VIII ~~Test-XII~~ (revision) (Squares and Square roots/rational no.s cubes and cube roots)

1) Product of rational number $-\frac{2}{5}$ and its additive inverse is (a) 0 (b) 1 (c) $-\frac{4}{25}$ (d) $-\frac{5}{2}$

2) If one number of Pythagorean triplet is 6, then the triplet is (a) (4,5,6) (b) (5,6,7) (c) (6,7,8) (d) (6,8,10)

3) How many natural numbers lie between 25^2 and 26^2?
(a) 49 (b) 50 (c) 51 (d) 52

4) $\sqrt{0.0016} =$ ___

5) A negative rational number raised to the power zero equals ___

6) 0.000543 in scientific notation is ___

7) If we subtract $\frac{1}{2}$ from a number and multiply the result by $\frac{1}{2}$, we get $\frac{1}{8}$, then find the number.

8) Without adding, find the Sum of

$1+3+5+7+9+11+13+15+17$

9) If $\sqrt{15625} = 125$, then find the value of

$\sqrt{1.5625} + \sqrt{156.25}$

10) Evaluate $\frac{3}{7} + \left(\frac{-6}{11}\right) + \left(\frac{-8}{21}\right) + \frac{5}{22}$ by rearranging the rational numbers using properties of addition

11) If $p = \frac{-8}{27}$, $q = \frac{3}{4}$ and $r = \frac{-12}{15}$, then verify that

$p \times (q \times r) = (p \times q) \times r$

12) Find the smallest square number that is divisible by each of the numbers 8, 15 and 20.

13) Concert tickets usually cost ₹120 $\frac{4}{5}$ per person. For students they are priced at $\frac{1}{4}$ of the normal cost. How much will 6 tickets cost for students?

14) Find the least number which must be subtracted from 8934 to make it a perfect square. Also find the square root of the perfect square number so obtained.

15) Find the greatest 4-digit number which is a perfect square. Also find the square root of this number.

16) Three numbers are in the ratio 2 : 3 : 4. If the sum of their cubes is 50688, find the numbers.

17) $\frac{2}{5}$ of total no. of students of a school come by car while $\frac{1}{4}$ of students come by bus to school. All the other students walk to school of which $\frac{1}{3}$ walk on their own and the rest are escorted by their parents. If 224 students come to school walking on their own, then how many students study in that school?

18) Evaluate $\sqrt{23104}$ and calculate $\sqrt{231.04} + \sqrt{2.3104}$

19) Find the least square number which is exactly divisible by each of the numbers 8, 12, 15 and 20

20) Find the greatest 5-digit number which is a perfect square

21) Using appropriate properties, find

$$\frac{2}{3} \times -\frac{5}{7} + \frac{7}{3} + \frac{2}{3} \times -\frac{2}{7}$$

22) By what number should we multiply $-\frac{15}{20}$ so that the product is $-\frac{5}{7}$?

23) Verify Commutative property of multiplication

$x = \frac{-3}{8}$; $y = \frac{-4}{9}$

24) Find the square root of 1369 by long division method

25) How many natural no.s lie between 5^2 and 6^2

26) Write the multiplicative inverse of $-1\frac{1}{7}$?

27) Write the equivalent rational number of $\frac{8}{9}$ whose denominator is 45.

28) Find the value of $\sqrt{1.44}$

29) Find the Sum of successive odd numbers 1, 3, 5, 7, 9, 11, 13 and 15

30) Write a Pythagorean triplet in which one number is 15

31) The Cost of $\frac{19}{4}$ m of wire is Rs $\frac{171}{2}$. Find the cost of one metre of the wire.

32) A train travels $\frac{1445}{2}$ km in $\frac{17}{2}$ hours. Find the speed of the train in km/hr.

33) If 16 shirts of equal size can be made out of 24 m of cloth, how much cloth is needed for making one shirt?

