

## SESSION – 2

### ⚙️ SPEED MATHS - II PRACTICE EXERCISE

1. Find the square of 307.

**Solution:**

$$307^2$$

(1)  $7^2 = 49$ , write down 9 as the last digit and carry over 4.

(2)  $3 \times 0 \times 7 + 4 = 4$ , write it down in the next position.

(3)  $2 \times 3 \times 7 + 0^2 = 42$ , write down 2 in the third position and carry over 4.

(4)  $3 \times 0 \times 3 + 4 = 4$  write down 4 in the fourth place.

(5)  $3^2 = 9$  write down 9

$$\therefore 307^2 = 94249$$

2. Find the squares of numbers 61 – 69.

**Solution:**

$$(61)^2 = 25 + 11 / 11^2 = 36 / 121 = 3721$$

$$(62)^2 = 25 + 12 / 12^2 = 37 / 144 = 3844$$

$$(63)^2 = 25 + 13 / 13^2 = 38 / 169 = 3969$$

$$(64)^2 = 25 + 14 / 14^2 = 39 / 196 = 4096$$

$$(65)^2 = 25 + 15 / 15^2 = 40 / 225 = 4225$$

$$(66)^2 = 25 + 16 / 16^2 = 41 / 256 = 4356$$

$$(67)^2 = 25 + 17 / 17^2 = 42 / 289 = 4489$$

$$(68)^2 = 25 + 18 / 18^2 = 43 / 324 = 4624$$

$$(69)^2 = 25 + 19 / 19^2 = 44 / 361 = 4761$$

3. Find the square of numbers 45 and 235.

**Solution:**

$$45^2 = 4 \times (4 + 1) / 5^2 = 20 / 25 = 2025$$

$$235^2 = 23 \times 24 / 25 = 552 / 25 = 55225$$

4. Find the squares of numbers 96 and 106.

**Solution:**

$$96^2 = (96 + 4)(96 - 4) + 4^2 \\ = 9200 + 16 = 9216$$

$$(106)^2 = (106 + 6)(106 - 6) + 6^2 \\ = 11200 + 36 = 11236$$

## SESSION – 3

### ⚙️ SPEED MATHS - III PRACTICE EXERCISE – I

1. Evaluate:  $\sqrt{248 + \sqrt{51 + \sqrt{169}}}$

**Solution:**

$$\sqrt{248 + \sqrt{51 + \sqrt{169}}} = \sqrt{248 + \sqrt{51 + 13}}$$

$$= \sqrt{248 + \sqrt{64}} = \sqrt{248 + 8} = \sqrt{256} = 16$$

$$\therefore \sqrt{248 + \sqrt{51 + \sqrt{169}}} = 16$$

2. Evaluate:  $\sqrt{\frac{0.289}{0.00121}}$

**Solution:**

$$\sqrt{\frac{0.289}{0.00121}} = \sqrt{\frac{28900}{121}} = \frac{170}{11}$$

3. Find the greatest number of 4 digits which is a perfect square.

**Solution:**

The greatest number of 4 digits is 9999

$$\begin{array}{r} 99 \\ 9 \overline{) 9999} \\ \underline{9} \phantom{99} \\ 81 \\ 189 \overline{) 1899} \\ \underline{1701} \\ 198 \end{array}$$

Since 198 is the remainder,  $9999 - 198$  will be a perfect square.

$$9999 - 198 = 9801$$

$\therefore$  The greatest number of 4 digits which is a perfect square is 9801.

## PRACTICE EXERCISE – II

1. Calculate  $23^3$ .

**Solution:**

The ten's digit of the given number is 2.

So, we write the first number in the first row as 8.

The ratio between the digits is 2:3 and so the next three numbers should also be in the same ratio with the previous one.

If the next number is a two digit number, the ten's digit is written as carryover below the previous number.

In the second row, twice the second and third numbers are written below them in the same manner.

