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Arithmetic & algebra · Lesson 2/7 · ●●○ Intermediate

Order of operations made easy

What is 2 + 3 × 4? 20 or 14? Let's see the right order of operations: brackets first, then powers, then multiplication and division, and finally addition and subtraction, left to right.

In this video we solve 3 expressions step by step, up to one with square brackets.

The method

$$1.\ \text{brackets}\ (\,) \rightarrow [\,] \rightarrow \{\,\}$$

$$2.\ \text{powers}\ a^n$$

$$3.\ \times\ \text{and}\ \div$$

$$4.\ +\ \text{and}\ -$$

Worked examples

Exercise 1

Work out the value of the expression: 18 − 3 × 4 + 20 ÷ 5

Data: $18 - 3 \times 4 + 20 \div 5$

1. **Multiplication and division first**

$$18 - \underbrace{3 \times 4}_{12} + \underbrace{20 \div 5}_{4}$$

💡 Careful: don't start with 18 − 3!

2. **Then addition and subtraction, left to right**

$$= \underbrace{18 - 12}_{6} + 4$$

$$= 6 + 4 = 10$$

Result: $= 10$

✓ Check

$$3 \times 4 = 12, \quad 20 \div 5 = 4$$

$$18 - 12 + 4 = 10 \checkmark$$

Exercise 2

Work out the value of the expression: $(2^3 + 4) \div 3 + 3^2$

Data: $(2^3 + 4) \div 3 + 3^2$

1. **Inside the brackets: the power first, then the sum**

$$(\underbrace{2^3}_{8} + 4) \div 3 + 3^2$$

$$= 12 \div 3 + 3^2$$

Result: $(2^3 + 4) = 12$

2. **Outside the brackets: the power 3^2**

$$= 12 \div 3 + \underbrace{3^2}_{9}$$

$$= 12 \div 3 + 9$$

Result: $3^2 = 9$

3. **The division, then the addition**

$$= \underbrace{12 \div 3}_{4} + 9$$

$$= 4 + 9 = 13$$

Result: $= 13$

✓ Check

$$8 + 4 = 12, \quad 12 \div 3 = 4$$

$$4 + 9 = 13 \checkmark$$

Exercise 3

Work out the value of the expression: 50 − [(6 + 4)² ÷ 5 − 2 × 3]

Data: $50 - [(6+4)^2 \div 5 - 2 \times 3]$

1. **Start with the round brackets, then the power**

$$50 - [\underbrace{(6+4)^2}_{10^2=100} \div 5 - 2 \times 3]$$

$$= 50 - [100 \div 5 - 2 \times 3]$$

> 💡 Innermost brackets first: ( ), then [ ], then { }

Result: $(6+4)^2 = 100$

2. **Inside the square brackets: ÷ and × first, then subtract**

$$= 50 - [\underbrace{100 \div 5}_{20} - \underbrace{2 \times 3}_{6}]$$

$$= 50 - [20 - 6] = 50 - 14$$

Result: $[\ldots] = 14$

3. **No more brackets: the last subtraction**

$$= 50 - 14 = 36$$

Result: $= 36$

✓ Check

$$100 \div 5 - 6 = 14$$

$$50 - 14 = 36 \checkmark$$

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