Dividing fractions.

If you ask any group of students HOW to divide two fractions such as

$$\frac{5}{7} \div \frac{3}{4}$$

the usual answer you get is **"Turn the 2nd one upside down then multiply".**

$$\frac{5}{7} \div \frac{3}{4} = \frac{5}{7} \times \frac{4}{3} = \frac{20}{21}$$

If you then ask "WHY?", nobody knows why!
It is of little use giving explanations in words that just bamboozle students, such as ***"Dividing is the same as multiplying by the reciprocal"*** because the same question arises: "WHY?"

Here is an interesting way to EXPLAIN this:

$$\frac{\frac{5}{7}}{\frac{2}{3}} = \frac{5}{7}$$

Here, we multiply by **1**
in the form of:

$$1 = \frac{\frac{3}{2}}{\frac{3}{2}}$$

This produces….

$$\frac{\frac{5}{7}}{\frac{2}{3}} \times \frac{\frac{3}{2}}{\frac{3}{2}}$$

This produces:

$$\frac{\frac{5}{7} \times \frac{3}{2}}{1} = \frac{5}{7} \times \frac{3}{2} = \frac{15}{14}$$

Hence the "rule" which says:
To divide two fractions, turn the second one upside down and multiply!

The same idea applies to SURDS

Consider $\dfrac{5 + 2\sqrt{3}}{4 - \sqrt{3}}$

Here, we multiply by **1** in the form of:

$$1 = \frac{4 + \sqrt{3}}{4 + \sqrt{3}}$$

This produces….

$$\frac{(5 + 2\sqrt{3})}{(4 - \sqrt{3})} \times \frac{(4 + \sqrt{3})}{(4 + \sqrt{3})}$$

This produces:

$$\frac{20 + 13\sqrt{3} + 6}{16 - 3}$$

$$= \frac{26}{13} + \frac{13\sqrt{3}}{13} = 2 + \sqrt{3}$$

The same idea even applies to COMPLEX NUMBERS

Consider $\dfrac{5 + 3i}{4 - 3i}$

Here, we multiply by **1** in the form of:

$$1 = \frac{4 + 3i}{4 + 3i}$$

This produces….

$$\frac{(5 + 3i)}{(4 - 3i)} \times \frac{(4 + 3i)}{(4 + 3i)}$$

This produces:

$$\frac{20 + 27i + 9i^2}{16 - 9i^2}$$

$$= \frac{11}{25} + \frac{27i}{25}$$