	8	2	8	7
	1	1	2	
		4	6	
	2	3		
1	2	1	6	7

2. Calculate  $97^3$ .

**Solution:**

$$\begin{array}{r} 729 \quad 567 \quad 441 \quad 343 \\ 1134 \quad 882 \\ \hline 729 \quad 1701 \quad 1323 \quad 343 \end{array}$$

$$\therefore 97^3 = 912673$$

3. Find the cube root of 5832.

**Solution:**

$$5832 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

$$= 2^3 \times 3^3 \times 3^3$$

$$\therefore \sqrt[3]{5832} = 2 \times 3 \times 3$$

$$= 18$$

4. Find the cube root of 0.000216.

**Solution:**

$$\sqrt[3]{0.000216} = \sqrt[3]{\frac{216}{1000000}} = \frac{\sqrt[3]{216}}{100}$$

$$\sqrt[3]{216} = \sqrt{2^3 \times 3^3}$$

$$\therefore \sqrt[3]{216} = 2 \times 3 = 6$$

$$\therefore \sqrt[3]{0.000216} = \frac{6}{100} = 0.06$$

$$\begin{array}{r} 2 \overline{) 216} \\ 2 \overline{) 108} \\ 2 \overline{) 54} \\ 3 \overline{) 27} \\ 3 \overline{) 9} \\ 3 \end{array}$$

5. Find the smallest number by which 33275 be divided to make it a perfect cube.

**Solution:**

$$33275 = 5 \times 5 \times 11 \times 11 \times 11$$

$$= 5^2 \times 11^3$$

$\therefore$  33275 should be divided by  $5^2$  to make it a perfect cube.

$\therefore$  The required number is  $5^2 = 25$

$$\begin{array}{r} 5 \overline{) 33275} \\ 5 \overline{) 6655} \\ 11 \overline{) 1331} \\ 11 \overline{) 121} \\ 11 \end{array}$$

## SIMPLIFICATION

### PRACTICE EXERCISE

1. If  $\frac{37}{13} = 2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$  where x, y, z are natural numbers

find x, y, z.

**Solution:**

$$\frac{37}{13} = 2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$$

$$\Rightarrow \frac{37}{13} = 2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$$

$$\Rightarrow 2 + \frac{11}{13} = 2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$$

$$\Rightarrow \frac{11}{13} = \frac{1}{x + \frac{1}{y + \frac{1}{z}}} \Rightarrow x + \frac{1}{y + \frac{1}{z}} = \frac{13}{11} = 1 + \frac{2}{11}$$

$$\Rightarrow x = 1, \frac{1}{y + \frac{1}{z}} = \frac{2}{11} \Rightarrow x = 1, y + \frac{1}{z} = \frac{11}{2}$$

$$\Rightarrow x = 1, y + \frac{1}{z} = 5 + \frac{1}{2} \Rightarrow x = 1, y = 5, z = 2$$

$\therefore$  x, y, z are 1, 5, 2.

2. If  $4x + 5y = 83$  and  $\frac{3x}{2y} = \frac{21}{22}$ , find y - x.

**Solution:**

$$\left. \begin{array}{l} 4x + 5y = 83 \\ \frac{3x}{2y} = \frac{21}{22} \end{array} \right\}$$

$$\Rightarrow 66x = 42y \Rightarrow y = \frac{66}{42}x = \frac{11}{7}x$$

$$4x + 5 \times \frac{11}{7}x = 83$$

$$\Rightarrow 28x + 55x = 581$$

$$\Rightarrow 83x = 581 \Rightarrow x = 7$$

$$4x + 5y = 83 \Rightarrow 4 \times 7 + 5y = 83 \Rightarrow 5y = 55 \Rightarrow y = 11$$

$$\therefore y - x = 11 - 7 = 4$$

3. Find the sum  $\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90} + \frac{1}{110} + \frac{1}{132}$

**Solution:**

$$\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90} + \frac{1}{110} + \frac{1}{132}$$

$$= \frac{1}{2} + \frac{1}{2.3} + \frac{1}{3.4} + \frac{1}{4.5} + \frac{1}{5.6} + \frac{1}{6.7} + \frac{1}{7.8}$$

$$+ \frac{1}{8.9} + \frac{1}{9.10} + \frac{1}{10.11} + \frac{1}{11.12}$$

$$= \frac{1}{2} + \left( \frac{1}{2} - \frac{1}{3} \right) + \left( \frac{1}{3} - \frac{1}{4} \right) + \left( \frac{1}{4} - \frac{1}{5} \right) + \left( \frac{1}{5} - \frac{1}{6} \right)$$

