

$$(c) \frac{3}{x^2} = 16\frac{1}{3}$$

$$(e) \sqrt[3]{x} = -\frac{1}{2}$$

$$(g) 32^x = 0.5$$

$$(i) 8^x = 0.125$$

$$(k) \left(\frac{2}{5}\right)^x = 0.16$$

$$(m) \left(\frac{16}{81}\right)^x = 3\frac{3}{8}$$

$$(o) (0.4)^x = 6\frac{1}{4}$$

$$(q) \left(\frac{4}{9}\right)^{-x} = \frac{3}{2}$$

$$(s) 10^{2x+1} = 0.001$$

$$(u) 2^x \times 2^{3x-1} = 2$$

$$(w) a^{x-3} \div a^{3-x} = a$$

$$(y) 4^x \times 3^{2x} = 6$$

$$(d) -\frac{4}{x^3} = 0.5$$

$$(f) -7\sqrt{x} = 4$$

$$(h) 10^x = 0.1$$

$$(j) (0.1)^x = 100$$

$$(l) (0.3)^x = 3\frac{1}{3}$$

$$(n) \left(\frac{10}{3}\right)^x = 0.09$$

$$(p) 243^{-x} = 27$$

$$(r) 10^{x-3} = 1$$

$$(t) 16^{\frac{3x+1}{4}} = 2$$

$$(v) 3^{3x-1} \div 9^{x+1} \times 27^{x+2} = 81$$

$$(x) \left(\frac{a}{b}\right)^{2x} \times \left(\frac{b}{a}\right)^{1-x} = \left(\frac{a}{b}\right)^3$$

11. Express the following in ordinary notation.

$$(a) 2.48 \times 10^{-3}$$

$$(b) 4.125 \times 10^5$$

$$(c) 5.01 \times 10^7 \times 4 \times 10^{-5}$$

$$(d) 8 \times 10^3 + 8 \times 10 + 8 + 8 \times 10^{-2}$$

$$(e) \frac{2.24 \times 10^{-1}}{4 \times 10^2}$$

$$(f) 4.2 \times 10^{-2} - 3 \times 10^{-3}$$

12. Express the following in standard form.

$$(a) 23\,400$$

$$(b) 0.005\,089$$

$$(c) 0.57 \times 0.3$$

$$(d) 347.17 \times 10^{-5}$$

$$(e) 0.216 \times 10^7$$

$$(f) \frac{1.26 \times 10^{-5}}{7 \times 10^{-2}}$$

$$(g) \frac{27 \times 10^5 \times 0.03 \times 10^{-2}}{4.5 \times 10^{-3}}$$

$$(h) (7 \times 10^{-3})^2 - 3(4 \times 10^{-7})$$

13. Express $1.5 \times 15 \times 150$ in scientific notation.

14. Express the following in standard form.

$$(a) 12 \text{ m in cm}$$

$$(b) 0.6 \text{ m}^2 \text{ in km}^2$$

$$(c) \frac{1}{8} \text{ g in kg}$$

$$(d) 44\frac{1}{5} \text{ l in ml}$$

$$(e) \frac{1}{2} \text{ m}^3 \text{ in cm}^3$$

15. Given that $p = 2.8 \times 10^3$ and $q = 4 \times 10^{-2}$, calculate the following, expressing each answer in standard form.

$$(a) pq$$

$$(b) p + q$$

$$(c) \frac{p}{q}$$

16. If $a = 2.4 \times 10^3$ and $b = 3.2 \times 10^2$, calculate the following, giving your answers in standard form.

$$(a) b - a$$

$$(b) b^3, \text{ giving your answer in integer form}$$

$$(c) \frac{5a}{3b}, \text{ giving your answer in integer form}$$

17. Given that $A = 1.2 \times 10^3$ and $B = 3.4 \times 10^2$, calculate the following, giving your answers in standard form.

$$1 \leq A < 10$$

18. Without using a calculator, calculate the following, giving your answers in standard form.

$$(a) 6.4 \times 10^3 \div 2 \times 10^2$$

$$(b) 2^3 \times 3^2$$

19. Given that $a = 2.5 \times 10^3$ and $b = 3.2 \times 10^2$, calculate the following, giving your answers in standard form.

$$(a) \sqrt{a},$$

20. With the help of a calculator, calculate the following, giving your answers correct to 3 significant figures.

$$(a) 84.3 \times 10^2$$

$$(c) \frac{1.48 \times 10^3}{3.7 \times 10^2}$$

$$(e) \frac{4.1 \times 10^2}{\sqrt{5.75^3}}$$

$$(g) \left(\frac{1}{0.041}\right)^3$$

$$27^{-\frac{1}{4}} + 1$$

$$(i) \frac{1}{27^{-\frac{1}{4}} + 1}$$

$$(k) \left(\frac{57}{9}\right)^{-3}$$

21. Express 3.95×10^3 as a whole number.

$$(a) \text{ as a whole number}$$

$$(b) (i) \text{ as a decimal}$$

$$(ii) \text{ in standard form, giving your answer in integer form}$$

22. Find x in each of the following.

$$(a) 2^{10} \times 2^x = 2^{15}$$

$$(b) \left(\frac{3}{4}\right)^x = \frac{1}{8}$$