MENTAL MATHS

Write T for true and F for false statements :

1. A perfect square is always positive. T
2. Square of an odd number is always odd. T
3. The number of zeroes at the end of a perfect square is always odd. F
4. Square of any odd number can always be expressed as the sum of two consecutive positive integers. F
5. Square root of a positive integer may be a negative integer. F
6. The number of digits in the square root of 16129 is 3. T
7. The value of $\sqrt{0.16}$ is 0.04. T
8. If x and y are perfect squares, and $y \neq 0$, then $\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$. T
9. Square of 0.3 is 0.9. F
10. The least number which must be subtracted from 200 to get a perfect square is 4. F

MULTIPLE CHOICE QUESTIONS

Tick (✓) the correct option :

1. Square of an odd number is :
   (a) an odd number
   (b) an even number
   (c) either an even or an odd number
   (d) none of these

2. Which of the following is a perfect square?
   (a) 125
   (b) 289
   (c) 304
   (d) 464

3. Which of the following cannot be a digit in the units place of a perfect square?
   (a) 1
   (b) 5
   (c) 7
   (d) 0

4. The value of $\frac{(65-56)^2}{9}$ is equal to :
   (a) 81
   (b) 9
   (c) 3
   (d) 1

5. The smallest number by which 72 must be divided to get a perfect square is :
   (a) 2
   (b) 3
   (c) 4
   (d) 5

6. The square root of 1444 is :
   (a) 32
   (b) 34
   (c) 38
   (d) 42

7. If $\frac{\sqrt{x}}{16} = \frac{15}{8}$, then the value of x is :
   (a) 400
   (b) 500
   (c) 700
   (d) 900

8. $\sqrt{213 + \sqrt{144}}$ is equal to :
   (a) 12
   (b) 13
   (c) 14
   (d) 15

9. The number of digits in the square root of 16744464 is :
   (a) 2
   (b) 3
   (c) 4
   (d) 5

10. If the number of digits in the square root of a perfect square number be 3, then the number of digits in the number is :
    (a) 4
    (b) 5
    (c) 6
    (d) 5 or 6

VALUE BASED QUESTIONS

In a school, students of class 8 collected ₹ 2704 as donation to help flood victims. Each student gave as many rupees as the number of students in the class. Find the number of students in the class and the amount of money given by each student. Here, what value did the students depict?

8. $\sqrt{14.725} = 3.83$

	3.83
3	14.72 50
+3	9
68	572
+8	544
763	2850
+3	2289

9. $\sqrt{14} = 3.74$

	3.74
3	14.0000
+3	9
67	500
+7	469
744	3100
+4	2976

10. $\sqrt{2} = 1.41$

	1.41
1	2.00 00
+1	1
24	100
+4	96
281	400
+1	281

MULTIPLE CHOICE QUESTIONS

Tick (✓) the correct option :

1. Square of an odd number is :
   (a) an odd number ✓ (b) an even number
   (c) either an even or an odd number (d) none of these
2. Which of the following is a perfect square?
   (a) 125 (b) 289 ✓ (c) 304 (d) 464
3. Which of the following cannot be a digit in the units place of a perfect square?

3. $\sqrt{0.9} = 0.94$

	0.94
9	0.90 00
+9	81
184	900
+4	736

4. $\sqrt{0.846} = 0.91$

	0.91
9	0.84 60
+9	81
181	360
+1	181
	1

5. $\sqrt{\frac{3}{5}} = \sqrt{0.6} = 0.77$

	.77
7	.60 00
+7	49
147	1100
+7	1029

6. $\sqrt{\frac{8}{3}} = \sqrt{2.6666} = 1.63$

	1.63
1	2.6666
+1	1
26	166
+6	156
32	166

7. $\sqrt{\frac{4}{7}} = \sqrt{\frac{4\times7}{7\times7}} = \frac{\sqrt{28}}{7}$

$= \frac{5.28}{7} = 0.75$

	5.28
5	28
+5	25
102	300
+2	204
1048	9600
+8	8384

8. If $\sqrt{15625} = 125$, evaluate $\sqrt{1.5625} + \sqrt{156.25} - \sqrt{0.015625}$.

Sol. Given $\sqrt{15625} = 125 \Rightarrow \sqrt{1.5625} = 1.25$

$\sqrt{156.25} = 12.5$ and $\sqrt{0.015625} = 0.125$

Then, $\sqrt{1.5625} + \sqrt{156.25} - \sqrt{0.015625}$

$= 1.25 + 12.5 - 0.125$

$= 13.625.$

EXERCISE 3.6

Evaluate the square root upto 2 places of decimal :

1. 38.24	2. 2695	3. 0.9	4. 0.846	5. $\frac{3}{5}$
6. $\frac{8}{3}$	7. $\frac{4}{7}$	8. 14.725	9. 14	10. 2

