CHAPTER 3
SQUARE AND SQUARE ROOT

Question 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) 20387
(vii) 52698
(viii) 99880
(ix) 12796
(x) 55555
Solution:
(i) Unit digit of 81^2 = 1
(ii) Unit digit of 272^2 = 4
(iii) Unit digit of 799^2 = 1
(iv) Unit digit of 3853^2 = 9
(v) Unit digit of 1234^2 = 6
(vi) Unit digit of 26387^2 = 9
(vii) Unit digit of 52698^2 = 4
(viii) Unit digit of 99880^2 = 0
(ix) Unit digit of 12796^2 = 6
(x) Unit digit of 55555^2 = 5

Question 2.
The following numbers are not perfect squares. Give reason.
(i) 1057
(ii) 23453
(iii) 7928
(iv) 222222
(v) 64000
(vi) 89722
(vii) 222000
(viii) 505050
Solution:
(i) 1057 ends with 7 at unit place. So it is not a perfect square number.
(ii) 23453 ends with 3 at unit place. So it is not a perfect square number.
(iii) 7928 ends with 8 at unit place. So it is not a perfect square number.
(iv) 222222 ends with 2 at unit place. So it is not a perfect square number.

(v) 64000 ends with 3 zeros. So it cannot a perfect square number.
(vi) 89722 ends with 2 at unit place. So it is not a perfect square number.

(vii) 22000 ends with 3 zeros. So it can not be a perfect square number.
(viii) 505050 ends with 1 zero. So it is not a perfect square number.

Question 3.
The squares of which of the following would be odd numbers?
(i) 431
(ii) 2826
(iii) 7779
(iv) 82004
Solution:
(i) 431^2 is an odd number.
(ii) 2826^2 is an even number.
(iii) 7779^2 is an odd number.
(iv) 82004^2 is an even number.

Question 4.
Observe the following pattern and find the missing digits.
$11^2 = 121$
$101^2 = 10201$
$1001^2 = 1002001$
100001^2 = 1…2…1
10000001^2 = ………
Solution:
According to the above pattern, we have
$100001^2 = 10000200001$
$10000001^2 = 100000020000001$

Question 5.
Observe the following pattern and supply the missing numbers.
$11^2 = 121$
$101^2 = 10201$
$10101^2 = 102030201$
1010101^2 = ……….
……….^{2} = 10203040504030201
Solution:
According to the above pattern, we have
$1010101^2 = 1020304030201$
$101010101^2 = 10203040504030201$

Question 6.
Using the given pattern, find the missing numbers.
$1^2 + 2^2 + 2^2 = 3^2$
$2^2 + 3^2 + 6^2 = 7^2$
$3^2 + 4^2 + 12^2 = 13^2$
$4^2 + 5^2 + ...^2 = 21^2$
$5^2 + ...^2 + 30^2 = 31^2$
$6^2 + 7^2 + ...^2 = ...^2$
Solution:
According to the given pattern, we have
$4^2 + 5^2 + 20^2 = 21^2$
$5^2 + 6^2 + 30^2 = 31^2$
$6^2 + 7^2 + 42^2 = 43^2$

Question 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
Solution:
We know that the sum of n odd numbers = n^2
(i) $1 + 3 + 5 + 7 + 9 = (5)^2 = 25$ [$\because n = 5$]
(ii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = (10)^2 = 100$ [$\because n = 10$]
(iii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 = (12)^2 = 144$ [$\because n = 12$]

Question 8.
(i) Express 49 as the sum of 7 odd numbers.
(ii) Express 121 as the sum of 11 odd numbers.
Solution:
(i) 49 = 1 + 3 + 5 + 7 + 9 + 11 + 13 (n = 7)
(ii) 121 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 (n = 11)

Question 9.
How many numbers lie between squares of the following numbers?
(i) 12 and 13
(ii) 25 and 26
(iii) 99 and 100.
Solution:
(i) We know that numbers between n^2 and $(n + 1)^2 = 2n$
Numbers between 12^2 and $13^2 = (2n) = 2 \times 12 = 24$
(ii) Numbers between 25^2 and $26^2 = 2 \times 25 = 50$ ($\because n = 25$)
(iii) Numbers between 99^2 and $100^2 = 2 \times 99 = 198$ ($\because n = 99$)

Q1 : 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

Answer :

We know that if a number has its unit's place digit as *a*, then its square will end with the unit digit of the multiplication *a* x *a*.

(i) 81

Since the given number has its unit's place digit as 1, its square will end with the unit digit of the multiplication (1 x 1 = 1) i.e., 1.

(ii) 272

Since the given number has its unit's place digit as 2, its square will end with the unit digit of the multiplication (2 x 2 = 4) i.e., 4.

