

Squares and Square Roots

MATHEMATICAL REASONING

- 1. If $\sqrt{2 + \sqrt{x}} = 3$, then x =____. (a) 1 (b) $\sqrt{7}$ (c) 7 (d) 49
- 2. If $\frac{\sqrt{0.2304} + \sqrt{0.1764}}{\sqrt{0.2304} \sqrt{0.1764}} = x$, then the value of x is _____. (a) 0.8 (b) 15 (c) 12.5 (d) 0.16
- Find the least number which must be subtracted from 7230 to make it a perfect square.
 (a) 15
 (b) 12
 (c) 5
 (d) 10
- 4. If $\sqrt{1 + \frac{25}{144}} = 1 + \frac{x}{12}$, then x is _____. (a) 5 (b) 13 (c) 1 (d) 17
- 5. Square numbers can have _____ at the end.(a) Odd number of zeroes
 - (b) Even number of zeroes
 - (c) Both (a) and (b)
 - (d) None of these
- A number is multiplied by 2¹/₃ times itself and then 61 is subtracted from the product obtained, If the final result is 9200, then the number is _____.
 (a) 36 (b) 63

(c) 67 (d)

7. The product of two numbers is 1296. If one number is 16 times the other, find the numbers.
(a) 9 144
(b) 8 128

(), 111	(0) 0, 120
(c) 12, 192	(d) None of these

8. The least positive integer with which 661.25 should be multiplied so that the product is a perfect square, is _____.
(a) 4 (b) 5
(c) Both (a) and (b) (d) None of these

9. The square root of $\frac{36}{5}$ correct up to two decimal places is _____. (a) 2.68 (b) 2.69 (c) 2.67 (d) 2.66

10. The value of $\sqrt{248 + \sqrt{52 + \sqrt{144}}}$ is ____. (a) 14 (b) 12 (c) 16 (d) 13

11. If the three numbers are in the ratio 2 : 3 : 5, so that the sum of their squares is 608. Find the numbers respectively.

(a) 8, 12, 20	(b) 12, 8, 20
(c) 20, 8, 12	(d) 20, 12, 8

12. Square root of $\frac{0.081}{0.0064} \times \frac{0.484}{6.25} \times \frac{2.5}{12.1}$ is_______. (a) 0.45 (b) 0.75 (c) 0.95 (d) 0.99

13. The greatest 6-digit number, which is a perfect square is __.
(a) 998001 (b) 995001
(c) 997001 (d) 996001

14. Find the value of $\left(\sqrt{\frac{625}{9801}} + \sqrt{\frac{576}{1089}}\right) \times \left(\sqrt{\frac{121}{\sqrt{21025} + 144}}\right)$ (a) $\frac{97}{153}$ (b) $\frac{89}{51}$ (c) $\frac{101}{99}$ (d) $\frac{69}{33}$ **15.** Find the square root of the following correct upto two decimal places.

(i)
$$4\frac{5}{7}$$
 (ii) $9\frac{9}{13}$

	(i)	(ii)
(a)	2.52	3.18
(b)	2.28	2.98
(c)	2.17	3.11
(d)	2.17	2.98

EVERYDAY MATHEMATICS

- 16. The area of a square field is $80\frac{244}{729}$ sq. m. The length of each side of the field, is (a) 8.96 m (b) 10.26 m (c) 13.54 m (d) 12.26 m
- 17. A certain number of men went to a hotel. Each man spent as many rupees as one-fourth of the men. If the total bill paid was Rs.20449, then how many men visited the hotel?
 (a) 286 (b) 284

(a) 286	(6) 284
(c) 281	(d) 283

18. A general arranges his soldiers in rows to form a perfect square. He finds that in doing so, 60 soldiers are left out. If the total number of soldiers be 8160, find the number of soldiers in each row.

(a) 81	(b) 90
(c) 80	(d) 91

19. A group of students decided to collect as many paise from each member of the group as is the number of members. If the total collection amounts to Rs.59.29, the number of members in the group is ____.

