

Exponents and Powers

Grade 7 CBSE

Q1) Write in standard notation.

i) 2.7×10^{12}

ii) 1.5×10^8

Q2) Write in exponential form.

i) 40,00,00,00,00,00,000

ii) 300,000,000,000,000,000

Q3) Simplify a) $\frac{2^{10} \times 7^3}{2^9 \times 7}$ b) $\frac{25 \times 5^2 \times t^8}{10^3 \times t^4}$

Q4) If $2^n = 32$ then find 2^{n-2}

Q5) Find the value of C if,

$$7^{n+2} - 7^{n+1} + 7^n = C \times 7^n$$

Q6) $\frac{x}{y} = \left(\frac{3}{5}\right)^2 \div \left(\frac{9}{4}\right)^0$ find the value of $\left(\frac{y}{x}\right)^3$

Q7) Find value of k.

$$\left(\frac{7}{3}\right)^7 \times \left(\frac{7}{3}\right)^3 = \left(\frac{49}{9}\right)^{2k-3}$$

Q8) The speed of the light in vacuum is 3×10^8 m/s. Sunlight takes about 8 min to reach the earth. Express the distance of sun from the earth in standard form.

Solutions

Q1) Write in standard notation.

i) $2.7 \times 10^{12} = 2700000000000$

ii) $1.5 \times 10^8 = 150000000$

Q2) Write in exponential form.

i) $40,00,00,00,00,00,000 = 4 \times 10^{14}$

ii) $300,000,000,000,000,000 = 3 \times 10^{17}$

Q3) Simplify a) $\frac{(2^2)^5 \times 7^3}{2^9 \times 7}$ b) $\frac{25 \times 5^2 \times t^8}{10^3 \times t^4}$

Sol3) a) $\frac{(2^2)^5 \times 7^3}{2^9 \times 7} = \frac{2^{10} \times 7^3}{2^9 \times 7} \quad \because (a^m)^n = a^{mn}$

$2^{10} \times 7^3 \times 2^{-9} \times 7^{-1} \quad \because a^{-m} = \frac{1}{a^m}$

$2^{10-9} \times 7^{3-1} \quad \because a^m \times a^n = a^{m+n}$

2×7^2

3b)

$\frac{25 \times 5^2 \times t^8}{10^3 \times t^4} = \frac{5^2 \times 5^2 \times t^8}{2^3 \times 5^3 \times t^4} \quad \because a^m \times b^m = (ab)^m$

$5^2 \times 5^2 \times t^8 \times t^{-4} \times 2^{-3} \times 5^{-3} \quad \because a^{-m} = \frac{1}{a^m}$

$5^{2+2-3} \times t^{8-4} \times 2^{-3} \quad \because a^m \times a^n = a^{m+n}$

$\frac{5t^4}{2^3} \quad \because a^{-m} = \frac{1}{a^m}$

Q4) If $2^n = 32$ then find 2^{n-2}

Sol. 4)

$$2^n = 2^5, n = 5$$

$$2^{n-2} = 2^{5-2} = 2^3 = 8$$

Q5) Find the value of C if.

$$7^{n+2} - 7^{n+1} + 7^n = C \times 7^n$$

Sol.5)

$$7^{n+2} - 7^{n+1} + 7^n = C \times 7^n$$

$$7^n \times 7^2 - 7^n \times 7^1 + 7^n = C \times 7^n$$

$$7^n(49 - 7 + 1) = C \times 7^n$$

$$7^n \times 43 = C \times 7^n$$

$$3 = C$$

Q6) $\frac{x}{y} = \left(\frac{3}{5}\right)^2 \div \left(\frac{9}{4}\right)^0$ find the value of $\left(\frac{y}{x}\right)^3$

Sol. 6) $\frac{x}{y} = \left(\frac{3}{5}\right)^2 \div 1$ since $a^0 = 1$

$$\frac{x}{y} = \left(\frac{3}{5}\right)^2 \quad \frac{y}{x} = \left(\frac{3}{5}\right)^{-2} = \left(\frac{5}{3}\right)^2 \quad \text{since } a^{-m} = \frac{1}{a^m}$$

$$\left(\frac{y}{x}\right)^3 = \left(\left(\frac{5}{3}\right)^2\right)^3 = \left(\frac{5}{3}\right)^6 \quad \text{since } (a^m)^n = a^{mn}$$

Q7) Find value of k.

$$\left(\frac{7}{3}\right)^7 \times \left(\frac{7}{3}\right)^3 = \left(\frac{49}{9}\right)^{2k-3}$$

Sol. 7)

$$\left(\frac{7}{3}\right)^{7+3} = \left(\frac{7^2}{3^2}\right)^{2k-3} \quad \text{since } a^m \times a^n = a^{m+n}$$



$$\left(\frac{7}{3}\right)^{10} = \left(\left(\frac{7}{3}\right)^2\right)^{2k-3} \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$$

$$\left(\frac{7}{3}\right)^{10} = \left(\frac{7}{3}\right)^{2(2k-3)} \text{ since } (a^m)^n = a^{mn}$$

$$10 = 2(2k-3)$$

$$10 = 4k-6$$

$$K = 16/4 = 4$$

Q8) The speed of the light in vacuum is 3×10^8 m/s. Sunlight takes about 8min to reach the earth. Express the distance of sun from the earth in standard form.

Sol.8) Speed = distance /time

Distance = speed x time

$$\text{Distance} = 3 \times 10^8 \times 8 = 24 \times 10^8$$

$$2.4 \times 10^9$$