34) $\frac{7}{11}$ of all money in Hamid's bank account is Rs 77000. How much money does Hamid have in his bank account?

35) $117\frac{1}{3}$ m long rope is cut into equal pieces measuring $7\frac{1}{3}$ m each. How many such small pieces are these?

36) $\frac{1}{6}$ of the class students are above average, $\frac{1}{4}$ are average and rest are below average. If there are

48 students in all, how many students are below average in the class?

37) Huma, Hubna and Seema received a total of Rs 2016 as monthly allowance from their mother such that Seema gets $\frac{1}{2}$ of what Hubna gets and Huma gets $1\frac{2}{3}$ times Seema's share. How much money do the three sisters get individually?

38) A mother and her two daughters got a room constructed for Rs 62000. The elder daughter contributes $\frac{3}{8}$ of her mother's contribution while the younger daughter contributes $\frac{1}{2}$ of her mother's share. How much do the three contribute individually?

39) The product of two rational numbers is $-\frac{14}{27}$. If one of the numbers be $\frac{7}{9}$ find the other.

40) By what numbers should we multiply $-\frac{15}{20}$ so that the product may be $-\frac{5}{7}$?

41) By what number should we multiply $-\frac{8}{13}$ so that the product may be 24?

42) The product of two rational numbers is -7. If one of the number is -5, find the other.

43) Find five rational numbers between 0 and 1

44) From a rope 40m long, pieces of equal size are cut. If the length of one piece is $\frac{10}{3}$ m, find the no. of such pieces.

45) $5\frac{1}{2}$ m long rope is cut into 12 equal pieces. What is the length of each piece?

46) Write in descending order: $\frac{8}{7}, -\frac{9}{8}, -\frac{3}{2}, 0, \frac{2}{5}$

47) Find the Sum of additive inverse and multiplicative inverse of 7.

48) Find the product of additive inverse and multiplicative inverse of $-\frac{1}{3}$.

49) One fruit salad recipe requires $\frac{1}{2}$ cup of sugar. Another recipe for the same fruit salad requires 2 tablespoons of sugar. If 1 tablespoon is 1 equivalent to $\frac{1}{16}$ cup, how much more sugar does the first recipe require?

50) Roller coaster at an amusement park is $-\frac{2}{3}$ m high. If a new roller coaster is built that is $-\frac{3}{5}$ times the height of the existing coaster, what will be the height of the new roller coaster?

VIII Revision (Squares and Square roots / Rational no.s / Cubes and Cube roots)

1) additive inverse of $-\frac{2}{5}$ is $\frac{2}{5}$

Product $= -\frac{2}{5} \times \frac{2}{5} = -\frac{4}{25}$ (c)

2) We know that $(2m, m^2-1, m^2+1)$ forms a Pythagorean triplet.

Let $2m = 6$

$\Rightarrow m = \frac{6}{2} = 3$

Then, $m^2-1 = 3^2-1 = 9-1 = 8$

$m^2+1 = 3^2+1 = 9+1 = 10$

$\therefore (6, 8, 10)$ forms Pythagorean triplet. (a)

3) There are $2n$ natural numbers between n^2 and $(n+1)^2$

Thus $n = 25$

$2n = 50$ (b)

4) $\sqrt{0.0016} = \sqrt{\frac{16}{10000}} = \frac{4}{100} = \underline{0.04}$

5) 1

eg:- $(-5)^0 = 1$

i.e, any rational number to the power 0 is 1

6) $0.000543 = 5.43 \times 10^{-4}$

7) Let the number be x

$\left(x - \frac{1}{2}\right)\frac{1}{2} = \frac{1}{8}$

$\Rightarrow x - \frac{1}{2} = \frac{2}{8}^{1}_{4}$

$\Rightarrow x = \frac{1}{4} + \frac{1}{2}^{\times 2}_{\times 2} = \frac{1+2}{4} = \frac{3}{4}$ //