$$+ \left( \frac{1}{6} - \frac{1}{7} \right) + \left( \frac{1}{7} - \frac{1}{8} \right) + \left( \frac{1}{8} - \frac{1}{9} \right) + \left( \frac{1}{9} - \frac{1}{10} \right) + \left( \frac{1}{10} - \frac{1}{11} \right) + \left( \frac{1}{11} - \frac{1}{12} \right)$$

$$= \frac{1}{2} + \frac{1}{2} - \frac{1}{12} = 1 - \frac{1}{12} = \frac{11}{12}$$

4. Simplify  $\frac{\left(\frac{3}{5}\right)^3 - \left(\frac{2}{5}\right)^3}{\left(\frac{3}{5}\right)^2 - \left(\frac{2}{5}\right)^2}$

**Solution:**

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

$$= \frac{\frac{9}{25} + \frac{4}{25} + \frac{6}{25}}{\frac{3}{5} + \frac{2}{5}} = \frac{\frac{19}{25}}{\frac{5}{5}} = \frac{19}{25}$$

## SESSION – 4

### ⚙️ SPEED MATHS – IV

1. Add 707325, 192382, 58009, 564943 and 656.  
Ans: [a]  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = ..... 5  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = ..... 15  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = .....315  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = .....3315  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = ..... 23315  
~~707325~~ + ~~192382~~ + ~~58009~~ + ~~564943~~ + ~~656~~ = 1523315  
∴ 707325 + 192382 + 58009 + 564943 + 656 = 1523315

2. Simplify: 5124 – 829 + 731 – 435

Ans: [b]

$$5124 - 829 + 731 - 435$$

**Step 1:** (5) (-4) (0) (-9) [Adding or subtracting each digit separately]

**Step 2:** 4 5 9 1 [Borrow from tens to make the negative ones positive]

$$\therefore 5124 - 829 + 731 - 435 = 4591$$

3. Solve: 5732 × 1002

Ans: [a]

$$5732 \times 1002 = 5732 \times (1000 + 2) = 5732000 + 11464 = 5743464$$

4. Evaluate:  $8492^2 - 508^2$

Ans: [c]

$$8492^2 - 508^2 = (8492 + 508) \times (8492 - 508) = 9000 \times 7984 = 71856000$$

5. Multiply 84726 by 5.

Ans: [c]

$$84726 \times 10 = 847260$$

$$847260 \div 2 = 423630$$

$$\therefore 84726 \times 5 = 423630$$

6. Multiply 625 by 25.

Ans: [a]

$$625 \times 100 = 62500$$

$$62500 \div 4 = 15625$$

$$\therefore 625 \times 25 = 15625$$

7. Evaluate: 8966 × 11

Ans: [b]

Step 1: (6 × 1) = 6 (note down).

Step 2: Add the 6 + (6 × 1) = 12 (note down 2 to the left of 6 and carry 1) 26.

Step 3: Again add 9 + (6 × 1) + 1 (add carry) = 16 (note down 6 and carry 1) 626.

Step 4: Again add 8 + (9 × 1) + 1 (add carry) = 18 (note down 8 and carry 1) 8626.

Step 5: Lastly add carry 1 to the left most number 8 + 1 = 9 (note down the number).

We get our final result that is 98626.

8. Evaluate: 35609 × 12

Ans: [a]

$$\frac{35609 \times 12}{8} \quad (9 \times 2 = 18, \text{ write down 8, carry over 1})$$

$$\frac{35609 \times 12}{08} \quad (1 + 0 + 9 = 10, \text{ write down 0, carry over 1})$$

$$\frac{35609 \times 12}{308} \quad (1 + 2 \times 6 + 0 = 13, \text{ write down 3 carry over 1})$$

$$\frac{35609 \times 12}{7308} \quad (1 + 5 \times 2 + 6 = 17, \text{ write down 7 carry over 1})$$

$$\frac{35609 \times 12}{27308} \quad (1 + 3 \times 2 + 5 = 12, \text{ write down 2, carry over 1})$$

