

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) $7 \times \frac{1}{7} = 1$ Multiplicative inverse

(ix) $a > b \Rightarrow ac > bc (c > 0)$
Multiplicative property of inequality

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

$$\begin{aligned} & 3x + 3(y - x) \\ &= 3x + 3y - 3x \text{ Distributive property} \\ &= 3x - 3x + 3y \text{ Commutative property} \\ &= 0 + 3y \text{ Additive Inverse } (3x, -3x) \\ &= 3y \text{ Additive Identity } (0 + a = a) \end{aligned}$$

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

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

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

Distributive property of multiplication over addition

$$(iii) \quad \pi + (-\pi) = 0 \quad \text{Additive Inverse}$$

$$(iv) \quad \sqrt{3} \cdot \sqrt{3} \text{ is a real number}$$

Closure property w.r.t. multiplication

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

Example

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

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

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

Solution:

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

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

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

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

Example

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

Solution:

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