Hence the number is $\frac{3}{4}$

8) Sum of first n odd natural numbers $= n^2$

Thus, $1+3+5+7+9+11+13+15+17 = 9^2 = \underline{81}$

9) $\sqrt{1.5625} = \sqrt{\frac{15625}{10000}} = \frac{125}{100} = 1.25$

$\sqrt{156.25} = \sqrt{\frac{15625}{100}} = \frac{125}{10} = 12.5$

$\therefore \sqrt{1.5625} + \sqrt{156.25} = 1.25 + 12.5$

$= \underline{\underline{13.75}}$

01.25	
12.50	
13.75	

10) $\left(\frac{3^{\times 3}}{7^{\times 3}} - \frac{8}{21}\right) + \left(\frac{-6^{\times 2}}{11^{\times 2}} + \frac{5}{22}\right)$

$= \left(\frac{9-8}{21}\right) + \left(\frac{-12+5}{22}\right) = \frac{1}{21} - \frac{7}{22}$

LCM $= 7 \times 11 \times 3 \times 2 = 462$

$\frac{1^{\times 22}}{21^{\times 22}} - \frac{7^{\times 21}}{22^{\times 21}} = \frac{22 - 147}{462} = \underline{\underline{-\frac{125}{462}}}$

7	21, 22
11	3, 22
3	3, 2
2	1, 2
	1, 1

11) LHS, $p \times (q \times r) = \frac{-8}{27} \times \left(\frac{3}{4} \times \frac{-12}{15}\right)$

$= \frac{-8}{27_9} \times \frac{-3}{5}$

$= \frac{8 \times 1}{9 \times 5} = \frac{8}{45}$ //

RHS, $(p \times q) \times r = \left(\frac{-8^{2}}{27_9} \times \frac{1}{\cancel{4}}\right) \times \frac{-12^{4}}{15_5}$

$= \left(\frac{-2 \times 1}{9}\right) \times \frac{-4}{5} = \frac{8}{45}$ //

$\therefore$ LHS = RHS

Hence verified

12) LCM $(8, 15, 20) = 5 \times 4 \times 2 \times 3$

$= 120$

$120 = 2 \times 2 \times 2 \times 3 \times 5$

Thus the smallest square number divisible by each of 8, 15, 20 is

$120 \times 2 \times 3 \times 5 = \underline{\underline{3600}}$

2	120
2	60
2	30
3	15
	5

5	8, 15, 20
4	8, 3, 4
	2, 3, 1

13) Cost of 1 ticket $= ₹\frac{604}{5}$

Cost of 1 Student's ticket $= \frac{1}{41} \times \frac{604}{5} = ₹\frac{151}{5}$

∴ Cost of 6 Student's ticket $= 6 \times \frac{151}{5} = \frac{906}{5}$

$= ₹ 181\frac{1}{5}$

181
5) 906
5
40
40
6
5
1

14)

94
9) 8934
81
184) 834
736
98

∴ the required least number to be subtracted = 98

8934 − 98 = 8836, which is a perfect Square

Thus the Square root of the perfect Square obtained,

$\sqrt{8836} = 94$

15) Greatest 4-digit number = 9999

∴ The required perfect Square = 9999 − 198

= 9801

99
9) 9999
81
189) 1899
1701
198

$\sqrt{9801} = 99$

16) Let the three numbers be 2x, 3x and 4x

Then, $(2x)^3 + (3x)^3 + (4x)^3 = 50688$

$\Rightarrow 8x^3 + 27x^3 + 64x^3 = 50688$

$\Rightarrow 99x^3 = 50688$

$x^3 = \frac{50688}{99}$ 512 ~~5632~~ ~~99~~ +1

$x = \sqrt[3]{512} = 8$

∴ The numbers are 2x = 16, 3x = 24, 4x = 32

17) Let the total no. of students be x.

