Mathematics Grade 8th

Exponents and Powers Max: 20

Q1) Simplify : 1x4 = 4

i) $[7^2 \times 32^{\left(\frac{1}{5}\right)} \div 256^{-4}]^0$

ii) $\left(\frac{27}{8}\right)^{-2}$

iii) $\left(\frac{125}{27}\right)^{\frac{1}{3}}$

iv) $[10^{13} \div 10^{12}]$

Q2) Find the value of m for which $5^m \div 5^{-3} = 5^5$. 2

Q3) Simplify 2x2=4

(i) $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$ $(t \neq 0)$

(ii) $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

Q4)Solve 3

$$\frac{10 \times 5^{n+1} \times 5^2 \times 5^n}{2 \times 5^{n+2} \times 100 \times 5^{n+1}}$$

Q5) Find x, if $9 \times 3^x = (27)^{2x-3}$ 3

Q6) Show That : $\left(\frac{x^a}{x^{-b}}\right)^{a-b} \times \left(\frac{x^b}{x^{-c}}\right)^{b-c} \times \left(\frac{x^c}{x^{-a}}\right)^{c-a} = 1$ 4

Solutions

Exponents and Powers

Q1) Simplify :

i) $[7^2 \times 32^{\left(\frac{1}{5}\right)} \div 256^{-4}]^0 = 1$ $[a^0 = 1]$

ii) $\left(\frac{27}{8}\right)^{-2} = \left(\frac{8}{27}\right)^2 = \frac{64}{729}$ $[a^{-m} = \frac{1}{a^m}]$

iii) $\left(\frac{125}{27}\right)^{\frac{1}{3}} = \sqrt[3]{\frac{125}{27}} = \frac{\sqrt[3]{125}}{\sqrt[3]{27}} = \frac{5}{3}$

iv) $[10^{13} \div 10^{12}] = 10^{13-12} = 10$

Q2)Find the value of m for which $5^m \div 5^{-3} = 5^5$.

Solution:

$5^m \div 5^{-3} = 5^5$

$\Rightarrow 5^{m-(-3)} = 5^5$ $[\because a^m \div a^n = a^{m-n}]$

$\Rightarrow 5^{m+3} = 5^5$

Comparing the powers of equal bases, we have

$m + 3 = 5$

$m = 5 - 3 = 2$, i.e., $m = 2$

Q3)Simplify:

(i) $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$ $(t \neq 0)$

(ii) $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

Solution:

(i) $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

$= \frac{5^2 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

$= \frac{5^{2+3} \times t^{-4+8}}{10} = \frac{5^5 \times t^4}{10}$

$= \frac{{}^{1}\cancel{5}.5^4 \times t^4}{\cancel{10}_{2}} = \frac{625}{2} t^4$

(ii) $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

$= \frac{3^{-5} \times (2 \times 5)^{-5} \times 125}{5^{-7} \times (2 \times 3)^{-5}}$

$= \frac{3^{-5} \times 2^{-5} \times 5^{-5} \times 5^3}{5^{-7} \times 2^{-5} \times 3^{-5}}$

$[\because \ (ab)^m = a^m \times b^m]$

$= (3)^{-5+5} \times (2)^{-5+5} \times (5)^{7-5+3}$

$= 3^0 \times 2^0 \times 5^5$

$= 1 \times 1 \times 5^5 = 5^5$

Q 4) Solve

$$\frac{10 \times 5^{n+1} \times 5^2 \times 5^n}{2 \times 5^{n+2} \times 100 \times 5^{n+1}}$$

Sol)

$$\frac{5 \times 2 \times 5^{n+1} \times 5^2 \times 5^n}{2 \times 5^{n+2} \times 2^2 \times 5^2 \times 5^{n+1}}$$

$$\frac{5^{1+n+1+2+n} \times 2^1}{5^{n+2+2+n+1} \times 2^{1+2}}$$

$$\frac{5^{2n+4} \times 2^1}{5^{2n+5} \times 2^3}$$

$$5^{2n+4} \times 2^1 \times 5^{-2n-5} \times 2^{-3}$$

$$5^{2n+4-2n-5} \times 2^{1-3}$$

$$5^{-1} \times 2^{-2}$$

$$\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$$

Q5) Find x, if $9 \text{ x } 3^x = (27)^{2x-3}$

Sol) $3^2 \text{x} 3^x = (3^3)^{2x-3}$

$3^{2+x} = 3^{3(2x-3)}$

$3^{2+x} = 3^{6x-9}$

2+x = 6x -9

6x-x=9+2

5x=11

X=11/5

Q6) Show That : $\left(\frac{x^a}{x^{-b}}\right)^{a-b} \times \left(\frac{x^b}{x^{-c}}\right)^{b-c} \times \left(\frac{x^c}{x^{-a}}\right)^{c-a} = 1$

Solution :

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

$$(x^{a+b})^{a-b}.(x^{b+c})^{b-c}.(x^{c-a})^{c-a}$$

$$x^{a^2-b^2}.x^{b^2-c^2}.x^{c^2-a^2}$$

$$x^{a^2-b^2+b^2-c^2+c^2-a^2}$$

x^0 =1