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# 1 Order of Operations

- solving addition, subtraction, multiplication, and division problems



To solve problems with more than one operation, remember to follow the order of operations and do each operation from left to right.

## Order of Operations

- 1 ( ) brackets
- 2  $\times \div$  multiplication or division
- 3  $+$   $-$  addition or subtraction



**Example** Evaluate.

$$40 - (16 \div 4) \leftarrow \begin{array}{l} \text{division comes first:} \\ 16 \div 4 = 4 \end{array}$$

$$= 40 - 4 \leftarrow \text{subtract}$$

$$= 36$$

$(30 - 12) \div 6$	$30 - (12 \div 6)$
$= \square \div 6$	$= 30 - \square$
$= \square$	$= \square$

Circle the part that should be solved first. Then evaluate. Show the steps.

- |  |  |   |
|--|--|---|
| ① $20 - 4 \times 2$<br>= _____<br>= _____  | ② $6 \times 5 - 9$<br>= _____<br>= _____   | ③ $8 \div 2 + 7$<br>= _____<br>= _____      |
| ④ $5 + 18 \div 9$<br>= _____<br>= _____    | ⑤ $11 - 15 \div 5$<br>= _____<br>= _____   | ⑥ $10 + 4 \times 6$<br>= _____<br>= _____   |
| ⑦ $(2 + 3) \times 5$<br>= _____<br>= _____ | ⑧ $8 \div (9 - 5)$<br>= _____<br>= _____   | ⑨ $(15 - 7) \times 3$<br>= _____<br>= _____ |
| ⑩ $(13 + 7) \div 5$<br>= _____<br>= _____  | ⑪ $7 \times (3 + 7)$<br>= _____<br>= _____ | ⑫ $45 \div (13 - 4)$<br>= _____<br>= _____  |

Apply the commutative property to solve the problems.

⑬  $29 + 16 + 11$

⑭  $4 \times 23 \times 25$

⑮  $15 \times 8 \times 4$

⑯  $8 + 59 + 22$

⑰  $5 \times 17 \times 8$

⑱  $7 + 38 + 3$



### Commutative Property

Changing the order of addends or factors does not affect the sum or product.

e.g. **Addition**

$$\begin{aligned} & 7 + 19 + 3 \\ & \quad \swarrow \quad \searrow \text{swap} \\ & = 7 + 3 + 19 \\ & = \boxed{10} + 19 \\ & \quad \uparrow \text{a friendly number} \\ & = \underline{29} \end{aligned}$$

### Multiplication

$$\begin{aligned} & 6 \times 16 \times 5 \\ & \quad \swarrow \quad \searrow \text{swap} \\ & = 6 \times 5 \times 16 \\ & = \boxed{30} \times 16 \\ & \quad \uparrow \text{a friendly number} \\ & = \underline{480} \end{aligned}$$

In each of the cases above, a friendly number is formed after swapping. The friendly number makes it easier to find the answer.

Match the expressions that have the same answers.

⑲

$24 + 16 \times 29$  •

•  $17 \times 31 + 22$

$31 \times 17 + 22$  •

•  $16 + 24 \times 29$

$29 \times 24 + 16$  •

•  $29 \times 16 + 24$

$22 \times 31 + 17$  •

•  $31 \times 22 + 17$

Use the distributive property to solve the problems.

⑳  $(8 + 5) \times 5$

㉑  $4 \times (11 - 7)$

㉒  $(17 + 6) \times 7$

㉓  $(6 + 8) \times 3$

㉔  $(12 - 7) \times 2$

㉕  $6 \times (15 - 6)$

㉖  $5 \times (8 + 11)$

Simplify the problem by using brackets. Then solve the problem.

㉗  $5 \times 36 - 5 \times 16$

$= 5 \times (\text{---} - \text{---})$

$= 5 \times \text{---}$

$= \text{---}$

㉘  $12 \times 8 + 8 \times 18$

㉙  $31 \times 9 - 9 \times 16$

㉚  $18 \times 7 + 3 \times 7$

㉛  $23 \times 6 - 5 \times 6$

㉜  $32 \times 6 + 28 \times 6$



### Distributive Property

By this property, numbers in brackets can be rewritten as separate multiplications.

e.g.  $2 \times (3 + 1)$   
 $= 2 \times 3 + 2 \times 1$   
 $= 6 + 2$   
 $= 8$

Solve.

③③  $15 + 3 \times 6 - 9$

③④  $15 - 24 \div (5 + 3)$

③⑤  $30 \times 5 \div 6 + 9$

③⑥  $14 + 6 \times (3 + 17) - 12$

③⑦  $3 \times 17 - 8 \times 3 \div 4$

③⑧  $37 \times 6 - (18 - 11) \times 6$

③⑨  $18 \div 3 - 4 + (5 + 7) \times 9$

④⑩  $15 \times (16 - 9) - 7 \times (2 + 4)$

Write the symbols “+”, “-”, “x”, or “÷” or add brackets to make the equations correct.

④① a.  $3 \bigcirc 8 \bigcirc 1 = 25$

b.  $4 \bigcirc 9 \bigcirc 3 = 7$

c.  $13 \bigcirc 7 \bigcirc 11 = 31$

d.  $26 \bigcirc 19 \bigcirc 4 = 11$

④② a.  $2 \times 4 + 5 \div 3 = 6$

b.  $4 \times 9 - 4 - 2 = 18$

c.  $20 - 8 + 6 \div 2 = 9$

d.  $11 + 3 \times 6 - 2 = 23$