

Review Exercise 2

Q.1 Multiple choice questions. Choose the correct answer.

(i) $(27x^{-1})^{-\frac{2}{3}}$ _____

(a) $\frac{\sqrt[3]{x^2}}{9}$

(b) $\frac{\sqrt{x^3}}{9}$

(c) $\frac{\sqrt[3]{x^2}}{8}$

(d) $\frac{\sqrt{x^3}}{8}$

(ii) Write $\sqrt[7]{x}$ in the exponential form _____

(a) x

(b) x^7

(c) $x^{\frac{1}{7}}$

(d) $x^{\frac{7}{2}}$

(iii) Write $4^{\frac{2}{3}}$ with radical sign _____

(a) $\sqrt[3]{4^2}$

(b) $\sqrt[2]{4^3}$

(c) $\sqrt[2]{4^3}$

(d) $\sqrt{4^6}$

(iv) In $\sqrt[3]{35}$ the radicand is;

(a) 3

(b) $\frac{1}{3}$

(c) 35

(d) None

(v) $\left(\frac{25}{16}\right)^{-\frac{1}{2}} =$ _____

(a) $\frac{5}{4}$

(b) $\frac{4}{5}$

(c) $-\frac{5}{4}$

(d) $-\frac{4}{5}$

(vi) The conjugate of $5 + 4i$ is _____

(a) $-5 + 4i$

(b) $-5 - 4i$

(c) $5 - 4i$

(d) $5 + 4i$

(vii) The value of i^9 is;

(a) 1

(b) -1

(c) i

(d) $-i$

- (viii) Every real number is _____
 (a) Positive integer (b) A rational number
 (c) A negative integer (d) A complex number
- (ix) Real point of $2ab(i + i^2)$ is _____
 (a) $2ab$ (b) $-2ab$
 (c) $2abi$ (d) $-2abi$
- (x) Imaginary part of $-i(3i + 2)$ is _____
 (a) -2 (b) 2
 (c) 3 (d) -3
- (xi) Which of the following sets have the closure property w.r.t addition _____
 (a) $\{0\}$ (b) $\{0, 1\}$
 (c) $\{0, 1\}$ (d) $\left\{1, \sqrt{2}, \frac{1}{2}\right\}$
- (xii) Name the property of real number used in $\left[-\frac{\sqrt{5}}{2}\right] \times 1 = -\frac{\sqrt{5}}{2}$ _____
 (a) Additive identity (b) Additive inverse
 (c) Multiplicative identity (d) Multiplicative inverse
- (xiii) If $x, y, z \in R, z < 0$, then $x < y \Rightarrow \dots$
 (a) $xz < yz$ (b) $xz > yz$
 (c) $xz = yz$ (d) None of these
- (xiv) IF $a, b \in R$, only one of $a = b$ or $a < b$ or $a > b$ hold is called _____
 (a) Trichotomy property (b) Transitive property
 (c) Additive property (d) Multiplicative property
- (xv) A non-terminating, non-recurring decimal represents ...
 (a) A natural number (b) A rational number
 (c) An irrational number (d) A prime number

ANSWER KEY

i	a	vi	c	xi	a
ii	c	vii	c	xii	c
iii	a	viii	d	xiii	b
iv	c	ix	b	xiv	a
v	b	x	a	xv	c

Q.2 True or False? Identity

- (i) Division is not an associative operation. **True**
- (ii) Every whole number is a natural number. **False**
- (iii) Multiplicative inverse of 0.02 is 50. **True**
- (iv) π is rational number. **False**
- (v) Every integer is a rational number. **True**
- (vi) Subtraction is a commutative operation. **False**
- (vii) Every real number is a rational number. **False**
- (viii) Decimal representation of a rational number is either terminating or recurring. **True**
- (ix) $1.\bar{8} = 1 + \frac{8}{9}$ **True**

