EXPRESSWALA ACADEMY

Squares and Square Roots

Question Paper, Set 08

Time: 1 hour 30 minutes | Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. Write $t \times t$ in power form. [1 mark]

2. Write the square of 22. [1 mark]

3. Find the value of $27^2 - 14^2$. [2 marks]

4. Which number, when squared, gives 2500? [1 mark]

5. Using the rule for numbers ending in 5, find 75^2. [2 marks]

6. Given $183^2 = 33489$, write the square root of 33489. [1 mark]

7. Find the value of $\sqrt{784} - \sqrt{169}$. [2 marks]

8. Using the prime factorization method, find the square root of 2916. [3 marks]

9. Using the long division method, find the square root of 3721. [3 marks]

10. Find $\sqrt{1521}$ by (i) the prime factorization method (ii) the long division method. [5 marks]

11. Using the long division method, find the square root of 185761. [5 marks]

12. Simplify $\sqrt{18} \times \sqrt{50}$. [2 marks]

13. Find the value of $\sqrt{10} \times \sqrt{10}$. [1 mark]

14. Simplify $\frac{\sqrt{44}}{\sqrt{99}}$. [2 marks]

15. Show that $\frac{17}{\sqrt{17}} = \sqrt{17}$. [1 mark]

16. Verify that $\sqrt{100} + \sqrt{49} \neq \sqrt{100 + 49}$. [3 marks]

17. If $a = 12$ and $b = 16$, show that (i) $\sqrt{a^2 + b^2} \neq a + b$ (ii) $\sqrt{(a+b)^2} = a + b$. [5 marks]

18. Find the square root of 0.0529. [2 marks]

19. Find the square root of 0.001296. [3 marks]

20. Find the square root of 11.56. [5 marks]

Key sheet

Q	Answer
1	t^2
2	484
3	533
4	50
5	5625
6	183
7	15
8	54
9	61
10	39
11	431
12	30
13	10
14	$\frac{2}{3}$
15	$\sqrt{17}$
16	LHS $= 17 = \sqrt{289}$, RHS $= \sqrt{149}$; LHS $\neq$ RHS
17	(i) $20 \neq 28$ (ii) $28 = 28$
18	0.23
19	0.036
20	3.4

Solutions

1. Write $t \times t$ in power form. [1]

t is multiplied by itself 2 times.

$\therefore t \times t = t^2$ (read as 't squared')

Ans: t^2

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2. Write the square of 22. [1]

$22^2 = 22 \times 22$

$= 484$

Ans: 484

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3. Find the value of $27^2 - 14^2$. [2]

$27^2 - 14^2 = 729 - 196$

$= 533$

Ans: 533

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4. Which number, when squared, gives 2500? [1]

$50^2 = 50 \times 50 = 2500$

$\therefore$ the number is 50

Ans: 50

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5. Using the rule for numbers ending in 5, find 75^2. [2]

The number before 5 is 7: $7 \times 8 = 56$

Write 25 after it.

$\therefore 75^2 = 5625$

Ans: 5625

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6. Given $183^2 = 33489$, write the square root of 33489. [1]

$a^2 = b \Rightarrow \sqrt{b} = a$

$183^2 = 33489 \Rightarrow \sqrt{33489} = 183$

Ans: 183

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7. Find the value of $\sqrt{784} - \sqrt{169}$. [2]

From the table, $\sqrt{784} = 28$ and $\sqrt{169} = 13$

$\sqrt{784} - \sqrt{169} = 28 - 13 = 15$

Ans: 15

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8. Using the prime factorization method, find the square root of 2916. [3]

Prime factorization method:

Divide by primes: $2916 \div 2 = 1458$, $1458 \div 2 = 729$, $729 \div 3 = 243$, $243 \div 3 = 81$, $81 \div 3 = 27$, $27 \div 3 = 9$, $9 \div 3 = 3$

$\sqrt{2916} = \sqrt{(2 \times 2) \times (3 \times 3) \times (3 \times 3) \times (3 \times 3)}$

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

$= 54$

Ans: 54

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9. Using the long division method, find the square root of 3721. [3]

Long division method:

Pair the digits from the right: $\overline{37}\ \overline{21}$

$6 \times 6 = 36 \leq 37$: first digit 6, and $37 - 36 = 1$

Bring down 21: we get 121. New divisor: $6 \times 2 = 12$; $121 \times 1 = 121$ ($122 \times 2 = 244$ is too big); $121 - 121 = 0$

Remainder 0. $\therefore \sqrt{3721} = 61$

Ans: 61

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10. Find $\sqrt{1521}$ by (i) the prime factorization method (ii) the long division method. [5]

(i) Prime factorization method:

Divide by primes: $1521 \div 3 = 507$, $507 \div 3 = 169$, $169 \div 13 = 13$

$\sqrt{1521} = \sqrt{(3 \times 3) \times (13 \times 13)}$

$= 3 \times 13$

$= 39$

(ii) Long division method:

Pair the digits from the right: $\overline{15}\ \overline{21}$

$3 \times 3 = 9 \leq 15$: first digit 3, and $15 - 9 = 6$

Bring down 21: we get 621. New divisor: $3 \times 2 = 6$; $69 \times 9 = 621$; $621 - 621 = 0$

Remainder 0. $\therefore \sqrt{1521} = 39$

Ans: 39

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11. Using the long division method, find the square root of 185761. [5]

Long division method:

Pair the digits from the right: $\overline{18}\ \overline{57}\ \overline{61}$

$4 \times 4 = 16 \leq 18$: first digit 4, and $18 - 16 = 2$

Bring down 57: we get 257. New divisor: $4 \times 2 = 8$; $83 \times 3 = 249$ ($84 \times 4 = 336$ is too big); $257 - 249 = 8$

Bring down 61: we get 861. New divisor: $43 \times 2 = 86$; $861 \times 1 = 861$ ($862 \times 2 = 1724$ is too big); $861 - 861 = 0$

Remainder 0. $\therefore \sqrt{185761} = 431$

Ans: 431

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12. Simplify $\sqrt{18} \times \sqrt{50}$. [2]

$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$

$\sqrt{18} \times \sqrt{50} = \sqrt{18 \times 50} = \sqrt{900}$

$= \sqrt{30 \times 30} = 30$

Ans: 30

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13. Find the value of $\sqrt{10} \times \sqrt{10}$. [1]

$(\sqrt{a})^2 = \sqrt{a} \times \sqrt{a} = \sqrt{a^2} = a$

$\therefore \sqrt{10} \times \sqrt{10} = \sqrt{10^2} = 10$

Ans: 10

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14. Simplify $\frac{\sqrt{44}}{\sqrt{99}}$. [2]

$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$

$\frac{\sqrt{44}}{\sqrt{99}} = \sqrt{\frac{44}{99}} = \sqrt{\frac{11 \times 4}{11 \times 9}}$

$= \sqrt{\frac{4}{9}} = \frac{2}{3}$

Ans: $\frac{2}{3}$

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15. Show that $\frac{17}{\sqrt{17}} = \sqrt{17}$. [1]

$17 = \sqrt{17} \times \sqrt{17}$

$\frac{17}{\sqrt{17}} = \frac{\sqrt{17} \times \sqrt{17}}{\sqrt{17}} = \sqrt{17}$

Ans: $\sqrt{17}$

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16. Verify that $\sqrt{100} + \sqrt{49} \neq \sqrt{100 + 49}$. [3]

LHS $= \sqrt{100} + \sqrt{49} = 10 + 7 = 17 = \sqrt{289}$

RHS $= \sqrt{100 + 49} = \sqrt{149}$

$\therefore$ LHS $\neq$ RHS

Ans: LHS $= 17 = \sqrt{289}$**, RHS** $= \sqrt{149}$**; LHS** $\neq$ **RHS**

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17. If $a = 12$ and $b = 16$, show that (i) $\sqrt{a^2 + b^2} \neq a + b$ (ii) $\sqrt{(a+b)^2} = a + b$. [5]

(i) LHS $= \sqrt{12^2 + 16^2} = \sqrt{144 + 256} = \sqrt{400} = 20$

RHS $= a + b = 12 + 16 = 28$

$20 \neq 28$, so $\sqrt{a^2 + b^2} \neq a + b$

(ii) LHS $= \sqrt{(12 + 16)^2} = \sqrt{28^2} = 28$

RHS $= 12 + 16 = 28$

LHS $=$ RHS, so $\sqrt{(a+b)^2} = a + b$

Ans: (i) $20 \neq 28$ **(ii)** $28 = 28$

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18. Find the square root of 0.0529. [2]

$\sqrt{0.0529} = \sqrt{\frac{529}{10000}}$

$= \frac{\sqrt{529}}{\sqrt{10000}}$

$= \frac{23}{100}$

$= 0.23$

Ans: 0.23

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19. Find the square root of 0.001296. [3]

$\sqrt{0.001296} = \sqrt{\frac{1296}{1000000}}$

$= \frac{\sqrt{1296}}{\sqrt{1000000}}$

$36^2 = 1296$, so $\sqrt{1296} = 36$

$= \frac{36}{1000}$

$= 0.036$

Ans: 0.036

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20. Find the square root of 11.56. [5]

$\sqrt{11.56} = \sqrt{\frac{1156}{100}} = \frac{\sqrt{1156}}{\sqrt{100}}$

$\sqrt{1156}$ by the long division method:

Pair the digits from the right: $\overline{11}\ \overline{56}$

$3 \times 3 = 9 \leq 11$: first digit 3, and $11 - 9 = 2$

Bring down 56: we get 256. New divisor: $3 \times 2 = 6$; $64 \times 4 = 256$ ($65 \times 5 = 325$ is too big); $256 - 256 = 0$

$\sqrt{1156} = 34$

$\therefore \sqrt{11.56} = \frac{34}{10} = 3.4$

Ans: 3.4