

1 Squares and square roots

a) Work out $\sqrt{2\frac{1}{4}} - \sqrt{0.0025}$

b) Solve $2(x+1)^2 - 5 = 45$

a) $\sqrt{\frac{9}{4}} = 1.5, 1.5 - 0.05$

b) $(x+1)^2 = 25, x+1 = \pm 5$

a) 1.45 b) $x = 4$ or $x = -6$

2 Cubes and cube roots

a) Work out $\sqrt[3]{-3\frac{3}{8}}$

b) A cube has a volume of $8x^6 \text{ cm}^3$.
Find its surface area in terms of x .

a) $\sqrt[3]{(-\frac{27}{8})} = -\frac{3}{2}$

b) edge $\sqrt[3]{(8x^6)} = 2x^2, 6 \times 4x^4$

a) $-1\frac{1}{2}$ b) $24x^4 \text{ cm}^2$

3 Estimating roots

a) Without a calculator, show that $\sqrt{3} + \sqrt{8}$ is between 4.5 and 4.7

b) Find the whole number n for which $\sqrt[3]{n}$ is closest to 4.5

a) $1.7^2 < 3 < 1.8^2, 2.8^2 < 8 < 2.9^2$

a) $1.7 + 2.8 < \sqrt{3} + \sqrt{8} < 1.8 + 2.9$

b) $4.5^3 = 91.125, n = 91$

4 Index laws

a) Simplify $\frac{(3x^{-2}y)^3}{9x^{-4}y^5}$

b) Show that $\frac{2^x \times 8^{x+1}}{4^{2x}} = 8$ for every value of x .

a) $3x^{-6} + 4y^3 - 5 = 3x^{-2}y^{-2}$

b) $2^x + 3x + 3 - 4x = 2^3$

a) $\frac{3}{x^2y^2}$ b) $2^3 = 8$

5 Fractional indices

a) Work out $0.008^{-\frac{2}{3}}$

b) Write $(\sqrt[3]{x})^2 \times \frac{1}{\sqrt{x}}$ as a single power of x .

a) $0.008 = 1 \div 125, \sqrt[3]{125} = 5, 5^2$

b) $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$

a) 25 b) $x^{\frac{1}{6}}$

Indices, standard form and surds revision mat answers

6 Simplifying surds

a) Expand and simplify $(2\sqrt{3} - \sqrt{5})^2$

b) A square has an area of 48 cm^2 .
Find its perimeter in the form $a\sqrt{b}$.

a) $12 - 2\sqrt{15} - 2\sqrt{15} + 5$

b) side $\sqrt{48} = 4\sqrt{3}$

a) $17 - 4\sqrt{15}$ b) $16\sqrt{3} \text{ cm}$

7 Rationalising denominators

a) Rationalise and simplify $\frac{\sqrt{5}+1}{\sqrt{5}-1}$

b) Write $\frac{4}{\sqrt{2}} + \sqrt{18}$ in the form $k\sqrt{2}$

a) $\frac{(\sqrt{5}+1)^2}{5-1} = \frac{6+2\sqrt{5}}{4}$

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

a) $\frac{3+\sqrt{5}}{2}$ b) $5\sqrt{2}$

8 Standard form (large)

a) Write 0.072×10^{11} in standard form.

b) Write in order, smallest first.
 52×10^6 5.3×10^7 0.51×10^8
 5.05×10^7

a) $7.2 \times 10^{-2} \times 10^{11} = 7.2 \times 10^9$

b) $5.05 \times 10^7, 0.51 \times 10^8,$
 $52 \times 10^6, 5.3 \times 10^7$

9 Standard form (small)

a) Write 0.0305×10^{-2} in standard form.

b) $x = 4 \times 10^{-6}$. Write $\sqrt{x}$ and x^2 in standard form.

a) $0.0305 = 3.05 \times 10^{-2}$

b) $\sqrt{4 \times 10^{-6}}; 16 \times 10^{-12}$

a) 3.05×10^{-4} b) $2 \times 10^{-3},$
 1.6×10^{-11}

10 Standard form calculations

Give your answers in standard form.

a) Work out $(8 \times 10^5)^2 \div (3.2 \times 10^{-3})$

b) $a = 3 \times 10^n$ and $b = 5 \times 10^{n+2}$. Find ab in terms of n .

a) $6.4 \times 10^{11} \div (3.2 \times 10^{-3})$

b) $15 \times 10^{2n+2}$

a) 2×10^{14} b) $1.5 \times 10^{2n+3}$