Q.3 Simplify the following

(i) $\sqrt[4]{81y^{-12}x^{-8}}$

Solution:

$$\begin{aligned}
 &= (3^4 y^{12} x^{-8})^{\frac{1}{4}} \\
 &= 3^{4 \times \frac{1}{4}} y^{12 \times \frac{1}{4}} x^{-8 \times \frac{1}{4}} \\
 &= 3y^{-3}x^{-2} \\
 \sqrt[4]{81y^{-12}x^{-8}} &= \frac{3}{y^3x^2} \text{ Ans}
 \end{aligned}$$

(ii) $\sqrt{25x^{10}y^{8m}}$

Solution:

$$\begin{aligned}
 &= \sqrt{25x^{10n}y^{8m}} \\
 &= (5^2 x^{10n} y^{8m})^{\frac{1}{2}} \\
 &= 5^{2 \times \frac{1}{2}} x^{10n \times \frac{1}{2}} y^{8m \times \frac{1}{2}} \\
 \sqrt{25x^{10}y^{8m}} &= 5x^{5n}y^{4m} \text{ Ans}
 \end{aligned}$$

(iii) $\left[\frac{x^3y^4z^5}{x^{-2}y^{-1}z^{-5}} \right]^{\frac{1}{5}}$

Solution:

$$\begin{aligned}
 &= (x^{3+2} \cdot y^{4+1} \cdot z^{5+5})^{\frac{1}{5}} \\
 &= (x^5 y^5 z^{10})^{\frac{1}{5}} \\
 &= x^{\frac{5}{5}} y^{\frac{5}{5}} z^{\frac{10}{5}} \\
 &= x^1 y^1 z^2 = xyz^2 \text{ Ans}
 \end{aligned}$$

$$\left[\frac{x^3y^4z^5}{x^{-2}y^{-1}z^{-5}} \right]^{\frac{1}{5}} = x.y.z^2 \text{ Ans}$$

(iv) $\left(\frac{32x^{-6}y^{-4}z}{625x^4yz^{-4}} \right)^{\frac{2}{5}}$

Solution:

$$\begin{aligned}
 &= \left(\frac{2^5 x^{-4} y^{-4} z}{5^4 x^4 y z^{-4}} \right)^{\frac{2}{5}} \\
 &= \left[\frac{2^5 z^{1+4}}{5^4 x^{4+6} \times y^{1+4}} \right]^{\frac{2}{5}} \\
 &= \left[\frac{2^5 z^5}{5^4 x^{10} y^5} \right]^{\frac{2}{5}} \\
 &= \frac{2^{\frac{5}{5} \times \frac{2}{5}} \times z^{\frac{5}{5} \times \frac{2}{5}}}{5^{\frac{4}{5} \times \frac{2}{5}} \times x^{\frac{10}{5} \times \frac{2}{5}} \times y^{\frac{5}{5} \times \frac{2}{5}}} \\
 &= \frac{2^2 \times z^2}{5^{\frac{8}{5}} \times x^4 \times y^2} \\
 &= \frac{4z^2}{5^{\frac{8}{5}} \times x^4 \times y^2} \\
 &= \frac{4z^2}{5^{\frac{5}{5} + \frac{3}{5}} \times x^4 y^2} \\
 &= \frac{4z^2}{5^{1+\frac{3}{5}} \times x^4 y^2} \\
 \left(\frac{32x^{-6}y^{-4}z}{625x^4yz^{-4}} \right)^{\frac{2}{5}} &= \frac{4z^2}{5 \times 5^{\frac{3}{5}} x^4 y^2} \text{ Ans}
 \end{aligned}$$

Q.4 Simplify $\sqrt{\frac{(216)^{\frac{2}{3}} \times (25)^{\frac{1}{2}}}{(0.04)^{-\frac{3}{2}}}}$

