L2 Irrational Numbers

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Lesson 2 Irrational Numbers

Real Numbers ℝ

Q Rationals

ℤ Integers

Whole

Natural

Q̄ Irrationals
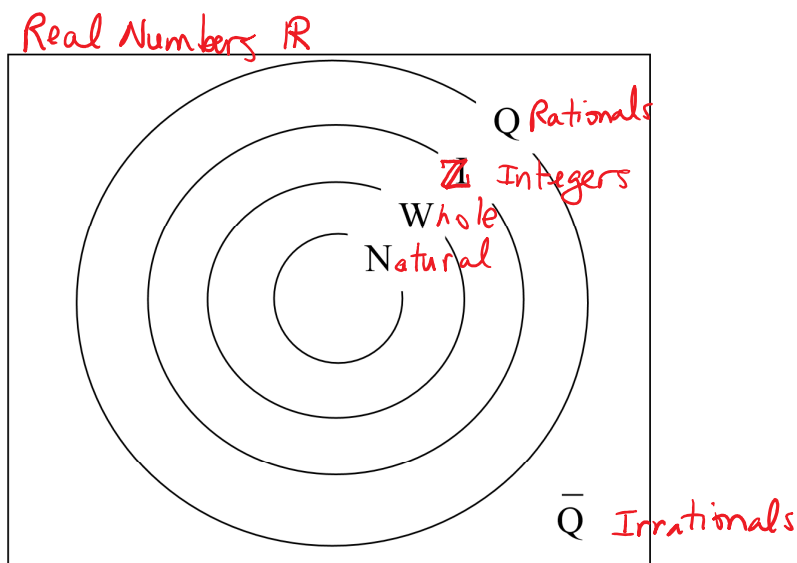
As you move outward from the centre of the model, each set includes the ones inside it

Natural Numbers   N

- "Counting Numbers"
- 1, 2, 3, 4, …

Whole Numbers   W

- Include Natural Numbers plus 0
- 0, 1, 2, 3, …

Integers   ℤ

- Include Whole Numbers plus all positive and negative whole numbers
- …, -3, -2, -1, 0, 1, 2, 3, …

Rational Numbers   Q

- "Fractional" numbers (both positive and negative)
- Terminating decimals (end somewhere)
- Repeating decimals (a digit or a pattern of digits)
- Square roots of perfect squares, cube roots of perfect cubes, etc

Irrational Numbers   Q' or $\overline{Q}$

- Non-terminating decimals
- Non-repeating decimals, including π
- Square roots of non-perfect squares, cube roots of non-perfect cubes, etc.

Real Numbers $\mathbb{R}$

- Include all rational and irrational numbers

Example 1: Classifying Numbers

Classify each number as rational or irrational.

a.) $\sqrt{2}$ $\overline{Q}$ (non-perfect square)   b.) $\sqrt{10}$ $\overline{Q}$

c.) $\frac{-5}{9}$ Q (fraction)   d.) $-\sqrt[3]{25}$ $\overline{Q}$ (not a perfect cube)

e.) 0.101101110… $\overline{Q}$ (non-terminating, non-repeating)   f.) $\sqrt[3]{8}$ Q (perfect cube)

g.) -3 Q (Integer)   h.) $5.32\overline{32}$ Q (repeating decimal)

i.) 0 Q (whole number)   j.) $\sqrt{4}$ Q (perfect square)

Example 2: Ordering Irrational Numbers on a Number line

Use a number line to order these numbers from least to greatest.

$$\sqrt[3]{-2}, \sqrt{2}, \sqrt{11}, \sqrt[3]{6}$$

only negative
value so will
be the smallest

$\sqrt{1}$ ← $\sqrt{2}$ $\sqrt{4}$
1 closer to 1 2

$\sqrt{9}$ $\sqrt{11}$ $\sqrt{16}$
← closer to 9
3   4

$\sqrt[3]{1}$ $\sqrt[3]{6}$ $\sqrt[3]{8}$
1   closer to 8
        2

$\sqrt[3]{-2}$ $\sqrt{2}$ $\sqrt[3]{6}$ $\sqrt{11}$

0   1   2   3   4