# RD Sharma Solutions For Class 8 Chapter 3 Squares and Square Roots

**1. Which of the following numbers are perfect squares?**

**(i) 484**

**(ii) 625**

**(iii) 576**

**(iv) 941**

**(v) 961**

**(vi) 2500**

**Solution:**

**(i)** 484

First find the prime factors for 484

484 = 2×2×11×11

By grouping the prime factors in equal pairs we get,

= (2×2) × (11×11)

By observation, none of the prime factors are left out.

∴ 484 is a perfect square.

**(ii)** 625

First find the prime factors for 625

625 = 5×5×5×5

By grouping the prime factors in equal pairs we get,

= (5×5) × (5×5)

By observation, none of the prime factors are left out.

∴ 625 is a perfect square.

**(iii)** 576

First find the prime factors for 576

576 = 2×2×2×2×2×2×3×3

By grouping the prime factors in equal pairs we get,

= (2×2) × (2×2) × (2×2) × (3×3)

By observation, none of the prime factors are left out.

∴ 576 is a perfect square.

**(iv)** 941

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First find the prime factors for 941

941 = 941 × 1

We know that 941 itself is a prime factor.

∴ 941 is not a perfect square.

**(v)** 961

First find the prime factors for 961

961 = 31×31

By grouping the prime factors in equal pairs we get,

= (31×31)

By observation, none of the prime factors are left out.

∴ 961 is a perfect square.

**(vi)** 2500

First find the prime factors for 2500

2500 = 2×2×5×5×5×5

By grouping the prime factors in equal pairs we get,

= (2×2) × (5×5) × (5×5)

By observation, none of the prime factors are left out.

∴ 2500 is a perfect square.

**2. Show that each of the following numbers is a perfect square. Also find the number whose square is the given number in each case:**
**(i) 1156**
**(ii) 2025**
**(iii) 14641**
**(iv) 4761**

**Solution:**

**(i)** 1156

First find the prime factors for 1156

1156 = 2×2×17×17

By grouping the prime factors in equal pairs we get,

= (2×2) × (17×17)

By observation, none of the prime factors are left out.

∴ 1156 is a perfect square.

To find the square of the given number

1156 = (2×17) × (2×17)

= 34 × 34

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$= (34)^2$

∴ 1156 is a square of 34.

**(ii)** 2025

First find the prime factors for 2025

2025 = 3×3×3×3×5×5

By grouping the prime factors in equal pairs we get,

= (3×3) × (3×3) × (5×5)

By observation, none of the prime factors are left out.

∴ 2025 is a perfect square.

To find the square of the given number

2025 = (3×3×5) × (3×3×5)

= 45 × 45

$= (45)^2$

∴ 2025 is a square of 45.

**(iii)** 14641

First find the prime factors for 14641

14641 = 11×11×11×11

By grouping the prime factors in equal pairs we get,

= (11×11) × (11×11)

By observation, none of the prime factors are left out.

∴ 14641 is a perfect square.

To find the square of the given number

14641 = (11×11) × (11×11)

= 121 × 121

$= (121)^2$

∴ 14641 is a square of 121.

**(iv)** 4761

First find the prime factors for 4761

4761 = 3×3×23×23

By grouping the prime factors in equal pairs we get,

= (3×3) × (23×23)

By observation, none of the prime factors are left out.

∴ 4761 is a perfect square.

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To find the square of the given number

4761 = (3×23) × (3×23)

= 69 × 69

= $(69)^2$

∴ 4761 is a square of 69.

**3. Find the smallest number by which the given number must be multiplied so that the product is a perfect square:**
**(i) 23805**
**(ii) 12150**
**(iii) 7688**

**Solution:**

**(i)** 23805

First find the prime factors for 23805

23805 = 3×3×23×23×5

By grouping the prime factors in equal pairs we get,

= (3×3) × (23×23) × 5

By observation, prime factor 5 is left out.

So, multiply by 5 we get,

23805 × 5 = (3×3) × (23×23) × (5×5)

= (3×5×23) × (3×5×23)

= 345 × 345

= $(345)^2$

∴ Product is the square of 345.

**(ii)** 12150

First find the prime factors for 12150

12150 = 2×3×3×3×3×5×5

By grouping the prime factors in equal pairs we get,

= 2×3 × (3×3) × (3×3) × (5×5)

By observation, prime factor 2 and 3 are left out.

So, multiply by 2×3 = 6 we get,

12150 × 6 = 2×3 × (3×3) × (3×3) × (5×5) × 2 × 3

= (2×3×3×3×5) × (2×3×3×3×5)

= 270 × 270

= $(270)^2$

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∴ Product is the square of 270.

**(iii)** 7688

First find the prime factors for 7688

7688 = 2×2×31×31×2

By grouping the prime factors in equal pairs we get,

= (2×2) × (31×31) × 2

By observation, prime factor 2 is left out.

So, multiply by 2 we get,

7688 × 2 = (2×2) × (31×31)× (2×2)

= (2×31×2) × (2×31×2)

= 124 × 124

= $(124)^2$

∴ Product is the square of 124.

**4. Find the smallest number by which the given number must be divided so that the resulting number is a perfect square:**
**(i) 14283**
**(ii) 1800**
**(iii) 2904**

**Solution:**

**(i)** 14283

First find the prime factors for 14283

14283 = 3×3×3×23×23

By grouping the prime factors in equal pairs we get,

= (3×3) × (23×23) × 3

By observation, prime factor 3 is left out.

So, divide by 3 to eliminate 3 we get,

14283/3 = (3×3) × (23×23)

= (3×23) × (3×23)

= 69 × 69

= $(69)^2$

∴ Resultant is the square of 69.

**(ii)** 1800

First find the prime factors for 1800

1800 = 2×2×5×5×3×3×2

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By grouping the prime factors in equal pairs we get,

= (2×2) × (5×5) × (3×3) × 2

By observation, prime factor 2 is left out.

So, divide by 2 to eliminate 2 we get,

1800/2 = (2×2) × (5×5) × (3×3)

= (2×5×3) × (2×5×3)

= 30 × 30

= $(30)^2$

∴ Resultant is the square of 30.

**(iii)** 2904

First find the prime factors for 2904

2904 = 2×2×11×11×2×3

By grouping the prime factors in equal pairs we get,

= (2×2) × (11×11) × 2 × 3

By observation, prime factor 2 and 3 are left out.

So, divide by 6 to eliminate 2 and 3 we get,

2904/6 = (2×2) × (11×11)

= (2×11) × (2×11)

= 22 × 22

= $(22)^2$

∴ Resultant is the square of 22.

**5. Which of the following numbers are perfect squares?**
**11, 12, 16, 32, 36, 50, 64, 79, 81, 111, 121**

**Solution:**

11 it is a prime number by itself.

So it is not a perfect square.

12 is not a perfect square.

16= $(4)^2$

16 is a perfect square.

32 is not a perfect square.

36= $(6)^2$

36 is a perfect square.

50 is not a perfect square.

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$64 = (8)^2$

64 is a perfect square.

79 it is a prime number.

So it is not a perfect square.

$81 = (9)^2$

81 is a perfect square.

111 it is a prime number.

So it is not a perfect square.

$121 = (11)^2$

121 is a perfect square.

**6. Using prime factorization method, find which of the following numbers are perfect squares?**
**189, 225, 2048, 343, 441, 2961, 11025, 3549**

**Solution:**

189 prime factors are

$189 = 3^2 \times 3 \times 7$

Since it does not have equal pair of factors 189 is not a perfect square.

225 prime factors are

$225 = (5 \times 5) \times (3 \times 3)$

Since 225 has equal pair of factors. ∴ It is a perfect square.

2048 prime factors are

$2048 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times 2$

Since it does not have equal pair of factors 2048 is not a perfect square.

343 prime factors are

$343 = (7 \times 7) \times 7$

Since it does not have equal pair of factors 2048 is not a perfect square.

441 prime factors are

$441 = (7 \times 7) \times (3 \times 3)$

Since 441 has equal pair of factors. ∴ It is a perfect square.

2961 prime factors are

$2961 = (3 \times 3) \times (3 \times 3) \times (3 \times 3) \times (2 \times 2)$

Since 2961 has equal pair of factors. ∴ It is a perfect square.

11025 prime factors are

$11025 = (3 \times 3) \times (5 \times 5) \times (7 \times 7)$

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Since 11025 has equal pair of factors. ∴ It is a perfect square.

3549 prime factors are

3549 = (13×13) × 3 × 7

Since it does not have equal pair of factors 3549 is not a perfect square.

**7. By what number should each of the following numbers by multiplied to get a perfect square in each case? Also find the number whose square is the new number.**

**(i) 8820**

**(ii) 3675**
**(iii) 605**

**(iv) 2880**
**(v) 4056**

**(vi) 3468**
**(vii) 7776**

**Solution:**

**(i)** 8820

First find the prime factors for 8820

8820 = 2×2×3×3×7×7×5

By grouping the prime factors in equal pairs we get,

= (2×2) × (3×3) × (7×7) × 5

By observation, prime factor 5 is left out.

So, multiply by 5 we get,

8820 × 5 = (2×2) × (3×3) × (7×7) × (5×5)

= (2×3×7×5) × (2×3×7×5)

= 210 × 210

= $(210)^2$

∴ Product is the square of 210.

**(ii)** 3675

First find the prime factors for 3675

3675 = 5×5×7×7×3

By grouping the prime factors in equal pairs we get,

= (5×5) × (7×7) × 3

By observation, prime factor 3 is left out.

So, multiply by 3 we get,

3675 × 3 = (5×5) × (7×7) × (3×3)

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= (5×7×3) × (5×7×3)

= 105 × 105

= $(105)^2$

∴ Product is the square of 105.

**(iii)** 605

First find the prime factors for 605

605 = 5×11×11

By grouping the prime factors in equal pairs we get,

= (11×11) × 5

By observation, prime factor 5 is left out.

So, multiply by 5 we get,

605 × 5 = (11×11) × (5×5)

= (11×5) × (11×5)

= 55 × 55

= $(55)^2$

∴ Product is the square of 55.

**(iv)** 2880

First find the prime factors for 2880

2880 = 5×3×3×2×2×2×2×2×2

By grouping the prime factors in equal pairs we get,

= (3×3) × (2×2) × (2×2) × (2×2) × 5

By observation, prime factor 5 is left out.

So, multiply by 5 we get,

2880 × 5 = (3×3) × (2×2) × (2×2) × (2×2) × (5×5)

= (3×2×2×2×5) × (3×2×2×2×5)

= 120 × 120

= $(120)^2$

∴ Product is the square of 120.

**(v)** 4056

First find the prime factors for 4056

4056 = 2×2×13×13×2×3

By grouping the prime factors in equal pairs we get,

= (2×2) × (13×13) × 2 × 3

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By observation, prime factors 2 and 3 are left out.

So, multiply by 6 we get,

$4056 \times 6 = (2\times2) \times (13\times13) \times (2\times2) \times (3\times3)$

$= (2\times13\times2\times3) \times (2\times13\times2\times3)$

$= 156 \times 156$

$= (156)^2$

∴ Product is the square of 156.

**(vi)** 3468

First find the prime factors for 3468

$3468 = 2\times2\times17\times17\times3$

By grouping the prime factors in equal pairs we get,

$= (2\times2) \times (17\times17) \times 3$

By observation, prime factor 3 is left out.

So, multiply by 3 we get,

$3468 \times 3 = (2\times2) \times (17\times17) \times (3\times3)$

$= (2\times17\times3) \times (2\times17\times3)$

$= 102 \times 102$

$= (102)^2$

∴ Product is the square of 102.

**(vii)** 7776

First find the prime factors for 7776

$7776 = 2\times2\times2\times2\times3\times3\times3\times3\times2\times3$

By grouping the prime factors in equal pairs we get,

$= (2\times2) \times (2\times2) \times (3\times3) \times (3\times3) \times 2 \times 3$

By observation, prime factors 2 and 3 are left out.

So, multiply by 6 we get,

$7776 \times 6 = (2\times2) \times (2\times2) \times (3\times3) \times (3\times3) \times (2\times2) \times (3\times3)$

$= (2\times2\times3\times3\times2\times3) \times (2\times2\times3\times3\times2\times3)$

$= 216 \times 216$

$= (216)^2$

∴ Product is the square of 216.

**8. By What numbers should each of the following be divided to get a perfect square in each case? Also, find the number whose square is the new number.**
**(i) 16562**

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**(ii) 3698**
**(iii) 5103**
**(iv) 3174**
**(v) 1575**

**Solution:**

**(i)** 16562

First find the prime factors for 16562

16562 = 7×7×13×13×2

By grouping the prime factors in equal pairs we get,

= (7×7) × (13×13) × 2

By observation, prime factor 2 is left out.

So, divide by 2 to eliminate 2 we get,

16562/2 = (7×7) × (13×13)

= (7×13) × (7×13)

= 91 × 91

= $(91)^2$

∴ Resultant is the square of 91.

**(ii)** 3698

First find the prime factors for 3698

3698 = 2×43×43

By grouping the prime factors in equal pairs we get,

= (43×43) × 2

By observation, prime factor 2 is left out.

So, divide by 2 to eliminate 2 we get,

3698/2 = (43×43)

= $(43)^2$

∴ Resultant is the square of 43.

**(iii)** 5103

First find the prime factors for 5103

5103 = 3×3×3×3×3×3×7

By grouping the prime factors in equal pairs we get,

= (3×3) × (3×3) × (3×3) × 7

By observation, prime factor 7 is left out.

So, divide by 7 to eliminate 7 we get,

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5103/7 = (3×3) × (3×3) × (3×3)

= (3×3×3) × (3×3×3)

= 27 × 27

= $(27)^2$

∴ Resultant is the square of 27.

**(iv)** 3174

First find the prime factors for 3174

3174 = 2×3×23×23

By grouping the prime factors in equal pairs we get,

= (23×23) × 2 × 3

By observation, prime factor 2 and 3 are left out.

So, divide by 6 to eliminate 2 and 3 we get,

3174/6 = (23×23)

= $(23)^2$

∴ Resultant is the square of 23.

**(v)** 1575

First find the prime factors for 1575

1575 = 3×3×5×5×7

By grouping the prime factors in equal pairs we get,

= (3×3) × (5×5) × 7

By observation, prime factor 7 is left out.

