

Key

Lesson 1.2 Following Orders or PEMDAS

In a mathematical expression like $16 + 5 \cdot 35$, it may not be clear if we should add the 16 and 5 first, then multiply by the 35, or multiply the 5 and 35 first, then add the 16. One way gives the answer of 191 and the other is 735.

$$\begin{aligned} 16 + 5 \cdot 35 \\ 21 \cdot 35 \\ 735 \end{aligned}$$

$$\begin{aligned} 16 + 5 \cdot 35 \\ 16 + 175 \\ 191 \end{aligned}$$

Which is correct? To avoid confusion, an official **order of operations** has been established.

Order of Operations

PEMDAS:

P - Parenthesis

E - exponents

MD - multiplication / division

AS - addition / subtraction

So, what is the correct answer to $16 + 5 \cdot 35$? Find the work at the top of the page that follows the correct order of operations, and circle that answer.

Here is another example: $8[36 - 3(2+5)] \div 8 + 3 = 8[36 - 3(7)] \div 8 + 3$
 $= 8[36 - 21] \div 8 + 3$
 $= 8[15] \div 8 + 3$
 $= 120 \div 8 + 3$
 $= 15 + 3$
 $= 18$

Now you try a few:

1. $25 \div 5 + 4 \cdot 10 =$
 $5 + 40 = 45$

2. $9 \cdot 2 - 12 \div 6 =$
 $18 - 2 = 16$

3. $24 - 18 \div 3 \div (6 - 4) =$
 $24 - 6 \div 2 =$
 $24 - 3 = 21$

4. $27 \div (6 - 3) \div 2 =$
 $27 \div 3 \div 2 =$
 $9 \div 2 = 9/2 = 4.5$

5. $5 \cdot 20 - 2 \cdot 40 + 27 \div 3 - 6 \div 2 =$
 $100 - 80 + 9 - 3 =$
 $20 + 9 - 3 =$

6. $4 - (9 - 5) + 20 \cdot (4 - 2) \cdot 6 =$
 $4 - (4) + 20 \cdot (2) \cdot 6 =$
 $4 - 4 + 40 \cdot 6 =$

Algebra 1

$$\begin{aligned} 29 - 3 \\ 26 \end{aligned}$$

OBJ: Use order of operations

$$\begin{aligned} 4 - 4 + 240 \\ 0 + 240 = 240 \end{aligned}$$

1-2.A

Evaluating Expressions

We have learned that, in an algebraic expression, letters can stand for numbers. When we substitute a specific value for each Variable, and then perform the operations according to Order of Operations, we are simplifying.

Let's evaluate the expression $5x+2$ when $x=6$.

$$\begin{aligned} 5(6)+2 \\ 30+2 \\ 32 \end{aligned}$$

1. Substitute each letter in the expression with the assigned value.
2. Perform the Operations in the expression using PEMDAS.

Now you try some!

1. $3y+2y$ when $y=5$

$$\begin{aligned} 3(5)+2(5) \\ 15+10 \\ \textcircled{25} \end{aligned}$$

2. $x+5$ when $x=5$

$$\begin{aligned} 5+5 \\ \textcircled{10} \end{aligned}$$

3. $10/x$ when $x=-2$

$$\frac{10}{-2} = -5$$

4. $10x+2y-z$ when $x=1$, $y=-1$, and $z=5$

$$\begin{aligned} 10(1)+2(-1)-5 \\ 10-2-5 \\ 8-5 = \textcircled{3} \end{aligned}$$

5. If l is the length of a room and w is the width, then the expression $2l+2w$ can be used to find the perimeter of the room. Find the perimeter of a room with a length of 11 and a width of 13.

$$\begin{aligned} 2l+2w \\ 2(11)+2(13) \\ 22+26 = \textcircled{48} \end{aligned}$$

