

Get ready for today's lesson on Order of Operations

You need:

Clicker

Notebook

Pencil

**Get ready for the warm-up
questions.**



A 12-in. sub sandwich is divided into 6 slices, and a second 12-in. sandwich is divided into 8 slices. Which sandwich has the larger slices, the one with 6 slices, or the one with 8 slices?

Text in your answer now.

Remember, with a text question, your name **will** appear on screen right beside your answer.



Name the property that lets you write $35 + 5 = 5 + 35$

- (A) Associative Property of Addition
- (B) Commutative Property of Addition
- (C) Identify Property of Addition
- (D) None of the above



Use mental math to solve:
 $35 + 17 + 5$

Text in your number answer now



Use mental math to solve:
 $124 + (25 + 26)$

Text in your number answer now.

Hint: Use both the
commutative and associative properties.

1-2

Order of Operations

What You'll Learn

To use the order of operations to simplify expressions and solve problems

🔊 **New Vocabulary** order of operations, expression

Order of operations

Example

$$2^3(7 - 4) = 2^3 \cdot 3 = 8 \cdot 3 = 24$$

Definition

1. Work inside grouping symbols.
2. Do all work with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Please Excuse My Dear Aunt Sally

P stands for parentheses

E stands for exponents

M and D stand for multiply and divide

A and S stand for addition and subtraction

Expression

Example

The expression $24 - 6 \div 3$ contains two operations.

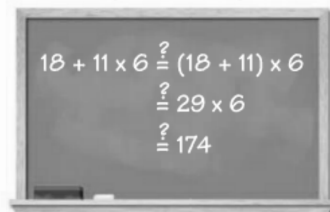
Definition

An expression is a mathematical phrase containing numbers and operation symbols.

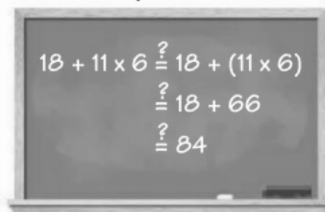
Why Learn This?

A problem such as $18 + 11 \times 6$ requires you to do more than one operation. To find the correct answer, you need to know which operation to do first. Should you add first, or multiply?

Diane's Work
(addition first)


$$\begin{aligned} 18 + 11 \times 6 &\stackrel{?}{=} (18 + 11) \times 6 \\ &\stackrel{?}{=} 29 \times 6 \\ &\stackrel{?}{=} 174 \end{aligned}$$

Dana's Work
(multiplication first)


$$\begin{aligned} 18 + 11 \times 6 &\stackrel{?}{=} 18 + (11 \times 6) \\ &\stackrel{?}{=} 18 + 66 \\ &\stackrel{?}{=} 84 \end{aligned}$$

Only one answer is correct. To make sure everyone gets the same value, you use the **order of operations**.

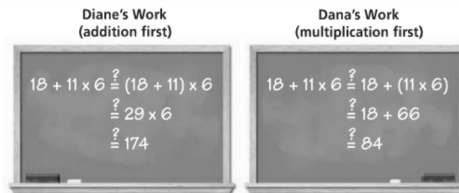
KEY CONCEPTS Order of Operations

1. Do all operations within parentheses first.
2. Multiply and divide in order from left to right.
3. Add and subtract in order from left to right.

Based on the order of operations, you multiply before you add.

$$18 + 11 \times 6 = 18 + 66 = 84$$

So Dana's answer is correct.



An **expression** is a mathematical phrase that contains numbers and operation symbols. In the work above, $18 + 11 \times 6$ is an expression.

EXAMPLE Finding the Value of Expressions

1 Find the value of each expression.

a. $6 + 96 \div 3 = 6 + 32$ ← Divide 96 by 3.
 $= 38$ ← Add.

b. $30 - (6 + 2) \times 3 = 30 - 8 \times 3$ ← Add 6 and 2 within the parentheses.
 $= 30 - 24$ ← Multiply 8 and 3.
 $= 6$ ← Subtract 24 from 30.

1 **EXAMPLE** Find the value of $20 - 5 \times 8 \div 2$.

$$20 - 5 \times 8 \div 2 = 20 - 40 \div 2 \leftarrow \text{Multiply 5 by 8.}$$

$$= 20 - 20 \leftarrow \text{Divide 40 by 2.}$$

$$= 0 \leftarrow \text{Subtract.}$$

Your turn to solve some order of operations problems, answering with your clickers.



Find the value of $34 + 5 \times 2 - 17$

(A)

27

(B)

7

(C)

-585

(D)

56



Find the value of $(6 + 12) \div 3 \times 2$

(A)

16

(B)

8

(C)

12

(D)

6

EXAMPLE

Using Expressions to Solve Problems

2 Multiple Choice Suppose you buy the items shown on the store receipt. What is the total cost of the items, including the tax?

- (A) \$160 (C) \$190
(B) \$170 (D) \$1,570

You can write an expression to help you find the total cost.

CRAWFORD'S	
ITEMS ORDERED	
JEANS	3 @ \$35.00 EACH
DISCOUNT	-\$5.00
SHIRTS	4 @ \$15.00 EACH
TAX	\$10.00
TOTAL	

Words	cost of jeans	-	discount	+	cost of shirts	+	tax	
↓								
Expression	$3 \times \$35$	-	\$5	+	$4 \times \$15$	+	\$10	
	\$105	-	\$5	+	\$60	+	\$10	← Multiply.
	\$100			+	\$60	+	\$10	← Subtract.
							\$170	← Add.

The total cost is \$170. The correct answer is choice B.

2 EXAMPLE Find the value of $\$350 + 8 \times \$50 - 2 \times \$350$.

$$\$350 + 8 \times \$50 - 2 \times \$350 = \$350 + \$400 - \$700 \leftarrow \text{Multiply.}$$

$$= \$750 - \$700 \leftarrow \text{Add.}$$

$$= \$50 \leftarrow \text{Subtract.}$$



You are paid \$7 per hour to rake leaves. Your brother is paid \$5 per hour. You worked 4 hours and your brother worked 3 hours. How much did the two of you earn together?

A \$43.00

B \$48.00

C \$36.00

D \$41.00

Extra practice

Which operation should you do first?

3. $6 - 2 \times 2$ 4. $33 - (4 + 6)$ 5. $6 \times (2 - 5)$ 6. $7 + 4 \times 3$

You can power down and put away your clickers. You have a worksheet assignment that I will pass out to you now. It is due tomorrow.

Practice 1-2**Order of Operations**

Which operation would you perform first in each expression?

1. $4 + 6 \times 9$

2. $(7 - 5) \times 3$

3. $18 - 5 + 3$

4. $5 \times 2 + 6$

Find the value of each expression.

5. $8 - 3 \times 1 + 5$

6. $(43 - 16) \times 5$

7. $100 \div (63 - 43)$

8. $9 \times (3 \times 5)$

9. $15 - (5 + 7)$

10. $(12 - 9) \times (6 + 1)$

11. $8 - 3 \times 2 + 7$

12. $(9 - 4) \times 6$

13. $4 + (20 \div 4) - 2$

14. $9 - (2 \times 3) \div 2$

15. $7 \times (10 - 2) \div 4$

16. $(16 \div 2) \div 9 + 9$

Insert parentheses to make each statement true.

17. $6 + 7 \times 4 - 2 = 26$

18. $14 - 5 \div 3 = 3$

Write a mathematical expression and solve.

19. Haircuts for boys cost \$7. Haircuts for men cost \$10. If 20 boys and 20 men went to the barber yesterday, how much did the barber earn?
-
- _____