Sol. 1. $\sqrt{38.24} = 6.18$

	6.18
6	38.2400
+6	36
124	224
+1	124
1228	10300
	9824

2. $\sqrt{2695} = 51.91$

	51.91
5	26 95.0000
+5	25
101	195
+1	101
1029	9400
+9	9261
1038 1	13900
+1	10381

3. $\sqrt{0.9} = 0.94$

	0.94
9	0.90 00
+9	81
184	900
+4	736

5. $\sqrt{0.009216} = \sqrt{\frac{9216}{1000000}}$

$= \sqrt{\frac{96 \times 96}{1000 \times 1000}}$

$= \frac{96}{1000} = 0.096.$

	96
9	$\overline{92}\,\overline{16}$
+9	81
186	1116
+6	1116
	0

6. $\sqrt{231.9529} = \sqrt{\frac{2319529}{10000}}$

$= \sqrt{\frac{1523 \times 1523}{100 \times 100}}$

$= \frac{1523}{100}$

$= 15.23.$

	1523
1	$2\overline{31}\,\overline{95}\,\overline{29}$
+1	1
25	131
+5	125
302	695
+2	604
3043	9129
+3	9129
	0

7. If $\sqrt{6.5536} = 2.56$, find the value of $\sqrt{655.36} - \sqrt{65536}$.

Sol. Given $\sqrt{6.5536} = 2.56$

$\sqrt{\frac{65536}{10000}} = \frac{256}{100} \Rightarrow \sqrt{65536} = 256$

$\Rightarrow \sqrt{655.36} = 25.6$

Then, $\sqrt{655.36} - \sqrt{65536} = 25.6 - 256$

$= -230.4.$

8. If $\sqrt{15625} = 125$, evaluate $\sqrt{1.5625} + \sqrt{156.25} - \sqrt{0.015625}$.

Sol. Given $\sqrt{15625} = 125 \Rightarrow \sqrt{1.5625} = 1.25$

$\sqrt{156.25} = 12.5$ and $\sqrt{0.015625} = 0.125$

EXERCISE 3.5

Evaluate the square root of the following (1 – 6) :

1. 0.0441 2. 753.5025 3. 0.00006561 4. 1.2996 5. 0.009216 6. 231.9529

Sol. 1. $\sqrt{0.0441} = \sqrt{\frac{441}{10000}}$

$= \sqrt{\frac{21 \times 21}{100 \times 100}} = \frac{21}{100} = 0.21.$

	21
2	4 41
+2	4
41	41
	41
	0

2. $\sqrt{753.5025} = \sqrt{\frac{7535025}{10000}}$

$= \sqrt{\frac{2745 \times 2745}{100 \times 100}}$

$= \frac{2745}{100} = 27.45$

	2745
2	7 53 50 25
+2	4
47	353
+7	329
544	2450
+4	21 76
5485	27425
+5	27425
	0

3. $\sqrt{0.00006561} = \sqrt{\frac{6561}{100000000}}$

$= \sqrt{\frac{81 \times 81}{100 \times 100 \times 100 \times 100}}$

$= \frac{81}{100 \times 100} = \frac{81}{10000} = 0.0081.$

	81
8	65 61
+8	64
161	161
+1	161
	0

4. $\sqrt{1.2996} = \sqrt{\frac{12996}{10000}}$

$= \sqrt{\frac{114 \times 114}{100 \times 100}} = \frac{114}{100}$

$= 1.14.$

	114
1	12996
+1	1
21	29
+1	21
224	896
+4	896
	0

5. $\sqrt{0.009216} = \sqrt{\frac{9216}{1000000}}$

	96
9	92 16
+9	81

$= \sqrt{961} = \sqrt{31 \times 31} = \frac{26}{31}$.

5. $\sqrt{\frac{21316}{65025}} = \sqrt{\frac{2 \times 2 \times 73 \times 73}{5 \times 5 \times 51 \times 57}} = \frac{2 \times 73}{5 \times 57} = \frac{146}{255}$.

6. $\sqrt{108} \times \sqrt{243} = \sqrt{36 \times 3} \times \sqrt{3 \times 81}$

$= \sqrt{36 \times 3 \times 3 \times 81}$

$= 6 \times 3 \times 9 = 162$.

7. $\sqrt{250} \times \sqrt{40} = \sqrt{250 \times 40}$

$= \sqrt{25 \times 10 \times 4 \times 10}$

$= 5 \times 10 \times 2 = 100$

8. $\sqrt{147} \times \sqrt{75} = \sqrt{49 \times 3} \times \sqrt{25 \times 3}$

$= \sqrt{49 \times 3 \times 3 \times 25}$

$= 7 \times 3 \times 5 = 105$

9. $\sqrt{20} \times \sqrt{605} = \sqrt{4 \times 5} \times \sqrt{5 \times 121}$

$= \sqrt{4 \times 5 \times 5 \times 121}$

$= 2 \times 5 \times 11 = 110$.

10. $\sqrt{128} \times \sqrt{72} = \sqrt{64 \times 2} \times \sqrt{2 \times 36}$

$= \sqrt{64 \times 2 \times 2 \times 36}$

$= 8 \times 2 \times 6 = 96$.

EXERCISE 3.5

$= 2\times2\times2\times3\times5 = 120.$

2	4, 15, 10
2	2, 15, 5
3	1, 15, 5
	1, 5, 5

To make it perfect square it must be multiplied by $2\times3\times5 = 30$.