So, divide by 7 to eliminate 7 we get,

1575/7 = (3×3) × (5×5)

= (3×5) × (3×5)

= 15 × 15

= $(15)^2$

∴ Resultant is the square of 15.

**9. Find the greatest number of two digits which is a perfect square.**

**Solution:**

We know that the two digit greatest number is 99

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| | |
|---|---|
| | 9 |
| 9 | 99 |
| | 81 |
| | 18 |

∴ Greatest two digit perfect square number is 99-18 = 81

**10. Find the least number of three digits which is perfect square.**

**Solution:**

We know that the three digit greatest number is 100

To find the square root of 100

| | |
|---|---|
| | 10 |
| 1 | 100 |
| | 1 |
| 2 | 0 |

∴ the least number of three digits which is a perfect square is 100 itself.

**11. Find the smallest number by which 4851 must be multiplied so that the product becomes a perfect square.**

**Solution:**

First find the prime factors for 4851

4851 = 3×3×7×7×11

By grouping the prime factors in equal pairs we get,

= (3×3) × (7×7) × 11

∴ The smallest number by which 4851 must be multiplied so that the product becomes a perfect square is 11.

**12. Find the smallest number by which 28812 must be divided so that the quotient becomes a perfect square.**

**Solution:**

First find the prime factors for 28812

28812 = 2×2×3×7×7×7×7

By grouping the prime factors in equal pairs we get,

= (2×2) × 3 × (7×7) × (7×7)

∴ The smallest number by which 28812 must be divided so that the quotient becomes a perfect square is 3.

**13. Find the smallest number by which 1152 must be divided so that it becomes a perfect square. Also find the number whose square is the resulting number.**

**Solution:**

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First find the prime factors for 1152

1152 = 2×2×2×2×2×2×2×3×3

By grouping the prime factors in equal pairs we get,

= (2×2) × (2×2) × (2×2) × (3×3) × 2

∴ The smallest number by which 1152 must be divided so that the quotient becomes a perfect square is 2.

The number after division, 1152/2 = 576

prime factors for 576 = 2×2×2×2×2×2×3×3

By grouping the prime factors in equal pairs we get,

= (2×2) × (2×2) × (2×2) × (3×3)

= $2^6 \times 3^2$

= $24^2$

∴ The resulting number is the square of 24.

## EXERCISE 3.2 PAGE NO: 3.18

**1. The following numbers are not perfect squares. Give reason.**
**(i) 1547**

**(ii) 45743**
**(iii)8948**

**(iv) 333333**

**Solution:**

The numbers ending with 2, 3, 7 or 8 is not a perfect square.

So, **(i)** 1547

**(ii)** 45743
**(iii)** 8948

**(iv)** 333333

Are not perfect squares.

**2. Show that the following numbers are not, perfect squares:**
**(i) 9327**

**(ii) 4058**
**(iii)22453**

**(iv) 743522**

**Solution:**

The numbers ending with 2, 3, 7 or 8 is not a perfect square.

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So, **(i)** 9327

**(ii)** 4058

**(iii)** 22453

**(iv)** 743522

Are not perfect squares.

**3. The square of which of the following numbers would be an old number?**
**(i) 731**

**(ii) 3456**
**(iii)5559**

**(iv) 42008**

**Solution:**

We know that square of an even number is even number.

Square of an odd number is odd number.

**(i)** 731

Since 731 is an odd number, the square of the given number is also odd.

**(ii)** 3456

Since 3456 is an even number, the square of the given number is also even.

**(iii)** 5559

Since 5559 is an odd number, the square of the given number is also odd.

**(iv)** 42008

Since 42008 is an even number, the square of the given number is also even.

**4. What will be the unit's digit of the squares of the following numbers?**
**(i) 52**

**(ii) 977**
**(iii) 4583**

**(iv) 78367**
**(v) 52698**

**(vi) 99880**
**(vii) 12796**

**(viii) 55555**
**(ix) 53924**

**Solution:**

**(i)** 52

Unit digit of $(52)^2 = (2^2) = 4$

**(ii)** 977

Unit digit of $(977)^2 = (7^2) = 49 = 9$

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**(iii)** 4583

Unit digit of $(4583)^2 = (3^2) = 9$

**(iv)** 78367

Unit digit of $(78367)^2 = (7^2) = 49 = 9$

**(v)** 52698

Unit digit of $(52698)^2 = (8^2) = 64 = 4$

**(vi)** 99880

Unit digit of $(99880)^2 = (0^2) = 0$

**(vii)** 12796

Unit digit of $(12796)^2 = (6^2) = 36 = 6$

**(viii)** 55555

Unit digit of $(55555)^2 = (5^2) = 25 = 5$

**(ix)** 53924

Unit digit of $(53924)^2 = (4^2) = 16 = 6$

**5. Observe the following pattern**
**$1+3 = 2^2$**

**$1+3+5 = 3^2$**

**$1+3+5+7 = 4^2$**
**And write the value of 1+3+5+7+9+…… up to n terms.**

**Solution:**

We know that the pattern given is the square of the given number on the right hand side is equal to the sum of the given numbers on the left hand side.

∴ The value of 1+3+5+7+9+…… up to n terms = $n^2$ (as there are only n terms).

**6. Observe the following pattern**

**$2^2 - 1^2 = 2 + 1$**

**$3^2 – 2^2 = 3 + 2$**

**$4^2 – 3^2 = 4 + 3$**

**$5^2 – 4^2 = 5 + 4$**

**And find the value of**

**(i) $100^2 - 99^2$**

**(ii)$111^2 – 109^2$**

**(iii) $99^2 – 96^2$**

**Solution:**

**(i)** $100^2 - 99^2$

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100 + 99 = 199

**(ii)** $111^2 - 109^2$

$(111^2 - 110^2) + (110^2 - 109^2)$

(111 + 110) + (100 + 109)

440

**(iii)** $99^2 - 96^2$

$(99^2 - 98^2) + (98^2 - 97^2) + (97^2 - 96^2)$

(99 + 98) + (98 + 97) + (97 + 96)

585

**7. Which of the following triplets are Pythagorean?**
**(i) (8, 15, 17)**
**(ii) (18, 80, 82)**
**(iii) (14, 48, 51)**
**(iv) (10, 24, 26)**
**(v) (16, 63, 65)**
**(vi) (12, 35, 38)**

**Solution:**

**(i)** (8, 15, 17)

LHS = $8^2 + 15^2$

= 289

RHS = $17^2$

= 289

LHS = RHS

∴ The given triplet is a Pythagorean.

**(ii)** (18, 80, 82)

LHS = $18^2 + 80^2$

= 6724

RHS = $82^2$

= 6724

LHS = RHS

∴ The given triplet is a Pythagorean.

**(iii)** (14, 48, 51)

LHS = $14^2 + 48^2$

= 2500

RHS = $51^2$

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= 2601

LHS ≠ RHS

∴ The given triplet is not a Pythagorean.

**(iv)** (10, 24, 26)

LHS = $10^2 + 24^2$

= 676

RHS = $26^2$

= 676

LHS = RHS

∴ The given triplet is a Pythagorean.

**(v)** (16, 63, 65)

LHS = $16^2 + 63^2$

= 4225

RHS = $65^2$

= 4225

LHS = RHS

∴ The given triplet is a Pythagorean.

**(vi)** (12, 35, 38)

LHS = $12^2 + 35^2$

= 1369

RHS = $38^2$

= 1444

LHS ≠ RHS

∴ The given triplet is not a Pythagorean.

**8. Observe the following pattern**

**(1×2) + (2×3) = (2×3×4)/3**

**(1×2) + (2×3) + (3×4) = (3×4×5)/3**

**(1×2) + (2×3) + (3×4) + (4×5) = (4×5×6)/3**

**And find the value of**

**(1×2) + (2×3) + (3×4) + (4×5) + (5×6)**

**Solution:**

(1×2) + (2×3) + (3×4) + (4×5) + (5×6) = (5×6×7)/3 = 70

**9. Observe the following pattern**

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**1 = 1/2 (1×(1+1))**

**1+2 = 1/2 (2×(2+1))**

**1+2+3 = 1/2 (3×(3+1))**

**1+2+3+4 = 1/2 (4×(4+1))**

**And find the values of each of the following:**

**(i) 1+2+3+4+5+…+50**

**(ii) 31+32+….+50**

**Solution:**

We know that R.H.S = 1/2 [No. of terms in L.H.S × (No. of terms + 1)] (if only when L.H.S starts with 1)

**(i)** 1+2+3+4+5+…+50 = 1/2 (5×(5+1))

25 × 51 = 1275

**(ii)** 31+32+….+50 = (1+2+3+4+5+…+50) – (1+2+3+…+30)

1275 – 1/2 (30×(30+1))

1275 – 465

810

**10. Observe the following pattern**

**$1^2$ = 1/6 (1×(1+1)×(2×1+1))**

**$1^2+2^2$ = 1/6 (2×(2+1)×(2×2+1)))**

**$1^2+2^2+3^2$ = 1/6 (3×(3+1)×(2×3+1)))**

**$1^2+2^2+3^2+4^2$ = 1/6 (4×(4+1)×(2×4+1)))**

**And find the values of each of the following:**

**(i) $1^2+2^2+3^2+4^2+…+10^2$**

**(ii) $5^2+6^2+7^2+8^2+9^2+10^2+11^2+12^2$**

**Solution:**

RHS = 1/6 [(No. of terms in L.H.S) × (No. of terms + 1) × (2 × No. of terms + 1)]

**(i)** $1^2+2^2+3^2+4^2+…+10^2$ = 1/6 (10×(10+1)×(2×10+1))

= 1/6 (2310)

= 385

**(ii)** $5^2+6^2+7^2+8^2+9^2+10^2+11^2+12^2 = 1^2+2^2+3^2+…+12^2 – (1^2+2^2+3^2+4^2)$

1/6 (12×(12+1)×(2×12+1)) – 1/6 (4×(4+1)×(2×4+1))

650-30

620

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**11. Which of the following numbers are squares of even numbers?**
**121, 225, 256, 324, 1296, 6561, 5476, 4489, 373758**

**Solution:**

We know that only even numbers be the squares of even numbers.

So, 256, 324, 1296, 5476, 373758 are even numbers, since 373758 is not a perfect square

∴ 256, 324, 1296, 5476 are squares of even numbers.

**12. By just examining the units digits, can you tell which of the following cannot be whole squares?**

(i) 1026

**(ii) 1028**
**(iii)1024**

**(iv) 1022**
**(v) 1023**

**(vi) 1027**

**Solution:**

We know that numbers ending with 2, 3, 7, 8 cannot be a perfect square.

∴ 1028, 1022, 1023, and 1027 cannot be whole squares.

**13. Which of the numbers for which you cannot decide whether they are squares.**

**Solution:**

We know that the natural numbers such as 0, 1, 4, 5, 6 or 9 cannot be decided surely whether they are squares or not.

**14. Write five numbers which you cannot decide whether they are square just by looking at the unit's digit.**

**Solution:**

We know that any natural number ending with 0, 1, 4, 5, 6 or 9 can be or cannot be a square number.

Here are the five examples which you cannot decide whether they are square or not just by looking at the units place:

**(i)** 2061

The unit digit is 1. So, it may or may not be a square number

**(ii)** 1069

The unit digit is 9. So, it may or may not be a square number

**(iii)** 1234

The unit digit is 4. So, it may or may not be a square number

**(iv)** 56790

The unit digit is 0. So, it may or may not be a square number

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**(v)** 76555

The unit digit is 5. So, it may or may not be a square number

**15. Write true (T) or false (F) for the following statements.**
**(i) The number of digits in a square number is even.**
**(ii) The square of a prime number is prime.**
**(iii) The sum of two square numbers is a square number.**
**(iv) The difference of two square numbers is a square number.**
**(v) The product of two square numbers is a square number.**
**(vi) No square number is negative.**
**(vii) There is no square number between 50 and 60.**
**(viii) There are fourteen square number up to 200.**

**Solution:**

**(i)** False, because 169 is a square number with odd digit.

**(ii)** False, because square of 3(which is prime) is 9(which is not prime).

**(iii)** False, because sum of $2^2$ and $3^2$ is 13 which is not square number.

**(iv)** False, because difference of $3^2$ and $2^2$ is 5, which is not square number.

**(v)** True, because the square of $2^2$ and $3^2$ is 36 which is square of 6

**(vi)** True, because $(-2)^2$ is 4, which is not negative.

**(vii)** True, because as there is no square number between them.

**(viii)** True, because the fourteen numbers up to 200 are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196.

## EXERCISE 3.3 PAGE NO: 3.32

**1. Find the squares of the following numbers using column method. Verify the result by finding the square using the usual multiplication:**
**(i) 25**
**(ii) 37**
**(iii) 54**
**(iv) 71**
**(v) 96**

**Solution:**

**(i)** 25

So here, a = 2 and b = 5

| Column I | Column II | Column III |
|---|---|---|
| $a^2$<br>4 | 2ab<br>20 | $b^2$<br>25 |

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| | | |
|---|---|---|
| +2<br>6 | +2<br>22 | |
| 6 | 2 | 5 |

∴ $25^2 = 625$

Where, it can be expressed as

$25^2 = 25 \times 25 = 625$

**(ii)** 37

So here, a = 3 and b = 7

| Column I | Column II | Column III |
|---|---|---|
| $a^2$<br>9<br>+4<br>13 | 2ab<br>42<br>+4<br>46 | $b^2$<br>49 |
| 13 | 6 | 9 |

∴ $37^2 = 1369$

Where, it can be expressed as

$25^2 = 37 \times 37 = 1369$

**(iii) 54**

So here, a = 5 and b = 4

| Column I | Column II | Column III |
|---|---|---|
| $a^2$<br>25<br>+4<br>29 | 2ab<br>40<br>+1<br>41 | $b^2$<br>16 |
| 29 | 1 | 6 |

∴ $54^2 = 2916$

Where, it can be expressed as

$54^2 = 54 \times 54 = 2916$

**(iv)** 71

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So here, a = 7 and b = 1

| Column I | Column II | Column III |
|---|---|---|
| $a^2$<br>49<br>+1<br>50 | 2ab<br>14<br>+0<br>14 | $b^2$<br>01 |
| 50 | 4 | 1 |

∴ $71^2 = 5041$

Where, it can be expressed as

$71^2 = 71 \times 71 = 5041$

**(v)** 96

So here, a = 9 and b = 6

| Column I | Column II | Column III |
|---|---|---|
| $a^2$<br>81<br>+11<br>92 | 2ab<br>108<br>+3<br>111 | $b^2$<br>36 |
| 92 | 1 | 6 |

∴ $96^2 = 9216$

Where, it can be expressed as

$96^2 = 96 \times 96 = 9216$

**2. Find the squares of the following numbers using diagonal method:**
**(i) 98**
**(ii) 273**
**(iii) 348**
**(iv) 295**
**(v) 171**

**Solution:**

**(i)** 98

Step 1: Obtain the number and count the number of digits in it. Let there be n digits in the number to be squared.

