Review Exercise 2

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

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

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

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

(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 sing _____

(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) $\dfrac{1}{3}$

(c) 35   (d) None

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

(a) $\dfrac{5}{4}$ (b) $\dfrac{4}{5}$

(c) $-\dfrac{5}{4}$ (d) $-\dfrac{4}{5}$

(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** $2ab\left(i+i^2\right)$ **is** _____
(a) $2ab$ (b) $-2ab$
(c) $2abi$ (d) $-2abi$

(x) **Imaginary part of** $-i\left(3i+2\right)$ **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) $\left\{1,\sqrt{2},\dfrac{1}{2}\right\}$

(xii) **Name the property of real number used in** $\left[-\dfrac{\sqrt{5}}{2}\right]\times 1=-\dfrac{\sqrt{5}}{2}$ _____
(a) Additive identity   (b) Additive inverse
(c) Multiplicative identity   (d) Multiplicative inverse

(xiii) **If** $x,y,z\in R, z<0,$ **then** $x<y\Rightarrow>$ ...
(a) $xz<yz$ (b) $xz>yz$
(c) $xz=yz$ (d) None of these

(xiv) **IF** $a,b\in\ \in R,$ **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) $1.\bar{8} = 1 + \dfrac{8}{9}$ **True**

Q.3 Simplify the following

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

Solution:

$$= \left(3^4 y^{12} x^{-8}\right)^{\frac{1}{4}}$$

$$= 3^{4 \times \frac{1}{4}} y^{12 \times \frac{1}{4}} x^{-8 \times \frac{1}{4}}$$

$$= 3 y^{-3} x^{-2}$$

$$\sqrt[4]{81 y^{-12} x^{-8}} = \frac{3}{y^3 x^2} \quad \textbf{Ans}$$

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

Solution:

$$= \sqrt{25 x^{10n} y^{8m}}$$

$$= \left(5^2 x^{10n} y^{8m}\right)^{\frac{1}{2}}$$

$$= 5^{2 \times \frac{1}{2}} \cdot x^{10n \times \frac{1}{2}} \cdot y^{8m \times \frac{1}{2}}$$

$$\sqrt{25 x^{10} y^{8m}} = 5 x^{5n} \cdot y^{4m} \quad \textbf{Ans}$$

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

Solution:

$$= \left(x^{3+2} \cdot y^{4+1} \cdot z^{5+5}\right)^{\frac{1}{5}}$$

$$= \left(x^5 y^5 z^{10}\right)^{\frac{1}{5}}$$

$$= x^{5 \times \frac{1}{5}} \times y^{5 \times \frac{1}{5}} \times z^{10 \times \frac{1}{5}}$$

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

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

Solution:

$$= \left(\frac{2^5 x^{-4} y^{-4} z}{5^4 x^4 y z^{-4}}\right)^{\frac{2}{5}}$$

$$= \left[\frac{2^5 z^{1+4}}{5^4 x^{4+6} \times y^{1+4}}\right]^{\frac{2}{5}}$$

$$= \left[\frac{2^5 z^5}{5^4 x^{10} y^5}\right]^{\frac{2}{5}}$$

$$= \frac{2^{5 \times \frac{2}{5}} \times z^{5 \times \frac{2}{5}}}{5^{4 \times \frac{2}{5}} \times x^{10 \times \frac{2}{5}} \times y^{5 \times \frac{2}{5}}}$$

$$= \frac{2^2 \times z^2}{5^{\frac{8}{5}} \times x^4 \times y^2}$$

$$= \frac{4 z^2}{5^{\frac{5}{5} + \frac{3}{5}} \times x^4 y^2}$$

$$= \frac{4 z^2}{5^{1 + \frac{3}{5}} \times x^4 y^2}$$

$$\left(\frac{32 x^{-6} y^{-4} z}{625 x^4 y z^{-4}}\right)^{\frac{2}{5}} = \frac{4 z^2}{5 \times 5^{\frac{3}{5}} x^4 y^2} \quad \textbf{Ans}$$

