

# Order of Operations and Equations

**Solve multiplications and divisions before additions and subtractions.**  
**Solve multiplications and divisions “on the same level,” from left to right.**  
**Solve additions and subtractions “on the same level,” from left to right.**  
**Parentheses ( ) change the order. *First* solve whatever is inside parentheses.**

1. Solve in the right order!

a. $12 \times 5 + 8 = \underline{\quad}$	b. $10 \times 2 + 9 \times 8 = \underline{\quad}$	c. $(8 + 16) \div 3 = \underline{\quad}$
$45 + 5 \times 7 = \underline{\quad}$	$10 + 2 \times 9 + 8 = \underline{\quad}$	$120 - 2 \times 11 = \underline{\quad}$
$8 \times 5 \div 2 = \underline{\quad}$	$10 + 2 \times (9 + 8) = \underline{\quad}$	$2 \times (100 - 80 + 20) = \underline{\quad}$

Which expression(s) match each problem?

2. Mark bought three light bulbs for \$8 each, and paid with \$50. What was his change?

- a.  $3 \times \$8 - \$50$       b.  $\$50 - \$8 + \$8 + \$8$   
 c.  $\$50 - 3 \times \$8$       d.  $\$50 - (\$8 - \$8 - \$8)$

3. Andy buys a salad for \$8 and a pizza for \$13, and shares them evenly with his friend. How many dollars is Andy's share of the cost?

- a.  $\$8 + \$13 \div 2$       b.  $\$2 \div (\$8 + \$13)$   
 c.  $2 \times \$8 + 2 \times \$13$       d.  $(\$8 + \$13) \div 2$

4. Melissa shares equally the cost of a new fence with three other neighbors and the cost of road repair with two other neighbors. The fence cost \$600 and the road repair cost \$1,200. What is Melissa's share of the costs?

- a.  $\$600 \div 4 + \$1,200 \div 3$   
 b.  $(\$600 + \$1,200) \div 3 \div 2$   
 c.  $\$600 \div 3 + \$1,200 \div 2$   
 d.  $(\$600 + \$1,200) \div 5$

5. Division can also be written with a line. Solve in the right order.

a.  $6 + \frac{24}{2} =$       b.  $\frac{32}{2} - 6 =$       c.  $\frac{54}{6} - 6 - 2 =$

In this case, what we do first is the operation that is *above* the line, as though it were written in parentheses:

d.  $\frac{6 + 24}{2} =$       e.  $\frac{32 - 6}{2} =$       f.  $\frac{54 - 6}{6} - 2 =$

An **equation** has numbers, letters, operation symbols, and one equal sign, “=”. It's called an *equation* because it contains an *equal* sign.

An **expression** only has numbers, letters, and operation symbols—but no equal sign. For example, “ $40 \times 2 + 6 \times 5$ ” is an expression.

6. Equation or expression? (You do not have to solve these.)

a.  $4t = 180$

b.  $2 + 60 \times 345 \div 9$

c.  $15 = x + y$

d.  $\frac{5.4 - 2.12}{0.4} = 8.2$

e.  $1,000 = 1,000$

f.  $12 - \frac{24 \div 0.8}{189}$

<p><math>120 - 75 = 3 \times 15</math></p> <p>This is the left side of the equation.      This is the right side of the equation.</p> <p>Do the left and right sides have the same value? Just calculate <math>120 - 75</math>, then calculate <math>3 \times 15</math>, and check.</p> <p>If yes, it's a <b>true equation</b>. If not, it's a <b>false equation</b>.</p>	<p><math>2 = 5</math></p> <p>left side      right side</p> <p>This is a very simple equation - but it's false!</p> <p><math>4 + 5 = 21 - 3</math></p> <p>left side      right side</p> <p>This is also a false equation!</p>	<p><math>18 = x - 3</math></p> <p>left side      right side</p> <p>Solving the equation means finding the value of x (the <b>unknown</b>) that makes it true.</p> <p>The value <math>x = 21</math> makes this equation true, so we say <math>x = 21</math> is the solution.</p>
---	--	---

7. Place parenthesis into these equations to make them true.

a.  $10 + 40 + 40 \times 2 = 180$

b.  $144 = 3 \times 2 + 4 \times 8$

c.  $40 \times 3 = 80 - 50 \times 4$

8. Find a number to fit in the box so the equation is true.

a.  $40 = (\square + 9) \times 2$

b.  $4 \times 8 = 5 \times 6 + \square$

c.  $4 + 5 = (20 - \square) \div 2$

d.  $81 = 9 \times (2 + \square)$

e.  $\square \times 11 = 12 + 20 \times 6$

f.  $(4 + 5) \times 3 = \square \div 2$

9. Build at least three true equations using (only) the symbols and numbers given. You may use the same number or symbol many times.

11, 3, 1, -, +, ×, ( ), =