Step 2: Draw square and divide it into $n^2$ sub-squares of the same size by drawing (n – 1) horizontal and (n – 1) vertical lines.

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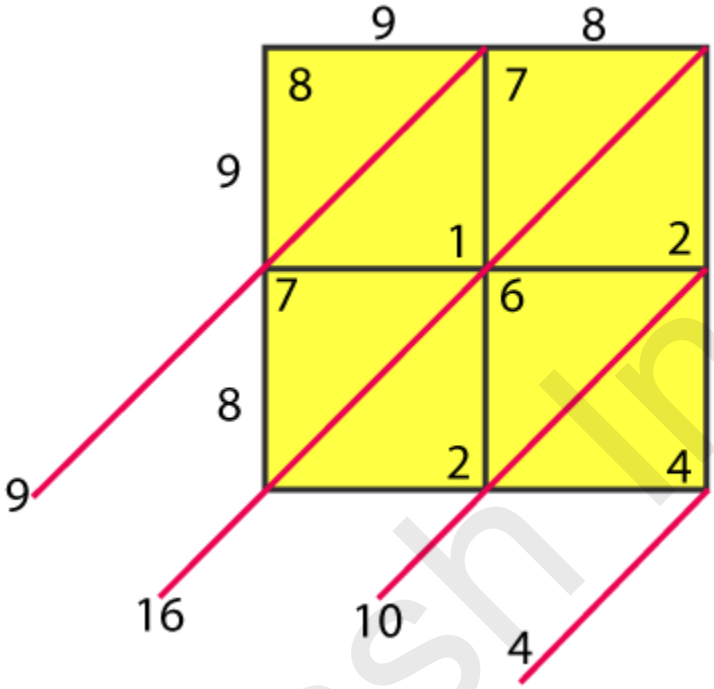
Step 3: Draw the diagonals of each sub-square.

Step 4: Write the digits of the number to be squared along left vertical side sand top horizontal side of the squares.

Step 5: Multiply each digit on the left of the square with each digit on top of the column one-by-one. Write the units digit of the product below the diagonal and tens digit above the diagonal of the corresponding sub-square.

Step 6: Starting below the lowest diagonal sum the digits along the diagonals so obtained. Write the units digit of the sum and take carry, the tens digit (if any) to the diagonal above.

Step 7: Obtain the required square by writing the digits from the left-most side.




∴ $98^2 = 9604$

**(ii)** 273

Step 1: Obtain the number and count the number of digits in it. Let there be n digits in the number to be squared.

Step 2: Draw square and divide it into $n^2$ sub-squares of the same size by drawing (n – 1) horizontal and (n – 1) vertical lines.

Step 3: Draw the diagonals of each sub-square.

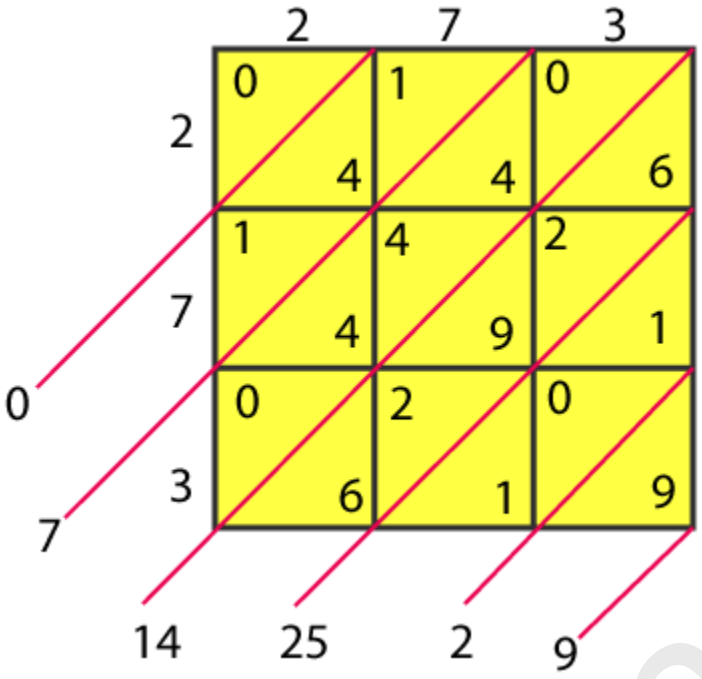
Step 4: Write the digits of the number to be squared along left vertical side sand top horizontal side of the squares.

Step 5: Multiply each digit on the left of the square with each digit on top of the column one-by-one. Write the units digit of the product below the diagonal and tens digit above the diagonal of the corresponding sub-square.

Step 6: Starting below the lowest diagonal sum the digits along the diagonals so obtained. Write the units digit of the sum and take carry, the tens digit (if any) to the diagonal above.

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Step 7: Obtain the required square by writing the digits from the left-most side.




$\therefore 273^2 = 74529$

**(iii)** 348

Step 1: Obtain the number and count the number of digits in it. Let there be n digits in the number to be squared.

Step 2: Draw square and divide it into $n^2$ sub-squares of the same size by drawing (n – 1) horizontal and (n – 1) vertical lines.

Step 3: Draw the diagonals of each sub-square.

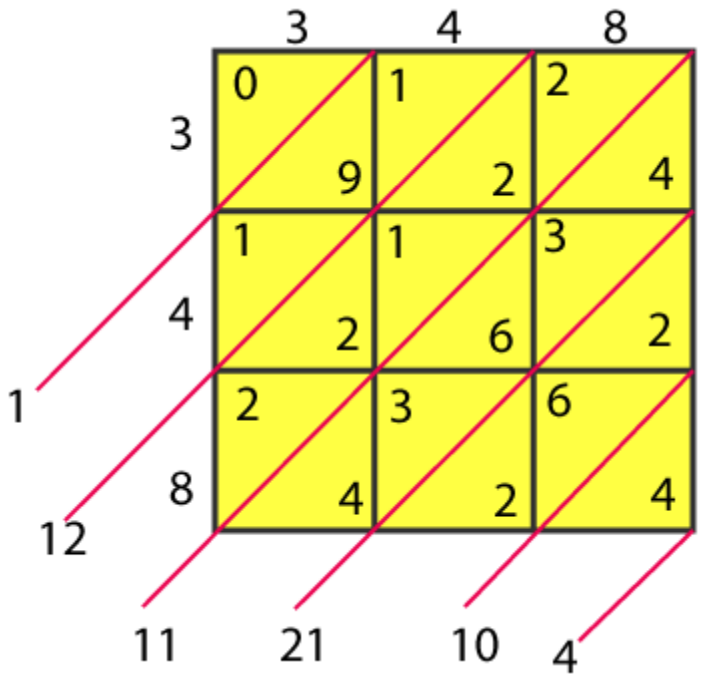
Step 4: Write the digits of the number to be squared along left vertical side sand top horizontal side of the squares.

Step 5: Multiply each digit on the left of the square with each digit on top of the column one-by-one. Write the units digit of the product below the diagonal and tens digit above the diagonal of the corresponding sub-square.

Step 6: Starting below the lowest diagonal sum the digits along the diagonals so obtained. Write the units digit of the sum and take carry, the tens digit (if any) to the diagonal above.

Step 7: Obtain the required square by writing the digits from the left-most side.

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∴ $348^2$ = 121104

**(iv)** 295

Step 1: Obtain the number and count the number of digits in it. Let there be n digits in the number to be squared.

Step 2: Draw square and divide it into $n^2$ sub-squares of the same size by drawing (n – 1) horizontal and (n – 1) vertical lines.

Step 3: Draw the diagonals of each sub-square.

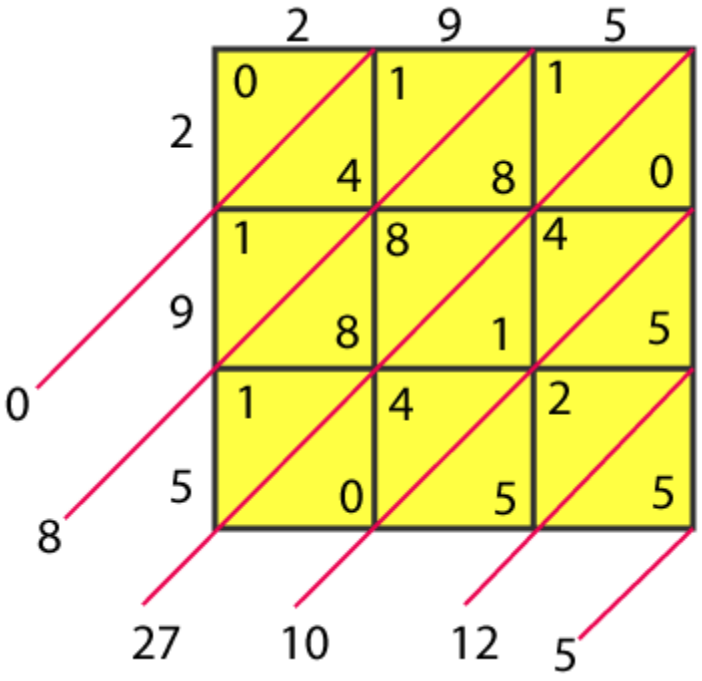
Step 4: Write the digits of the number to be squared along left vertical side sand top horizontal side of the squares.

Step 5: Multiply each digit on the left of the square with each digit on top of the column one-by-one. Write the units digit of the product below the diagonal and tens digit above the diagonal of the corresponding sub-square.

Step 6: Starting below the lowest diagonal sum the digits along the diagonals so obtained. Write the units digit of the sum and take carry, the tens digit (if any) to the diagonal above.

Step 7: Obtain the required square by writing the digits from the left-most side.

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∴ $295^2 = 87025$

**(v)** 171

Step 1: Obtain the number and count the number of digits in it. Let there be n digits in the number to be squared.

Step 2: Draw square and divide it into $n^2$ sub-squares of the same size by drawing (n – 1) horizontal and (n – 1) vertical lines.

Step 3: Draw the diagonals of each sub-square.

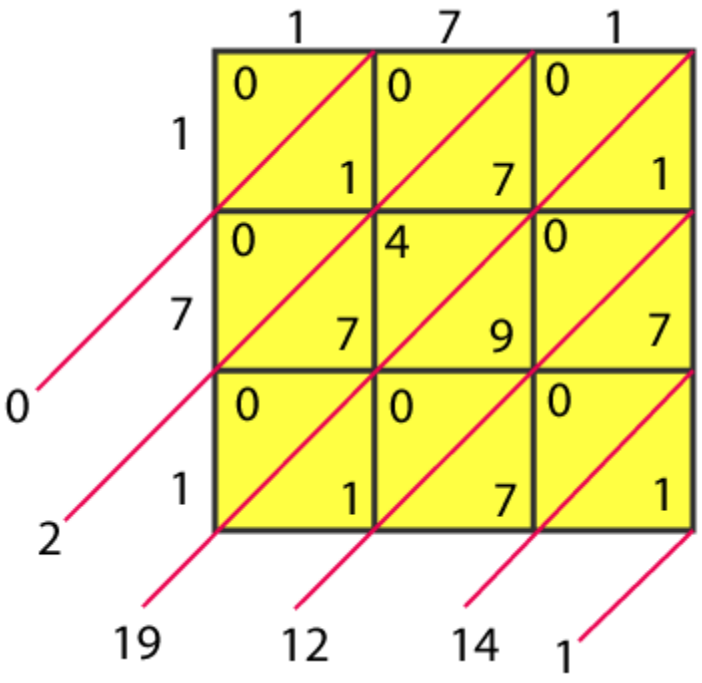
Step 4: Write the digits of the number to be squared along left vertical side sand top horizontal side of the squares.

Step 5: Multiply each digit on the left of the square with each digit on top of the column one-by-one. Write the units digit of the product below the diagonal and tens digit above the diagonal of the corresponding sub-square.

Step 6: Starting below the lowest diagonal sum the digits along the diagonals so obtained. Write the units digit of the sum and take carry, the tens digit (if any) to the diagonal above.

Step 7: Obtain the required square by writing the digits from the left-most side.

