

Order of Operations and Equations

- **First** solve whatever is inside parentheses.
- **Next**, solve multiplications and divisions “on the same level,” from left to right.
- **Last**, solve additions and subtractions “on the same level,” from left to right.

1. Solve what is within parenthesis first. You can enclose the operation to be done first in a “bubble.”

$(36 + 4) \div (5 + 5)$ $\begin{array}{r} \backslash \ / \quad \backslash \ / \\ = 40 \div 10 \\ = 4 \end{array}$	<p>a. $(50 - 2) \div (3 + 5)$</p>	<p>b. $20 \times (1 + 7 + 5)$</p>
	<p>c. $2 \times (600 \div 60) + (19 - 8)$</p>	<p>d. $180 \div (13 - 7 + 3)$</p>

2. Solve. When there are many multiplications and divisions, do them from left to right.

$24 \div 3 \times 2 \div 4$ $\begin{array}{r} \backslash \ / \\ = 8 \times 2 \div 4 \\ \backslash \ / \\ = 16 \div 4 = 4 \end{array}$	<p>a. $36 \div 4 \div 3$</p>	<p>b. $1,200 \div 4 \times 5 \div 3$</p>
	<p>c. $7 \times 90 \div 2 \times 2 \div 10$</p>	<p>d. $5 \times 6 \div 3 \div 2 \times 20$</p>

3. Solve in the right order. You can enclose the operation to be done first in a “bubble” or a “cloud.”

<p>a. $12 \times 5 + 8 =$ _____</p>	<p>b. $10 + 2 \times 9 + 8 =$ _____</p>
<p>c. $45 + 5 \times 7 =$ _____</p>	<p>d. $10 + 2 \times (9 + 8) =$ _____</p>
<p>e. $(8 + 16) \div 3 \div 2 =$ _____</p>	<p>f. $2 \times (100 - 80 + 20) =$ _____</p>
<p>g. $120 - 2 \times (11 - 5) =$ _____</p>	<p>h. $25 + 8 \times 5 \div 2 =$ _____</p>

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

<p>a. $6 + \frac{24}{2} =$ _____</p>	<p>b. $\frac{32}{2} - 6 =$ _____</p>	<p>c. $\frac{54}{6} - 6 - 2 =$ _____</p>
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An **equation** has numbers, letters, operation symbols, and one equal sign, “=”.
It’s called an *equation* because it contains an *equal* sign. For example, “ $5 = 1 + 4$ ” is an equation.

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

5. Equation or expression? (Do not 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. $12 - \frac{24 \div 0.8}{189}$

6. Which expression matches each problem? Also, solve the problems.

<p>a. Mark bought three light bulbs for \$8 each, and paid with \$50. What was his change?</p>	<p>(1) $3 \times \\$8 - \\50 (3) $\\$50 - 3 \times \\8</p>	<p>(2) $\\$50 - \\$8 + \\$8 + \\8 (4) $\\$50 - (\\$8 - \\$8 - \\$8)$</p>
<p>b. Shirts that cost \$16 each were discounted by \$5, so Mom bought six of them. What was the total cost?</p>	<p>(1) $\\$16 - \\5×6 (3) $\\$16 \times 6 - \\5</p>	<p>(2) $6 \times (\\$16 - \\$5)$ (4) $(\\$16 - 6) \times 5$</p>
<p>c. Andy bought a salad for \$8 and a pizza for \$13, and shared the cost evenly with his friend. How much was Andy’s share of the cost?</p>	<p>(1) $\\$8 + \\$13 \div 2$ (3) $2 \times \\$8 + 2 \times \\13</p>	<p>(2) $\\$2 \div (\\$8 + \\$13)$ (4) $(\\$8 + \\$13) \div 2$</p>
<p>d. Melissa shared equally the cost of a meal with three other people and the cost of a taxi with two other people. The meal cost \$48 and the taxi cost \$30. How much did Melissa pay?</p>	<p>(1) $\\$48 \div 4 + \\$30 \div 3$ (3) $\\$48 \div 3 + \\$30 \div 2$</p>	<p>(2) $(\\$48 + \\$30) \div 3 \div 2$ (4) $(\\$48 + \\$30) \div 5$</p>

$120 - 75 = 3 \times 15$ This is the left side of the equation. This is the right side of the equation. Do the left and right sides have the same value? Just calculate $120 - 75$, then calculate 3×15 , and check. If yes, it is a true equation . If not, it is a false equation .	$2 = 5$ left side right side This is a very simple equation—but it is false! $4 + 5 = 21 - 3$ left side right side This is also a false equation!	$18 = x - 3$ left side right side Solving the equation means finding the value of x (the unknown) that makes it true. The value $x = 21$ makes this equation true, so we say $x = 21$ is the solution.
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7. If the equation is false, change one number in it to make it true.

a. $6 + \frac{32}{8} = 5$	b. $(6 - 2) \times 3 = 5 + 5$	c. $5 \times 2 = 16 \div 2 + 2$
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8. Place parentheses into these equations to make them true.

a. $10 + 40 + 40 \times 2 = 180$	b. $144 = 3 \times 2 + 4 \times 8$	c. $40 \times 3 = 80 - 50 \times 4$
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9. 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. $(4 + 5) \times 3 = \square \div 2$

10. Solve these simple equations.

a. $s \times 2 = 660$ $s = \underline{\hspace{2cm}}$	b. $\frac{x}{2} = 5$ $x = \underline{\hspace{2cm}}$	c. $200 - y = 60$ $y = \underline{\hspace{2cm}}$
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11. 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, -, +, ×, (), =