When a square root, or cube, or any other root, of a number can’t be shown as a whole number or fraction, we call this a surd.

For example, the square of five, or 12, or 20. Non-surds would be perfect squares.

Like the square root of four is two and the square root of 100 is 10.

Surds can be multiplied using the rule root A times root B equals root AB.

For example, root three times root four, equals root three times four, which is root 12.

Surds can also be divided. The rule is root A over B, equals root A divided by root B.

Root 64 over 16, becomes root 64 divided by root 16.

Which can be simplified as eight over four, which is two.

Notice that root A times root A equals A.

So, root three times root three is root nine. And the square root of nine is three.

You might be asked to simplify a surd, for example root 45. To do this you need to check if any factors of 45 are perfect squares. The Factor pairs of 45 are one and 45, three and 15 and five and nine. The factor pair to use is five and nine, as nine is a square number, so we can write root 45 as root nine times root five.

The square root of nine is three, so we can write this as three times root five.

That's our surd simplified.

The rules of surds make it possible to simplify complex calculations exactly.