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∴ $171^2$ = 29241

**3. Find the squares of the following numbers:**
**(i) 127**

**(ii) 503**
**(iii) 450**

**(iv) 862**
**(v) 265**

**Solution:**

**(i)** 127

$127^2 = 127 \times 127 = 16129$

**(ii)** 503

$503^2 = 503 \times 503 = 253009$

**(iii)** 450

$450^2 = 450 \times 450 = 203401$

**(iv)** 862

$862^2 = 862 \times 862 = 743044$

**(v)** 265

$265^2 = 265 \times 265 = 70225$

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**4. Find the squares of the following numbers:**
**(i) 425**

**(ii) 575**
**(iii)405**

**(iv) 205**
**(v) 95**

**(vi) 745**
**(vii) 512**

**(viii) 995**

**Solution:**

**(i)**425

$425^2 = 425 \times 425 = 180625$

**(ii) 575**

$575^2 = 575 \times 575 = 330625$

**(iii)405**

$405^2 = 405 \times 405 = 164025$

**(iv) 205**

$205^2 = 205 \times 205 = 42025$

**(v) 95**

$95^2 = 95 \times 95 = 9025$

**(vi) 745**

$745^2 = 745 \times 745 = 555025$

**(vii) 512**

$512^2 = 512 \times 512 = 262144$

**(viii) 995**

$995^2 = 995 \times 995 = 990025$

**5. Find the squares of the following numbers using the identity $(a+b)^2 = a^2+2ab+b^2$:**
**(i) 405**
**(ii) 510**
**(iii) 1001**
**(iv) 209**
**(v) 605**

**Solution:**

**(i)** 405

We know, $(a+b)^2 = a^2+2ab+b^2$

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$405 = (400+5)^2$

$= (400)^2 + 5^2 + 2\,(400)\,(5)$

$= 160000 + 25 + 4000$

$= 164025$

**(ii)** 510

We know, $(a+b)^2 = a^2+2ab+b^2$

$510 = (500+10)^2$

$= (500)^2 + 10^2 + 2\,(500)\,(10)$

$= 250000 + 100 + 10000$

$= 260100$

**(iii)** 1001

We know, $(a+b)^2 = a^2+2ab+b^2$

$1001 = (1000+1)^2$

$= (1000)^2 + 1^2 + 2\,(1000)\,(1)$

$= 1000000 + 1 + 2000$

$= 1002001$

**(iv)** 209

We know, $(a+b)^2 = a^2+2ab+b^2$

$209 = (200+9)^2$

$= (200)^2 + 9^2 + 2\,(200)\,(9)$

$= 40000 + 81 + 3600$

$= 43681$

**(v)** 605

We know, $(a+b)^2 = a^2+2ab+b^2$

$605 = (600+5)^2$

$= (600)^2 + 5^2 + 2\,(600)\,(5)$

$= 360000 + 25 + 6000$

$= 366025$

**6. Find the squares of the following numbers using the identity $(a-b)^2 = a^2-2ab+b^2$**
**(i) 395**

**(ii) 995**
**(iii)495**

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**(iv) 498**
**(v) 99**

**(vi) 999**
**(vii)599**

**Solution:**

**(i)** 395

We know, $(a-b)^2 = a^2-2ab+b^2$

$395 = (400-5)^2$

$= (400)^2 + 5^2 – 2\ (400)\ (5)$

$= 160000 + 25 – 4000$

$= 156025$

**(ii)** 995

We know, $(a-b)^2 = a^2-2ab+b^2$

$995 = (1000-5)^2$

$= (1000)^2 + 5^2 – 2\ (1000)\ (5)$

$= 1000000 + 25 – 10000$

$= 990025$

**(iii)** 495

We know, $(a-b)^2 = a^2-2ab+b^2$

$495 = (500-5)^2$

$= (500)^2 + 5^2 – 2\ (500)\ (5)$

$= 250000 + 25 – 5000$

$= 245025$

**(iv)** 498

We know, $(a-b)^2 = a^2-2ab+b^2$

$498 = (500-2)^2$

$= (500)^2 + 2^2 – 2\ (500)\ (2)$

$= 250000 + 4 – 2000$

$= 248004$

**(v)** 99

We know, $(a-b)^2 = a^2-2ab+b^2$

$99 = (100-1)^2$

$= (100)^2 + 1^2 – 2\ (100)\ (1)$

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= 10000 + 1 – 200

= 9801

**(vi)** 999

We know, $(a-b)^2 = a^2-2ab+b^2$

$999 = (1000-1)^2$

$= (1000)^2 + 1^2 – 2\ (1000)\ (1)$

= 1000000 + 1 – 2000

= 998001

**(vii)** 599

We know, $(a-b)^2 = a^2-2ab+b^2$

$599 = (600-1)^2$

$= (600)^2 + 1^2 – 2\ (600)\ (1)$

= 360000 + 1 – 1200

= 358801

**7. Find the squares of the following numbers by visual method:**
**(i) 52**

**(ii) 95**
**(iii) 505**

**(iv) 702**
**(v) 99**

**Solution:**

**(i)** 52

We know, $(a+b)^2 = a^2+2ab+b^2$

$52 = (50+2)^2$

$= (50)^2 + 2^2 + 2\ (50)\ (2)$

= 2500 + 4 + 200

= 2704

**(ii)** 95

We know, $(a-b)^2 = a^2-2ab+b^2$

$95 = (100-5)^2$

$= (100)^2 + 5^2 – 2\ (100)\ (5)$

= 10000 + 25 – 1000

= 9025

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**(iii)** 505

We know, $(a+b)^2 = a^2+2ab+b^2$

$505 = (500+5)^2$

$= (500)^2 + 5^2 + 2\,(500)\,(5)$

$= 250000 + 25 + 5000$

$= 255025$

**(iv)** 702

We know, $(a+b)^2 = a^2+2ab+b^2$

$702 = (700+2)^2$

$= (700)^2 + 2^2 + 2\,(700)\,(2)$

$= 490000 + 4 + 2800$

$= 492804$

**(v)** 99

We know, $(a-b)^2 = a^2-2ab+b^2$

$99 = (100-1)^2$

$= (100)^2 + 1^2 - 2\,(100)\,(1)$

$= 10000 + 1 - 200$

$= 9801$

## EXERCISE 3.4 PAGE NO: 3.38

**1.Write the possible unit's digits of the square root of the following numbers. Which of these numbers are odd square roots?**
**(i) 9801**
**(ii) 99856**
**(iii) 998001**
**(iv) 657666025**

**Solution:**

**(i)** 9801

We know that unit digit of 9801 is 1

Unit digit of square root = 1 or 9

Since the number is odd, square root is also odd

**(ii)** 99856

We know that unit digit of 99856 = 6

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Unit digit of square root = 4 or 6

Since the number is even, square root is also even

**(iii)** 998001

We know that unit digit of 998001 = 1

Unit digit of square root = 1 or 9

Since the number is odd, square root is also odd

**(iv)** 657666025

We know that unit digit of 657666025 = 5

Unit digit of square root = 5

Since the number is odd, square root is also odd

**2. Find the square root of each of the following by prime factorization.**
**(i) 441 (ii) 196**
**(iii) 529 (iv) 1764**
**(v) 1156 (vi) 4096**
**(vii) 7056 (viii) 8281**
**(ix) 11664 (x) 47089**
**(xi) 24336 (xii) 190969**
**(xiii) 586756 (xiv) 27225**
**(xv) 3013696**

**Solution:**

**(i)** 441

Firstly let's find the prime factors for

$441 = 3\times3\times7\times7$

$= 3^2\times7^2$

$\sqrt{441} = 3\times7$

$= 21$

**(ii)** 196

Firstly let's find the prime factors for

$196 = 2\times2\times7\times7$

$= 2^2\times7^2$

$\sqrt{196} = 2\times7$

$= 14$

**(iii)** 529

Firstly let's find the prime factors for

$529 = 23\times23$

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$= 23^2$

$\sqrt{529} = 23$

**(iv)** 1764

Firstly let's find the prime factors for

$1764 = 2\times2\times3\times3\times7\times7$

$= 2^2\times3^2\times7^2$

$\sqrt{1764} = 2\times3\times7$

$= 42$

**(v)** 1156

Firstly let's find the prime factors for

$1156 = 2\times2\times17\times17$

$= 2^2\times17^2$

$\sqrt{1156} = 2\times17$

$= 34$

**(vi)** 4096

Firstly let's find the prime factors for

$4096 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

$= 2^{12}$

$\sqrt{4096} = 2^6$

$= 64$

**(vii)** 7056

Firstly let's find the prime factors for

$7056 = 2\times2\times2\times2\times21\times21$

$= 2^2\times2^2\times21^2$

$\sqrt{7056} = 2\times2\times21$

$= 84$

**(viii)** 8281

Firstly let's find the prime factors for

$8281 = 91\times91$

$= 91^2$

$\sqrt{8281} = 91$

**(ix)** 11664

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Firstly let's find the prime factors for

11664 = 2×2×2×2×3×3×3×3×3×3

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

√11664 = 2×2×3×3×3

= 108

**(x)** 47089

Firstly let's find the prime factors for

47089 = 217×217

= $217^2$

√47089 = 217

**(xi)** 24336

Firstly let's find the prime factors for

24336 = 2×2×2×2×3×3×13×13

= $2^2 \times 2^2 \times 3^2 \times 13^2$

√24336 = 2×2×3×13

= 156

**(xii)** 190969

Firstly let's find the prime factors for

190969 = 23×23×19×19

= $23^2 \times 19^2$

√190969 = 23×19

= 437

**(xiii)** 586756

Firstly let's find the prime factors for

586756 = 2×2×383×383

= $2^2 \times 383^2$

√586756 = 2×383

= 766

**(xiv)** 27225

Firstly let's find the prime factors for

27225 = 5×5×3×3×11×11

= $5^2 \times 3^2 \times 11^2$

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$\sqrt{27225} = 5\times3\times11$

$= 165$

**(xv)** 3013696

Firstly let's find the prime factors for

$3013696 = 2\times2\times2\times2\times2\times2\times217\times217$

$= 2^6\times217^2$

$\sqrt{3013696} = 2^3\times217$

$= 1736$

**3.Find the smallest number by which 180 must be multiplied so that it becomes a perfect square. Also, find the square root of the perfect square so obtained.**

**Solution:**

Firstly let's find the prime factors for

$180 = (2 \times 2) \times (3 \times 3) \times 5$

$=2^2 \times 3^2 \times 5$

To make the unpaired 5 into paired, multiply the number with 5

$180 \times 5 = 2^2 \times 3^2 \times 5^2$

$\therefore$ Square root of $\sqrt{}\ (180 \times 5) = 2 \times 3 \times 5$

$= 30$

**4. Find the smallest number by which 147 must be multiplied so that it becomes a perfect square. Also, find the square root of the number so obtained.**

**Solution:**

Firstly let's find the prime factors for

$147 = (7 \times 7) \times 3$

$=7^2 \times 3$

To make the unpaired 3 into paired, multiply the number with 3

$147 \times 3 = 7^2 \times 3^2$

$\therefore$ Square root of $\sqrt{}\ (147 \times 3) = 7 \times 3$

$= 21$

**5. Find the smallest number by which 3645 must be divided so that it becomes a perfect square. Also, find the square root of the resulting number.**

**Solution:**

Firstly let's find the prime factors for

$3645 = (3 \times 3) \times (3 \times 3) \times (3 \times 3) \times 5$

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$=3^2 \times 3^2 \times 3^2 \times 5$

To make the unpaired 5 into paired, the number 3645 has to be divided by 5

$3645 \div 5 = 3^2 \times 3^2 \times 3^2$

∴ Square root of $\sqrt{(3645 \div 5)} = 3 \times 3 \times 3$

$= 27$

**6. Find the smallest number by which 1152 must be divided so that it becomes a square. Also, find the square root of the number so obtained.**

**Solution:**

Firstly let's find the prime factors for

$1152 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times 2 \times (3 \times 3)$

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

To make the unpaired 2 into paired, the number 1152 has to be divided by 2

$1152 \div 2 = 2^2 \times 2^2 \times 2^2 \times 3^2$

∴ Square root of $\sqrt{(1152 \div 2)} = 2 \times 2 \times 2 \times 3$

$= 24$

**7. The product of two numbers is 1296. If one number is 16 times the other, find the numbers.**

**Solution:**

Let us consider two numbers a and b

So we know that one of the number, $a = 16b$

$a \times b = 1296$

$16b \times b = 1296$

$16b^2 = 1296$

$b^2 = 1296/16 = 81$

$b = 9$

$a = 16b$

$= 16(9)$

$= 144$

∴ $a = 144$ and $b = 9$

**8. A welfare association collected Rs 202500 as donation from the residents. If each paid as many rupees as there were residents, find the number of residents.**

**Solution:**

Let us consider total residents as a

So, each paid Rs. a

Total collection = a (a) = $a^2$

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We know that the total Collection = 202500

$a = \sqrt{}\ 202500$

$a = \sqrt{}a(2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5)$

$= 2 \times 3 \times 3 \times 5 \times 5a$

$= 450$

∴ Total residents = 450

**9. A society collected Rs 92.16. Each member collected as many paise as there were members. How many members were there and how much did each contribute?**

**Solution:**

Let us consider there were few members, each attributed a paise

a (a), i.e. total cost collected = 9216 paise

$a^2 = 9216$

$a = \sqrt{}9216$

$= 2 \times 2 \times 2 \times 12$

$= 96$

∴ There were 96 members in the society and each contributed 96 paise

**10. A society collected Rs 2304 as fees from its students. If each student paid as many paise as there were students in the school, how many students were there in the school?**

**Solution:**

Let us consider number of school students as a

each student contributed a paise

Total money obtained = $a^2$paise

= 2304 paise

$a = \sqrt{}2304$

$a = \sqrt{}2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$

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

$a = 48$

∴ There were 48 students in the school

**11. The area of a square field is 5184 $m^2$. A rectangular field, whose length is twice its breadth has its perimeter equal to the perimeter of the square field. Find the area of the rectangular field.**

**Solution:**

Let us consider the side of square field as a

$a^2 = 5184\ m^2$

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a = √5184m

a = 2 × 2 ×2 × 9

= 72 m

Perimeter of square = 4a

= 4(72)

= 288 m

Perimeter of rectangle = 2 (l + b) = perimeter of the square field

= 288 m

2 (2b + b) = 288

b = 48 and l = 96

Area of rectangle = 96 × 48 $m^2$

= 4608 $m^2$

**12. Find the least square number, exactly divisible by each one of the numbers: (i) 6, 9, 15 and 20 (ii) 8, 12, 15 and 20**

**Solution:**

**(i)** 6, 9, 15 and 20

Firstly take L.C.M for 6, 9, 15, 20 which is 180

So the prime factors of 180 = $2^2 \times 3^2 \times 5$

To make it a perfect square, we have to multiply the number with 5

$180 \times 5 = 2^2 \times 3^2 \times 5^2$

∴ 900 is the least square number divisible by 6, 9, 15 and 20

**(ii)** 8, 2, 15 and 20

Firstly take L.C.M for 8, 2, 15, 20 which is 360

So the prime factors of 360 = $2^2 \times 3^2 \times 2 \times 5$

To make it a perfect square, we have to multiply the number with 2 × 5 = 10

$360 \times 10 = 2^2 \times 3^2 \times 5^2 \times 2^2$

∴ 3600 is the least square number divisible by 8, 12, 15 and 20

**13. Find the square roots of 121 and 169 by the method of repeated subtraction.**

**Solution:**

Let us find the square roots of 121 and 169 by the method of repeated subtraction

121 – 1 = 120

120 – 3 = 117

117 – 5 = 112

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112 – 7 = 105

105 – 9 = 96

96 – 11 = 85

85 – 13 = 72

72 – 15 = 57

57 – 17 = 40

40 – 19 = 21

21 – 21 = 0

Clearly, we have performed operation 11 times

∴ $\sqrt{121} = 11$

169 – 1 = 168

168 – 3 = 165

165 – 5 = 160

160 – 7 = 153

153 – 9 = 144

144 – 11 = 133

133 – 13 = 120

120 – 15 = 105

105 – 17 = 88

88 – 19 = 69

69 – 21 = 48

48 – 23 = 25

25 – 25 = 0

Clearly, we have performed subtraction 13 times

∴ $\sqrt{169} = 13$

**14. Write the prime factorization of the following numbers and hence find their square roots.**
**(i) 7744**

**(ii) 9604**
**(iii) 5929**
**(iv) 7056**

**Solution:**

**(i)** 7744

Prime factors of 7744 is

$7744 = 2^2 \times 2^2 \times 2^2 \times 11^2$

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∴ The square root of 7744 is

$\sqrt{7744} = 2 \times 2 \times 2 \times 11$

$= 88$

**(ii)** 9604

Prime factors of 9604 is

$9604 = 2^2 \times 7^2 \times 7^2$

∴ The square root of 9604 is

$\sqrt{9604} = 2 \times 7 \times 7$

$= 98$

**(iii)** 5929

Prime factors of 5929 is

$5929 = 11^2 \times 7^2$

∴ The square root of 5929 is

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

$= 77$

**(iv)** 7056

Prime factors of 7056 is

$7056 = 2^2 \times 2^2 \times 7^2 \times 3^2$

∴ The square root of 7056 is

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

$= 84$

**15. The students of class VIII of a school donated Rs 2401 for PM's National Relief Fund. Each student donated as many rupees as the number of students in the class, Find the number of students in the class.**

**Solution:**

Let us consider number of students as a

Each student denoted a rupee

So, total amount collected is a × a rupees = 2401

$a^2 = 2401$

$a = \sqrt{2401}$

$a = 49$

∴ There are 49 students in the class.

