

PART I GET STARTED

Today's Mathematics

We will use grouping symbols, exponents, multiplication, division, addition, and subtraction in an agreed order.

Essential Question

How does the order of operations help everyone interpret an expression the same way?

DO NOW

Review Section 1.2. Write or evaluate each power.

1. Write $5 \cdot 5 \cdot 5$ as a power.
2. Evaluate 2^6 .
3. Evaluate 10^3 .
4. Is 81 a perfect square? Explain.

SEE IT

Two students evaluate $18 + 6 \div 3$. One gets 8; the other gets 20.

1. What first step leads to 8?
2. What first step leads to 20?
3. Which result follows the agreed order of operations? Explain.

QUICK WRITE | 2 MINUTES

Why is an agreed order necessary when an expression contains more than one operation?

PART II INVESTIGATE**PLAY OUT THE ORDER**

For each expression, record one stage at a time. Do not skip directly to the answer.

Expression	Grouping / powers	Multiply / divide	Add / subtract
$15 + 8 \div 2$			
$4(12 - 4)$			
$3^2 + 4^2 + 2^2$			
$9(3 + 2) - 3(8 - 7)$			

COMPARE

Choose one row. Explain why changing the order of two steps would change the value.

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

1. Evaluate inside grouping symbols first. 2. Evaluate powers before multiplying or dividing. 3. Multiply and divide from left to right, then add and subtract from left to right.

WORKED MODEL

$20 - 4^2 + 3^3 = 20 - 16 + 27 = 4 + 27 = 31$. Powers are evaluated before subtraction and addition.

FOCUSED PRACTICE

Show a clear strategy and enough work that another student could follow your reasoning.

1. Evaluate $7(6 - 3)^2$. Show each stage.

2. Evaluate $60 \div (6^1 - 7^{-1} - 7) \cdot 4$.

CHALLENGE

Create a new problem that uses today's idea and has a whole-number answer. Trade with a partner and solve.

MATH WRITE | 5 MINUTES

Explain why the order of operations is a mathematical agreement, not just a memory rule.

PART IV PUZZLE PRACTICE

Homework

Name _____ Date _____

WHICH KING WAS PURPLE AND HAD MANY WIVES?

Evaluate each expression. Write the letter of its answer in the decoder.

1. $15 + 8 \div 2$

2. $3 \cdot 7 - 2 \cdot 3$

3. $(6 + 10) \div 2$

4. $4(12 - 4)$

5. $3^2 + 4^2 + 2^2$

6. $(15 - 10)^2 + (15 - 5)^2$

7. $33 \div 11 \cdot 12 \div 2$

8. $9(3 + 2) - 3(8 - 7)$

9. $7(6 - 3)^2$

10. $20 - 4^2 + 3^3$

11. $\left(\frac{1}{3} + 2\frac{2}{3}\right) 13$

12. $60 \div \left(6\frac{1}{7} - \frac{1}{7}\right) \cdot 4$

13. $(0.6 + 7.4)^2 - 14$

14. $4(10.1 + 1.9) \div 2$

15. $\frac{2^4 \cdot 5 + 8}{4}$

16. $\frac{5(12 - 5) + 13}{6 + 2}$

17. Practice guitar for 15 minutes on three weekdays and 20 minutes on Saturday and Sunday. Evaluate $15 \cdot 3 + 20 \cdot 2$.

E:18	N:22	N:29	R:50	P:6	H:15
G:85	T:31	R:24	E:19	G:42	A:8
E:125	I:39	K:32	Y:63	H:40	

4	11	15	8	12	1	5	13	9
10	2	6	17	14	3	16	7	