

Rules of Indices

$$1) \quad x^p \times x^q = x^{p+q}$$

$$2) \quad x^p \div x^q = x^{p-q}$$

$$3) \quad (x^p)^q = x^{p \times q}$$

$$4) \quad x^0 = 1$$

$$5) \quad x^1 = x$$

$$6) \quad x^{-p} = \frac{1}{x^p}$$

$$7) \quad x^{\frac{1}{p}} = \sqrt[p]{x}$$

$$8) \quad x^{\frac{p}{q}} = \left(\sqrt[q]{x}\right)^p \text{ or } \sqrt[q]{x^p}$$

Examples

$$1) \quad y^4 \times y^6 = y^{4+6} = y^{10}$$

$$2) \quad y^{12} \div y^4 = y^{12-4} = y^8$$

$$3) \quad (x^7)^4 = x^{7 \times 4} = x^{28}$$

$$4) \quad 7^0 = 1$$

$$5) \quad 8^1 = 8$$

$$6) \quad 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$7) \quad 64^{\frac{1}{3}} = \sqrt[3]{64} = 4$$

$$8) \quad 27^{\frac{4}{3}} = \left(\sqrt[3]{27}\right)^4 \quad \text{or} \quad \sqrt[3]{27^4}$$
$$= 3^4$$
$$= 81$$

much more
difficult
without a
calculator

$$9) \quad 2x^2 \times 3x^3 = 6x^5$$

$$10) \quad \frac{20x^{20}}{5x^5} = 4x^{15}$$

$$11) \quad (2x^2)^3 = 8x^6$$

$$12) \quad 5p^4q^3r^2 \times 2pqr^5 = 10p^5q^4r^7$$
