

$$(b) \frac{\left\{ \sqrt[4]{(625)^{-3}} \times \sqrt[5]{0.00001} \times \sqrt[3]{729} \times \sqrt[3]{(0.008)^{-2}} \right\}}{\left\{ \sqrt[5]{243} \times \sqrt[3]{(125)^{-2}} \right\}}$$

----- x -----

01 Number Systems

(Work Sheet – 2)

- Visualise 2.4619 on the number line using successive magnification.
- Visualise 3.62 on the number line up to 5 decimal places.
- Evaluate each of the following:
 - $6^2 \times 6^3$
 - $\left(\frac{2}{3}\right)^{-3}$
- Evaluate each of the following:
 - $\left(\frac{2}{11}\right)^4 \times \left(\frac{11}{3}\right)^2 \times \left(\frac{3}{2}\right)^3$
 - $\left(\frac{1}{2}\right)^5 \times \left(\frac{-2}{3}\right)^4 \times \left(\frac{3}{5}\right)^{-1}$
 - $\left(\frac{2}{3}\right)^2 \times \left(\frac{2}{5}\right)^{-3} \times \left(\frac{3}{5}\right)^2$
 - $\left(\frac{81}{16}\right)^{\frac{3}{4}} \times \left(\frac{25}{9}\right)^{\frac{3}{2}} \times \left(\frac{2}{5}\right)^{-3}$
- If $a = 2$ and $b = 3$, then find the values of each of the following:
 - $a^a + b^b$
 - $a^b + b^a$
 - a^b
 - $\left(\frac{a}{b}\right)^a$
 - $\left(\frac{1}{a} + \frac{1}{b}\right)^a$
- Simplify each of the following, removing radical signs and negative indices:
 - $(\sqrt{4})^{-3}$
 - $(\sqrt{5})^{-3} \times (\sqrt{2})^{-3}$
 - $\frac{1}{\sqrt[3]{4^{-5}}}$
 - $(25)^{\frac{1}{3}} \times \sqrt[3]{16}$
 - $(\sqrt[3]{8})^{-\frac{1}{2}}$
 - $(\sqrt{4})^{-7} (\sqrt{2})^{-5}$
- Simplify each of the following:
 - $(625)^{-\frac{1}{4}}$
 - $\left(\frac{256}{81}\right)^{\frac{5}{4}}$
 - $\left(\frac{243}{32}\right)^{-\frac{4}{5}}$
 - $(0.001)^{\frac{1}{3}}$

$$(e) \sqrt[5]{(32)^{-3}} \quad (f) (0.00032)^{\frac{2}{5}} \quad (g) \sqrt[3]{(343)^{-2}}$$

8. Simplify each of the following, where x , y and z are positive real numbers.

$$(a) \sqrt{x^{-2}y^3} \quad (b) (\sqrt{x^{-3}})^5 \quad (c) \left(x^{\frac{2}{3}}y^{\frac{1}{2}}\right)^2$$

$$(d) (\sqrt{x})^{\frac{2}{3}}\sqrt{y^4} \div \sqrt{xy}^{\frac{1}{2}} \quad (e) \sqrt[3]{xy^2} \div x^2y \quad (f) \sqrt[4]{\sqrt[3]{x^2}}$$

9. Simplify

$$(a) \frac{(25)^{\frac{3}{2}} \times (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} (8)^{\frac{4}{3}}} \quad (b) \frac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}}$$

10. Simplify:

$$(a) \left(\frac{81}{16}\right)^{\frac{3}{4}} \times \left[\left(\frac{25}{9}\right)^{\frac{3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right] \quad (b) \left(\frac{5^{-1} \times 7^2}{5^2 \times 7^{-4}}\right)^{\frac{7}{2}} \times \left(\frac{5^{-2} \times 7^3}{5^3 \times 7^{-5}}\right)^{-\frac{5}{2}}$$

11. If x , y and z are positive real numbers show that:

$$\sqrt{x^{-1}y} \cdot \sqrt{y^1z} \cdot \sqrt{z^{-1}x} = 1$$

12. Show that:

$$(a) \frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c = 1 \quad (b) \frac{(x^{a+b})^2 (x^{b+c})^2 (x^{c+a})^2}{(x^a y^b z^c)^4} = 1$$

13. Find the value of x , if

$$(a) 5^{x-3} \cdot 3^{2x-8} = 225. \quad (b) 27^x = \frac{9}{3^x}$$

14. Prove that: $\frac{a^{-1}}{a^{-1} + b^{-1}} + \frac{a^{-1}}{a^{-1} - b^{-1}} = \frac{2b^2}{b^2 - a^2}$.

15. Prove that:

$$(a) \sqrt{3 \times 5^{-3}} \div \sqrt[3]{3^{-1}} \sqrt{5} \times \sqrt{3 \times 5^6} = \frac{3}{5} \quad (b) 9^{\frac{3}{2}} - 3 \times 5^0 - \left(\frac{1}{81}\right)^{-\frac{1}{2}} = 15$$

$$(c) \left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}} = \frac{16}{3} \quad (d) \sqrt{\frac{1}{4}} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}} = \frac{3}{2}$$

16. Find the value of x in each of the following:

$$(a) 2^{5x} \div 2^x = \sqrt[5]{2^{20}} \quad (b) (2^3)^4 = (2^2)^x \quad (c) \left(\frac{3}{5}\right)^x \left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$$

$$(d) 5^{x-2} \times 3^{2x-3} = 135 \quad (e) 2^{x-5} \times 5^{x-4} = 5 \quad (f) 2^{x-7} \times 5^{x-4} = 1250$$

17. For any positive real number x , find the value of

$$\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$$

18. Simplify: $\left[\left\{(625)^{-\frac{1}{2}}\right\}^{-\frac{1}{4}}\right]^2$

19. Write $\left(\frac{1}{9}\right)^{-\frac{1}{2}} \times \sqrt[3]{125 \times 27}$ in form of a rational number.

20. Simplify:

$$(a) \frac{\left(\frac{243}{32}\right)^{-\frac{2}{5}} \times \left(\frac{2}{3}\right)^{-3} \times \left\{\left(\frac{125}{27}\right)^{\frac{2}{3}} + \left(\frac{3}{5}\right)^{-2}\right\}}{\left\{(256)^{\frac{1}{4}} \times (625)^{\frac{1}{4}}\right\}}$$