



Surds

Adding and subtracting surds

$$3x + 5x + 12x = (3 + 5 + 12)x = 20x$$

$$3\sqrt{7} + 5\sqrt{7} + 12\sqrt{7} = (3 + 5 + 12)\sqrt{7} = 20\sqrt{7}$$

Try these

1 a $3x + 4x - 2x =$

b $3\sqrt{11} + 4\sqrt{11} - 2\sqrt{11} =$

2 a $7x + 5x - 17x =$

b $7\sqrt{13} + 5\sqrt{13} - 17\sqrt{13} =$

3 a $9x - 4x + 9x =$

b $9\sqrt{17} - 4\sqrt{17} + 9\sqrt{17} =$

4 a $8x + 11x + 22x =$

b $8\sqrt{11} + 11\sqrt{11} + 22\sqrt{11} =$

5 a $10x + 26x - 17x =$

b $10\sqrt{13} + 26\sqrt{13} - 17\sqrt{13} =$

6 a $x + 7x + 13x =$

b $\sqrt{17} + 7\sqrt{17} + 13\sqrt{17} =$

7 a $27x + 17x + 7x =$

b $27\sqrt{17} + 17\sqrt{17} + 7\sqrt{17} =$

Multiplying and Dividing Surds

1 a $\frac{15x}{5} =$

b $\frac{15\sqrt{2}}{5} =$

2 a $\frac{25x}{5} =$

b $\frac{25\sqrt{3}}{5} =$

3 a $\frac{15\sqrt{242}}{5} =$

b $\frac{\sqrt{15}}{\sqrt{5}} = \sqrt{\quad}$

4 a $\frac{\sqrt{27}}{\sqrt{9}} =$

b $\frac{\sqrt{27}}{3} =$

5 a $\frac{\sqrt{24}}{2} =$

b $\frac{\sqrt{108}}{3} =$

6 a $\frac{\sqrt{792}}{\sqrt{54}} =$

b $\frac{\sqrt{105}}{\sqrt{35}} =$

7 a $\frac{\sqrt{64}}{\sqrt{80}} =$

b $\frac{5}{\sqrt{375}} =$



Rationalising Surds

$$1 \quad \frac{5}{2+\sqrt{3}} =$$

$$2 \quad \frac{4\sqrt{3}}{8+\sqrt{21}} =$$

$$3 \quad \frac{8\sqrt{45}}{2+\sqrt{48}} =$$

$$4 \quad \frac{5\sqrt{15}}{7+\sqrt{5}} =$$

$$5 \quad \frac{6+\sqrt{7}}{2+\sqrt{21}} =$$

$$6 \quad \frac{\sqrt{300}}{2+\sqrt{8}} =$$

$$7 \quad \frac{\sqrt{200}}{5+\sqrt{4}} =$$

$$8 \quad \frac{\sqrt{450}}{3+\sqrt{18}} =$$

$$9 \quad \frac{\sqrt{39}}{6+\sqrt{21}} =$$

$$10 \quad \frac{\sqrt{242}}{1+\sqrt{11}} =$$

$$11 \quad \frac{6}{2+\sqrt{3}} =$$

$$12 \quad \frac{\sqrt{980}}{2+\sqrt{7}} =$$

Expand these expressions

- 1 $(3 + \sqrt{7})^2 =$
- 2 $(5 + \sqrt{11})^2 =$
- 3 $(8 + \sqrt{8})^2 =$
- 4 $(2 - \sqrt{11})^2 =$
- 5 $(5 + \sqrt{17})^2 =$
- 6 $(11 - \sqrt{72})^2 =$
- 7 $(3 + \sqrt{5})^4 =$
- 8 $(9 + \sqrt{3})^5 =$
- 9 $(4 + \sqrt{12})^3 =$
- 10 $(5 + \sqrt{11})^0 =$
- 11 $(4 + \sqrt{7})(3 + \sqrt{11})$
- 12 $(5 + \sqrt{7})(2 - \sqrt{32})$
- 13 $(3 - \sqrt{7})(5 + \sqrt{125})$
- 14 $(11 + \sqrt{7})(6 - \sqrt{13})$
- 15 $(8 - \sqrt{7})(7 - \sqrt{4})$