

## Prior Knowledge

Here are 5 questions designed to get the little grey cells firing before we journey through the topic of Surds.

- Expand  $(x + 3)(x + 5)$
- Calculate  $\sqrt{49} \times \sqrt{49}$
- Simplify  $3a + 9a - 4a$
- Simplify  $3\sqrt{5} + 9\sqrt{5} - 4\sqrt{5}$
- Which is larger  $(\sqrt{9})^2$  or  $\sqrt{3^2}$

# Expanding with Surds

## Pairing Exercise

In this box pair up the matching expressions. There will be one left over.

- |                  |                |
|------------------|----------------|
| $(x + 2)(x + 3)$ | $x^2 - x - 6$  |
| $(x - 2)(x + 3)$ | $x^2 - 5x + 6$ |
| $(x - 2)(x - 3)$ | $x^2 + 5x + 6$ |
| $(x + 2)(x - 3)$ | $x^2 + x + 6$  |
|                  | $x^2 + x - 6$  |

Can you make a match to this expression?

## Recap Example

Expand and simplify the following:

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

|             |              |              |
|-------------|--------------|--------------|
|             | 5            | $+\sqrt{3}$  |
| 2           | 10           | $+2\sqrt{3}$ |
| $+\sqrt{3}$ | $+5\sqrt{3}$ | $+\sqrt{9}$  |

$$\underline{13 + 7\sqrt{5}}$$

## First Practice

Expand and simplify the following:

- $(5 - \sqrt{2})(5 + \sqrt{2})$
- $(2 + \sqrt{5})(2 + \sqrt{3})$
- $(\sqrt{3} + \sqrt{5})(\sqrt{3} + \sqrt{5})$
- $4(\sqrt{5} + 3)$
- $(3 - \sqrt{5})(3 - 2\sqrt{5})$
- $\sqrt{6}(\sqrt{2} + \sqrt{8})$

Simplify

$$(2\sqrt{x} + \sqrt{y})(\sqrt{x} - 3\sqrt{y})$$

A rectangle has sides  $\sqrt{5} + 1$  and  $2\sqrt{5} - 1$ . Find its exact area.

Evaluate  $k$  if

$$(2\sqrt{7} - \sqrt{3})(2\sqrt{7} + \sqrt{3}) = k$$

If  $(2\sqrt{3} - \sqrt{5})^2 = a - \sqrt{b}$ , evaluate  $a$  and  $b$

## Squaring surds...

Expand and simplify the following:

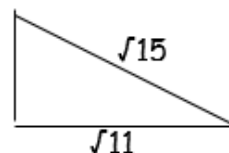
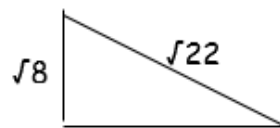
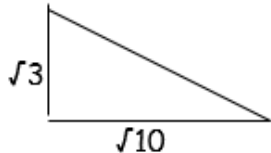
- $(3\sqrt{2} + \sqrt{7})^2$
- $(2\sqrt{3} + 3\sqrt{5})^2$
- $(\sqrt{7} - 2\sqrt{5})^2$
- $(2\sqrt{8} - 3\sqrt{5})^2$
- $(3\sqrt{5} + 2\sqrt{2})^2$
- $(\sqrt{2} + \sqrt{5})^2$

## Pushing on...

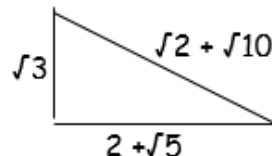
Expand and simplify the following:

- $(\sqrt{2} + 3)(\sqrt{5} + 3\sqrt{3})$
- $(\sqrt{5} - \sqrt{2})(\sqrt{2} - \sqrt{7})$
- $(\sqrt{2} + 5\sqrt{3})(2\sqrt{5} - 3\sqrt{2})$
- $(3\sqrt{10} - 2\sqrt{5})(4\sqrt{2} + 6\sqrt{6})$
- $(2\sqrt{5} - 7\sqrt{2})(\sqrt{5} - 3\sqrt{2})$
- $(\sqrt{6} + 3\sqrt{7})(2\sqrt{2} + \sqrt{5})$

Work out the missing lengths in the following triangles. Leave your answer in surd form



Prove that the following triangle is right-angled.



## Applications of surds