(a) 57	(b) 67
(c) 77	(d) 87

20. A housing society has been allotted a square piece of land measuring 2550.25 sq. m. What is the side of the plot?
(a) 50.25 m
(b) 50.5 m
(c) 50.65 m
(d) 50.05 m

ACHIEVERS SECTION (HOTS)

21. Find the value of

$$\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}}$$

 $+ \left(\sqrt{\frac{225}{729}} - \sqrt{\frac{25}{144}}\right) \div \sqrt{\frac{16}{81}}$
(a) $\frac{69}{16}$ (b) $\frac{54}{7}$
(c) $\frac{31}{3}$ (d) $\frac{108}{13}$

22. Find the value of P, Q, R and S.
(i) Square root of 1354.24 is <u>P</u>.
(ii) Square root of 151.29 is <u>Q</u>.

(iii) Square root of 7208.01 is \underline{R} .

(iv) Square root of 1789.29 is <u>S</u>.

	Р	Q	R	S
(a)	38.2	12.9	83.4	41.3
(b)	36.8	11.3	86.9	41.7
(c)	35.4	13.3	85.1	42.9
(d)	36.8	12.3	84.9	42.3

23. Which of the following options is TRUE?(a) Square of any odd number can be expressed as the sum of two consecutive positive integers.

(b) Square of any natural number can be expressed as the sum of successive odd numbers starting from 1.

(c) For any natural number $m > 1, 2m, m^2 - 1$

and $m^2 + 1$ form Pythagorean triplets.

(d) All of these

24. Study the statements and choose the correct option.

Statement-1: The square root of certain decimals are obtained by first changing the decimals into fractions with perfect squares as their numerators and denominators.

Statement-2: $(26.1)^2$ lies between 400 and 900.

(a) Both Statement-1 and Statement-2 are true.

(b) Statement-1 is true but Statement-2 is false.

(c) Statement-1 is false but Statement-2 is true.

(d) Both Statement-1 and Statement-2 are false.

- **25.** Slate 'T' for true and 'F' for false.
 - (i) The square root of 0.9 is 0.3.

(ii) The square root of a perfect square of n

digits will have $\left(\frac{n+1}{2}\right)$ digits, if *n* is odd.

(iii) All numbers of a Pythagorean triplet are odd.

(iv) There are 200 natural numbers between 100^2 and 101^2 .

	(i)	(ii)	(iii)	(iv)
(a)	Т	F	Т	F
(b)	F	Т	F	Т
(c)	Т	Т	F	F
(d)	F	Т	Т	F

ANSWER KEY									
1.	D	2.	В	3.	С	4.	С	5.	В
6.	В	7.	А	8.	В	9.	А	10.	С
11.	А	12.	А	13.	А	14.	А	15.	С
16.	А	17.	А	18.	В	19.	С	20.	В
21.	А	22.	D	23.	D	24.	А	25.	В

HINTS & EXPLANATIONS

1. (d) : We have, $\sqrt{2 + \sqrt{x}} = 3$ Squaring both sides, we get $2 + \sqrt{x} = 9$ or $\sqrt{x} = 9 - 2 = 7$ Now, again squaring both sides, we get x = 49.

2. (b): We have
$$\frac{\sqrt{0.2304} + \sqrt{0.1764}}{\sqrt{0.2304} - \sqrt{0.1764}} = x$$

 $\Rightarrow \frac{0.48 + 0.42}{0.48 - 0.42} = x \Rightarrow \frac{0.9}{0.06} = x \Rightarrow x = 15$

	85
8	7230
	-64
165	830
	-825
	5

Least number that should be subtracted from 7230 to make it a perfect square is 5.