$$\frac{35609 \times 12}{427308} \quad (0 \times 2 + 3 + 1 = 4, \text{ (write down 4)})$$

$$\therefore 35609 \times 12 = 427308$$

9. Simplify: 109 × 113

Ans: [c]

$$109 \rightarrow 9$$

$$113 \rightarrow 13$$

$$9 \times 13 \rightarrow 117$$

$$109 + 13 = 113 + 9 = 122$$

$$117$$

$$+ 122$$

$$\underline{12317}$$

$$\therefore 109 \times 113 = 12317$$

10. Multiply 95 with 83.

Ans: [b]

$$95 = 100 - 5$$

$$83 = 100 - 17$$

$$95 - 17 = 83 - 5 = 78$$

$$17 \times 5 = 85$$

$$\therefore 83 \times 95 = 7885$$

11. Find the value of  $147 \times 143$ .

Ans: [a]

**Step 1:**

$$\begin{array}{r} 147 \\ \times 143 \\ \hline \end{array}$$

2 carry

**Step 2:**

$$\begin{array}{r} 147 \\ \times 143 \\ \hline 21 \end{array}$$

$28 + 12 + 2 = 42$  carry '4'

**Step 3:**

$$\begin{array}{r} 147 \\ \times 143 \\ \hline 021 \end{array}$$

In 30 place '0' 3 as carry

**Step 4:**

$$\begin{array}{r} 147 \\ \times 143 \\ \hline 1021 \end{array}$$

$4 + 4 + 3 = 11$  1 as carry

**Step 5:**

$$\begin{array}{r} 147 \\ \times 143 \\ \hline 11021 \end{array}$$

$3 \times 1 + 1 = 4$

$$\therefore 147 \times 143 = 11021$$

12. Find the value of  $671 \times 359$ .

Ans: [d]

**Step 1:**

$$\begin{array}{r} 671 \\ \times 359 \\ \hline \end{array}$$

**Step 2:**

$$\begin{array}{r} 671 \\ \times 359 \\ \hline 89 \end{array}$$

$63 + 5 = 68$  6 carry

**Step 3:**

$$\begin{array}{r} 671 \\ \times 359 \\ \hline 0889 \end{array}$$

$= 30 + 21 + 9 = 60$  6 as carry

**Step 4:**

$$\begin{array}{r} 671 \\ \times 359 \\ \hline 240889 \end{array}$$

$18 + 6 = 24$

$\therefore 671 \times 359 = 240889$

13. Multiply 678 by 37.

Ans: [a]

$$\begin{array}{r} 678 \\ \times 37 \\ \hline \end{array}$$

14. Divide 45625 by 73.

Ans: [b]

$$45625 \div 73$$

$$\begin{array}{r} 45625 \\ 5 \overline{) 9125} \\ \underline{5} \phantom{00} \\ 5 \overline{) 1825} \\ \underline{5} \phantom{00} \\ 5 \overline{) 365} \\ \underline{5} \phantom{00} \\ 73 \end{array}$$

$$\frac{5^4 \times 73}{73} = 5^4 = 625$$

15. Divide  $718.589 \div 96$  to 3 places of decimals.

Ans: [a]

16. Find the value of  $92 \times 67$  using percentage.

Ans: [b]

$$\begin{array}{r} 92 \\ (\times) \\ \times 67 \\ \hline 6164 \end{array}$$

17. Find the largest number of 3 digits which is a perfect square.

Ans: [a]

Largest 3 digit number is 999.

So we find out square root of 999 by long division method and check whether it is a perfect square or root.

$$\begin{array}{r} 31 \\ 3 \overline{) 999} \\ \underline{9} \phantom{00} \\ +3 \phantom{00} \\ \underline{61} \phantom{00} \\ 61 \phantom{00} \\ \underline{61} \phantom{00} \\ 38 \end{array}$$

$$\text{So, } 999 - 38 = 961$$

961 is a perfect square.

18. Find the value of  $\sqrt{0.0025} \times \sqrt{2.25} \times \sqrt{0.0001}$ .

Ans: [d]

$$0.05 \times 1.5 \times 0.01$$

$$0.00075$$

None of these