

# INDICES & SURDS

# REVIEW EXERCISE

- 1** Simplify as far as possible, given that  $x = \sqrt{5}$ ,  $y = \sqrt{20}$
- a**  $x^2$       **b**  $y^2$       **c**  $x + y$       **d**  $2x - 3y$
- e**  $\frac{y}{x}$       **f**  $x^3$       **g**  $\sqrt{xy}$
- 2** Express these in terms of the simplest possible surds.
- a**  $\sqrt{80}$       **b**  $\sqrt{32}$       **c**  $\sqrt{72}$       **d**  $\sqrt{180} + \sqrt{125}$
- 3** Rationalise the denominator of these fractions.
- a**  $\frac{1}{\sqrt{3}}$       **b**  $\frac{1}{\sqrt{2}}$       **c**  $\frac{4}{\sqrt{7}}$       **d**  $\frac{1}{4 - \sqrt{10}}$
- e**  $\frac{2}{\sqrt{6} + 2}$       **f**  $\frac{3}{2\sqrt{6}}$       **g**  $\frac{3}{\sqrt{6} - \sqrt{5}}$
- 4** Solve these for  $x$ , giving the answers exactly or to 3 significant figures.
- a**  $2^{x^2+x} = 64$       **b**  $2x^{\frac{1}{2}} = 14$       **c**  $2x^{-3} = 15$       **d**  $x^{\frac{2}{3}} = 9$
- e**  $4^{2x+2} = 8^{3x-2}$       **f**  $\sqrt[3]{x} = -2$       **g**  $3^x \times 3^{2x+1} = 9^x$       **h**  $x^{-\frac{1}{2}} = 2.17$
- 5** A square has area  $6 \text{ cm}^2$ . Find its perimeter.
- 6** A rectangle has sides  $(4 - \sqrt{7}) \text{ cm}$  and  $(3 + 2\sqrt{7}) \text{ cm}$ . Find its perimeter and its area.
- 7** A rectangle has area  $(6 - \sqrt{3}) \text{ cm}^2$  and the length of one of its sides is  $(2 + \sqrt{3}) \text{ cm}$ . Find the length of the other side.
- 8** The sides of a rectangle are in the ratio 2:3. The diagonal is of length 26 cm. Find the perimeter.
- 9** A cube has volume  $10 \text{ cm}^3$ . Find the sum of the lengths of the edges, and the total surface area.
- 10** Given that  $72 = 2^x \times 3^y$ , find  $x$  and  $y$ , given that  $x, y \in \mathbb{Z}$ .
- 11** Find the values of
- a**  $4^0$       **b**  $4^3$       **c**  $4^{-1}$       **d**  $4^{\frac{1}{2}}$       **e**  $4^{\frac{3}{2}}$
- f**  $4^{-\frac{1}{2}}$       **g**  $(\frac{1}{5})^{-1}$       **h**  $(\frac{2}{3})^3$       **i**  $(\frac{3}{2})^{-2}$       **j**  $(\frac{27}{8})^{-1}$
- k**  $(\frac{27}{8})^{\frac{1}{3}}$       **l**  $(\frac{1}{36})^0$       **m**  $36^{\frac{1}{2}}$       **n**  $36^{-\frac{1}{2}}$       **o**  $64^{\frac{1}{3}}$
- 12** Simplify
- a**  $3^{\frac{1}{2}} \times 3^{\frac{2}{3}}$       **b**  $\sqrt{64} \times \sqrt[3]{64} \times \sqrt[4]{64}$       **c**  $7^{\frac{1}{2}} \times 7^{\frac{1}{3}} \times 7^{\frac{1}{6}}$
- d**  $(0.2)^4 \times 5^4$       **e**  $(2.5)^3 \times 4^3$       **f**  $\frac{6^{\frac{1}{2}} \times 36^{\frac{1}{3}}}{\sqrt{6}}$
- 13** Work out these values, giving each answer in index form where possible.
- a**  $7^3 \times 7^2 \times 7^4$       **b**  $3^4 \times 3^5 \times 3^2$       **c**  $4^3 + 4^2$
- d**  $5^2 \times 5^4 \times 5$       **e**  $2^{10} - 2^5$       **f**  $\frac{2^{10}}{2^5}$
- g**  $\frac{8^3}{8}$       **h**  $6^3 + 6$       **i**  $\frac{7^6}{7^3}$
- j**  $(7^2)^2$       **k**  $(5^3)^3$
- 14** Simplify these, where possible.
- a**  $a^4 \times a^3 \times a$       **b**  $b^5 + b^3$       **c**  $2c^3 + 3c^3$
- d**  $d^3 \times d^4 \times d^2$       **e**  $e^2 + e^3$       **f**  $3f^2 \times 2f^3$
- g**  $4g^3 \times 5g^2$       **h**  $(h^4)^3$       **i**  $(i^3)^4$
- j**  $(3j)^2$       **k**  $(2k^3)^2$       **l**  $(7l^6)^2$
- m**  $(m^2n)^3$       **n**  $(p^2q^4)^3$       **o**  $(3rs)^2$
- p**  $v^2w \times vw^2$       **q**  $\frac{x^4}{x^3}$       **r**  $\frac{y^6}{y^2}$
- s**  $\frac{z^6}{z}$