

3.6

Order of Operations with Decimals

Focus Use the order of operations to evaluate expressions.

Explore



How many different ways can you find the answer for this expression?

$$6 \times 15.9 + 36.4 \div 4$$

Show your work for each answer.

Reflect & Share

Compare your answers with those of another pair of classmates.

Which solution do you think is correct? Explain your reasoning.

Connect

To make sure everyone gets the same answer for a given expression, we add, subtract, multiply, and divide in this order:

- Do the operations in brackets first.
- Then divide and multiply, in order, from left to right.
- Then add and subtract, in order, from left to right.

When we find the answer to an expression, we *evaluate*.

We use the same order of operations for decimals as for whole numbers.

Example

Evaluate: $12.376 \div (4.75 + 1.2) + 2.45 \times 0.2 - 1.84$

Use a calculator when you need to.

A Solution

$$12.376 \div (4.75 + 1.2) + 2.45 \times 0.2 - 1.84 \quad \text{Calculate in brackets.}$$

$$= 12.376 \div 5.95 + 2.45 \times 0.2 - 1.84 \quad \text{Multiply and divide from left to right.}$$

$$= 2.08 + 0.49 - 1.84 \quad \text{Add and subtract from left to right.}$$

$$= 2.57 - 1.84$$

$$= 0.73$$

Many calculators follow the order of operations.

To see whether your calculator does, enter: $12.4 \times 2.2 - 15.2 \div 4$

If your answer is 23.48, your calculator follows the order of operations.

Practice

1. Evaluate.

a) $4.6 + 5.1 - 3.2$ b) $8 - 3.6 \div 2$ c) $46.4 - 10.8 \times 3$ d) $85.6 \div 0.4 \times 7$

2. Evaluate.

a) $(46.78 - 23.58) \times 2.5$ b) $(98.5 + 7) \div 0.5$ c) $7.2 \div (2.4 - 1.8)$

3. Evaluate.

a) $9.8 - 3.2 \div 0.4 + 2.6$ b) $(9.8 - 3.2) \div (0.4 + 2.6)$

Explain why the answers are different.



4. Evaluate.

a) $1.35 + (5 \times 4.9 \div 0.07) - 2.7 \times 2.1$ b) $9.035 \times 5.2 - 4.32 \times 6.7$
c) $2.368 \div 0.016 + 16.575 \div 1.105$ d) $0.38 + 16.2 \times (2.1 + 4.7) + 21 \div 3.5$

5. **Assessment Focus** Ioana, Aida, and Norman got different answers

for this problem: $12 \times (4.8 \div 0.3) - 3.64 \times 3.5$

Ioana's answer was 39.12, Aida's answer was 179.26,
and Norman's answer was 659.26.

a) Which student had the correct answer?

How do you know?

b) Show and explain how the other
two students got their answers.

Where did they go wrong?



6. Evaluate. Show all steps:

$0.38 + 16.2 \times (2.1 - 1.2) + 21 \div 0.8$

7. **Take It Further** Use at least 4 of the numbers 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8 and 0.9,
and any operations or brackets to make each whole number from 1 to 5.

Reflect

Why do we need to agree on an order of operations?