No. of students come by car $= \frac{2}{5}x$

No. of students come by bus $= \frac{1}{4}x$

No. of students walk to school $= x - \left(\frac{2}{5}x + \frac{1}{4}x\right)$

$\left(\frac{2}{5}\times\frac{4}{4}x + \frac{1}{4}\times\frac{5}{5}x\right)$

$= x - \left(\frac{8x+5x}{20}\right)$

$= x - \frac{13x}{20}$

$= \frac{20x-13x}{20} = \frac{7x}{20}$

No. of students walking on their own

$= \frac{1}{3} \times \frac{7x}{20} = \frac{7x}{60}$

$\therefore \frac{7x}{60} = 224$

$7x = 224 \times 60$

$x = \frac{\cancel{224}^{32} \times 60}{\cancel{7}1} = \underline{\underline{1920}}$

Hence total no. of students study in that School = 1920 students

18) $\sqrt{23104} = 152$

	152
1	23104
	1
25	131
	125
302	604
	604
	0

$\sqrt{231.04} = \sqrt{\frac{23104}{100}}$

$= \frac{152}{10}$

$= 15.2$ //

$\sqrt{2.3104} = \sqrt{\frac{23104}{10000}} = \frac{152}{100} = 1.52$ //

$\therefore \sqrt{231.04} + \sqrt{2.3104} = 15.2 + 1.52 = \underline{\underline{16.72}}$

19) LCM (8, 12, 15, 20) = 120

$120 = 2 \times 2 \times 2 \times 3 \times 5$

Since the factors 2, 3 and 5 do not form pairs, the required square number $= 120 \times 2 \times 3 \times 5 = \underline{3600}$

2	120
2	60
2	30
3	15
	5

4	8, 12, 15, 20
5	2, 3, 15, 5
3	2, 3, 3, 1
2	2, 1, 1, 1
	1, 1, 1, 1

20) Greatest 5-digit number = 99999

∴ the required 5-digit perfect square number = 99999 − 143

= 99856

	316
3	99999
	9
61	99
	61
626	3899
	3756
	143

21) $\frac{2}{3} \times -\frac{5}{7} + \frac{7}{3} + \frac{2}{3} \times -\frac{2}{7}$

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

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

$= \frac{2}{3} \times -\frac{7^1}{7_1} + \frac{7}{3}$

$= -\frac{2}{3} + \frac{7}{3} = \frac{5}{3}$

22) Let the number be x

Then, $x \times -\frac{15}{20} = -\frac{5}{7}$

$x = -\frac{5^1}{7} \times -\frac{20}{{}^{+}\cancel{5}3} = \frac{20}{21}$

Hence the required number is $\frac{20}{21}$

23) Commutative property of multiplication is

$x \times y = y \times x$

LHS, $x \times y = -\frac{\cancel{2}^1}{\cancel{8}_2} \times -\frac{\cancel{4}^1}{\cancel{9}_3} = \frac{1}{6}$

RHS, $y \times x = -\frac{4}{\cancel{9}_3} \times -\frac{\cancel{3}^1}{\cancel{8}_2} = \frac{1}{6}$

$\therefore$ LHS = RHS. Hence Verified.

24) $\sqrt{1369} = 37$

$$\begin{array}{r|l} & 37 \\ \hline 3 & 13\,69 \\ & 9 \\ \hline 67 & 469 \\ & 469 \\ \hline & 0 \end{array}$$

25) We know that there are $2n$ natural numbers between n^2 and $(n+1)^2$.
$\therefore$ There are $2 \times 5 = 10$ natural numbers lie between 5^2 and 6^2.

26) $-1\frac{1}{7} = -\frac{8}{7}$

Multiplicative inverse is $-\frac{7}{8}$

27) $\frac{8 \times 5}{9 \times 5} = \frac{\boxed{40}}{45}$

28) $\sqrt{1.44} = \sqrt{\frac{144}{100}} = \frac{12}{10} = 1.2$

29) Sum of first n odd natural numbers $= n^2$
$1+3+5+7+9+11+13+15 = 8^2 = 64$

30) We know that $(2m, m^2-1, m^2+1)$ forms the Pythagorean Triplet.