(iii) 799

Since the given number has its unit's place digit as 9, its square will end with the unit digit of the multiplication (9 x 9 = 81) i.e., 1.

(iv) 3853

Since the given number has its unit's place digit as 3, its square will end with the unit digit of the multiplication (3 x 3 = 9) i.e., 9.

(v) 1234

Since the given number has its unit's place digit as 4, its square will end with the unit digit of the multiplication (4 x 4 = 16) i.e., 6.

(vi) 26387

Since the given number has its unit's place digit as 7, its square will end with the unit digit of the multiplication (7 x 7 = 49) i.e., 9.

(vii) 52698

Since the given number has its unit's place digit as 8, its square will end with the unit digit of the multiplication (8 x 8 = 64) i.e., 4.

(viii) 99880

Since the given number has its unit's place digit as 0, its square will have two zeroes at the end. Therefore, the unit digit of the square of the given number is 0.

(xi) 12796

Since the given number has its unit's place digit as 6, its square will end with the unit digit of the multiplication (6 x 6 = 36) i.e., 6.

(x) 55555

Since the given number has its unit's place digit as 5, its square will end with the unit digit of the multiplication (5 x 5 = 25) i.e., 5.

Q2 : 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

Answer :

The square of numbers may end with any one of the digits 0, 1, 5, 6, or 9. Also, a perfect square has even number of zeroes at the end of it.

(i) 1057 has its unit place digit as 7. Therefore, it cannot be a perfect square.

(ii) 23453 has its unit place digit as 3. Therefore, it cannot be a perfect square.

(iii) 7928 has its unit place digit as 8. Therefore, it cannot be a perfect square.

(iv) 222222 has its unit place digit as 2. Therefore, it cannot be a perfect square.

(v) 64000 has three zeros at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(vi) 89722 has its unit place digit as 2. Therefore, it cannot be a perfect square.

(vii) 222000 has three zeroes at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(viii) 505050 has one zero at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

Q3 : The squares of which of the following would be odd numbers?

(i) 431 (ii) 2826

(iii) 7779 (iv) 82004

Answer :

The square of an odd number is odd and the square of an even number is even. Here, 431 and 7779 are odd numbers.

Thus, the square of 431 and 7779 will be an odd number.

Q4 : Observe the following pattern and find the missing digits.

$11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 1...2...1$

$10000001^2 = ...$

Answer :

In the given pattern, it can be observed that the squares of the given numbers have the same number of zeroes before and after the digit 2 as it was in the original number. Therefore,

$100001^2 = 10000200001$

$10000001^2 = 100000020000001$

Q5 : Observe the following pattern and supply the missing number.

$11^2 = 121$

$101^2 = 10201$

$10101^2 = 102030201$

$1010101^2 = ...$

$...^2 = 10203040504030201$

Answer :

By following the given pattern, we obtain

$1010101^2 = 1020304030201$

$101010101^2 = 10203040504030201$

Q6 : Using the given pattern, find the missing numbers.

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

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

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

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

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

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

Answer :

From the given pattern, it can be observed that,

(i) The third number is the product of the first two numbers.

(ii) The fourth number can be obtained by adding 1 to the third number.

Thus, the missing numbers in the pattern will be as follows.

$4^2 + 5^2 + \underline{20^2} = 21^2$

$5^2 + \underline{6^2} + 30^2 = 31^2$

$6^2 + 7^2 + \underline{42^2} = \underline{43^2}$

Q7 : 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

Answer :

We know that the sum of first n odd natural numbers is n^2.

(i) Here, we have to find the sum of first five odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 = (5)^2 = 25$

(ii) Here, we have to find the sum of first ten odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = (10)^2 = 100$

(iii) Here, we have to find the sum of first twelve odd natural numbers.

Therefore, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 +17 + 19 + 21 + 23 = (12)^2 = 144$

Q8 : (i) Express 49 as the sum of 7 odd numbers.

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

Answer :

We know that the sum of first n odd natural numbers is n^2.

(i) $49 = (7)^2$

Therefore, 49 is the sum of first 7 odd natural numbers.

$49 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) $121 = (11)^2$

Therefore, 121 is the sum of first 11 odd natural numbers.

$121 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$

Q9 : How many numbers lie between squares of the following numbers?

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

Answer :

We know that there will be 2*n* numbers in between the squares of the numbers *n* and (*n* + 1).

(i) Between 12^2 and 13^2, there will be 2 x 12 = 24 numbers

(ii) Between 25^2 and 26^2, there will be 2 x 25 = 50 numbers

(iii) Between 99^2 and 100^2, there will be 2 x 99 = 198 numbers