Number Types & Arithmetic

Matthew Williams • Math • May 6, 2026

Number sense is the base layer of the whole exam. If you can identify number types, handle signs, and follow the correct order of operations, every later topic becomes easier.

CSEC uses computation across all sections, not only in the Computation questions. A geometry answer, statistics answer, or consumer arithmetic answer can still be wrong because of a sign error or PEMDAS mistake. Use estimation to check whether your final value is reasonable.

Every calculation starts with knowing **what kind of number is involved**.

Natural Numbers

These are the numbers you learned to count with as a child.

Natural numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...

Notice: Natural numbers start at 1. Zero is NOT included.

> 📋 **Example**
> How many students are in a class? A natural number answer: 25 students.

Whole Numbers

Whole numbers are like natural numbers, BUT they include **zero**.

Whole numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...

The only difference between whole numbers and natural numbers is that zero exists in whole numbers.

> 📋 **Example**
> How many apples are left after you eat them all? Zero apples. This is a whole number but NOT a natural number.

Integers

Integers include **negative numbers**. They are all the whole numbers PLUS their negative versions.

Integers: ..., -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...

Integers go forever in both directions,to negative infinity and positive infinity.

> 📋 **Example**
> Temperature can be negative: "It's -5°C outside." This is an integer.
> Bank account: "You owe the bank $200" = -200. This is an integer.

Rational Numbers

A rational number is **any number that can be written as a fraction**.

$$\frac{\text{whole number}}{\text{whole number}}$$

Rational numbers include:

- **Fractions:** $\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{5}$
- **Decimals that terminate:** 0.5, 0.75, 0.25
- **Decimals that repeat forever:** 0.333... (which is $\frac{1}{3}$), 0.666... (which is $\frac{2}{3}$)

> 📋 **Example**
> $\frac{1}{2}$ = 0.5 (these are the same number, just written differently)
> $\frac{3}{4}$ = 0.75
> $\frac{1}{3}$ = 0.333... (the 3 repeats forever)
> All of these are rational numbers because they can be written as fractions.

Irrational Numbers

An irrational number **cannot be written exactly as a fraction**. The decimal never ends and never repeats.

The most famous irrational numbers are:

- **Pi:** π ≈3.14159265358979... (never ends, never repeats)

- **Square root of 2:** $\sqrt{2}$ ≈ 1.41421356... (never ends, never repeats)

> 📋 **Example**
> If you use a calculator to find π, it shows: 3.141592653589793...
>
> But that's NOT the exact value. The digits go on forever. You can never write the exact decimal form of
> π.

> 🧠 **Remember**
> The difference between rational and irrational:
> - **Rational** = can be written as a fraction
> - **Irrational** = cannot be written as a fraction

Basic Arithmetic: The Four Operations

Fluency in addition, subtraction, multiplication, and division is essential, especially when negative numbers are involved.

Adding and Subtracting with Negatives

Rule 1: Adding a negative is the same as subtracting

$$5 + (-3) = 5 - 3 = 2$$

Think of it: "I have 5, I owe 3, so I have 2 left."

Rule 2: Subtracting a negative is the same as adding

$$12 - (-5) = 12 + 5 = 17$$

Think of it: "I have 12, and I DON'T owe 5, so I actually have 17."

📋 **Example**

Problem 1: Calculate $-7+15$

Start at -7 on a number line. Move 15 steps to the right.

You end up at: $-7+15=8$

Problem 2: Calculate $20-(-8)$

This means: $20-(-8)=20+8=28$

(Subtracting a negative becomes addition)

Multiplying and Dividing with Negatives

The Sign Rules:

Operation	Result	Example
Positive × Positive	Positive	[Math: 3 × 4 = 12]
Negative × Negative	Positive	[Math: (-3) × (-4) = 12]
Positive × Negative	Negative	[Math: 3 × (-4) = -12]
Negative × Positive	Negative	[Math: (-3) × 4 = -12]

The same rules apply to division.

📋 **Example**

Problem 1: $(-6)\times 3$

Negative times positive = negative

$(-6)\times 3=-18$

Problem 2: $(-15)\div(-3)$

Negative divided by negative = positive

$(-15)\div(-3)=5$

Problem 3: $(-20)\div 4$

Negative divided by positive = negative

$(-20)\div 4=-5$

> 💡 **Tip**
> A quick way to remember:
> - **Same signs** (both positive or both negative) = **positive result**
> - **Different signs** (one positive, one negative) = **negative result**

Order of Operations (PEMDAS)

Imagine you have this problem: $2+3\times4$

Do you get 20 or 14?

- If you do $2+3=5$ first, then $5\times4=20$
- If you do $3\times4=12$ first, then $2+12=14$

The answer is 14, because arithmetic follows a fixed order of operations.

PEMDAS tells you the order:

- 1. **Brackets** (parentheses)
- 2. **Orders** (powers and roots, like x^2 or $\sqrt{x}$)
- 3. **Division and Multiplication** (left to right, whichever comes first)
- 4. **Addition and Subtraction** (left to right, whichever comes first)

📋 **Example**

Calculate: $18 \div 3 + 5^2 - (7 - 2) \times 4$

Step 1 - Brackets first: $(7 - 2) = 5$

Now we have: $18 \div 3 + 5^2 - 5 \times 4$

Step 2 - Orders (powers): $5^2 = 25$

Now we have: $18 \div 3 + 25 - 5 \times 4$

Step 3 - Division and Multiplication (left to right):

$18 \div 3 = 6$

$5 \times 4 = 20$

Now we have: $6 + 25 - 20$

Step 4 - Addition and Subtraction (left to right):

$6 + 25 = 31$

$31 - 20 = 11$

Answer: 11

📝 **Exam Tip**

In CSEC exams, **always follow PEMDAS**. If you skip this, you'll get the wrong answer even if your arithmetic is correct!