Exercise 2.2

Q1. Identify the property used in the following.

(i) $a + b = b + a$
commutative property w.r.t. addition

(ii) $ab(c) = a(bc)$
Associative property w.r.t. multiplication

(iii) $7 \times 1 = 7$ Multiplicative Identity

(iv) $x > y$ or $x = y$ or $x < y$
Trichotomy property of inequality

(v) $ab = ba$
Commutative property w.r.t. multiplication

(vi) $a + c = b + c \Rightarrow a = b$
Cancellation property for addition

(vii) $5 + (-5) = 0$ Additive Inverse

(viii) $7 \times \dfrac{1}{7} = 1$ Multiplicative inverse

(ix) $a > b \Rightarrow ac > bc (c > o)$
Multiplicative property of inequality

Q2. Fill in the following blanks by stating the properties of real numbers used.

$3x + 3(y - x)$

$= 3x + 3y - 3x$ Distributive property

$= 3x - 3x + 3y$ Commutative property

$= 0 + 3y$ Additive Inverse $(3x, -3x)$

$= 3y$ Additive Identity $(o + a = a)$

Q3. Give the name of property used in the following.

(i) $\sqrt{24} + 0 = \sqrt{24}$ Additive Identity

(ii) $-\dfrac{2}{3}\left(5+\dfrac{7}{2}\right)=\left(-\dfrac{2}{3}\right)(5)+\left(-\dfrac{2}{3}\right)\left(\dfrac{7}{2}\right)$

Distributive property of multiplication over addition

(iii) $\pi+(-\pi)=0$ Additive Inverse

(iv) $\sqrt{3}.\sqrt{3}$ **is a real number**

Closure property w.r.t. multiplication

(v) $\left(-\dfrac{5}{8}\right)\left(-\dfrac{8}{5}\right)=1,$ Multiplicative inverse

Example

Write each radical expression in exponential notation and each exponential expression in radical notation. Do not simplify.

(i) $\sqrt[5]{-8}$ (ii) $\sqrt[3]{x^5}$

(iii) $y^{3/4}$ (iv) $x^{-3/2}$

Solution:

(i) $\sqrt[5]{-8}\ =(-8)^{1/5}$

(ii) $\sqrt[3]{x^5}=x^{5/3}$

(iii) $y^{3/4}=\sqrt[4]{y^3}$ or $\left(\sqrt[4]{y}\right)^3$

(iv) $x^{-3/2}=\sqrt{x^{-3}}$ or $\left(\sqrt{x}\right)^{-3}$

Example

Simplify $\sqrt[3]{16x^4y^5}$

Solution:

$$\sqrt[3]{16x^4y^5}=\sqrt[3]{(2)(8)(x)(x^3)(y^2)(y^3)},$$

$$=\sqrt[3]{2xy^2(2^3)(x^3)(y^3)}$$

$$=\sqrt[3]{2xy^2}\,\sqrt[3]{(2^3)(x^3)(y^3)},$$

$$=\sqrt[3]{2xy^2}\,\sqrt[3]{(2^3)}\,\sqrt[3]{(x^3)}\,\sqrt[3]{(y^3)}=2xy\sqrt[3]{2xy^2}$$