**Some Basic Formulae:**

1. (*a* + *b*)(*a* - *b*) = (*a*2 - *b*2)
2. (*a* + *b*)2 = (*a*2 + b2 + 2*ab*)
3. (*a* - *b*)2 = (*a*2 + b2 - 2*ab*)
4. (*a* + *b* + *c*)2 = *a*2 + b2 + *c*2 + 2(*ab* + *bc* + *ca*)
5. (*a*3 + *b*3) = (*a* + *b*)(*a*2 - *ab* + *b*2)
6. (*a*3 - *b*3) = (*a* - *b*)(*a*2 + *ab* + *b*2)
7. (*a*3 + *b*3 + *c*3 - 3*abc*) = (*a* + *b* + *c*)(*a*2 + *b*2 + *c*2 - *ab* - *bc* - *ac*)
8. When *a* + *b* + *c* = 0, then *a*3 + *b*3 + *c*3 = 3*abc*.

**Divisibility-**

Following are tips to check divisibility of numbers.

1. **Divisibility for 2** - A number is divisible by 2 if its unit digit is 0,2,4,6 or 8.
2. **Divisibility for 3** - A number is divisible by 3 if sum of its digits is completely divisible by 3.
3. **Divisibility for 4** - A number is divisible by 4 if number formed using its last two digits is completely divisible by 4.
4. **Divisibility for 5** - A number is divisible by 5 if its unit digit is 0 or 5.
5. **Divisibility for 6** - A number is divisible by 6 if the number is divisible by both 2 and 3.
6. **Divisibility for 8** - A number is divisible by 8 if number formed using its last three digits is completely divisible by 8.
7. **Divisibility for 9** - A number is divisible by 9 if sum of its digits is completely divisible by 9.
8. **Divisibility for 10** - A number is divisible by 10 if its unit digit is 0.
9. **Divisibility for 11** - A number is divisible by 11 if difference between sum of digits at odd places and sum of digits at even places is either 0 or is divisible by 11.

Finding the Unit Digit

**Cyclicity Table**

The concepts discussed above are summarized in the given table.

|  |  |  |
| --- | --- | --- |
| **Number** | **Cyclicity** | **Power Cycle** |
| 1 | 1 | 1 |
| 2 | 4 | 2, 4, 8, 6 |
| 3 | 4 | 3, 9, 7, 1 |
| 4 | 2 | 4, 6 |
| 5 | 1 | 5 |
| 6 | 1 | 6 |
| 7 | 4 | 7, 9, 3, 1 |
| 8 | 4 | 8, 4, 2, 6 |
| 9 | 2 | 9, 1 |
| 10 | 1 | 0 |

L=unit digit of given number

R= remainder when power is divided by cyclic value

Unit Digit = L^R

Cases when remainder is (R) = 0

1. If L = 2,4,6,8 UD=6
2. If L = 3,7,9 UD = 0
3. If L = 5 UD = 5