$67^2 = 4489$

$667^2 = 444889$

$6667^2 = 44448889$

$66667^2 = 4444488889$

$666667^2 = 444444888889$

The fun is in being able to find out why this happens. May be it would be interesting for you to explore and think about such questions even if the answers come some years later.

pattern.

(i) 111111^2 (ii) 1111111^2

TRY THESE

Can you find the square of the following numbers using the above pattern?

(i) 6666667^2 (ii) 66666667^2

EXERCISE 6.1

1. What will be the unit digit of the squares of the following numbers?

(i) 81 (ii) 272 (iii) 799 (iv) 3853

(v) 1234 (vi) 26387 (vii) 52698 (viii) 99880

(ix) 12796 (x) 55555

2. The following numbers are obviously not perfect squares. Give reason.

(i) 1057 (ii) 23453 (iii) 7928 (iv) 222222

(v) 64000 (vi) 89722 (vii) 222000 (viii) 505050

3. The squares of which of the following would be odd numbers?

(i) 431 (ii) 2826 (iii) 7779 (iv) 82004

4. Observe the following pattern and find the missing digits.

$11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 1 \ldots\ldots\ldots 2 \ldots\ldots\ldots 1$

$10000001^2 = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

5. Observe the following pattern and supply the missing numbers.

$11^2 = 1\ 2\ 1$

$101^2 = 1\ 0\ 2\ 0\ 1$

$10101^2 = 102030201$

$1010101^2 = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

$\ldots\ldots\ldots\ldots^2 = 10203040504030201$

6. Using the given pattern, find the missing numbers.

$1^2 + 2^2 + 2^2 = 3^2$

$2^2 + 3^2 + 6^2 = 7^2$

$3^2 + 4^2 + 12^2 = 13^2$

$4^2 + 5^2 + \_^2 = 21^2$

$5^2 + \_^2 + 30^2 = 31^2$

$6^2 + 7^2 + \_^2 = \_\_^2$

To find pattern

Third number is related to first and second number. How?

Fourth number is related to third number. How?

7. Without adding, find the sum.

(i) $1 + 3 + 5 + 7 + 9$

(ii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$

(iii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23$

8. (i) Express 49 as the sum of 7 odd numbers.

(ii) Express 121 as the sum of 11 odd numbers.

9. How many numbers lie between squares of the following numbers?

(i) 12 and 13 (ii) 25 and 26 (iii) 99 and 100

6.4 Finding the Square of a Number

Squares of small numbers like 3, 4, 5, 6, 7, ... etc. are easy to find. But can we find the square of 23 so quickly?

The answer is not so easy and we may need to multiply 23 by 23.

There is a way to find this without having to multiply 23×23.

We know $23 = 20 + 3$

Therefore $23^2 = (20 + 3)^2 = 20(20 + 3) + 3(20 + 3)$

$= 20^2 + 20 \times 3 + 3 \times 20 + 3^2$

$= 400 + 60 + 60 + 9 = 529$

Example 1: Find the square of the following numbers without actual multiplication.

(i) 39 (ii) 42

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Hence, the required square number is $90 \times 10 = 900$.

EXERCISE 6.3

1. What could be the possible 'one's' digits of the square root of each of the following numbers?
   (i) 9801 (ii) 99856 (iii) 998001 (iv) 657666025
2. Without doing any calculation, find the numbers which are surely not perfect squares.
   (i) 153 (ii) 257 (iii) 408 (iv) 441
3. Find the square roots of 100 and 169 by the method of repeated subtraction.
4. Find the square roots of the following numbers by the Prime Factorisation Method.
   (i) 729 (ii) 400 (iii) 1764 (iv) 4096
   (v) 7744 (vi) 9604 (vii) 5929 (viii) 9216
   (ix) 529 (x) 8100
5. For each of the following numbers, find the smallest whole number by which it should be multiplied so as to get a perfect square number. Also find the square root of the square number so obtained.
   (i) 252 (ii) 180 (iii) 1008 (iv) 2028
   (v) 1458 (vi) 768
6. For each of the following numbers, find the smallest whole number by which it should be divided so as to get a perfect square. Also find the square root of the square number so obtained.
   (i) 252 (ii) 2925 (iii) 396 (iv) 2645
   (v) 2800 (vi) 1620
7. The students of Class VIII of a school donated ₹ 2401 in all, for Prime Minister'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.

plants are to be planted in a garden in such a way that each row contains as plants as the number of rows. Find the number of rows and the number of in each row.
he smallest square number that is divisible by each of the numbers 4, 9 and 10.
he smallest square number that is divisible by each of the numbers 8, 15 and 20.

nding square root by division method

umbers are large, even the method of finding square root by prime factorisation ngthy and difficult. To overcome this problem we use Long Division Method.

we need to determine the number of digits in the square root.
ollowing table:

ber	Square	
)	100	which is the smallest 3-digit perfect square
l	961	which is the greatest 3-digit perfect square
2	1024	which is the smallest 4-digit perfect square
9	9801	which is the greatest 4-digit perfect square

vhat can we say about the number of digits in the square root if a perfect