



Expanding brackets with surds

Getting ready for A-Level Maths...

*"The most important investment you can make is in **yourself**."*

Expanding brackets with surds

Important rules

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

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

Be careful...

$$\sqrt{a} + \sqrt{b} \neq \sqrt{a + b}$$

$$\sqrt{a} - \sqrt{b} \neq \sqrt{a - b}$$

Learn by heart...

$$1^2 = 1 \times 1 = \mathbf{1}$$

$$2^2 = 2 \times 2 = \mathbf{4}$$

$$3^2 = 3 \times 3 = \mathbf{9}$$

$$4^2 = 4 \times 4 = \mathbf{16}$$

$$5^2 = 5 \times 5 = \mathbf{25}$$

$$6^2 = 6 \times 6 = \mathbf{36}$$

$$7^2 = 7 \times 7 = \mathbf{49}$$

$$8^2 = 8 \times 8 = \mathbf{64}$$

$$9^2 = 9 \times 9 = \mathbf{81}$$

$$10^2 = 10 \times 10 = \mathbf{100}$$

$$11^2 = 11 \times 11 = \mathbf{121}$$

$$12^2 = 12 \times 12 = \mathbf{144}$$

$$13^2 = 13 \times 13 = \mathbf{169}$$

$$14^2 = 14 \times 14 = \mathbf{196}$$

$$15^2 = 15 \times 15 = \mathbf{225}$$

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Question

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

What's the answer

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

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Question

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

What's the answer

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

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Question

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

What's the answer

$$\sqrt{919} \times \sqrt{919} =$$

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Expanding brackets

Expand and simplify

$$2(x + 4)$$

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Expanding brackets

Expand and simplify

$$(x + 2)(x + 4)$$

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My turn

Evaluate without a calculator

$$\sqrt{2}(\sqrt{8} + \sqrt{50})$$

Your turn

Evaluate without a calculator

$$\sqrt{3}(\sqrt{12} + \sqrt{27})$$

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My turn

Express in the form $a + b\sqrt{3}$

$$(4 + \sqrt{3})(1 + 2\sqrt{3})$$

State the values of a and b .

Your turn

Express in the form $a + b\sqrt{5}$

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

State the values of a and b .

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My turn

Express in the form $a + b\sqrt{3}$

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

State the values of a and b .

Your turn

Express in the form $a + b\sqrt{5}$

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

State the values of a and b .

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My turn

Express in the form $a + b\sqrt{3}$

$$(2\sqrt{3} - 1)^2$$

State the values of a and b .

Your turn

Express in the form $a + b\sqrt{5}$

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

State the values of a and b .

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My turn

Simplify

$$(\sqrt{7} - 1)(\sqrt{7} + 1)$$

Your turn

Simplify

$$(\sqrt{11} - 2)(\sqrt{11} + 2)$$

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Difference of two squares

$$(a + b)(a - b) = a^2 - b^2$$

$$(a - b)(a + b) = a^2 - b^2$$

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My turn

Simplify

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

Your turn

Simplify

$$(8 + \sqrt{7})(8 - \sqrt{7})$$

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My turn

Simplify

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

Your turn

Simplify

$$(10 - 3\sqrt{5})(10 + 3\sqrt{5})$$

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Review Exercise

1. Evaluate without a calculator.

$$\sqrt{5}(\sqrt{20} + \sqrt{45})$$

2. Express in the form $a + b\sqrt{2}$.

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

State the values of a and b .

3. Express in the form $a + b\sqrt{6}$.

$$(4 + 2\sqrt{6})^2$$

State the values of a and b .

4. Express in the form $a + b\sqrt{7}$.

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

State the values of a and b .

5. Simplify $(\sqrt{13} - 2)(\sqrt{13} + 2)$

6. Simplify $(7 + \sqrt{6})(7 - \sqrt{6})$

7. Simplify $(9 - 5\sqrt{3})(9 + 5\sqrt{3})$

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Review Exercise (Answers)

- Evaluate without a calculator. $\sqrt{5}(\sqrt{20} + \sqrt{45})$ **25**
- Express in the form $a + b\sqrt{2}$. $(5 + \sqrt{2})(6 + 3\sqrt{2})$ **$36 + 21\sqrt{2}$**
State the values of a and b . **$a = 36$**
 $b = 21$
- Express in the form $a + b\sqrt{6}$. $(4 + 2\sqrt{6})^2$ **$40 + 16\sqrt{6}$**
State the values of a and b . **$a = 40$**
 $b = 16$
- Express in the form $a + b\sqrt{7}$. $(2\sqrt{7} - 3)^2$ **$37 - 12\sqrt{7}$**
State the values of a and b . **$a = 37$**
 $b = -12$
- Simplify $(\sqrt{13} - 2)(\sqrt{13} + 2)$ **9**
- Simplify $(7 + \sqrt{6})(7 - \sqrt{6})$ **43**
- Simplify $(9 - 5\sqrt{3})(9 + 5\sqrt{3})$ **6**