &= -2 && \text{Add } -6 \text{ and } 4. \end{aligned}$$

4. Evaluate  $-24 \div (-3)(5) \div 4$ .

Multiplication and division are operations of the same level – we perform them from the left to the right.

$$\begin{aligned} -24 \div (-3)(5) \div 4 &= 8(5) \div 4 && \text{Divide } -24 \div (-3). \\ &= 40 \div 4 && \text{Multiply 8 by 5.} \\ &= 10 && \text{Divide 40 by 4.} \end{aligned}$$

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5. Evaluate  $(-6)^2 - 4(5)(-2)$ .

$$\begin{aligned}(-6)^2 - 4(5)(-2) &= 36 - 4(5)(-2) && \text{Raise to the power.} \\ &= 36 - 20(-2) && \text{Multiply } -4 \text{ by } 5. \\ &= 36 + 40 && \text{Multiply } -20 \text{ by } -2. \\ &= 76 && \text{Add } 36 \text{ and } 40.\end{aligned}$$

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6. Evaluate  $4 - 3[4 - 2(6 - 3)] \div 2$ .

Simplify from the inside out: first the parentheses, then the square brackets, being careful to remember that the "minus" sign on the 3 in front of the brackets goes with the 3. Only once the grouping parts are done, do the division, followed by adding in the 4.

$$\begin{aligned}4 - 3[4 - 2(6 - 3)] \div 2 & \\ &= 4 - 3[4 - 2(3)] \div 2 \\ &= 4 - 3[4 - 6] \div 2 \\ &= 4 - 3[-2] \div 2 \\ &= 4 + 6 \div 2 \\ &= 4 + 3 \\ &= 7\end{aligned}$$

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7. Evaluate  $16 - 3(8 - 3)^2 \div 5$ .

Remember to simplify inside the parentheses *before* square, because  $(8 - 3)^2$  is *not* the same as  $8^2 - 3^2$ .

$$\begin{aligned}16 - 3(8 - 3)^2 \div 5 & \\ &= 16 - 3(5)^2 \div 5 \\ &= 16 - 3(25) \div 5 \\ &= 16 - 75 \div 5 \\ &= 16 - 15 \\ &= 1\end{aligned}$$

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8. Evaluate  $16 + 2[8 - 3(4 - 2)] + 1$ .

$$\begin{aligned} & 16 + 2[8 - 3(4 - 2)] + 1 \\ &= 16 + 2[8 - 3(2)] + 1 \\ &= 16 + 2[8 - 6] + 1 \\ &= 16 + 2[2] + 1 \\ &= 16 + 4 + 1 \\ &= 21 \end{aligned}$$

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9. Evaluate  $1 - 2[3 - (6 + 2)]$ .

$$\begin{aligned} & 1 - 2[3 - (6 + 2)] \\ &= 1 - 2[3 - 8] \\ &= 1 - 2[-5] \\ &= 1 + 10 \\ &= 11 \end{aligned}$$

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10. Evaluate  $2(-3) + 4[1 - 3(6 - 2)]$ .

$$\begin{aligned} & -6 + 4[1 - 3(4)] \\ &= -6 + 4[1 - 12] \\ &= -6 + 4[-11] \\ &= -6 - 44 \\ &= -50 \end{aligned}$$

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