- 4. (c): We have, $\sqrt{1 + \frac{25}{144}} = 1 + \frac{x}{12}$ $\Rightarrow \sqrt{\frac{144 + 25}{144}} = 1 + \frac{x}{12}$ $\Rightarrow \sqrt{\frac{169}{144}} = 1 + \frac{x}{12} \Rightarrow \frac{13}{12} = 1 + \frac{x}{12}$ $\Rightarrow \frac{x}{12} = \frac{1}{12} \Rightarrow x = 1$
- **5.** (b) :
- 6. (b) : Let the required number be x. According to question, $x\left(2\frac{1}{3}x\right) - 61 = 9200$ $\Rightarrow \frac{7}{3}x^2 - 61 = 9200 \Rightarrow \frac{7}{3}x^2 = 9261$ $\Rightarrow x^2 = \frac{9261 \times 3}{7} \Rightarrow x = \sqrt{3969} \Rightarrow x = 63$
- **7.** (a) : Let first number be x. Then other number = 16x

According to question, we have $x(16x) = 1296 \Rightarrow 16x^2 = 1296$ $\Rightarrow x^2 = 81 \Rightarrow x = 9$ \therefore Numbers are 9,144.

8. (b): We have
$$661.25 = \frac{66125}{100}$$

 $\frac{66125}{100} = \frac{5 \times 5 \times 5 \times 23 \times 23}{10 \times 10}$

 \therefore The least positive integer with which 661.25 should be multiplied to make it a perfect square is 5.

9. (a) : Since we have to find the square root of $\frac{36}{5}$ correct up to two decimal places. So, we

have to find its square root up to three decimal places.

$$\therefore \frac{36}{5} = 7.200000$$

Now,

	2.683
0	7.200000
Ζ	-4
16	320
40	-276
E00	4400
528	- 4224
E262	17600
5505	- 16089
	1511

$$\therefore \sqrt{\frac{36}{5}} = 2.683 \text{ (upto 3 decimal places)}$$
$$\Rightarrow \sqrt{\frac{36}{5}} = 2.68$$

- **10.** (c) : We have, $\therefore \sqrt{248 + \sqrt{52 + \sqrt{144}}} = \sqrt{248 + \sqrt{52 + 12}}$ $= \sqrt{248 + \sqrt{64}} = \sqrt{248 + 8} = \sqrt{256} = 16$
- 11. (a) : Let the numbers be 2x, 3x and 5x. According to question, we have () $(2x)^2 + (3x)^2 + (5x)^2 = 608$

$$\Rightarrow 4x^{2} + 9x^{2} + 25x^{2} = 608$$
$$\Rightarrow 38x^{2} = 608$$
$$\Rightarrow x^{2} = \frac{608}{38} = 16 \Rightarrow x = 4$$

Hence, the numbers are 8, 12 and 20.

- **12.** (a):
 - $$\begin{split} &\sqrt{\frac{0.081}{0.0064} \times \frac{0.484}{6.25} \times \frac{2.5}{12.1}} = \sqrt{\frac{81}{64} \times \frac{484}{625} \times \frac{25}{121}} \\ &= \frac{9}{8} \times \frac{22}{25} \times \frac{5}{11} = 0.45 \end{split}$$

13. (a) : Greatest 6-digit number is 999999.

	999	
9	<u> </u>	
	- 81	
189	1899	
	-1701	
1989	19899	
	-17901	
	1998	

∴ Greatest 6-digit perfect square numbe	r
= 999999 - 1998 = 998001	

14. (a) : We have,

$$\left(\sqrt{\frac{625}{9801}} + \sqrt{\frac{576}{1089}}\right) \times \left(\sqrt{\frac{121}{\sqrt{21025} + 144}}\right)$$

$$= \left(\frac{25}{99} + \frac{24}{33}\right) \times \left(\frac{11}{\sqrt{145 + 144}}\right)$$

$$= \left(\frac{25 + 72}{99}\right) \times \frac{11}{\sqrt{289}} = \frac{97}{99} \times \frac{11}{17} = \frac{97}{153}$$

15. (c) : (i) We have,
$$4\frac{5}{7} = \frac{33}{7} = 4.7142$$

$$\begin{array}{r} 2.17 \\ \hline 2 & \overline{4.7142} \\ -4 \\ \hline 41 & 71 \\ \hline -41 \\ \hline 427 & 3042 \\ \hline -2989 \\ \hline 53 \\ \hline \end{array}$$
∴ Square root of $4\frac{5}{7} = 2.17$

