

GCSE Maths: Multiplying, dividing and expanding with surds (Higher): answers

GCSE Maths - Standard Form, Indices and Surds - Higher - Lesson 6.8

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch06-standard-form-indices-surds/higher/multiplying-dividing-and-expanding-with-surds/

Exercise 6P Multiplying, dividing and expanding with surds Non-calculator

1 Simplify each product.

(a) $\sqrt{2} \times \sqrt{8}$

Answer: 4

(b) $\sqrt{3} \times \sqrt{5}$

Answer: $\sqrt{15}$

(c) $2\sqrt{3} \times 5\sqrt{6}$

Answer: $30\sqrt{2}$

(d) $3\sqrt{2} \times 4\sqrt{2}$

Answer: 24

(e) $\sqrt{6} \times \sqrt{15}$

Answer: $3\sqrt{10}$

(f) $4\sqrt{5} \times 2\sqrt{5}$

Answer: 40

2 Simplify each division.

(a) $6\sqrt{10} \div 2\sqrt{5}$

Answer: $3\sqrt{2}$

(b) $\sqrt{24} \div \sqrt{6}$

Answer: 2

(c) $8\sqrt{18} \div 2\sqrt{2}$

Answer: 12

(d) $\sqrt{45} \div \sqrt{5}$

Answer: 3

3 Work out each value.

(a) $(\sqrt{7})^2$

Answer: 7

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

Answer: 45

(c) $(2\sqrt{3})^2$

Answer: 12

4 Expand and simplify.

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

Answer: $3 + 2\sqrt{3}$

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

Answer: $5 - 2\sqrt{5}$

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

Answer: $4 + 6\sqrt{2}$

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

Answer: $3\sqrt{2} + 2\sqrt{3}$

5 Expand and simplify.

(a) $(3 + \sqrt{2})(4 - \sqrt{2})$

Answer: $10 + \sqrt{2}$

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

Answer: $5 + 3\sqrt{3}$

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

Answer: $3 + \sqrt{5}$

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

Answer: $7 + 4\sqrt{3}$

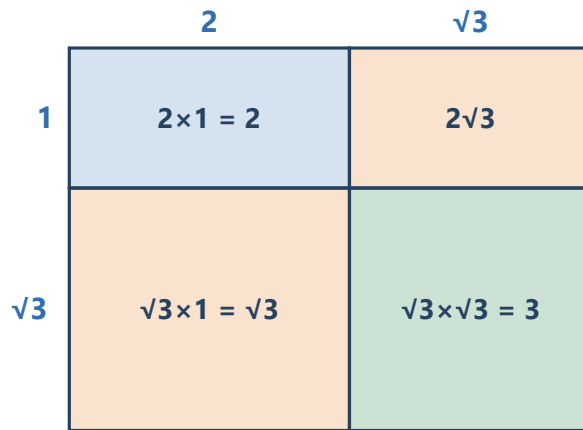
(e) $(1 - \sqrt{2})(1 - \sqrt{2})$

Answer: $3 - 2\sqrt{2}$

(f) $(4 + \sqrt{5})(4 - \sqrt{5})$

Answer: 11

6 A rectangle has length $(2 + \sqrt{3})$ cm and width $(1 + \sqrt{3})$ cm. Show that its area is $(5 + 3\sqrt{3})$ cm².



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

Answer: $5 + 3\sqrt{3}$

- 7** A rectangle has length $(4 + \sqrt{2})$ cm and width $(4 - \sqrt{2})$ cm. Work out its exact area and its exact perimeter.

(a) area

Answer: 14 cm^2

(b) perimeter

Answer: 16 cm

- 8** Show that $(\sqrt{5} + 2)(\sqrt{5} - 2) = 1$.

Answer: $5 - 4 = 1$

- 9** Show that $(\sqrt{8} + \sqrt{2})^2 = 18$.

Answer: 18

- 10** Is $(3 + \sqrt{2})^2$ equal to 11? Explain.

Answer: No. $(3 + \sqrt{2})^2 = 11 + 6\sqrt{2}$, which is more than 11.

- 11** Show that $(a + \sqrt{b})(a - \sqrt{b})$ is always a whole number when a and b are whole numbers.

Answer: $a^2 - b$

- 12** $x = 2 + \sqrt{3}$. Show that $x^2 - 4x + 1 = 0$.

Answer: 0

- 13** Show that $(\sqrt{3} + \sqrt{2})^2 - (\sqrt{3} - \sqrt{2})^2 = 4\sqrt{6}$.

Answer: $4\sqrt{6}$