Let $m^2 - 1 = 15$

$\Rightarrow m^2 = 16$

$m = 4$

$\therefore 2m = 2 \times 4 = 8$

$m^2 + 1 = 4^2 + 1 = 16 + 1 = 17$

$\therefore$ The required Pythagorean Triplet is $(8, 15, 17)$

31) Cost of $\frac{19}{4}$ m wire = ₹ $\frac{171}{2}$

$\therefore$ Cost of 1m wire = $\frac{171}{2} \div \frac{19}{4}$

$= \frac{\cancel{171}^{9}}{\cancel{21}_{1}} \times \frac{\cancel{4}^{2}}{\cancel{19}_{1}} = ₹18$

32) Distance covered by train $= \frac{1445}{2}$ km

Time taken $= \frac{17}{2}$ hours

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$\therefore$ Speed of the train $= \frac{1445}{2} \div \frac{17}{2} = \frac{\cancel{1445}^{85}}{\cancel{21}_{1}} \times \frac{\cancel{2}^{1}}{\cancel{17}_{1}}$

$= 85$ km/hr

33) Length of cloth for 16 shirts $= 24$m

$\therefore$ length of cloth for 1 shirt $= \frac{\cancel{24}^{3}}{\cancel{16}_{2}} = \frac{3}{2} = 1.5$m

34) Let the total amount in his bank account be ₹x

Then, $\frac{7}{11} \times x = 77000$

$\Rightarrow x = \frac{\cancel{77000}^{11000} \times 11}{\cancel{7}_{1}} = 121000$

Hence the total amount in the bank account $=$ ₹121000

35) length of rope $= 117\frac{1}{3}$ m $= \frac{352}{3}$ m.

length of 1 piece $= 7\frac{1}{3} = \frac{22}{3}$ m

$\therefore$ No. of pieces $= \frac{352}{3} \div \frac{22}{3} = \frac{\cancel{352}^{\cancel{32}\,16}}{\cancel{31}} \times \frac{\cancel{3}^{1}}{\cancel{22}_{\cancel{2}\,1}}$

$= 16$ pieces

36) Total no. of students $= 48$

no. of above average students $= \frac{1}{6} \times 48 = 8$

no. of average students $= \frac{1}{4} \times 48 = 12$

$\therefore$ No. of below average students $= 48 - (8+12)$

$= 48 - 20 = 28$

37) Let the monthly allowance received by Hubna be x

Thus, amount received by Seema $= \frac{1}{2}x$

amount received by Huma $= \frac{5}{3} \times \frac{1}{2}x$

$= \frac{5}{6}x$

$\therefore x + \frac{1}{2}x + \frac{5}{6}x = 2016$ (multiply by 6, 3, 1)

$\Rightarrow \frac{6x + 3x + 5x}{6} = 2016$

$\Rightarrow \frac{14x}{6} = 2016$

$\Rightarrow x = \frac{2016 \times 6}{14} = 288 \times 3 = 864$

Hence Hubna's share = ₹864//

Seema's share $= \frac{1}{2} \times 864 =$ ₹432//

Huma's share $= \frac{5}{6} \times 864 =$ ₹720//

38) Let the mother's contribution be ₹x

Then, elder daughter's contribution $= \frac{3}{8}x$

Younger daughter's contribution $= \frac{1}{2}x$

$\therefore x + \frac{3}{8}x + \frac{1}{2}x = 62000$ (multiply by 8, 4)

