

VIII Test-14 Exponents and Powers

Note: Write the laws of exponents used

- 1) Find the multiplicative inverse of (i) 3^{-3}
- 2) Find the value of x for which $2^x \div 2^{-4} = 4^5$ (ii) 10^{10}
- 3) Express 0.0000000837 in Standard form.
- 4) Write 3.61492×10^6 in usual form.
- 5) Calculate the missing value of x in the following expression: $\left(\frac{11}{9}\right)^3 \times \left(\frac{9}{11}\right)^6 = \left(\frac{11}{9}\right)^{2x-1}$
- 6) Simplify and write in exponential form:
(i) $(-5)^2 \times (-5)^{-3}$ (ii) $\left(\frac{1}{2}\right)^{-3} \times \left(\frac{1}{2}\right)^{-2}$
- 7) Simplify the following and write in exponential form:
(i) $2^3 \times 3^3$ (ii) $\left(\frac{4}{5}\right)^5 \times \left(\frac{5}{6}\right)^5$
- 8) Express 8^{-4} as a power with the base 2.
- 9) Simplify the following and write in exponential form:
(i) $\left(3^6 \div 3^8\right)^4 \times 3^{-4}$ (ii) $\frac{1}{27} \times 3^{-3}$
- 10) Find the value of k if $(-2)^{k+1} \times (-2)^3 = (-2)^7$
- 11) Simplify (i) $\left[\left(\frac{1}{4}\right)^{-3} - \left(\frac{1}{3}\right)^{-3}\right] \div \left(\frac{1}{4}\right)^{-2}$
(ii) $\left(\frac{2}{3}\right)^{-6} \times \left(\frac{3}{2}\right)^{-4}$
- 12) Find the value of $\left[\left(-\frac{3}{4}\right)^{-2}\right]^2$
- 13) Solve for x : $(81)^{-4} \div (729)^{2-x} = 9^{4x}$

VIII Test-14 (Answers)

1) (i) 3^3
(ii) 10^{-10}

2) $2^x \div \frac{1}{2^4} = 4^5$
 $\Rightarrow 2^x \times 2^4 = (2^2)^5$

$\Rightarrow 2^{x+4} = 2^{10}$ [$a^m \times a^n = a^{m+n}$]

$\therefore x+4 = 10$

$x = 10 - 4 = 6$

3) $0.00000000837 = 8.37 \times 10^{-9}$

4) $3.61492 \times 10^6 = 3614920$

5) $\left(\frac{11}{9}\right)^3 \times \left(\frac{11}{9}\right)^{-6} = \left(\frac{11}{9}\right)^{2x-1}$

$\Rightarrow \left(\frac{11}{9}\right)^{3-6} = \left(\frac{11}{9}\right)^{2x-1}$ [$a^m \times a^n = a^{m+n}$]

$\Rightarrow \left(\frac{11}{9}\right)^{-3} = \left(\frac{11}{9}\right)^{2x-1}$

$\therefore 2x-1 = -3$

$2x = -3 + 1 = -2$

$x = -1$

6) (i) $(-5)^2 \times (-5)^{-3} = (-5)^{2-3} = (-5)^{-1} = \left(-\frac{1}{5}\right)^1$

(ii) $\left(\frac{1}{2}\right)^{-3} \times \left(\frac{1}{2}\right)^{-2} = \left(\frac{1}{2}\right)^{-3-2} = \left(\frac{1}{2}\right)^{-5} = 2^5$

[$a^m \times a^n = a^{m+n}$]

7) (i) $2^3 \times 3^3 = (2 \times 3)^3 = 6^3$ [$\because a^m \times b^m = (a \times b)^m$]

(ii) $\left(\frac{4}{5}\right)^5 \times \left(\frac{5}{6}\right)^5 = \left(\frac{4 \times 5}{5 \times 6}\right)^5 = \left(\frac{2}{3}\right)^5$

8) $8^{-4} = (2^3)^{-4} = 2^{-12}$ [$(a^m)^n = a^{mn}$]

9) (i) $(3^6 \div 3^8)^4 \times 3^{-4} = (3^{6-8})^4 \times 3^{-4} = (3^{-2})^4 \times 3^{-4}$

$= 3^{-8} \times 3^{-4} = 3^{-8-4} = 3^{-12}$

$$(ii) \frac{1}{27} \times 3^{-3} = \frac{1}{3^3} \times 3^{-3} = 3^{-3} \times 3^{-3} = 3^{-3-3} = 3^{-6}$$

$$[a^m \times a^n = a^{m+n}]$$

$$10) (-2)^{k+1} \times (-2)^3 = (-2)^7$$

$$\Rightarrow (-2)^{k+1+3} = (-2)^7 \quad [\because a^m \times a^n = a^{m+n}]$$

$$\Rightarrow (-2)^{k+4} = (-2)^7$$

$$\therefore k+4 = 7$$

$$k = 7-4 = 3 //$$

$$11) (i) \left[\left(\frac{1}{4} \right)^{-3} - \left(\frac{1}{3} \right)^{-3} \right] \div \left(\frac{1}{4} \right)^{-2}$$

$$= (4^3 - 3^3) \div 4^2 = \frac{64-27}{16} = \frac{37}{16}$$

$$(ii) \left(\frac{2}{3} \right)^{-6} \times \left(\frac{3}{2} \right)^{-4}$$

$$= \left(\frac{3}{2} \right)^6 \times \left(\frac{3}{2} \right)^{-4} = \left(\frac{3}{2} \right)^{6-4} = \left(\frac{3}{2} \right)^2 = \frac{9}{4} \quad [a^m \times a^n = a^{m+n}]$$

$$12) \left[\left(-\frac{3}{4} \right)^{-2} \right]^2 = \left(-\frac{3}{4} \right)^{-4} = \left(\frac{4}{3} \right)^4 = \frac{256}{81} \quad [\because (a^m)^n = a^{mn}]$$

$$13) (81)^{-4} \div (729)^{2-x} = 9^{4x}$$

$$\Rightarrow (9^2)^{-4} \div (9^3)^{2-x} = 9^{4x}$$

$$\Rightarrow 9^{-8} \div 9^{6-3x} = 9^{4x}$$

$$\therefore -8 - 6 + 3x = 4x$$

$$-14 + 3x = 4x$$

$$4x = -14 + 3x$$

$$4x - 3x = -14$$

$$x = -14 //$$