

# Indices & Index laws

Roots of integers

Year 11

Q1. Learn with an example

question

Find the real-number root.

$$\sqrt{4}$$

Write your answer in simplified form.

key idea

For real numbers  $a$  and  $b$ , and a positive integer  $n$ ,  $a$  is an  **$n$ th root** of  $b$  if  $a^n = b$ . For example, 2 is a fourth root of 16 because  $2^4 = 16$ .

In the expression  $a = \sqrt[n]{b}$ , the symbol  $\sqrt[n]{\phantom{b}}$  is called the **radical**,  $n$  is called the **index**, and  $b$  is called the **radicand**. If  $n = 2$ , the radical is a square root and the 2 is not written:  $\sqrt{\phantom{b}}$ .

If  $n$  is even and the radicand  $b$  is positive,  $\sqrt[n]{b}$  is a positive real number. It is called the **principal root**.

solution

To start, identify the type of root in the question.

$$\sqrt{4}$$

The index is 2, so this is a square root.

Since  $2^2 = 4$ , 2 is the principal square root of 4.

Q2.

Find the real-number root.

$$\sqrt[3]{-1}$$

Q3.

Find the real-number root.

$$\sqrt[5]{243}$$



For detailed working of this worksheet

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