EXPRESSWALA ACADEMY

Squares and Square Roots

Question Paper, Set 03

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 43×43 in power form. [1 mark]

2. Find the value of 14^2. [1 mark]

3. Find $23^2 - 18^2$. [2 marks]

4. Find the number whose square is 8100. [1 mark]

5. Find 85^2 using the rule for numbers ending in 5. [2 marks]

6. If $132^2 = 17424$, find $\sqrt{17424}$. [1 mark]

7. Find $\sqrt{169} + \sqrt{576}$. [2 marks]

8. Find $\sqrt{5184}$ by the prime factorization method. [3 marks]

9. Find $\sqrt{7921}$ by the long division method. [3 marks]

10. Find $\sqrt{5929}$ by (i) the prime factorization method (ii) the long division method. [5 marks]

11. Find $\sqrt{83521}$ by the long division method. [5 marks]

12. Find $\sqrt{6} \times \sqrt{24}$. [2 marks]

13. Find $(\sqrt{5})^2$. [1 mark]

14. Find $\frac{\sqrt{48}}{\sqrt{27}}$. [2 marks]

15. Simplify $\frac{6}{\sqrt{6}}$. [1 mark]

16. Show that $\sqrt{225} + \sqrt{400} \neq \sqrt{225 + 400}$. [3 marks]

17. Taking $a = 35$ and $b = 28$, verify that (i) $\sqrt{a^2 - b^2} \neq a - b$ (ii) $\sqrt{(a-b)^2} = a - b$. [5 marks]

18. Find $\sqrt{0.0289}$. [2 marks]

19. Find $\sqrt{0.003025}$. [3 marks]

20. Find $\sqrt{84.64}$. [5 marks]

Key sheet

Q	Answer
1	43^2
2	196
3	205
4	90
5	7225
6	132
7	37
8	72
9	89
10	77
11	289
12	12
13	5
14	$\frac{4}{3}$
15	$\sqrt{6}$
16	LHS $= 35$, RHS $= 25$; LHS $\neq$ RHS
17	(i) $21 \neq 7$ (ii) $7 = 7$
18	0.17
19	0.055
20	9.2

Solutions

1. Write 43×43 in power form. [1]

43 is multiplied by itself 2 times.

$\therefore 43 \times 43 = 43^2$ (read as '43 squared')

Ans: 43^2

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2. Find the value of 14^2. [1]

$14^2 = 14 \times 14$

$= 196$

Ans: 196

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3. Find $23^2 - 18^2$. [2]

$23^2 - 18^2 = 529 - 324$

$= 205$

Ans: 205

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4. Find the number whose square is 8100. [1]

$90^2 = 90 \times 90 = 8100$

$\therefore$ the number is 90

Ans: 90

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5. Find 85^2 using the rule for numbers ending in 5. [2]

The number before 5 is 8: $8 \times 9 = 72$

Write 25 after it.

$\therefore 85^2 = 7225$

Ans: 7225

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6. If $132^2 = 17424$, find $\sqrt{17424}$. [1]

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

$132^2 = 17424 \Rightarrow \sqrt{17424} = 132$

Ans: 132

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7. Find $\sqrt{169} + \sqrt{576}$. [2]

From the table, $\sqrt{169} = 13$ and $\sqrt{576} = 24$

$\sqrt{169} + \sqrt{576} = 13 + 24 = 37$

Ans: 37

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8. Find $\sqrt{5184}$ by the prime factorization method. [3]

Prime factorization method:

Divide by primes: $5184 \div 2 = 2592$, $2592 \div 2 = 1296$, $1296 \div 2 = 648$, $648 \div 2 = 324$, $324 \div 2 = 162$, $162 \div 2 = 81$, $81 \div 3 = 27$, $27 \div 3 = 9$, $9 \div 3 = 3$

$\sqrt{5184} = \sqrt{(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3)}$

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

$= 72$

Ans: 72

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9. Find $\sqrt{7921}$ by the long division method. [3]

Long division method:

Pair the digits from the right: $\overline{79}\ \overline{21}$

$8 \times 8 = 64 \leq 79$: first digit 8, and $79 - 64 = 15$

Bring down 21: we get 1521. New divisor: $8 \times 2 = 16$; $169 \times 9 = 1521$; $1521 - 1521 = 0$

Remainder 0. $\therefore \sqrt{7921} = 89$

Ans: 89

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10. Find $\sqrt{5929}$ by (i) the prime factorization method (ii) the long division method. [5]

(i) Prime factorization method:

Divide by primes: $5929 \div 7 = 847$, $847 \div 7 = 121$, $121 \div 11 = 11$

$\sqrt{5929} = \sqrt{(7 \times 7) \times (11 \times 11)}$

$= 7 \times 11$

$= 77$

(ii) Long division method:

Pair the digits from the right: $\overline{59}\ \overline{29}$

$7 \times 7 = 49 \leq 59$: first digit 7, and $59 - 49 = 10$

Bring down 29: we get 1029. New divisor: $7 \times 2 = 14$; $147 \times 7 = 1029$ ($148 \times 8 = 1184$ is too big); $1029 - 1029 = 0$

Remainder 0. $\therefore \sqrt{5929} = 77$

Ans: 77

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11. Find $\sqrt{83521}$ by the long division method. [5]

Long division method:

Pair the digits from the right: $\overline{8}\ \overline{35}\ \overline{21}$

$2 \times 2 = 4 \leq 8$: first digit 2, and $8 - 4 = 4$

Bring down 35: we get 435. New divisor: $2 \times 2 = 4$; $48 \times 8 = 384$ ($49 \times 9 = 441$ is too big); $435 - 384 = 51$

Bring down 21: we get 5121. New divisor: $28 \times 2 = 56$; $569 \times 9 = 5121$; $5121 - 5121 = 0$

Remainder 0. $\therefore \sqrt{83521} = 289$

Ans: 289

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12. Find $\sqrt{6} \times \sqrt{24}$. [2]

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

$\sqrt{6} \times \sqrt{24} = \sqrt{6 \times 24} = \sqrt{144}$

$= \sqrt{12 \times 12} = 12$

Ans: 12

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13. Find $(\sqrt{5})^2$. [1]

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

$\therefore \sqrt{5} \times \sqrt{5} = \sqrt{5^2} = 5$

Ans: 5

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14. Find $\frac{\sqrt{48}}{\sqrt{27}}$. [2]

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

$\frac{\sqrt{48}}{\sqrt{27}} = \sqrt{\frac{48}{27}} = \sqrt{\frac{3 \times 16}{3 \times 9}}$

$= \sqrt{\frac{16}{9}} = \frac{4}{3}$

Ans: $\frac{4}{3}$

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15. Simplify $\frac{6}{\sqrt{6}}$. [1]

$6 = \sqrt{6} \times \sqrt{6}$

$\frac{6}{\sqrt{6}} = \frac{\sqrt{6} \times \sqrt{6}}{\sqrt{6}} = \sqrt{6}$

Ans: $\sqrt{6}$

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16. Show that $\sqrt{225} + \sqrt{400} \neq \sqrt{225 + 400}$. [3]

LHS $= \sqrt{225} + \sqrt{400} = 15 + 20 = 35$

RHS $= \sqrt{225 + 400} = \sqrt{625} = 25$

$\therefore$ LHS $\neq$ RHS

Ans: LHS $= 35$**, RHS** $= 25$**; LHS** $\neq$ **RHS**

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17. Taking $a = 35$ and $b = 28$, verify that (i) $\sqrt{a^2 - b^2} \neq a - b$ (ii) $\sqrt{(a-b)^2} = a - b$. [5]

(i) LHS $= \sqrt{35^2 - 28^2} = \sqrt{1225 - 784} = \sqrt{441} = 21$

RHS $= a - b = 35 - 28 = 7$

$21 \neq 7$, so $\sqrt{a^2 - b^2} \neq a - b$

(ii) LHS $= \sqrt{(35 - 28)^2} = \sqrt{7^2} = 7$

RHS $= 35 - 28 = 7$

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

Ans: (i) $21 \neq 7$ **(ii)** $7 = 7$

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18. Find $\sqrt{0.0289}$. [2]

$\sqrt{0.0289} = \sqrt{\frac{289}{10000}}$

$= \frac{\sqrt{289}}{\sqrt{10000}}$

$= \frac{17}{100}$

$= 0.17$

Ans: 0.17

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19. Find $\sqrt{0.003025}$. [3]

$\sqrt{0.003025} = \sqrt{\frac{3025}{1000000}}$

$= \frac{\sqrt{3025}}{\sqrt{1000000}}$

$55^2 = 3025$, so $\sqrt{3025} = 55$

$= \frac{55}{1000}$

$= 0.055$

Ans: 0.055

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20. Find $\sqrt{84.64}$. [5]

$\sqrt{84.64} = \sqrt{\frac{8464}{100}} = \frac{\sqrt{8464}}{\sqrt{100}}$

$\sqrt{8464}$ by the long division method:

Pair the digits from the right: $\overline{84}\ \overline{64}$

$9 \times 9 = 81 \leq 84$: first digit 9, and $84 - 81 = 3$

Bring down 64: we get 364. New divisor: $9 \times 2 = 18$; $182 \times 2 = 364$ ($183 \times 3 = 549$ is too big); $364 - 364 = 0$

$\sqrt{8464} = 92$

$\therefore \sqrt{84.64} = \frac{92}{10} = 9.2$

Ans: 9.2