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**16. A PT teacher wants to arrange maximum possible number of 6000 students in a field such that the number of rows is equal to the number of columns. Find the number of rows if 71 were left out after arrangement.**

**Solution:**

Let us consider number of rows as a

No. of columns = a

Total number of students who sat in the field = $a^2$

Total students $a^2 + 71 = 6000$

$a^2 = 5929$

$a = \sqrt{5929}$

$a = 77$

∴ total number of rows are 77.

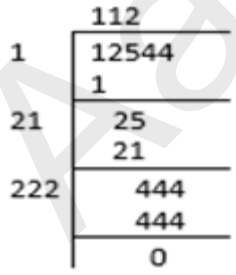
## EXERCISE 3.5 PAGE NO: 3.43

**1.Find the square root of each of the following by long division method:**
**(i) 12544 (ii) 97344**
**(iii) 286225 (iv) 390625**
**(v) 363609 (vi) 974169**
**(vii) 120409 (viii) 1471369**
**(ix) 291600 (x) 9653449**
**(xi) 1745041 (xii) 4008004**
**(xiii) 20657025 (xiv) 152547201**
**(xv) 20421361 (xvi)62504836**
**(xvii) 82264900 (xviii) 3226694416**
**(xix) 6407522209 (xx) 3915380329**

**Solution:**

**(i)** 12544

By using long division method



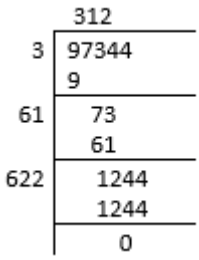

∴ the square root of 12544

$\sqrt{12544} = 112$

**(ii)** 97344

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By using long division method

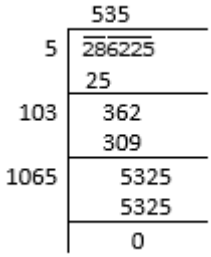



∴ the square root of 97344

√97344 = 312

**(iii)** 286225

By using long division method

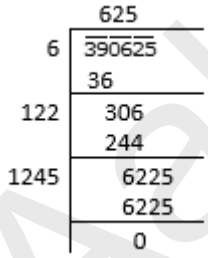



∴ the square root of 286225

√286225 = 535

**(iv)** 390625

By using long division method



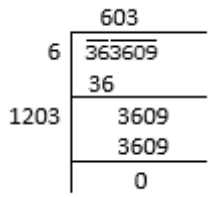

∴ the square root of 390625

√390625 = 625

**(v)** 363609

By using long division method

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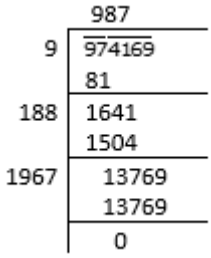



∴ the square root of 363609

√36369 = 603

**(vi)** 974169

By using long division method

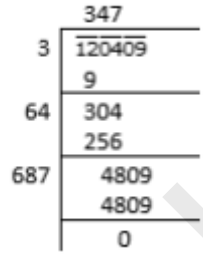



∴ the square root of 974169

√974169 = 987

**(vii)** 120409

By using long division method



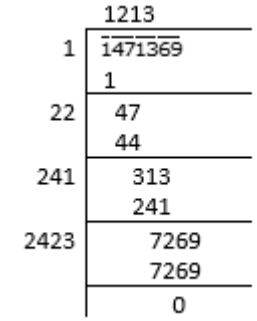

∴ the square root of 120409

√120409 = 347

**(viii)** 1471369

By using long division method

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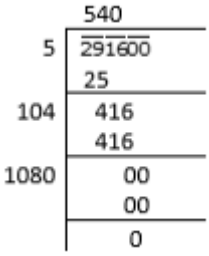



∴ the square root of 1471369

√1471369 = 1213

**(ix)** 291600

By using long division method

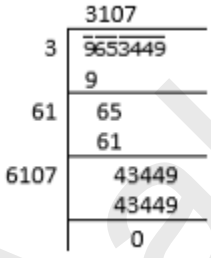



∴ the square root of 291600

√291600 = 540

**(x)** 9653449

By using long division method



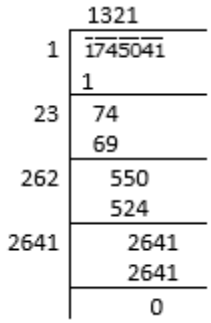

∴ the square root of 9653449

√9653449 = 3107

**(xi)** 1745041

By using long division method

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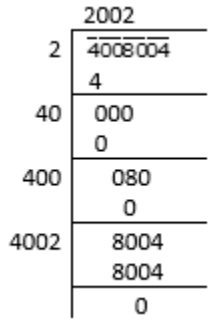



∴ the square root of 1745041

√1745041 = 1321

**(xii)** 4008004

By using long division method

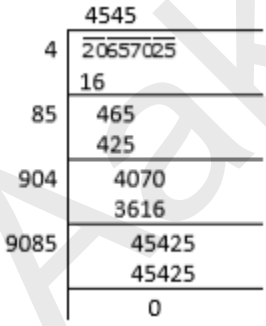



∴ the square root of 4008004

√4008004 = 2002

**(xiii)** 20657025

By using long division method



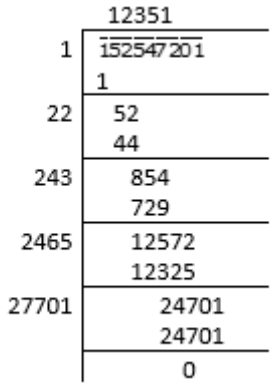

∴ the square root of 20657025

√20657025 = 4545

**(xiv)** 152547201

By using long division method

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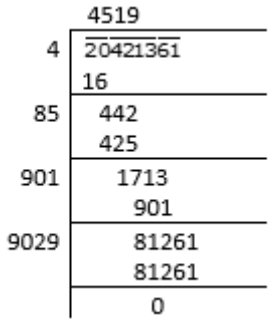



∴ the square root of 152547201

√152547201 = 12351

**(xv)** 20421361

By using long division method

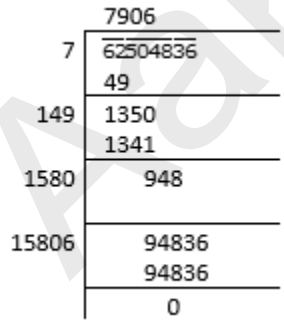



∴ the square root of 20421361

√20421361 = 4519

**(xvi)** 62504836

By using long division method



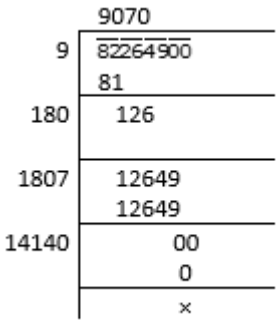

∴ the square root of 62504836

√62504836 = 7906

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**(xvii)** 82264900

By using long division method

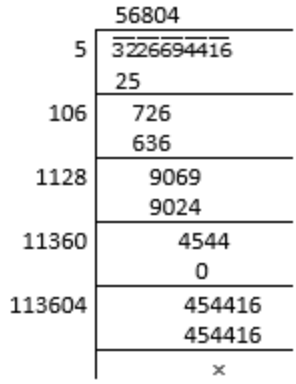



∴ the square root of 82264900

√82264900 = 9070

**(xviii)** 3226694416

By using long division method




∴ the square root of 3226694416

√3226694416 = 56804

**(xix)** 6407522209

By using long division method

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| | |
|---|---|
| | 80047 |
| 8 | 6407522209 |
| | 64 |
| 160 | 07 |
| | 0 |
| 1600 | 752 |
| | 00 |
| 16004 | 75222 |
| | 64016 |
| 160087 | 1120609 |
| | 1120609 |
| | × |

∴ the square root of 6407522209

√6407522209 = 80047

**(xx)** 3915380329

By using long division method

| | |
|---|---|
| | 62573 |
| 6 | 3915380329 |
| | 36 |
| 122 | 315 |
| | 244 |
| 1245 | 07138 |
| | 6225 |
| 12507 | 91303 |
| | 87549 |
| 125143 | 0375429 |
| | 375429 |
| | × |

∴ the square root of 3915380329

√3915380329 = 62573

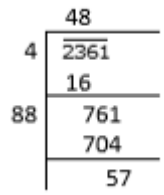
**2. Find the least number which must be subtracted from the following numbers to make them a perfect square:**
**(i) 2361**
**(ii) 194491**
**(iii) 26535**
**(iv) 161605**
**(v) 4401624**

**Solution:**

**(i)** 2361

By using long division method

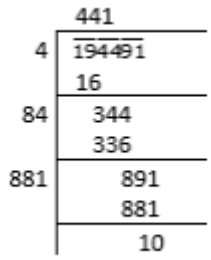
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∴ 57 has to be subtracted from 2361 to get a perfect square.

**(ii)** 194491

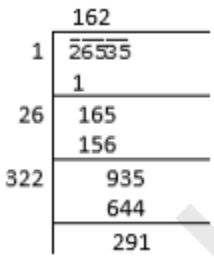
By using long division method




∴ 10 has to be subtracted from 194491 to get a perfect square.

**(iii)** 26535

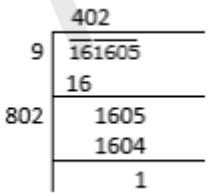
By using long division method




∴ 291 has to be subtracted from 26535 to get a perfect square.

**(iv)** 161605

By using long division method

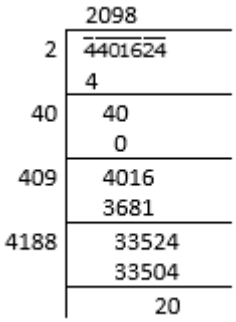



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∴ 1 has to be subtracted from 161605 to get a perfect square.

**(v)** 4401624

By using long division method



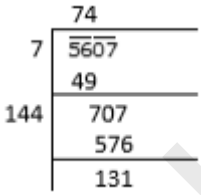

∴ 20 has to be subtracted from 4401624 to get a perfect square.

**3. Find the least number which must be added to the following numbers to make them a perfect square:**
**(i) 5607**
**(ii)4931**
**(iii) 4515600**
**(iv) 37460**
**(v) 506900**

**Solution:**

**(i)** 5607

By using long division method




The remainder is 131

Since, $(74)^2 < 5607$

We take, the next perfect square number i.e., $(75)^2$

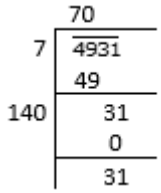
$(75)^2 = 5625 > 5607$

So, the number to be added = 5625 – 5607 = 18

**(ii)** 4931

By using long division method

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The remainder is 31

Since, $(70)^2 < 4931$

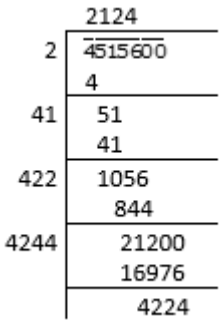
We take, the next perfect square number i.e., $(71)^2$

$(71)^2 = 5041 > 4931$

So, the number to be added = 5041 – 4931 = 110

**(iii)** 4515600

By using long division method




The remainder is 4224

Since, $(2124)^2 < 4515600$

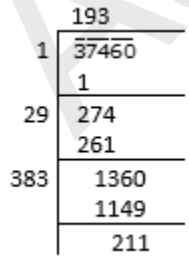
We take, the next perfect square number i.e., $(2125)^2$

$(2125)^2 = 4515625 > 4515600$

So, the number to be added = 4515625 – 4515600 = 25

**(iv)** 37460

By using long division method




The remainder is 211

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Since, $(193)^2 < 37460$

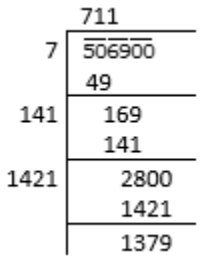
We take, the next perfect square number i.e., $(194)^2$

$(194)^2 = 37636 > 37460$

So, the number to be added = 37636 – 37460 = 176

**(v)** 506900

By using long division method




The remainder is 1379

Since, $(711)^2 < 506900$

We take, the next perfect square number i.e., $(712)^2$

$(712)^2 = 506944 > 506900$

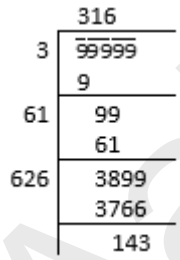
So, the number to be added = 506944 – 506900 = 44

**4. Find the greatest number of 5 digits which is a perfect square.**

**Solution:**

We know that the greatest 5 digit number is 99999

By using long division method




The remainder is 143

So, the greatest 5 digit perfect square number is:

99999 – 143 = 99856

∴ 99856 is the required greatest 5 digit perfect square number.