Solution:

$$\begin{aligned} & \sqrt{\frac{(216)^{\frac{2}{3}} \times (25)^{\frac{1}{2}}}{(0.04)^{-\frac{3}{2}}}} \\ &= \sqrt{\frac{(6^3)^{\frac{2}{3}} \times (5^2)^{\frac{1}{2}}}{\left(\frac{4}{100}\right)^{-\frac{3}{2}}}} \\ &= \sqrt{\frac{6^2 \times 5}{\left(\frac{100}{4}\right)^{\frac{3}{2}}}} \\ &= \sqrt{\frac{6^2 \times 5}{(5^2)^{\frac{3}{2}}}} \\ &= \sqrt{\frac{6^2 \times 5}{(5)^3}} \\ &= \sqrt{\frac{6^2}{5^3 \times 5^{-1}}} \\ &= \sqrt{\frac{6^2}{5^{3-1}}} \\ &= \sqrt{\frac{6^2}{5^2}} \\ &= \sqrt{\left(\frac{6}{5}\right)^2} \\ &= \left(\frac{6}{5}\right)^{2 \times \frac{1}{2}} \\ &= \frac{6}{5} \text{ Ans} \end{aligned}$$

Q.5 $\left(\frac{a^p}{a^q}\right)^{p+q} \times \left(\frac{a^q}{a^r}\right)^{q+r} \div 5(a^q \cdot a^r)^{p-r}$

Solution:

$$\begin{aligned} &= \frac{(a^{p-q})^{p+q} (a^{q-r})^{q+r}}{5(a^{p+r})^{p-r}} \\ &= \frac{a^{(p-q)(p+q)} a^{(q-r)(q+r)}}{5a^{(p+r)(p-r)}} \end{aligned}$$

$$\begin{aligned} &= \frac{a^{p^2-q^2} a^{q^2-r^2}}{5a^{p^2-r^2}} \\ &= \frac{a^{p^2-q^2+q^2-r^2}}{5a^{p^2-r^2+p^2-r^2}} \\ &= \frac{a^0}{5} \\ &= \frac{1}{5} \text{ Ans} \end{aligned}$$

Q.6 Simplify $\left(\frac{a^{2l}}{a^{l+m}}\right)\left(\frac{a^{2m}}{a^{m+n}}\right)\left(\frac{a^{2n}}{a^{n+2}}\right)$

Solution:

$$\begin{aligned} &= a^{2l-l-m} a^{2m-m-n} a^{2n-n-2} \\ &= a^{l-m} a^{m-n} a^{n-2} \\ &= a^{l-m+m-n+n-2} \\ &= a^0 \\ &= \left(\frac{a^{2l}}{a^{l+m}}\right)\left(\frac{a^{2m}}{a^{m+n}}\right)\left(\frac{a^{2n}}{a^{n+2}}\right) = 1 \text{ Ans} \end{aligned}$$

Q.7 Simplify $\sqrt[3]{\frac{a^l}{a^m}} \times \sqrt[3]{\frac{a^m}{a^n}} \times \sqrt[3]{\frac{a^n}{a^r}}$

Solution:

$$\begin{aligned} &= \sqrt[3]{a^{l-m}} \sqrt[3]{a^{m-n}} \sqrt[3]{a^{n-l}} \\ &= (a^{l-m})^{\frac{1}{3}} \times (a^{m-n})^{\frac{1}{3}} \times (a^{n-l})^{\frac{1}{3}} \\ &= a^{\frac{l-m}{3}} \times a^{\frac{m-n}{3}} \times a^{\frac{n-l}{3}} \\ &= a^{\frac{l-m}{3} + \frac{m-n}{3} + \frac{n-l}{3}} \\ &= a^{\frac{l-m+m-n+n-l}{3}} \\ &= a^{\frac{0}{3}} \\ &= a^0 \\ &= \sqrt[3]{\frac{a^l}{a^m}} \times \sqrt[3]{\frac{a^m}{a^n}} \times \sqrt[3]{\frac{a^n}{a^r}} = 1 \text{ Ans} \end{aligned}$$

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