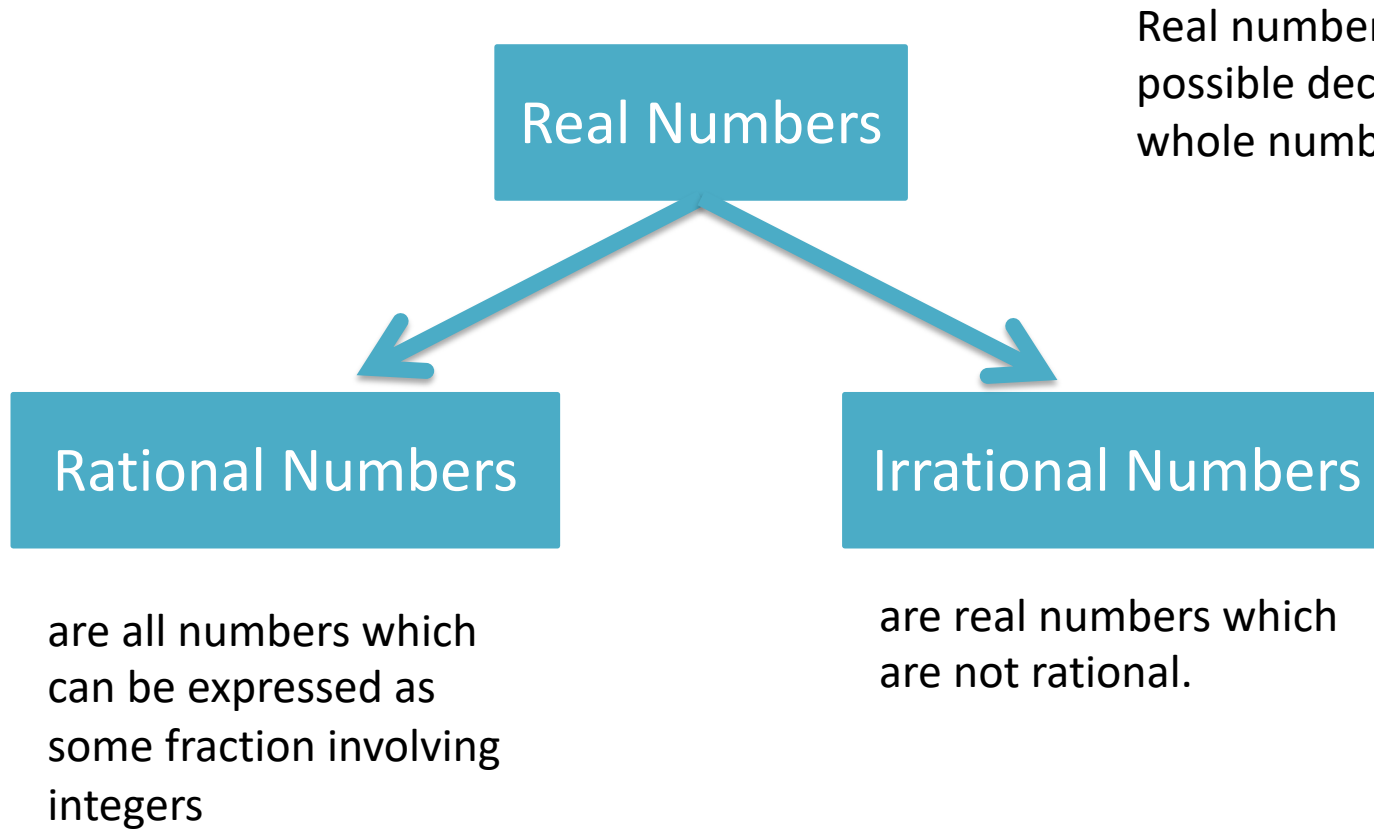


# Manipulating Surds





Real numbers are any possible decimal or whole number.

The only two things you need to know this topic...