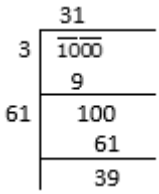
**5. Find the least number of 4 digits which is a perfect square.**

**Solution:**

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We know that the least 4 digit number is 1000

By using long division method




The remainder is 39

Since, $(31)^2 < 1000$

We take, the next perfect square number i.e., $(32)^2$

$(32)^2 = 1024 > 1000$

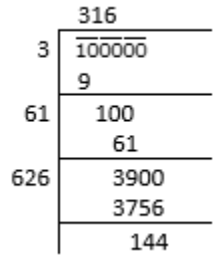
$\therefore$ 1024 is the required least number 4 digit number which is a perfect square.

**6. Find the least number of six digits which is a perfect square.**

**Solution:**

We know that the least 6 digit number is 100000

By using long division method




The remainder is 144

Since, $(316)^2 < 100000$

We take, the next perfect square number i.e., $(317)^2$

$(317)^2 = 100489 > 100000$

$\therefore$ 100489 is the required least number 6 digit number which is a perfect square.

**7. Find the greatest number of 4 digits which is a perfect square.**

**Solution:**

We know that the greatest 4 digit number is 9999

By using long division method

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```
    91
  ------
9 | 9999
    81
  ------
89| 1899
    1701
  ------
     198
```

The remainder is 198

So, the greatest 4 digit perfect square number is:

9999 – 198 = 9801

∴ 9801 is the required greatest 4 digit perfect square number.

**8. 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**

**Solution:**

We know that the total number of soldiers = 8160

Number of soldiers left out = 60

Number of soldiers arranged in rows to form a perfect square = 8160 – 60 = 8100

∴ number of soldiers in each row = $\sqrt{8100}$

= $\sqrt{(9\times9\times10\times10)}$

= 9×10

= 90

**9. The area of a square field is 60025$m^2$. A man cycles along its boundary at 18 Km/hr. In how much time will he return at the starting point?**

**Solution:**

We know that the area of square field = 60025 $m^2$

Speed of cyclist = 18 km/h

= 18 × (1000/60×60)

= 5 $m/s^2$

Area = 60025 $m^2$

$Side^2$ = 60025

Side = $\sqrt{60025}$

= 245

We know, Total length of boundary = 4 × Side

= 4 × 245

= 980 m

∴ Time taken to return to the starting point = 980/5

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= 196 seconds

= 3 minutes 16 seconds

**10. The cost of levelling and turning a square lawn at Rs 2.50 per $m^2$ is Rs13322.50 Find the cost of fencing it at Rs 5 per metre.**

**Solution:**

We know that the cost of levelling and turning a square lawn = 2.50 per $m^2$

Total cost of levelling and turning = Rs. 13322.50

Total area of square lawn = 13322.50/2.50

= 5329 $m^2$

$Side^2$ = 5329

Side of square lawn = $\sqrt{5329}$

= 73 m

So, total length of lawn = 4 × 73

= 292 m

∴ Cost of fencing the lawn at Rs 5 per metre = 292 × 5

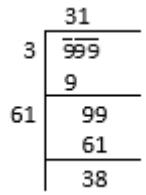
= Rs. 1460

**11. Find the greatest number of three digits which is a perfect square.**

**Solution:**

We know that the greatest 3 digit number is 999

By using long division method




The remainder is 38

So, the greatest 3 digit perfect square number is:

999 – 38 = 961

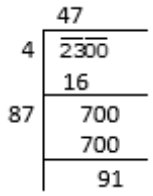
∴ 961 is the required greatest 3 digit perfect square number.

**12. Find the smallest number which must be added to 2300 so that it becomes a perfect square.**

**Solution:**

By using long division method let's find the square root of 2300

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The remainder is 91

Since, $(47)^2 < 2300$

We take, the next perfect square number i.e., $(48)^2$

$(48)^2 = 2304 > 2300$

∴ The smallest number required to be added to 2300 to get a perfect square is

2304 – 2300 = 4

## EXERCISE 3.6 PAGE NO: 3.48

**1. Find the square root of:**

**(i) 441/961**

**(ii) 324/841**

**(iii) 4 29/29**

**(iv) 2 14/25**

**(v) 2 137/196**

**(vi) 23 26/121**

**(vii) 25 544/729**

**(viii) 75 46/49**

**(ix) 3 942/2209**

**(x) 3 334/3025**

**(xi) 21 2797/3364**

**(xii) 38 11/25**

**(xiii) 23 394/729**

**(xiv) 21 51/169**

**(xv) 10 151/225**

**Solution:**

**(i)** 441/961

The square root of

√441/961 = 21/31

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**(ii)** 324/841

The square root of

√324/841= 18/29

**(iii)** 4 29/29

The square root of

√(4 29/29) = √(225/49) = 15/7

**(iv)** 2 14/25

The square root of

√(2 14/25) = √(64/25) = 8/5

**(v)** 2 137/196

The square root of

√2 137/196 = √ (529/196) = 23/14

**(vi)** 23 26/121

The square root of

√(23 26/121) = √(2809/121) = 53/11

**(vii)** 25 544/729

The square root of

√(25 544/729) = √(18769/729) = 137/27

**(viii)** 75 46/49

The square root of

√(75 46/49) = √(3721/49) = 61/7

**(ix)** 3 942/2209

The square root of

√(3 942/2209) = √(7569/2209) = 87/47

**(x)** 3 334/3025

The square root of

√(3 334/3025) = √(9409/3025) = 97/55

**(xi)** 21 2797/3364

The square root of

√(21 2797/3364) = √(73441/3364) = 271/58

**(xii)** 38 11/25

The square root of

√(38 11/25) = √(961/25) = 31/5

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**(xiii)** 23 394/729

The square root of

√(23 394/729) = √(17161/729) = 131/27 = 4 23/27

**(xiv)** 21 51/169

The square root of

√(21 51/169) = √(3600/169) = 60/13 = 4 8/13

**(xv)** 10 151/225

The square root of

√(10 151/225) = √(2401/225) = 49/15 = 3 4/15

**2. Find the value of:**

**(i) √80/√405**

**(ii) √441/√625**

**(iii) √1587/√1728**

**(iv) √72 ×√338**

**(v) √45 × √20**

**Solution:**

**(i)** √80/√405

√80/√405 = √16/√81 = 4/9

**(ii)** √441/√625

√441/√625 = 21/25

**(iii)** √1587/√1728

√1587/√1728 = √529/√576 = 23/24

**(iv)** √72 ×√338

√72 ×√338 = √(2×2×2×3×3) ×√(2×13×13)

By using the formula √a × √b = √(a×b)

= √(2×2×2×3×3×2×13×13)

= $2^2$ × 3 × 13

= 156

**(v)** √45 × √20

√45 × √20 = √(5×3×3) × √(5×2×2)

By using the formula √a × √b = √(a×b)

= √(5×3×3×5×2×2)

= 5 × 3 × 2

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= 30

**3. The area of a square field is 80 244/729 square metres. Find the length of each side of the field.**

**Solution:**

We know that the given area = 80 244/729 $m^2$

= 58564/729 $m^2$

If L is length of each side

$L^2$ = 58564/729

L = √ (58564/729) = √58564/√729

= 242/27

= 8 26/27

∴ Length is 8 26/27

**4. The area of a square field is 30 1/4$m^2$. Calculate the length of the side of the square.**

**Solution:**

We know that the given area = 30 1/4 $m^2$

= 121/4 $m^2$

If L is length of each side then,

$L^2$ = 121/4

L = √(121/4) = √121/√4

= 11/2

∴ Length is 11/2

**5. Find the length of a side of a square playground whose area is equal to the area of a rectangular field of dimensions 72m and 338 m.**

**Solution:**

By using the formula

Area of rectangular field = l × b

= 72 × 338 $m^2$

= 24336 $m^2$

Area of square, $L^2$ = 24336 $m^2$

L = √24336

= 156 m

∴ Length of side of square playground is 156 m.

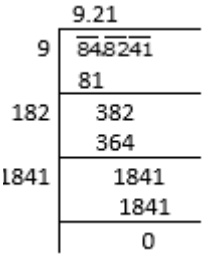
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# EXERCISE 3.7 PAGE NO: 3.52

**Find the square root of the following numbers in decimal form:**
**1. 84.8241**

**Solution:**

By using long division method



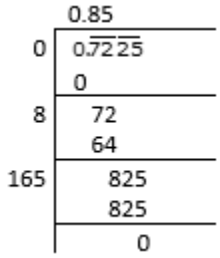

∴ the square root of 84.8241

√84.8241 = 9.21

**2. 0.7225**

**Solution:**

By using long division method



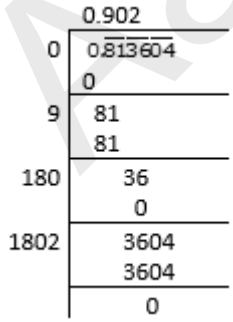

∴ the square root of 0.7225

√0.7225 = 0.85

**3. 0.813604**

**Solution:**

By using long division method




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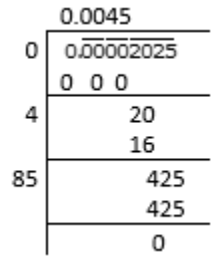
∴ the square root of 0.813604

√0.813604 = 0.902

**4. 0.00002025**

**Solution:**

By using long division method



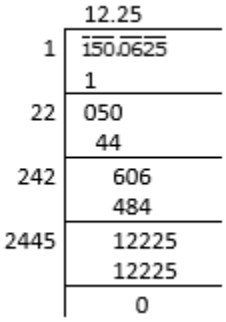

∴ the square root of 0.00002025

√0.00002025 = 0.0045

**5. 150.0625**

**Solution:**

By using long division method




∴ the square root of 150.0625

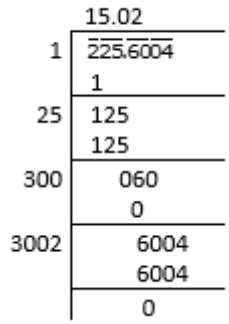
√150.0625 = 12.25

**6. 225.6004**

**Solution:**

By using long division method

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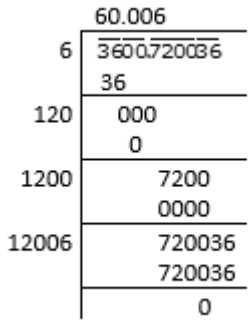

∴ the square root of 225.6004

√225.6004 = 15.02

**7. 3600.720036**

**Solution:**

By using long division method



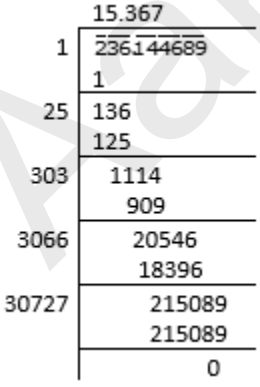

∴ the square root of 3600.720036

√3600.720036 = 60.006

**8. 236.144689**

**Solution:**

By using long division method




∴ the square root of 236.144689

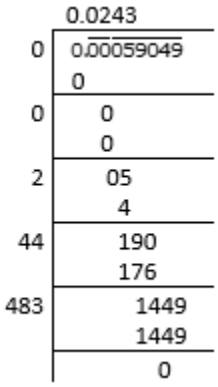
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√236.144689 = 15.367

**9. 0.00059049**

**Solution:**

By using long division method



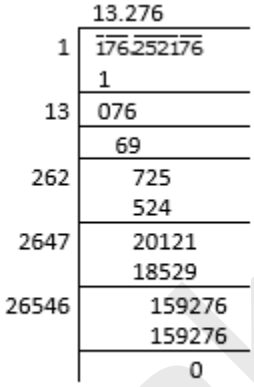

∴ the square root of 0.00059049

√0.00059049 = 0.0243

**10. 176.252176**

**Solution:**

By using long division method




∴ the square root of 176.252176

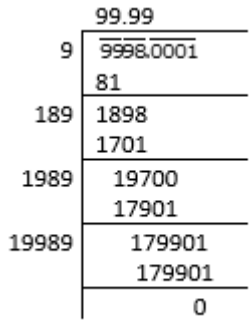
√176.252176 = 13.276

**11. 9998.0001**

**Solution:**

By using long division method

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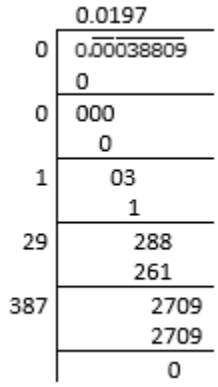

∴ the square root of 9998.0001

√9998.0001 = 99.99

**12. 0.00038809**

**Solution:**

By using long division method




∴ the square root of 0.00038809

√0.00038809 = 0.0197

**13. What is that fraction which when multiplied by itself gives 227.798649?**

**Solution:**

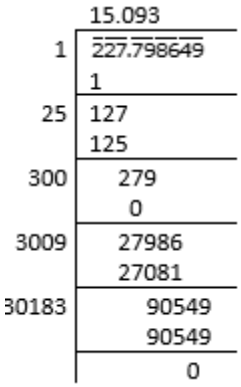
Let us consider a number a

Where, a = √227.798649

= 15.093

By using long division method let us verify

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∴ 15.093 is the fraction which when multiplied by itself gives 227.798649.

**14. The area of a square playground is 256.6404 square meter. Find the length of one side of the playground.**

**Solution:**

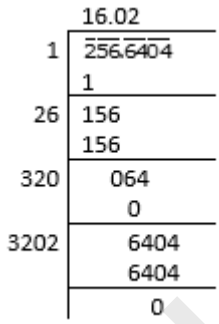
We know that the given area of a square playground = 256.6404

i.e., $L^2 = 256.6404\ m^2$

$L = \sqrt{256.6404}$

= 16.02m

By using long division method let us verify




∴ length of one side of the playground is 16.02m.

**15. What is the fraction which when multiplied by itself gives 0.00053361?**

**Solution:**

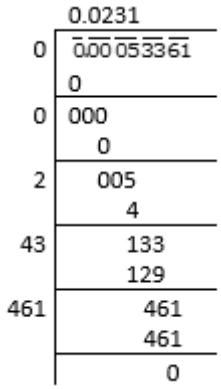
Let us consider a number a

Where, $a = \sqrt{0.00053361}$

= 0.0231

By using long division method let us verify

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∴ 0.0231 is the fraction which when multiplied by itself gives 0.00053361.

**16. Simplify:**

**(i) (√59.29 – √5.29)/ (√59.29 + √5.29)**

**(ii) (√0.2304 + √0.1764)/ (√0.2304 – √0.1764)**

**Solution:**

**(i)** (√59.29 – √5.29)/ (√59.29 + √5.29)

Firstly let us find the square root √59.29 and √5.29

√59.29 = √5929/ √100

= 77/10

= 7.7

√5.29 = √5.29/ √100

= 23/10

= 2.3

So, (7.7 – 2.3)/ (7.7 + 2.3)

= 54/10

= 0.54

**(ii)** (√0.2304 + √0.1764)/ (√0.2304 – √0.1764)

Firstly let us find the square root √0.2304 and √0.1764

√0.2304 = √2304/ √10000

= 48/100

= 0.48

√0.1764 = √1764/ √10000

= 42/100

= 0.42

So, (0.48 + 0.42)/ (0.48 – 0.42)

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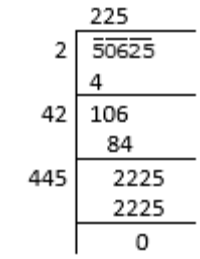
= 0.9/0.06

= 15

**17. Evaluate √50625 and hence find the value of √506.25 + √5.0625**

**Solution:**

By using long division method let us find the √50625




So now, √506.25 **=** √50625/ √100

= 225/10

= 22.5

√5.0625 = √50625/ √10000

= 225/100

= 2.25

So equating in the above equation we get,

√506.25 + √5.0625 = 22.5 + 2.25

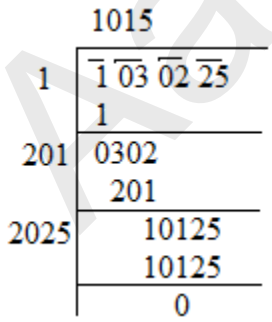
= 24.75

**18. Find the value of √103.0225 and hence find the value of**
**(i) √10302.25**
**(ii) √1.030225**

**Solution:**

By using long division method let us find the

√103.0225 = √(1030225/10000) = √1030225/√10000




So now, (i)√10302.25 **=** √(1030225/ 100)

= 1015/ 10

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= 101.5

(ii)√1.030225 = √1030225/ √1000000

= 1015/1000

= 1.015

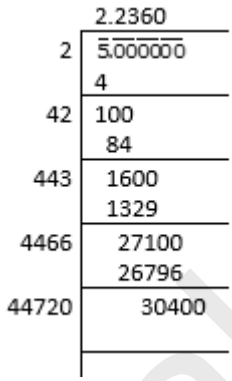
## EXERCISE 3.8 PAGE NO: 3.56

**1. Find the square root of each of the following correct to three places of decimal.**
**(i) 5 (ii) 7**
**(iii) 17 (iv) 20**
**(v) 66 (vi) 427**
**(vii) 1.7 (viii) 23.1**
**(ix) 2.5 (x) 237.615**
**(xi) 15.3215 (xii) 0.9**
**(xiii) 0.1 (xiv) 0.016**
**(xv) 0.00064 (xvi) 0.019**
**(xvii) 7/8 (xviii) 5/12**
**(xix) 2 1/2 (xx) 287 5/8**

**Solution:**

**(i)** 5

By using long division method

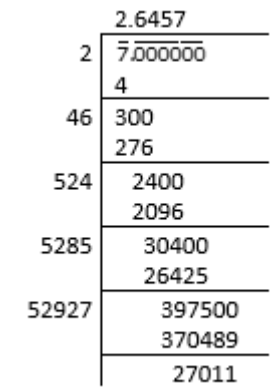



∴ the square root of 5 is 2.236

**(ii)** 7

By using long division method

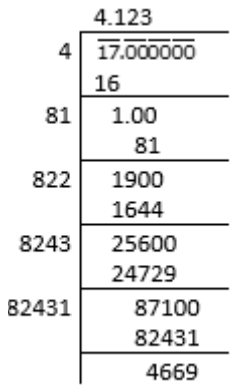
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∴ the square root of 7 is 2.646

**(iii)** 17

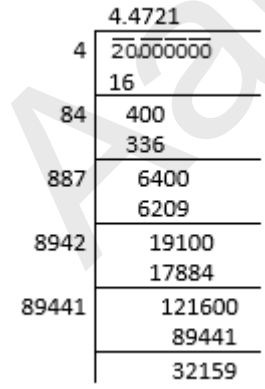
By using long division method




∴ the square root of 17 is 4.123

**(iv)** 20

By using long division method

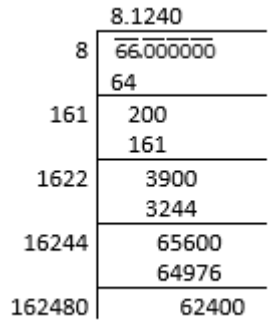



∴ the square root of 20 is 4.472

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**(v)** 66

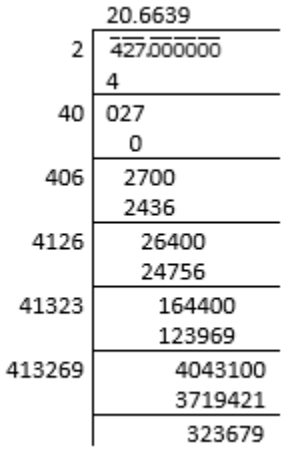
By using long division method




∴ the square root of 66 is 8.124

**(vi)** 427

By using long division method




∴ the square root of 427 is 20.664

**(vii)** 1.7

By using long division method

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```
        1.3038
      ---------
1   | 1.700000
      1
      -------
23  | 0.70
      69
      -------
260 |  100
        0
      -------
2603|  10000
        7809
      -------
26068|  219100
       208544
      -------
         10556
```

