## 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

Solution:
The unit digit of square of a number having 'a' at its unit place ends with $a \times a$.
i. The unit digit of the square of a number having digit 1 as unit's place is 1 .
$\therefore$ Unit digit of the square of number 81 is equal to 1 .
ii. The unit digit of the square of a number having digit 2 as unit's place is 4 .
$\therefore$ Unit digit of the square of number 272 is equal to 4 .
iii. The unit digit of the square of a number having digit 9 as unit's place is 1 .
$\therefore$ Unit digit of the square of number 799 is equal to 1.
iv. The unit digit of the square of a number having digit 3 as unit's place is 9 .
$\therefore$ Unit digit of the square of number 3853 is equal to 9 .
$v$. The unit digit of the square of a number having digit 4 as unit's place is 6 .
$\therefore$ Unit digit of the square of number 1234 is equal to 6 .
vi. The unit digit of the square of a number having digit 7 as unit's place is 9 .
$\therefore$ Unit digit of the square of number 26387 is equal to 9 .
vii. The unit digit of the square of a number having digit 8 as unit's place is 4 .
$\therefore$ Unit digit of the square of number 52698 is equal to 4 .
viii. The unit digit of the square of a number having digit 0 as unit's place is 01 .
$\therefore$ Unit digit of the square of number 99880 is equal to 0 .
ix. The unit digit of the square of a number having digit 6 as unit's place is 6 .
$\therefore$ Unit digit of the square of number 12796 is equal to 6 .
$x$. The unit digit of the square of a number having digit 5 as unit's place is 5 .
$\therefore$ Unit digit of the square of number 55555 is equal to 5 .
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

## Solution:

We know that natural numbers ending in the digits $0,2,3,7$ and 8 are not perfect squares.
i. $1057 \Rightarrow$ Ends with 7
ii. $23453 \Rightarrow$ Ends with 3
iii. $7928 \Rightarrow$ Ends with 8
iv. $222222 \Rightarrow$ Ends with 2
v. $64000 \Rightarrow$ Ends with 0
vi. $89722 \Rightarrow$ Ends with 2
vii. $222000 \Rightarrow$ Ends with 0
viii. $505050 \Rightarrow$ Ends with 0
3. The squares of which of the following would be odd numbers?
i. 431
ii. 2826
iii. 7779
iv. 82004

Solution:
We know that the square of an odd number is odd and the square of an even number is even.
i. The square of 431 is an odd number.
ii. The square of 2826 is an even number.
iii. The square of 7779 is an odd number.
iv. The square of 82004 is an even number.
4. Observe the following pattern and find the missing numbers. $11^{2}=121$
$101^{2}=10201$
$1001^{2}=1002001$
$100001 ²^{2}=1$....... $2 . . . . . . . . . ~ 1 ~$
$10000001^{2}=$ $\qquad$
Solution:
We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1 and middle digit is 2 . And the number of zeros between left most digits 1 and the middle digit 2 and right most digit 1 and the middle digit 2 is same as the number of zeros in the given number.
$\therefore 100001^{2}=10000200001$
$10000001^{2}=100000020000001$
5. Observe the following pattern and supply the missing numbers. $112=121$
$1012=10201$
$101012=102030201$
$10101012=$ $\qquad$
............ $2=10203040504030201$
Solution:
We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1 . And, the square is symmetric about the middle digit. If the middle digit is 4 , then the number to be squared is 10101 and its square is 102030201.
So, $10101012=1020304030201$
$1010101012=10203040505030201$
6. Using the given pattern, find the missing numbers. $1^{2}+2^{2}+2^{2}=3^{2}$
$2^{2}+3^{2}+6^{2}=7^{2}$
$3^{2}+4^{2}+12^{2}=13^{2}$
$4^{2}+5^{2}+2=21^{2}$
$5+{ }_{-}{ }^{2}+30^{2}=31^{2}$
$6+7+{ }^{2}={ }^{2}$

## Solution:

Given, $1^{2}+2^{2}+2^{2}=3^{2}$
i.e $1^{2}+2^{2}+(1 \times 2)^{2}=\left(1^{2}+2^{2}-1 \times 2\right)^{2}$
$2^{2}+3^{2}+6^{2}=7^{2}$
$\therefore 2^{2}+3^{2}+(2 \times 3)^{2}=\left(2^{2}+3^{2}-2 \times 3\right)^{2}$
$3^{2}+4^{2}+12^{2}=13^{2}$
$\therefore 3^{2}+4^{2}+(3 \times 4)^{2}=\left(3^{2}+4^{2}-3 \times 4\right)^{2}$
$4^{2}+5^{2}+(4 \times 5)^{2}=\left(4^{2}+5^{2}-4 \times 5\right)^{2}$
$\therefore 4^{2}+5^{2}+20^{2}=21^{2}$
$5^{2}+6^{2}+(5 \times 6)^{2}=\left(5^{2}+6^{2}-5 \times 6\right)^{2}$
$\therefore 5^{2}+6^{2}+30^{2}=31^{2}$
$6^{2}+7^{2}+(6 \times 7)^{2}=\left(6^{2}+7^{2}-6 \times 7\right)^{2}$
$\therefore 6^{2}+7^{2}+42^{2}=43^{2}$
7. Without adding, find the sum.
i. $1+3+5+7+9$

Solution:
Sum of first five odd number $=(5)^{2}=25$
ii. $1+3+5+7+9+11+13+15+17+19$

Solution:
Sum of first ten odd number $=(10)^{2}=100$
iii. 1 + 3 + 5 + $7+9+11+13+15+17+19+21+23$

Solution:
Sum of first thirteen odd number $=(12)^{2}=144$
8. (i) Express 49 as the sum of 7 odd numbers.

## Solution:

We know, sum of first n odd natural numbers is $\mathrm{n}^{2}$. Since, $49=72$
$\therefore 49=$ sum of first 7 odd natural numbers $=1+3+5+7+9+11+13$
(ii) Express 121 as the sum of 11 odd numbers.

## Solution:

Since, $121=11^{2}$
$\therefore 121=$ sum of first 11 odd natural numbers $=1+3+5+7+9+11+13+15+17+19+21$
9. How many numbers lie between squares of the following numbers?
i. 12 and 13
ii. 25 and 26
iii. 99 and 100

Solution:

Between $n^{2}$ and $(n+1)^{2}$, there are $2 n$ non-perfect square numbers.
i. 122 and 132 there are $2 \times 12=24$ natural numbers.
ii. 252 and 262 there are $2 \times 25=50$ natural numbers.
iii. 992 and 1002 there are $2 \times 99=198$ natural numbers.