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

Solution: $\sqrt{\dfrac{(216)^{\frac{2}{3}}\times(25)^{\frac{1}{2}}}{(0.04)^{-\frac{3}{2}}}}$

$=\sqrt{\dfrac{(6^3)^{\frac{2}{3}}\times(5^2)^{\frac{1}{2}}}{\left(\dfrac{4}{100}\right)^{-\frac{3}{2}}}}$

$=\sqrt{\dfrac{6^2\times5}{\left(\dfrac{100}{4}\right)^{\frac{3}{2}}}}$

$=\sqrt{\dfrac{6^2\times5}{(5^2)^{\frac{3}{2}}}}$

$=\sqrt{\dfrac{6^2\times5}{(5)^3}}$

$=\sqrt{\dfrac{6^2}{5^3\times5^{-1}}}$

$=\sqrt{\dfrac{6^2}{5^{3-1}}}$

$=\sqrt{\dfrac{6^2}{5^2}}$

$=\sqrt{\left(\dfrac{6}{5}\right)^2}$

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

$=\dfrac{6}{5}$ **Ans**

Q.5 $\left(\dfrac{a^p}{a^q}\right)^{p+q}\times\left(\dfrac{a^q}{a^r}\right)^{q+r}\div5\left(a^q\cdot a^r\right)^{p-r}$

Solution:

$=\dfrac{\left(a^{p-q}\right)^{p+q}\left(a^{q-r}\right)^{q+r}}{5\left(a^{p+r}\right)^{p-r}}$

$=\dfrac{a^{(p-q)(p+q)}a^{(q-r)(q+r)}}{5a^{(p+r)(p-r)}}$

$=\dfrac{a^{p^2-q^2}a^{q^2-r^2}}{5a^{p^2-r^2}}$

$=\dfrac{a^{p^2-q^2+q^2-r^2}}{5a^{p^2-r^2}}$
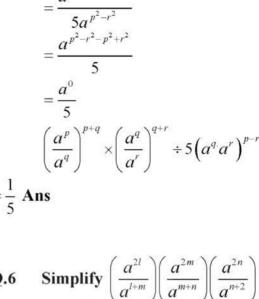
$=\dfrac{a^{p^2-r^2-p^2+r^2}}{5}$

$=\dfrac{a^0}{5}$

$\left(\dfrac{a^p}{a^q}\right)^{p+q}\times\left(\dfrac{a^q}{a^r}\right)^{q+r}\div5\left(a^q\cdot a^r\right)^{p-r}$

$=\dfrac{1}{5}$ **Ans**

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

Solution:

$=a^{2l-l-m}a^{2m-m-n}a^{2n-n-n}$

$=a^{l-m}a^{m-n}a^{n-l}$

$=a^{l-m+m-n+n-l}$

$=a^0$

$\left(\dfrac{a^{2l}}{a^{l+m}}\right)\left(\dfrac{a^{2m}}{a^{m+n}}\right)\left(\dfrac{a^{2n}}{a^{n+2}}\right)=1$ **Ans**

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

Solution:

$=\sqrt[3]{a^{l-m}}\sqrt[3]{a^{m-n}}\sqrt[3]{a^{n-l}}$

$=\left(a^{l-m}\right)^{\frac{1}{3}}\times\left(a^{m-n}\right)^{\frac{1}{3}}\times\left(a^{n-l}\right)^{\frac{1}{3}}$

$=a^{\frac{l-m}{3}}\times a^{\frac{m-n}{3}}\times a^{\frac{n-l}{3}}$

$=a^{\frac{l-m}{3}+\frac{m-n}{3}+\frac{n-l}{3}}$

$=a^{\frac{l-m+m-n+n-l}{3}}$

$=a^{\frac{0}{3}}$

$=a^0$

$\sqrt[3]{\dfrac{a^l}{a^m}}\times\sqrt[3]{\dfrac{a^m}{a^n}}\times\sqrt[3]{\dfrac{a^n}{a^r}}=1$ **Ans**