∴ the square root of 1.7 is 1.304

**(viii)** 23.1

By using long division method

```
        4.8062
      ---------
4   | 23100000
      16
      -------
88  | 710
      704
      -------
960 |  600
        0
      -------
9606|  60000
       57636
      -------
96122|  236400
       192244
      -------
         44156
```

∴ the square root of 23.1 is 4.806

**(ix)** 2.5

By using long division method

```
        1.5811
      ---------
1   | 2.500000
      1
      -------
25  | 150
      125
      -------
308 |  2500
       2464
      -------
3161|  3600
       3161
      -------
31621|  43900
       31621
      -------
         2279
```

∴ the square root of 2.5 is 1.581

**(x)** 237.615

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By using long division method

| | |
|---|---|
| | 15.4147 |
| 1 | $\overline{237}.\overline{61}\overline{5000}$ |
| | 1 |
| 25 | 137 |
| | 125 |
| 304 | 1261 |
| | 1216 |
| 3081 | 4550 |
| | 3081 |
| 30824 | 146900 |
| | 123296 |
| 308287 | 2360400 |
| | 2158009 |
| | 202391 |

∴ the square root of 237.615 is 15.415

**(xi)** 15.3215

By using long division method

| | |
|---|---|
| | 3.9142 |
| 3 | $\overline{15}\overline{32}\overline{15}\overline{00}$ |
| | 9 |
| 69 | 632 |
| | 621 |
| 781 | 1115 |
| | 781 |
| 7824 | 33400 |
| | 31296 |
| 78282 | 210400 |
| | 156564 |
| | 53836 |

∴ the square root of 15.3215 is 3.914

**(xii)** 0.9

By using long division method

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```
        0.9486
    ------------
0  | 0.900000
   | 0
    ------------
9  | 090
   |  81
    ------------
184|  900
   |  736
    ------------
1888|  16400
   |  15104
    ------------
18966|  129600
   |  113796
    ------------
   |  15804
```

∴ the square root of 0.9 is 0.949

**(xiii)** 0.1

By using long division method

```
        0.3162
    ------------
0  | 0.100000
   | 0
    ------------
3  | 10
   |  9
    ------------
61 |  100
   |  61
    ------------
626|  3900
   |  3756
    ------------
6322|  14400
   |  12644
    ------------
   |  1756
```

∴ the square root of 0.1 is 0.316

**(xiv)** 0.016

By using long division method

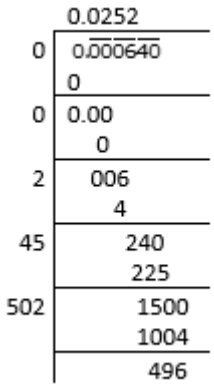
```
        0.1264
    ------------
0  | 0.016000
   | 0
    ------------
1  | 001
   |  1
    ------------
22 |  060
   |  44
    ------------
246|  1600
   |  1476
    ------------
2524|  12400
   |  10096
    ------------
   |  2304
```

∴ the square root of 0.016 is 0.126

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**(xv)** 0.00064

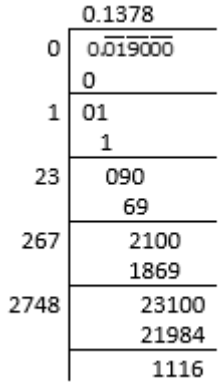
By using long division method




∴ the square root of 0.00064 is 0.025

**(xvi)** 0.019

By using long division method




∴ the square root of 0.019 is 0.138

**(xvii)** 7/8

By using long division method

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```
        0.9354
      ---------
0   | 0.875000
    | 0
      ---------
9   | 087
    |  81
      ---------
183 |   650
    |   549
      ---------
1865|   10100
    |    9325
      ---------
18704|   77500
    |   74816
      ---------
    |    2684
```

∴ the square root of 7/8 is 0.935

**(xviii)** 5/12

By using long division method

```
        0.6454
      ---------
0   | 0.416666
    | 0
      ---------
6   |  41
    |  36
      ---------
124 |   566
    |   496
      ---------
1285|    7066
    |    6245
      ---------
12904|    64100
    |    51616
      ---------
    |    12484
```

∴ the square root of 5/12 is 0.645

**(xix)** 2 1/2

By using long division method

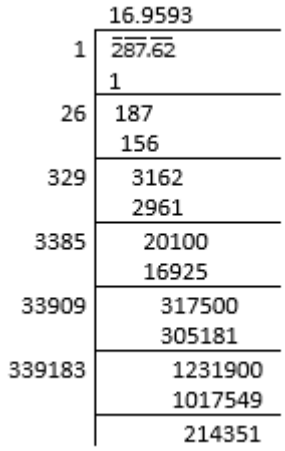
```
        1.5811
      ---------
1   | 2.500000
    | 1
      ---------
25  |  150
    |  125
      ---------
308 |   2500
    |   2464
      ---------
3161|    3600
    |    3161
      ---------
31621|    43900
    |    31621
      ---------
    |    12279
```

∴ the square root of 5/2 is 1.581

**(xx)** 287 5/8

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By using long division method

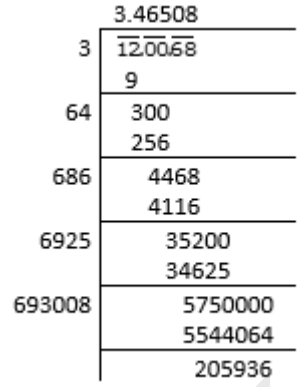



∴ the square root of 2301/8 is 16.960

**2. Find the square root of 12.0068 correct to four decimal places.**

**Solution:**

By using long division method




∴ the square root of 12.0068 is 3.4651

**3. Find the square root of 11 correct to five decimal places.**

**Solution:**

By using long division method

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| | |
|---|---|
| | 3.316624 |
| 3 | 11.000000 |
| | 9 |
| 63 | 200 |
| | 189 |
| 661 | 1100 |
| | 661 |
| 6626 | 43900 |
| | 39756 |
| 66326 | 414400 |
| | 398196 |
| 663322 | 1620400 |
| | 1327444 |
| 6633244 | 29295600 |
| | 26532976 |
| | 2762624 |

∴ the square root of 11 is 3.31662

**4. Give that: √2 = 1.414, √3 = 1.732, √5 = 2.236 and √7 = 2.646, evaluate each of the following:**
**(i) √ (144/7)**
**(ii) √ (2500/3)**

**Solution:**

**(i)** √ (144/7)

Now let us simplify the given equation

√ (144/7) = √ (12×12)/ √7

= 12/ 2.646

= 4.535

**(ii)** √ (2500/3)

Now let us simplify the given equation

√ (2500/3) = √ (5×5×10×10) /√3

= 5×10/ 1.732

= 50/1.732

= 28.867

**5. Given that √2 = 1.414, √3 = 1.732, √5 = 2.236 and √7 = 2.646 find the square roots of the following:**
**(i) 196/75**
**(ii) 400/63**
**(iii) 150/7**
**(iv) 256/5**
**(v) 27/50**

**Solution:**

**(i)** 196/75

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Let us find the square root for196/75

√(196/75) = √(196)/ √ (75)

= √(14×14)/ √ (5×5×3)

= 14/ (5√3)

= 14/ (5×1.732)

= 14/8.66

= 1.617

**(ii)** 400/63

Let us find the square root for400/63

√(400/63) = √(400)/ √ (63)

= √(20×20)/ √ (3×3×7)

= 20/ (3√7)

= 20/ (3×2.646)

= 20/7.938

= 2.520

**(iii)** 150/7

Let us find the square root for150/7

√(150/7) = √(150)/ √ (7)

= √(3×5×5×2)/ √ (7)

= (5√3×√2)/ (√7)

= 5×1.732×1.414/ (2.646)

= 12.245/2.646

= 4.628

**(iv)** 256/5

Let us find the square root for256/5

√(256/5) = √(256)/ √ (5)

= √(16×16)/ √ (5)

= 16/ (√5)

= 16/2.236

= 7.155

**(v)** 27/50

Let us find the square root for27/50

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√(27/50) = √(27)/ √ (50)

= √(3×3×3)/ √ (5×5×2)

= (3√3)/ (5√2)

= (3×1.732)/ (5×1.414)