$\Rightarrow \frac{8x + 3x + 4x}{8} = 62000$

$\Rightarrow \frac{15x}{8} = 62000$

$\Rightarrow x = \frac{62000 \times 8}{15} = \frac{99200}{3} = 33066.67$

∴ Mother's contribution = ₹ 33066.67//

Elder daughter's contribution = $\frac{3}{8} \times \frac{99200}{31}$

= ₹ 12400//

Younger daughter's contribution = $\frac{1}{2} \times \frac{99200}{3}$

= ₹ 16533.33//

39) Let the other number be x

Then, $x \times \frac{7}{9} = \frac{-14}{27}$

$x = \frac{-14}{27} \times \frac{9}{7} = -\frac{2}{3}$//

Hence the other number is $-\frac{2}{3}$

40) Let the required number be x

Then, $x \times -\frac{15}{20} = -\frac{5}{7}$

$x = \frac{-5}{7} \times \frac{20}{-15} = \frac{20}{21}$//

Hence the required number is $\frac{20}{21}$

41) Let the required number be x

Then, $x \times -\frac{8}{13} = 24$

$x = \frac{24}{-8} \times \frac{13}{1} = -39$//

Hence the required number is -39

42) Let the other number be x

$x \times -5 = -7$

$x = \frac{-7}{-5} = \frac{7}{5}$//

Hence the other number is $\frac{7}{5}$

43) $\frac{0 \times 6}{1 \times 6}$ $\frac{1 \times 6}{1 \times 6}$

$\frac{0}{6}$, $\frac{6}{6}$

∴ These five rational numbers between 0 and 1 are $\frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}$ and $\frac{5}{6}$

44) Total length of rope = 40m

length of 1 piece = $\frac{10}{3}$ m

∴ No. of pieces = $40 \div \frac{10}{3}$

$= \cancel{40}^{4} \times \frac{3}{\cancel{10}_{1}}$

= 12 pieces //

45) Total length of rope = $5\frac{1}{2} = \frac{11}{2}$ m

No. of pieces = 12

∴ length of each piece = $\frac{11}{2} \div 12$

$= \frac{11}{2} \times \frac{1}{12}$

$= \frac{11}{24}$ m //

46) $\frac{8}{7}, -\frac{9}{8}, -\frac{3}{2}, 0, \frac{2}{5}$

LCM (7, 8, 2, 5) = 280

$\frac{8 \times 40}{7 \times 40}, -\frac{9 \times 35}{8 \times 35}, -\frac{3 \times 140}{2 \times 140}, 0, \frac{2 \times 56}{5 \times 56}$

$\frac{320}{280}, -\frac{315}{280}, -\frac{420}{280}, 0, \frac{112}{280}$

2	7, 8, 2, 5
7	7, 4, 1, 5
4	1, 4, 1, 5
5	1, 1, 1, 5
	1, 1, 1, 1

$\frac{320}{280} > \frac{112}{280} > 0 > -\frac{315}{280} > -\frac{420}{280}$

∴ $\frac{8}{7} > \frac{2}{5} > 0 > -\frac{9}{8} > -\frac{3}{2}$ //

47) Additive inverse of $7 = -7$

Multiplicative inverse of $7 = \frac{1}{7}$

$\therefore$ Required Sum $= -7 + \frac{1}{7} = -\frac{49+1}{7} = -\frac{48}{7}$

48) Additive inverse of $-\frac{1}{3} = \frac{1}{3}$

Multiplicative inverse of $-\frac{1}{3} = -3$

Req. product $= \frac{1}{3} \times -3 = -1$

49) Sugar required for first recipe $= \frac{1}{2}$ cup

1 table spoon $= \frac{1}{16}$ th of a cup

Amount of Sugar required for second recipe = 2 table spoons

$= 2 \times \frac{1}{16} = \frac{1}{8}$ cup

$\therefore$ first recipe requires $\frac{1}{2} \overset{\times 4}{=} \frac{1}{8} = \frac{3}{8}$ cup more sugar than the second recipe.

50) Height of old roller coaster $= \frac{2}{3}$ m

$\therefore$ height of new roller coaster $= \frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$ m