EXPRESSWALA ACADEMY

Squares and Square Roots

Question Paper, Set 05

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 52×52 in power form. [1 mark]

2. Write the square of 19. [1 mark]

3. Find $24^2 + 9^2$. [2 marks]

4. Find the number whose square is 6400. [1 mark]

5. Find 95^2 using the rule for numbers ending in 5. [2 marks]

6. If $158^2 = 24964$, find $\sqrt{24964}$. [1 mark]

7. Find $\sqrt{841} - \sqrt{121}$. [2 marks]

8. Find $\sqrt{7056}$ by the prime factorization method. [3 marks]

9. Find $\sqrt{2209}$ by the long division method. [3 marks]

10. Find $\sqrt{8281}$ by (i) the prime factorization method (ii) the long division method. [5 marks]

11. Find $\sqrt{126736}$ by the long division method. [5 marks]

12. Find $\sqrt{7} \times \sqrt{28}$. [2 marks]

13. Find $(\sqrt{11})^2$. [1 mark]

14. Find $\frac{\sqrt{98}}{\sqrt{162}}$. [2 marks]

15. Simplify $\frac{10}{\sqrt{10}}$. [1 mark]

16. Show that $\sqrt{81} + \sqrt{25} \neq \sqrt{81 + 25}$. [3 marks]

17. Taking $a = 8$ and $b = 15$, verify that (i) $\sqrt{a^2 + b^2} \neq a + b$ (ii) $\sqrt{(a+b)^2} = a + b$. [5 marks]

18. Find $\sqrt{0.0784}$. [2 marks]

19. Find $\sqrt{0.005625}$. [3 marks]

20. Find $\sqrt{14.44}$. [5 marks]

Key sheet

Q	Answer
1	52^2
2	361
3	657
4	80
5	9025
6	158
7	18
8	84
9	47
10	91
11	356
12	14
13	11
14	$\frac{7}{9}$
15	$\sqrt{10}$
16	LHS $= 14 = \sqrt{196}$, RHS $= \sqrt{106}$; LHS $\neq$ RHS
17	(i) $17 \neq 23$ (ii) $23 = 23$
18	0.28
19	0.075
20	3.8

Solutions

1. Write 52×52 in power form. [1]

52 is multiplied by itself 2 times.

$\therefore 52 \times 52 = 52^2$ (read as '52 squared')

Ans: 52^2

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2. Write the square of 19. [1]

$19^2 = 19 \times 19$

$= 361$

Ans: 361

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3. Find $24^2 + 9^2$. [2]

$24^2 + 9^2 = 576 + 81$

$= 657$

Ans: 657

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4. Find the number whose square is 6400. [1]

$80^2 = 80 \times 80 = 6400$

$\therefore$ the number is 80

Ans: 80

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5. Find 95^2 using the rule for numbers ending in 5. [2]

The number before 5 is 9: $9 \times 10 = 90$

Write 25 after it.

$\therefore 95^2 = 9025$

Ans: 9025

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6. If $158^2 = 24964$, find $\sqrt{24964}$. [1]

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

$158^2 = 24964 \Rightarrow \sqrt{24964} = 158$

Ans: 158

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7. Find $\sqrt{841} - \sqrt{121}$. [2]

From the table, $\sqrt{841} = 29$ and $\sqrt{121} = 11$

$\sqrt{841} - \sqrt{121} = 29 - 11 = 18$

Ans: 18

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8. Find $\sqrt{7056}$ by the prime factorization method. [3]

Prime factorization method:

Divide by primes: $7056 \div 2 = 3528$, $3528 \div 2 = 1764$, $1764 \div 2 = 882$, $882 \div 2 = 441$, $441 \div 3 = 147$, $147 \div 3 = 49$, $49 \div 7 = 7$

$\sqrt{7056} = \sqrt{(2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (7 \times 7)}$

$= 2 \times 2 \times 3 \times 7$

$= 84$

Ans: 84

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9. Find $\sqrt{2209}$ by the long division method. [3]

Long division method:

Pair the digits from the right: $\overline{22}\ \overline{09}$

$4 \times 4 = 16 \leq 22$: first digit 4, and $22 - 16 = 6$

Bring down 09: we get 609. New divisor: $4 \times 2 = 8$; $87 \times 7 = 609$ ($88 \times 8 = 704$ is too big); $609 - 609 = 0$

Remainder 0. $\therefore \sqrt{2209} = 47$

Ans: 47

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10. Find $\sqrt{8281}$ by (i) the prime factorization method (ii) the long division method. [5]

(i) Prime factorization method:

Divide by primes: $8281 \div 7 = 1183$, $1183 \div 7 = 169$, $169 \div 13 = 13$

$\sqrt{8281} = \sqrt{(7 \times 7) \times (13 \times 13)}$

$= 7 \times 13$

$= 91$

(ii) Long division method:

Pair the digits from the right: $\overline{82}\ \overline{81}$

$9 \times 9 = 81 \leq 82$: first digit 9, and $82 - 81 = 1$

Bring down 81: we get 181. New divisor: $9 \times 2 = 18$; $181 \times 1 = 181$ ($182 \times 2 = 364$ is too big); $181 - 181 = 0$

Remainder 0. $\therefore \sqrt{8281} = 91$

Ans: 91

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11. Find $\sqrt{126736}$ by the long division method. [5]

Long division method:

Pair the digits from the right: $\overline{12}\ \overline{67}\ \overline{36}$

$3 \times 3 = 9 \leq 12$: first digit 3, and $12 - 9 = 3$

Bring down 67: we get 367. New divisor: $3 \times 2 = 6$; $65 \times 5 = 325$ ($66 \times 6 = 396$ is too big); $367 - 325 = 42$

Bring down 36: we get 4236. New divisor: $35 \times 2 = 70$; $706 \times 6 = 4236$ ($707 \times 7 = 4949$ is too big); $4236 - 4236 = 0$

Remainder 0. $\therefore \sqrt{126736} = 356$

Ans: 356

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12. Find $\sqrt{7} \times \sqrt{28}$. [2]

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

$\sqrt{7} \times \sqrt{28} = \sqrt{7 \times 28} = \sqrt{196}$

$= \sqrt{14 \times 14} = 14$

Ans: 14

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13. Find $(\sqrt{11})^2$. [1]

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

$\therefore \sqrt{11} \times \sqrt{11} = \sqrt{11^2} = 11$

Ans: 11

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14. Find $\frac{\sqrt{98}}{\sqrt{162}}$. [2]

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

$\frac{\sqrt{98}}{\sqrt{162}} = \sqrt{\frac{98}{162}} = \sqrt{\frac{2 \times 49}{2 \times 81}}$

$= \sqrt{\frac{49}{81}} = \frac{7}{9}$

Ans: $\frac{7}{9}$

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15. Simplify $\frac{10}{\sqrt{10}}$. [1]

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

$\frac{10}{\sqrt{10}} = \frac{\sqrt{10} \times \sqrt{10}}{\sqrt{10}} = \sqrt{10}$

Ans: $\sqrt{10}$

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16. Show that $\sqrt{81} + \sqrt{25} \neq \sqrt{81 + 25}$. [3]

LHS $= \sqrt{81} + \sqrt{25} = 9 + 5 = 14 = \sqrt{196}$

RHS $= \sqrt{81 + 25} = \sqrt{106}$

$\therefore$ LHS $\neq$ RHS

Ans: LHS $= 14 = \sqrt{196}$**, RHS** $= \sqrt{106}$**; LHS** $\neq$ **RHS**

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17. Taking $a = 8$ and $b = 15$, verify that (i) $\sqrt{a^2 + b^2} \neq a + b$ (ii) $\sqrt{(a+b)^2} = a + b$. [5]

(i) LHS $= \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17$

RHS $= a + b = 8 + 15 = 23$

$17 \neq 23$, so $\sqrt{a^2 + b^2} \neq a + b$

(ii) LHS $= \sqrt{(8 + 15)^2} = \sqrt{23^2} = 23$

RHS $= 8 + 15 = 23$

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

Ans: (i) $17 \neq 23$ **(ii)** $23 = 23$

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18. Find $\sqrt{0.0784}$. [2]

$\sqrt{0.0784} = \sqrt{\frac{784}{10000}}$

$= \frac{\sqrt{784}}{\sqrt{10000}}$

$= \frac{28}{100}$

$= 0.28$

Ans: 0.28

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19. Find $\sqrt{0.005625}$. [3]

$\sqrt{0.005625} = \sqrt{\frac{5625}{1000000}}$

$= \frac{\sqrt{5625}}{\sqrt{1000000}}$

$75^2 = 5625$, so $\sqrt{5625} = 75$

$= \frac{75}{1000}$

$= 0.075$

Ans: 0.075

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20. Find $\sqrt{14.44}$. [5]

$\sqrt{14.44} = \sqrt{\frac{1444}{100}} = \frac{\sqrt{1444}}{\sqrt{100}}$

$\sqrt{1444}$ by the long division method:

Pair the digits from the right: $\overline{14}\ \overline{44}$

$3 \times 3 = 9 \leq 14$: first digit 3, and $14 - 9 = 5$

Bring down 44: we get 544. New divisor: $3 \times 2 = 6$; $68 \times 8 = 544$ ($69 \times 9 = 621$ is too big); $544 - 544 = 0$

$\sqrt{1444} = 38$

$\therefore \sqrt{14.44} = \frac{38}{10} = 3.8$

Ans: 3.8