AQA Computer Science A-Level

4.5.1 Number Systems

Concise Notes

Specification:

4.5.1.1 Natural numbers:

Be familiar with the concept of a natural number and the set $\mathbb{N}$ of natural numbers (including zero).

4.5.1.2 Integer numbers:

Be familiar with the concept of an integer and the set $\mathbb{Z}$ of integers.

4.5.1.3 Rational numbers:

Be familiar with the concept of a rational number and the set $\mathbb{Q}$ of rational numbers, and that this set includes the integers.

4.5.1.4 Irrational numbers:

Be familiar with the concept of an irrational number.

4.5.1.5 Real numbers :

Be familiar with the concept of a real number and the set $\mathbb{R}$ of real numbers, which includes the natural numbers, the rational numbers and the irrational numbers.

4.5.1.6 Ordinal numbers:

Be familiar with the concept of ordinal numbers and their use to describe the numerical positions of objects.

4.5.1.7 Counting and measurement:

Be familiar with the use of:

- natural numbers for counting
- real numbers for measurement

Natural numbers

$$\mathbb{N} = \{0, 1, 2, 3\ldots\}$$

- All positive whole numbers and zero
- Can be used for counting
- The symbol for natural numbers is $\mathbb{N}$

Integer numbers

$$\mathbb{Z} = \{\ldots -2, -1, 0, 1, 2\ldots\}$$

- Whole numbers
- Positive and negative
- Including zero
- The symbol for integers is $\mathbb{Z}$

Rational numbers

- Also called quotients
- Can (but do not necessarily) have a fractional part
- Can be positive or negative
- Zero is a rational number
- If a number can be written exactly as a fraction, then it is rational
- The symbol for rational numbers (quotients) is $\mathbb{Q}$

Irrational numbers

- Cannot be written exactly as a fraction
- They have no symbol

Examples include:

π $\sqrt{2}$ e $\sqrt{3}$

Real numbers

- All possible real word quantities
- All members of irrational, rational, integers and natural numbers are real numbers
- Given the symbol $\mathbb{R}$

Ordinal numbers

- Integers used to describe the numerical positions of objects in relation to others
- Arrays index items using ordinal numbers

Counting and measuring

- Use natural numbers for counting (whole numbers)
- Use real numbers for measuring (numbers with fractional parts)