(ii) We	have, $9\frac{9}{13}$	$=\frac{126}{13}=9.6923$
	3.11	
3	9.6923	
	-9	
61	69	
	- 61	
621	823	
	- 621	
	202	

$$\therefore$$
 Square root of $9\frac{9}{13} = 3.11$

16. (a) : Area of square field =
$$80\frac{244}{729}$$
 sq.m
= $\frac{58564}{729}$ sq.m
∴ Side of square field = $\sqrt{\frac{58564}{729}}$
= $\frac{242}{27}$ m = 8.96m

- $\label{eq:alpha} \textbf{17.} \qquad (a): Let number of men visited hotel be x.$
 - \therefore Each man spent =Rs. $\left(\frac{x}{4}\right)$

According to question,

$$x\left(\frac{x}{4}\right) = 20449 \Rightarrow x^{2} = 20449 \times 4$$

$$\Rightarrow x^{2}81796 \Rightarrow x = 286$$

∴ Number of men visited hotel = 286

18. (b): Let x be the number of soldiers in each row. To form a perfect square, number of soldiers in each row must be equal to the number of rows.
According to question,
Number of soldiers who form square =8160-60=8100

$$\therefore x \times x = 8100$$

$$\Rightarrow x^2 = 8100 \Rightarrow x = 90$$

$$\therefore \text{ Number of soldiers in each row} = 90$$

19. (c): Let the number of members be x. Then, the amount received from each member = x paise. Now, total collection = x^2 paise $\Rightarrow (59.29 \times 100)$ paise = x^2 paise $\Rightarrow 5929 = x^2 \Rightarrow x = 77$ So, number of members = 77

20. (b) : Side of plot =
$$\sqrt{2550.25}$$

= $\sqrt{\frac{255025}{100}} = \frac{505}{10} = 50.5m$

21. (a): We have,

$$\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}} + \left(\sqrt{\frac{225}{729} - \sqrt{\frac{25}{144}}}\right) \div \sqrt{\frac{16}{81}} \\
= \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + 15}}}} + \left(\frac{15}{27} - \frac{5}{12}\right) \div \left(\frac{4}{9}\right) \\
= \sqrt{10 + \sqrt{25 + \sqrt{108 + 13}}} + \left(\frac{60 - 45}{108}\right) \div \frac{4}{9} \\
= \sqrt{10 + \sqrt{25 + 11}} + \frac{15}{108} \times \frac{9}{4} = \sqrt{10 + 6} + \frac{5}{16} \\
= 4 + \frac{5}{16} = \frac{64 + 5}{16} = \frac{69}{16}$$

22. (d) : (i)

$$\begin{array}{r} 36.8 \\
\hline 3 \\
\hline 3 \\
\hline 1354.24 \\
\hline -9 \\
\hline 66 \\
\hline 454 \\
\hline -396 \\
\hline 728 \\
\hline 5824 \\
\hline -5824 \\
\hline 0 \\
\hline \\ \cdot \text{ Square root of } 1354.24 = 36.8 \\
\end{array}$$

(ii)	
	12.3
1	$\overline{1}$ $\overline{51.29}$
	-1
22	51
	-44
243	729
	-729
	0

 \therefore Square root of 151.29 = 12.3 (iii)

	84.9	
8	$\overline{72} \ \overline{08}.\overline{01}$	_
	-64	
164	808	
	-656	
1689	15201	
	-15201	
	0	
∴ Squa	re root of 7208	0,01 = 84.9
(iv)		
(iv)	42.3	
(iv) 4	42.3 17 89.29	
(iv) 4	42.3 17 89.29 -16	
(iv) 4 82	42.3 17 89.29 -16 189	
(iv) 4 82	42.3 17 89.29 -16 189 -164	
(iv) 4 82 843	42.3 17 89.29 -16 189 -164 2529	
(iv) 4 82 843	42.3 17 89.29 -16 189 -164 2529 -2529	

 \therefore Square root of 1789.29 = 42.3

23. (d) :

24. (a) : Statement-1 is true. Now, $(26.1)^2 = \left(\frac{261}{10}\right)^2 = \frac{68121}{100} = 681.21$ And, 400 < 681.21 < 900 ∴ Statement-2 is true.

25. (b) :