= 5.196/7.07

= 0.735

## EXERCISE 3.9 PAGE NO: 3.61

| Square Root Table | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Number** | **Square Root(√)** | **Number** | **Square Root(√)** | **Number** | **Square Root(√)** | **Number** | **Square Root(√)** | **Number** | **Square Root(√)** |
| 1 | 1 | 21 | 4.583 | 41 | 6.403 | 61 | 7.81 | 81 | 9 |
| 2 | 1.414 | 22 | 4.69 | 42 | 6.481 | 62 | 7.874 | 82 | 9.055 |
| 3 | 1.732 | 23 | 4.796 | 43 | 6.557 | 63 | 7.937 | 83 | 9.11 |
| 4 | 2 | 24 | 4.899 | 44 | 6.633 | 64 | 8 | 84 | 9.165 |
| 5 | 2.236 | 25 | 5 | 45 | 6.708 | 65 | 8.062 | 85 | 9.22 |
| 6 | 2.449 | 26 | 5.099 | 46 | 6.782 | 66 | 8.124 | 86 | 9.274 |
| 7 | 2.646 | 27 | 5.196 | 47 | 6.856 | 67 | 8.185 | 87 | 9.327 |
| 8 | 2.828 | 28 | 5.292 | 48 | 6.928 | 68 | 8.246 | 88 | 9.381 |
| 9 | 3 | 29 | 5.385 | 49 | 7 | 69 | 8.307 | 89 | 9.434 |
| 10 | 3.162 | 30 | 5.477 | 50 | 7.071 | 70 | 8.367 | 90 | 9.487 |
| 11 | 3.317 | 31 | 5.568 | 51 | 7.141 | 71 | 8.426 | 91 | 9.539 |
| 12 | 3.464 | 32 | 5.657 | 52 | 7.211 | 72 | 8.485 | 92 | 9.592 |
| 13 | 3.606 | 33 | 5.745 | 53 | 7.28 | 73 | 8.544 | 93 | 9.644 |
| 14 | 3.742 | 34 | 5.831 | 54 | 7.348 | 74 | 8.602 | 94 | 9.695 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 3.873 | 35 | 5.916 | 55 | 7.416 | 75 | 8.66 | 95 | 9.747 |
| 16 | 4 | 36 | 6 | 56 | 7.483 | 76 | 8.718 | 96 | 9.798 |
| 17 | 4.123 | 37 | 6.083 | 57 | 7.55 | 77 | 8.775 | 97 | 9.849 |
| 18 | 4.243 | 28 | 6.164 | 58 | 7.616 | 78 | 8.832 | 98 | 9.899 |
| 19 | 4.359 | 29 | 6.245 | 59 | 7.681 | 79 | 8.888 | 99 | 9.95 |
| 20 | 4.472 | 40 | 6.325 | 60 | 7.746 | 80 | 8.944 | 100 | 10 |

**Using square root table, find the square roots of the following:**

**1. 7**

**Solution:**

From square root table we know,

Square root of 7 is:

$\sqrt{7} = 2.645$

∴ The square root of 7 is 2.645

**2. 15**

**Solution:**

We know that,

$15 = 3 \times 5$

So, $\sqrt{15} = \sqrt{3} \times \sqrt{5}$

From square root table we know,

Square root of 3 and 5 are:

$\sqrt{3} = 1.732$ and $\sqrt{5} = 2.236$

$\Rightarrow \sqrt{15} = 1.732 \times 2.236 = 3.873$

∴ The square root of 15 is 3.873

**3. 74**

**Solution:**

We know that,

$74 = 2 \times 37$

So, $\sqrt{74} = \sqrt{2} \times \sqrt{37}$

From square root table we know,

Square root of 2 and 37 are:

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√2 = 1.414 and √37 = 6.083

⇒ √74 = 1.414 x 6.083 = 8.602

∴ The square root of 74 is 8.602

**4. 82**

**Solution:**

We know that,

82 = 2 x 41

So, √82 = √2 x √41

From square root table we know,

Square root of 2 and 41 are:

√2 = 1.414 and √41 = 6.403

⇒ √82 = 1.414 x 6.403 = 9.055

∴ The square root of 82 is 9.055

**5. 198**

**Solution:**

We know that,

198 = 2 x 9 x 11

So, √198 = √2 x √9 x √11

From square root table we know,

Square root of 2, 9 and 11 are:

√2 = 1.414, √9 = 3 and √11 = 3.317

⇒ √198 = 1.414 x 3 x 3.317 = 14.071

∴ The square root of 198 is 14.071

**6. 540**

**Solution:**

We know that,

540 = 6 x 9 x 10

So, √540 = √6 x √9 x √10

From square root table we know,

Square root of 6, 9 and 10 are:

√6 = 2.449, √9 = 3 and √10 = 3.162

⇒ √540 = 2.449 x 3 x 3.162 = 23.24

∴ The square root of 540 is 23.24

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**7. 8700**

**Solution:**

We know that,

8700 = 87 x 100

So, √8700 = √87 x √100

From square root table we know,

Square root of 87 and 100 are:

√8700 = 9.327 and √100 = 10

⇒ √8700 = 9.327 x 10 = 93.27

∴ The square root of 8700 is 93.27

**8. 3509**

**Solution:**

We know that,

3509 = 121 x 29

So, √3509 = √121 x √29

From square root table we know,

Square root of 121 and 29 are:

√121 = 11 and √29 = 5.385

⇒ √3509 = 11 x 10 = 5.385

∴ The square root of 3509 is 59.235

**9. 6929**

**Solution:**

We know that,

6929 = 169 x 41

So, √6929 = √169 x √41

From square root table we know,

Square root of 169 and 41 are:

√169 = 13 and √41 = 6.403

⇒ √6929 = 13 x 6.403 = 83.239

∴ The square root of 6929 is 83.239

**10. 25725**

**Solution:**

We know that,

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25725 = 3 x 7 x 25 x 49

So, √25725 = √3 x √7 x √25 x √49

From square root table we know,

Square root of 3, 7, 25 and 49 are:

√3 = 1.732, √7 = 2.646, √25 = 5 and √49 = 7

⇒ √25725 = 1.732 x 2.646 x 5 x 7 = 160.41

∴ The square root of 25725 is 160.41

**11. 1312.**

**Solution:**

We know that,

1312 = 2 x 16 x 41

So, √1312 = √2 x √16 x √41

From square root table we know,

Square root of 2, 16 and 41 are:

√2 = 1.414, √16 = 4 and √41 = 6.403

⇒ √1312 = 1.414 x 4 x 6.403 = 36.22

∴ The square root of 1312 is 36.22

**12. 4192**

**Solution:**

We know that,

4192 = 2 x 16 x 131

So, √4192 = √2 x √16 x √131

From square root table we know,

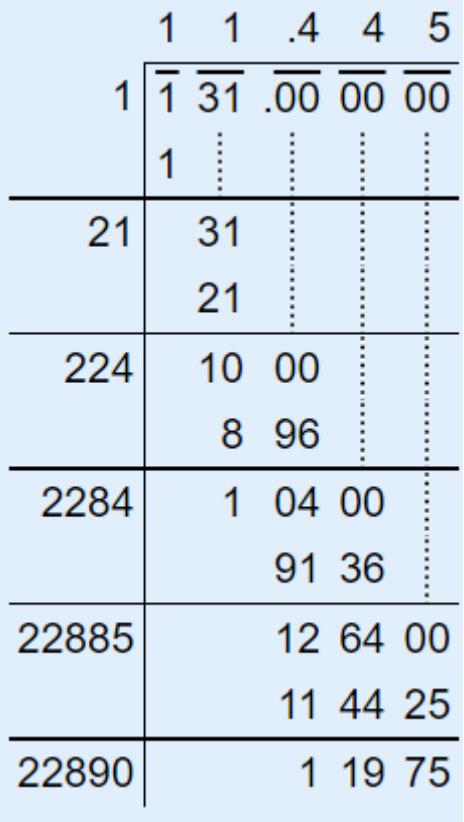
Square root of 2 and16 are:

√2 = 1.414 and √16 = 4

The square root of 131 is not listed in the table

Thus, let’s apply long division to find it

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| | 1 | 1 | .4 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 1 | 31 | .00 | 00 | 00 |
| | 1 | | | | |
| 21 | | 31 | | | |
| | | 21 | | | |
| 224 | | 10 | 00 | | |
| | | 8 | 96 | | |
| 2284 | | 1 | 04 | 00 | |
| | | | 91 | 36 | |
| 22885 | | | 12 | 64 | 00 |
| | | | 11 | 44 | 25 |
| 22890 | | | 1 | 19 | 75 |

So, square root of 131 is 11.445

Now,

⇒ √4192 = 1.414 x 4 x 11.445 = 64.75

∴ The square root of 4192 is 64.75

**13. 4955**

**Solution:**

We know that,

4955 = 5 x 991

So, √4955 = √5 x √991

From square root table we know,

Square root of 5 is:

√5 = 2.236

The square root of 991 is not listed in the table

Thus, let's apply long division to find it

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| | 3 | 1 | .4 | 8 | 0 |
|---|---|---|---|---|---|
| 3 | 9 | 91 | .00 | 00 | 00 |
| | 9 | | | | |
| 61 | | 91 | | | |
| | | 61 | | | |
| 624 | | 30 | 00 | | |
| | | 24 | 96 | | |
| 6288 | | | 5 04 | 00 | |
| | | | 5 03 | 04 | |
| 62960 | | | | 96 | 00 |
| | | | | | 0 |
| 62960 | | | | 96 | 00 |

So, square root of 991 is 31.480

Now,

⇒ √4955 = 2.236 x 31.480 = 70.39

∴ The square root of 4955 is 70.39

**14. 99/144**

**Solution:**

We know that,

99/144 = (9 x 11) / (12 x 12)

So, √(99/144) = √[(9 x 11) x (12 x 12)]

= 3/12 x √11

From square root table we know,

Square root of 11 is:

√11 = 3.317

⇒ √(99/144) = 3/12 x 3.317 = 3.317/4 = 0.829

∴ The square root of 99/144 is 0.829

**15. 57/169**

**Solution:**

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We know that,

57/169 = (3 x 19) / (13 x 13)

So, √(57/169) = √[(3 x 19) x (13 x 13)]

= √3 x √19 x 1/13

From square root table we know,

Square root of 3 and 19 is:

√3 = 1.732 and √19 = 4.359

⇒ √(57/169) = 1.732 x 4.359 x 1/13 = 0.581

∴ The square root of 57/169 is 0.581

**16. 101/169**

**Solution:**

We know that,

101/169 = 101 / (13 x 13)

So, √(101/169) = √[101 / (13 x 13)]

= √101/13

From square root table we don't have the square root of 101

Thus, we have to manipulate the number such that we get the square root of a number less than 100

√101 = √(1.01 x 100)

= √1.01 x 10

Now, we have to find the square of 1.01

We know that,

√1 = 1 and √2 = 1.414 (From the square root table)

Their difference = 1.414 – 1 = 0.414

Hence, for a difference of 1 (2 – 1), the difference in the value of the square root is 0.414

So,

For the difference of 0.01, the difference in the value of the square roots will be

0.01 x 1.414 = 0.00414

∴√1.01 = 1 + 0.00414 = 1.00414

Then, √101 = 1.00414 x 10 = 10.0414

⇒ √(101/169) = √101/13 = 10.0414/13

∴ The square root of 101/169 is 0.773

**17. 13.21**

**Solution:**

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We need to find √13.21

From square root table we know,

Square root of 13 and 14 are:

√13 = 3.606 and √14 = 3.742

Their difference = 3.742 – 3.606 = 0.136

Hence, for a difference of 1 (14 – 13), the difference in the value of the square root is 0.136

So,

For the difference of 0.21, the difference in the value of the square roots will be

0.136 x 0.21 = 0.0286

⇒ √13.21 = 3.606 + 0.0286 = 3.635

∴ The square root of 13.21 is 3.635

**18. 21.97**

**Solution:**

We need to find √21.97

From square root table we know,

Square root of 21 and 22 are:

√21 = 4.583 and √22 = 4.690

Their difference = 4.690 – 4.583 = 0.107

Hence, for a difference of 1 (23 – 22), the difference in the value of the square root is 0.107

So,

For the difference of 0.97, the difference in the value of the square roots will be

0.107 x 0.97 = 0.104

⇒ √21.97 = 4.583 + 0.104 = 4.687

∴ The square root of 21.97 is 4.687

**19. 110**

**Solution:**

We know that,

110 = 11 x 10

So, √110 = √11 x √10

From square root table we know,

Square root of 11 and 10 are:

√11 = 3.317 and √10 = 3.162

⇒ √110 = 3.317 x 3.162 = 10.488

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∴ The square root of 110 is 10.488

**20. 1110**

**Solution:**

We know that,

1110 = 37 x 30

So, √1110 = √37 x √30

From square root table we know,

Square root of 37 and 30 are:

√37 = 6.083 and √30 = 5.477

⇒ √1110 = 6.083 x 5.477 = 33.317

∴ The square root of 1110 is 33.317

**21. 11.11**

**Solution:**

We need to find √11.11

From square root table we know,

Square root of 11 and 12 are:

√11 = 3.317 and √12 = 3.464

Their difference = 3.464 – 3.317 = 0.147

Hence, for a difference of 1 (12 – 11), the difference in the value of the square root is 0.147

So,

For the difference of 0.11, the difference in the value of the square roots will be

0.11 x 0.147 = 0.01617

⇒ √11.11 = 3.317 + 0.0162 = 3.333

∴ The square root of 11.11 is 3.333

**22. The area of a square field is 325m$^2$. Find the approximate length of one side of the field.**

**Solution:**

We know that the given area of the field = 325 m$^2$

To find the approximate length of the side of the field we will have to calculate the square root of 325

√325 = √25 x √13

From the square root table, we know

√25 = 5 and √13 = 3.606

⇒ √325 = 5 x 3.606 = 18.030

∴ The approximate length of one side of the field is 18.030 m

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**23. Find the length of a side of a square, whose area is equal to the area of a rectangle with sides 240 m and 70 m.**

**Solution:**

We know that from the question,

Area of square = Area of rectangle

$Side^2 = 240 \times 70$

$Side = \sqrt{(240 \times 70)}$

$= \sqrt{(10 \times 10 \times 2 \times 2 \times 2 \times 3 \times 7)}$

$= 20\sqrt{42}$

Now, from the square root table, we know $\sqrt{42} = 6.481$

$= 20 \times 6.48$

$= 129.60$ m

$\therefore$ The length of side of the square is 129.60 m

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