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

$$\frac{3}{2}\left(\frac{5}{3}+\frac{7}{5}\right) = \left(\frac{3}{2}\right)\left(\frac{5}{3}\right) + \left(\frac{3}{2}\right)\left(\frac{7}{5}\right)$$
$$\frac{3}{2}\left(\frac{25+21}{15}\right) = \frac{15}{6} + \frac{21}{10}$$
$$\frac{3}{2}\left(\frac{46}{15}\right) = \frac{75+63}{30}$$
$$\frac{138}{30} = \frac{138}{30}$$

Hence Proved

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

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

$$\left(\frac{3}{2}+\frac{5}{3}\right)\frac{7}{5} = \left(\frac{3}{2}\right)\left(\frac{7}{5}\right) + \left(\frac{5}{3}\right)\left(\frac{7}{5}\right)$$
$$\left(\frac{9+10}{6}\right)\frac{7}{5} = \frac{21}{10} + \frac{35}{15}$$
$$\left(\frac{19}{6}\right)\frac{7}{5} = \frac{63+70}{30}$$
$$\frac{133}{30} = \frac{133}{30}$$

Hence Proved

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

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

2	2,4
2	1,2
	1,1

$$\frac{4}{3}+\left(\frac{5}{2}+\frac{7}{4}\right) = \left(\frac{4}{3}+\frac{5}{2}\right)+\frac{7}{4}$$
$$\frac{4}{3}+\left(\frac{10+7}{4}\right) = \left(\frac{8+15}{6}\right)+\frac{7}{4}$$
$$\frac{4}{3}+\frac{17}{4} = \frac{23}{6}+\frac{7}{4}$$
$$\frac{16+51}{12} = \frac{46+21}{12}$$
$$\frac{67}{12} = \frac{67}{12}$$

Hence Proved

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

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.

1st rational number = $(4 + 5) \div 2$

$= (9) \times \frac{1}{2}$

$= \frac{9}{2}$

2nd rational number = $\left(4 + \frac{9}{2}\right) \div 2$

$= \left(\frac{8+9}{2}\right) \times \frac{1}{2}$

$= \frac{17}{2} \times \frac{1}{2}$

$= \frac{17}{4}$

Question # 7: Simplify the following:

(i). $\sqrt[5]{\frac{x^{15}y^{35}}{z^{20}}}$

$= \left(\frac{x^{15}y^{35}}{z^{20}}\right)^{\frac{1}{5}}$

$= \frac{x^{\cancel{15}^{3} \times \frac{1}{\cancel{5}}} y^{\cancel{35}^{7} \times \frac{1}{\cancel{5}}}}{z^{\cancel{20}^{4} \times \frac{1}{\cancel{5}}}}$

$= \frac{x^3 y^7}{z^4}$ (Answer)

(ii). $\sqrt[3]{(27)^{2x}}$

$= (27)^{\frac{2x}{3}}$

$= (3^{\cancel{3}})^{\frac{2x}{\cancel{3}}}$

$= (3)^{2x}$

$= 9^{2x}$ (Answer)

3	27
3	9
3	3
	1

(iii). $\frac{6(3)^{n+2}}{3^{n+1} - 3^n}$

$= \frac{6 \times 3^n \times 3^2}{3^n \times 3^1 - 3^n}$

$= \frac{6 \times \cancel{3}^{n} \times 9}{\cancel{3}^{n}(3-1)}$

$= \frac{54}{2}$

$= 27$ (Answer)

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 (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,

$$\text{Balls in } 1^{st} \text{ bucket} = x$$
$$\text{Balls in } 2^{nd} \text{ bucket} = x + 28$$
$$\text{Total balls} = 96$$

According to question:

$$x + x + 28 = 96$$
$$2x = 96 - 28$$
$$2x = 68$$
$$x = \frac{68}{2}$$
$$\text{Balls in } 1^{st} \text{ Bucket} = x = 34$$
$$\text{Balls in } 2^{nd} \text{ Bucket} = x + 28$$
$$= 34 + 28 = 62$$

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:

$$\text{Principal Amount} = 3{,}50{,}000\ Rs$$
$$\text{Rate} = 7\frac{1}{4}\% = 7.25\%$$
$$\text{Time} = 2\ years$$
$$\text{Profit} = P_1 = \frac{Principal \times Rate \times Time}{100}$$
$$= \frac{3{,}50{,}000 \times 7.25 \times 2}{100}$$
$$= 50750\ Rs$$

For Next 5 years:

$$\text{Principal Amount} = 3{,}50{,}000\ Rs$$
$$\text{Rate} = 8\ \%$$
$$\text{Time} = 5\ years$$
$$\text{Profit} = P_2 = \frac{Principal \times Rate \times Time}{100}$$
$$= \frac{3{,}50{,}000 \times 8 \times 5}{100}$$
$$= 1{,}40{,}000\ Rs$$

At end of 7 years:

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