$$\sqrt{a} \times \sqrt{b} =$$

$$\frac{\sqrt{a}}{\sqrt{b}} =$$

**Basic Examples:**

$$\sqrt{3} \times \sqrt{2} =$$

$$\sqrt{\frac{1}{9}} =$$

$$\sqrt{4x^2} =$$

$$\sqrt{8} =$$

$$\sqrt{27} =$$

$$\sqrt{32} =$$

$$\sqrt{50} =$$

$$\sqrt{12} =$$

a  $\sqrt{24} =$

b  $\sqrt{75} =$

c  $\sqrt{20} =$

d  $\sqrt{48} =$

a  $2\sqrt{75} =$

b  $3\sqrt{40} =$

c  $4\sqrt{48} =$

d  $3\sqrt{200} =$

e  $5\sqrt{45} =$

a  $6 \times \sqrt{7} =$

b  $\sqrt{2} \times 2 =$

c  $3 \times 4\sqrt{3} =$

d  $5\sqrt{8} \times 2\sqrt{2} =$

e  $2\sqrt{2} \times 3\sqrt{6} =$

1 Simplify the following:

a  $\sqrt{8} \times 3\sqrt{2} =$

b  $\sqrt{27} \times 2\sqrt{3} =$

2 Express the following as a single square root  
(*hint: do the steps of simplification backwards!*)

a  $3\sqrt{2} =$

b  $2\sqrt{5} =$

3 Express the following as a single square root:

a  $a\sqrt{b} =$

b  $2\sqrt{k} =$

$$\sqrt{3} + \sqrt{3} =$$

$$2\sqrt{5} + \sqrt{5} =$$

$$7\sqrt{7} + 7\sqrt{7} =$$

$$3\sqrt{12} + \sqrt{27} =$$

$$\sqrt{2}(3 + \sqrt{2}) =$$

$$(\sqrt{2} + 1)(\sqrt{2} - 1) =$$

$$(\sqrt{8} + 3)(\sqrt{2} + 5) =$$

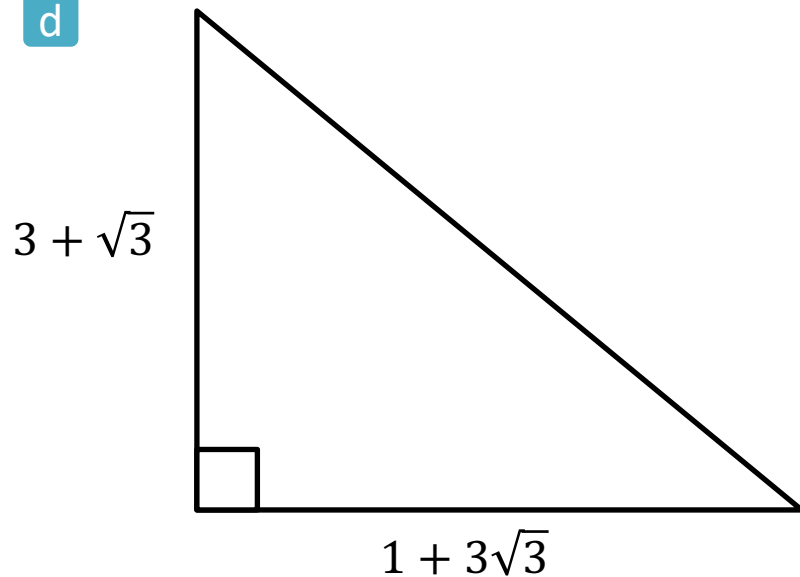
$$(\sqrt{5} - 2)^2 =$$

a  $\sqrt{5}(2 + \sqrt{3}) =$

b  $(\sqrt{8} - 1)(\sqrt{2} + 3) =$

c  $(3 - 2\sqrt{5})^2 =$

d



*Area =*

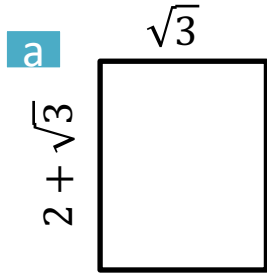
1 Expand and simplify:

a  $(2 - \sqrt{8})(2 + \sqrt{2}) =$

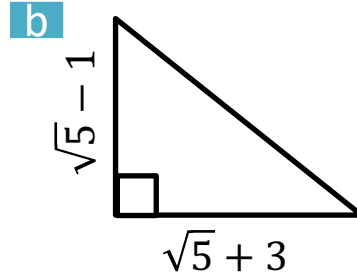
b  $(2\sqrt{2} + 5)(4 + \sqrt{18}) =$

c  $(\sqrt{2} + 1)^2 - (\sqrt{2} - 1)^2 =$

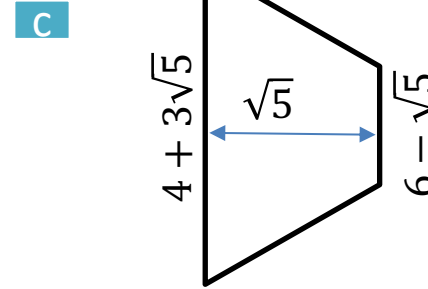
2 Determine the area of



**A =**

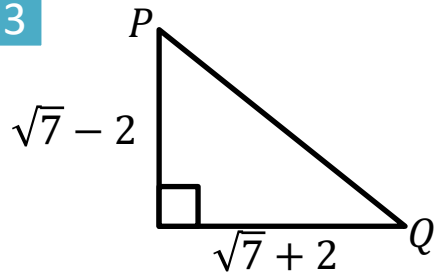


**A =**



**A =**

3



Find the length of  $PQ$ .

Here's a surd. What could we multiply it by such that it's no longer an irrational number?

$$\sqrt{5} \times \square = 5$$

$$\frac{1}{\sqrt{2}} \times \square = \square$$

a  $\frac{12}{\sqrt{3}} =$

b  $\frac{2}{\sqrt{6}} =$

c  $\frac{4\sqrt{2}}{\sqrt{8}} =$

$$\frac{1}{\sqrt{2} + 1} \times \square =$$

$$\frac{3}{\sqrt{6} - 2} \times \square =$$

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

$$\frac{3\sqrt{2} + 4}{5\sqrt{2} - 7} \times \square =$$

Rationalise the denominator and simplify

$$\frac{4}{\sqrt{5} - 2}$$

Rationalise the denominator and simplify

$$\frac{2\sqrt{3} - 1}{3\sqrt{3} + 1}$$

- 1 Expand and simplify:

$$(\sqrt{5} + 3)(\sqrt{5} - 2)(\sqrt{5} + 1) =$$

- 2 Rationalise the denominator, giving your answer in the form  $a + b\sqrt{3}$ .

$$\frac{3\sqrt{3} + 7}{3\sqrt{3} - 5}$$

- 3 Simplify:

$$\frac{\sqrt{a+1} - \sqrt{a}}{\sqrt{a+1} + \sqrt{a}}$$

Solve  $\frac{\sqrt[4]{9}}{\sqrt[5]{27}} = \sqrt[x]{3}$