

VIII Revision - Exponents and Powers

1) $10^0 = \underline{\quad}$; $a^0 = \underline{\quad}$

2) $10^{-1} = \underline{\quad}$; $a^{-m} = \underline{\quad}$

3) Express the following as positive exponents :-
(i) 3^4 (ii) 10^{-6} (iii) 8^{-2} (iv) 6^{-3} (v) 10^{-101}

4) Expand these numbers using exponents :-
(i) 1425.36 (ii) 1359.856 (iii) 2145

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

6) Simplify and express the result in power notation with positive exponent:

(i) $(-4)^5 \div (-4)^8$ (ii) $(-3)^4 \times \left(\frac{5}{3}\right)^4$ (iii) $(3^{-7} \div 3^{-10}) \times 3^{-5}$

7) Find the value of (i) $(2^{-1} \times 2^{-1}) \div 2^{-2}$

(ii) $\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$

(iii) $\left[\left(-\frac{2}{3}\right)^{-2}\right]^2$

(iv) $\frac{8^{-1} \times 5^3}{2^{-4}}$

8) Simplify:

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

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

10) Evaluate: (i) 2^{-3} (ii) $(-4)^{-2}$ (iii) $\left(\frac{1}{3}\right)^{-2}$

11) Simplify and express the result in power notation with positive exponent:

(i) $(-4)^5 \times (-4)^{-10}$

(ii) $\left(\frac{1}{2^3}\right)^2$

(iii) $2^5 \div 2^{-6}$

(iv) $(5^{-3} \div 5^{-8}) \times 5^{-3}$

VIII

REVISION - EXPONENTS & POWERS - Solutions

$$1) 10^0 = 1$$

$$a^0 = 1$$

$$2) 10^{-1} = \frac{1}{10}$$

$$a^{-m} = \frac{1}{a^m}$$

$$3) (i) 3^{-4} = \frac{1}{3^4}$$

$$(iv) 6^{-3} = \frac{1}{6^3}$$

$$(ii) 10^{-6} = \frac{1}{10^6}$$

$$(v) 10^{-101} = \frac{1}{10^{101}}$$

$$(iii) 8^{-2} = \frac{1}{8^2}$$

$$4) (i) 1425.36$$

$$10^3 10^2 10^1 10^0 \quad 10^1 10^0$$

$$= 1 \times 10^3 + 4 \times 10^2 + 2 \times 10^1 + 5 \times 10^0 + 3 \times 10^1 + 6 \times 10^2$$

$$(ii) 1359.856$$

$$10^3 10^2 10^1 10^0 \quad 10^1 10^0 10^{-1}$$

$$= 1 \times 10^3 + 3 \times 10^2 + 5 \times 10^1 + 9 \times 10^0 + 8 \times 10^1 + 5 \times 10^2 + 6 \times 10^3$$

$$(iii) 2145$$

$$10^3 10^2 10^1 10^0$$

$$= 2 \times 10^3 + 1 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$$

$$5) (i) 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$(ii) \left(\frac{1}{2}\right)^{-5} = 2^5 = \underline{\underline{32}}$$

$$6) (i) (-4)^5 \div (-4)^8 = (-4)^{5-8} = (-4)^{-3}$$

$$= -\frac{1}{4^3}$$

$$(ii) (-3)^4 \times \left(\frac{5}{3}\right)^4$$

$$= \cancel{3^4} \times \frac{5^4}{\cancel{3^4}} = \underline{\underline{5^4}}$$

$$(iii) (3^{-7} \div 3^{-10}) \times 3^{-5} = 3^{-7+10} \times 3^{-5}$$

$$= 3^3 \times 3^{-5} = 3^{3-5} = 3^{-2} = \frac{1}{3^2}$$

$$7) (i) (2^{-1} \times 2^{-1}) \div 2^{-2}$$

$$= \left(\frac{1}{2} \times \frac{1}{2}\right) \times 2^2 = \frac{1}{4} \times 4 = \underline{\underline{1}}$$

$$(ii) \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} = 2^2 + 3^2 + 4^2$$
$$= 4 + 9 + 16 = \underline{\underline{29}}$$

$$(iii) \left[\left(-\frac{2}{3}\right)^{-2}\right]^2 = \left(-\frac{2}{3}\right)^{-4} = \left(\frac{2}{3}\right)^{-4} = \left(\frac{3}{2}\right)^4 = \underline{\underline{\frac{81}{16}}}$$

$$(iv) \frac{8^{-1} \times 5^3}{2^{-4}} = \frac{5^3 \times 2^4}{8} = \frac{125 \times 16}{8} = \underline{\underline{250}}$$

8)

$$\frac{25 \times t^4}{5^3 \times 10 \times t^{-8}} = \frac{25^5 \times t^{4+8}}{10^2} = \frac{5^4 \times t^{12}}{2}$$
$$= \underline{\underline{\frac{625 t^{12}}{2}}}$$

$$9) 5^{2m} \div 5^{-3} = 5^5$$

$$5^{2m+3} = 5^5$$

$$\therefore 2m+3 = 5$$

$$2m = 2$$

$$\underline{\underline{m = 1}}$$

$$10) (i) 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$(ii) (-4)^{-2} = (4)^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

$$(iii) \left(\frac{1}{3}\right)^{-2} = 3^2 = \underline{\underline{9}}$$

$$11) (i) (-4)^5 \times (-4)^{-10} = (-4)^{5-10} = (-4)^{-5} = \underline{\underline{\frac{-1}{4^5}}}$$

$$(ii) \left(\frac{1}{2^3}\right)^2 = \frac{1}{2^6}$$

$$(iii) 2^5 \div 2^{-6} = 2^{5+6} = 2^{11}$$

$$(iv) (5^{-3} \div 5^{-8}) \times 5^{-3} = (5^{-3+8}) \times 5^{-3}$$
$$= 5^5 \times 5^{-3} = 5^{5-3}$$
$$= 5^2 = 25$$