

Chapter # 1

Real Numbers

Review Exercise # 1

Question # 1: Four options are given against each statement. Encircle the correct option.

#	Answer	#	Answer
i	C	vi	B
ii	D	vii	A
iii	D	viii	B
iv	D	ix	D
v	A	x	D

Question # 2: If $a = \frac{3}{2}$, $b = \frac{5}{3}$ and $c = \frac{7}{5}$, then verify that:

(i) $a(b + c) = ab + ac$

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

$$\frac{3}{2} \left(\frac{25+21}{15} \right) = \frac{15}{6} + \frac{21}{10}$$

$$\frac{3}{2} \left(\frac{46}{15} \right) = \frac{75+63}{30}$$

$$\frac{138}{30} = \frac{138}{30}$$

2		6,10
3		3,5
5		1,5
		1,1

Hence Proved

(ii) $(a + b)c = ac + bc$

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

$$\left(\frac{9+10}{6} \right) \frac{7}{5} = \frac{21}{10} + \frac{35}{15}$$

$$\left(\frac{19}{6} \right) \frac{7}{5} = \frac{63+70}{30}$$

$$\frac{133}{30} = \frac{133}{30}$$

2		10,15
3		5,15
5		5,5
		1,1

Hence Proved

Question # 3: If $a = \frac{4}{3}$, $b = \frac{5}{2}$, $c = \frac{7}{4}$, then verify the associative property of real numbers w.r.t addition and multiplication.

Addition $a + (b + c) = (a + b) + c$

$$\frac{4}{3} + \left(\frac{5}{2} + \frac{7}{4} \right) = \left(\frac{4}{3} + \frac{5}{2} \right) + \frac{7}{4}$$

$$\frac{4}{3} + \left(\frac{10+7}{4} \right) = \left(\frac{8+15}{6} \right) + \frac{7}{4}$$

$$\frac{4}{3} + \frac{17}{4} = \frac{23}{6} + \frac{7}{4}$$

$$\frac{16+51}{12} = \frac{46+21}{12}$$

$$\frac{67}{12} = \frac{67}{12}$$

2		4,6
2		2,3
3		1,3
		1,1

Hence Proved

Multiplication $a(bc) = (ab)c$

$$\frac{4}{3} \left(\frac{5}{2} \times \frac{7}{4} \right) = \left(\frac{4}{3} \times \frac{5}{2} \right) \frac{7}{4}$$

$$\frac{4}{3} \left(\frac{35}{8} \right) = \left(\frac{20}{6} \right) \frac{7}{4}$$

$$\frac{140}{24} = \frac{140}{24}$$

Hence Proved

Question # 4: Is 0 a rational number? Explain.

Ans: Yes, zero (0) is a rational number. It satisfies the definition of rational numbers.

e.g. $\frac{0}{2}$, $\frac{0}{-9}$ both are rational numbers.

Question # 5: State trichotomy property of real numbers.

Ans: For $a, b \in \mathcal{R}$, either $a = b$ *or* $a > b$ *or* $a < b$

Question # 6: Find two rational numbers between 4 and 5.

$$\begin{aligned} 1^{\text{st}} \text{ rational number} &= (4 + 5) \div 2 \\ &= (9) \times \frac{1}{2} \\ &= \frac{9}{2} \end{aligned}$$

$$\begin{aligned} 2^{\text{nd}} \text{ rational number} &= \left(4 + \frac{9}{2}\right) \div 2 \\ &= \left(\frac{8+9}{2}\right) \times \frac{1}{2} \\ &= \frac{17}{2} \times \frac{1}{2} \\ &= \frac{17}{4} \end{aligned}$$

Question # 7: Simplify the following:

$$\begin{aligned} \text{(i). } \sqrt[5]{\frac{x^{15}y^{35}}{z^{20}}} & \\ &= \left(\frac{x^{15}y^{35}}{z^{20}}\right)^{\frac{1}{5}} \\ &= \frac{x^{15 \times \frac{1}{5}} y^{35 \times \frac{1}{5}}}{z^{20 \times \frac{1}{5}}} \\ &= \frac{x^3 y^7}{z^4} \quad \text{(Answer)} \end{aligned}$$

$$\begin{aligned} \text{(ii). } \sqrt[3]{(27)^{2x}} & \\ &= (27)^{\frac{2x}{3}} \\ &= (3^3)^{\frac{2x}{3}} \\ &= (3)^{2x} \\ &= 9^{2x} \quad \text{(Answer)} \end{aligned}$$

3	27
3	9
3	3
	1

$$\begin{aligned} \text{(iii). } \frac{6(3)^{n+2}}{3^{n+1} - 3^n} & \\ &= \frac{6 \times 3^n \times 3^2}{3^n \times 3^1 - 3^n} \\ &= \frac{6 \times 3^n \times 9}{3^n(3-1)} \\ &= \frac{54}{2} \\ &= 27 \quad \text{(Answer)} \end{aligned}$$

Question # 8: The sum of three consecutive odd integers is 51. Find the three integers.

Let, three consecutive odd integers are: $x, x + 2, x + 4$

According to question:

$$x + x + 2 + x + 4 = 51$$

$$3x + 6 = 51$$

$$3x = 51 - 6$$

$$3x = 45$$

$$x = \frac{45}{3}$$

$$x = 15$$

Also,

$$x + 2 = 15 + 2 = 17$$

$$x + 4 = 15 + 4 = 19$$

$$15, 17, 19 \quad \text{(Answer)}$$

Question # 9: Abdullah picked up 96 balls and placed them into two buckets. One bucket has twenty-eight more balls than the other bucket. How many balls were in each bucket?

Let,

$$\text{Balls in 1}^{\text{st}} \text{ bucket} = x$$

$$\text{Balls in 2}^{\text{nd}} \text{ bucket} = x + 28$$

$$\text{Total balls} = 96$$

According to question:

$$x + x + 28 = 96$$

$$2x = 96 - 28$$

$$2x = 68$$

$$x = \frac{68}{2}$$

$$\text{Balls in 1}^{\text{st}} \text{ Bucket} = x = 34$$

$$\begin{aligned} \text{Balls in 2}^{\text{nd}} \text{ Bucket} &= x + 28 \\ &= 34 + 28 = 62 \end{aligned}$$

Question # 10: Salma invested Rs. 3,50,000 in a bank, which paid simple profit at the rate of $7\frac{1}{4}\%$ per annum. After 2 years, the rate was increased to 8 % per annum. Find the amount she had at the end of 7 years.

For 2 years:

$$\text{Principal Amount} = 3,50,000 \text{ Rs}$$

$$\text{Rate} = 7\frac{1}{4}\% = 7.25\%$$

$$\text{Time} = 2 \text{ years}$$

$$\begin{aligned} \text{Profit} = P_1 &= \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100} \\ &= \frac{3,50,000 \times 7.25 \times 2}{100} \\ &= 50750 \text{ Rs} \end{aligned}$$

For Next 5 years:

$$\text{Principal Amount} = 3,50,000 \text{ Rs}$$

$$\text{Rate} = 8\%$$

$$\text{Time} = 5 \text{ years}$$

$$\begin{aligned} \text{Profit} = P_2 &= \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100} \\ &= \frac{3,50,000 \times 8 \times 5}{100} \\ &= 1,40,000 \text{ Rs} \end{aligned}$$

At end of 7 years:

$$\begin{aligned} \text{Total Amount} &= \text{Principal Amount} + P_1 + P_2 \\ &= 3,50,000 + 50,750 + 1,40,000 \\ &= 5,40,750 \text{ Rs} \end{aligned}$$