$\therefore$ Required smallest square number $= 120\times30 = 3600$.

18. Find the least perfect square exactly divisible by each one of the numbers 4, 5, 10. [2015]

Sol. LCM of 4, 5, 10

$= 2\times2\times5 = 20$

2	4, 5, 10
2	2, 5, 5
5	1, 5, 5
	1, 1, 1

To make it perfect square it must be multiplied by 5

$\therefore$ Required least Square $= 20\times5 = 100$.

EXERCISE 3.4

Evaluate :

1. $\sqrt{\frac{144}{169}}$ 2. $\sqrt{\frac{625}{361}}$ 3. $\sqrt{\frac{121}{1600}}$ 4. $\sqrt{\frac{784}{961}}$ 5. $\sqrt{\frac{21316}{65025}}$

6. $\sqrt{108}\times\sqrt{243}$ 7. $\sqrt{250}\times\sqrt{40}$ 8. $\sqrt{147}\times\sqrt{75}$ 9. $\sqrt{20}\times\sqrt{605}$ 10. $\sqrt{128}\times\sqrt{72}$

Sol. 1. $\sqrt{\frac{144}{169}} = \sqrt{\frac{12\times12}{13\times13}} = \frac{12}{13}$.

2. $\sqrt{\frac{625}{361}} = \sqrt{\frac{25\times25}{19\times19}} = \frac{25}{19}$

3. $\sqrt{\frac{121}{1600}} = \sqrt{\frac{11\times11}{40\times40}} = \frac{11}{40}$.

4. $\sqrt{\frac{784}{961}} = \sqrt{\frac{28\times28}{31\times31}} = \frac{28}{31}$.

5. $\sqrt{\frac{21316}{65025}} = \sqrt{\frac{2\times2\times73\times73}{5\times5\times57\times57}} = \frac{2\times73}{5\times57} = \frac{146}{255}$.

The required perfect Square = 1266 + 30 = 1296.

$\therefore \sqrt{1296} = 36.$

15. Find the greatest number of 5 digits which is a perfect square. Also, find its square root. [HOTS]

Sol. The greatest 5-digits number = 99999

	316
3	99999
+3	9
61	99
1	61
626	3899
+6	3756
	143

∴ The required 5-digits number = 99999 − 143 = 99856

$\therefore \sqrt{99856} = 316.$

16. Find the least number of 4 digits which is a perfect square. Also, find its square root. [HOTS]

Sol. The least number of 4 digits = 1000

$(31)^2 < 1000 < (32)^2$

i.e. $1000 < 1024$

	31
3	1000
+3	9
61	100
+1	61

Least number to be added = 1024 − 1000 = 24.

∴ The least number of 4 digits = 1024.

$\therefore \sqrt{1024} = 32.$

17. Find the smallest square number, that is divisible by each of the numbers 8, 15 and 20. [HOTS]

Sol. LCM of 8, 15 and 20.

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

2	8, 15, 20
2	4, 15, 10
2	2, 15, 5
3	1, 15, 5
	1, 5, 5

To make it perfect square it must be multiplied by $2 \times 3 \times 5 = 30$.

∴ Required smallest square number = 120 × 30 = 3600.

18. Find the least perfect square exactly divisible by each one of the numbers 4, 5, 10. [HOTS]

Sol. LCM of 4, 5, 10

$= 2 \times 2 \times 5 = 20$

2	4, 5, 10
2	2, 5, 5
5	1, 5, 5
	1, 1, 1

To make it perfect square it must be multiplied by 5

∴

12. Find the least number that should be subtracted from 423922 to make a perfect square. Also, find the square root of the perfect square.

Sol.

The least number to be subtracted from 423922 is 121.

Required perfect square $= 423922 - 121$
$= 423801$

$\therefore \sqrt{423801} = 651$.

	651
6	42 39 22
+6	36
125	639
+5	625
1301	1422
+1	1301
	121

13. Find the least number that should be added to 203369 to make it a perfect square. Also, find the square root of the perfect square.

Sol. Here, $(450)^2 < 203369 < (451)^2$

i.e. $203369 < 203401$

The required number to be added $= 203401 - 203369$
$= 32$

The required perfect square $= 203369 + 32$
$= 203401$

$\therefore \sqrt{203401} = 451$.

	450
4	20 33 69
+4	16
85	433
+5	425
900	869

14. Find the least number that should be added to 1266 to make it a perfect square. Also, find the square root of the perfect square.

Sol. Here $(35)^2 < 1266 < (36)^2$.

i.e. $1266 < 1296$.

The required number to be added $= 1296 - 1266 = 30$

The required perfect square $= 1266 + 30 = 1296$.

$\therefore \sqrt{1296} = 36$.

	35
3	12 66
+3	9
65	366
+5	325
	41

15. Find the greatest number of 5 digits which is a perfect square. Also, find its square root. [HOTS]

Sol. The greatest 5-digits number $= 99999$

	316
3	99999
+3	9
61	99