

→ for / while

→ if else

→ var type

 ↳ (int)

→ input

 ↳ Scanner

→ output

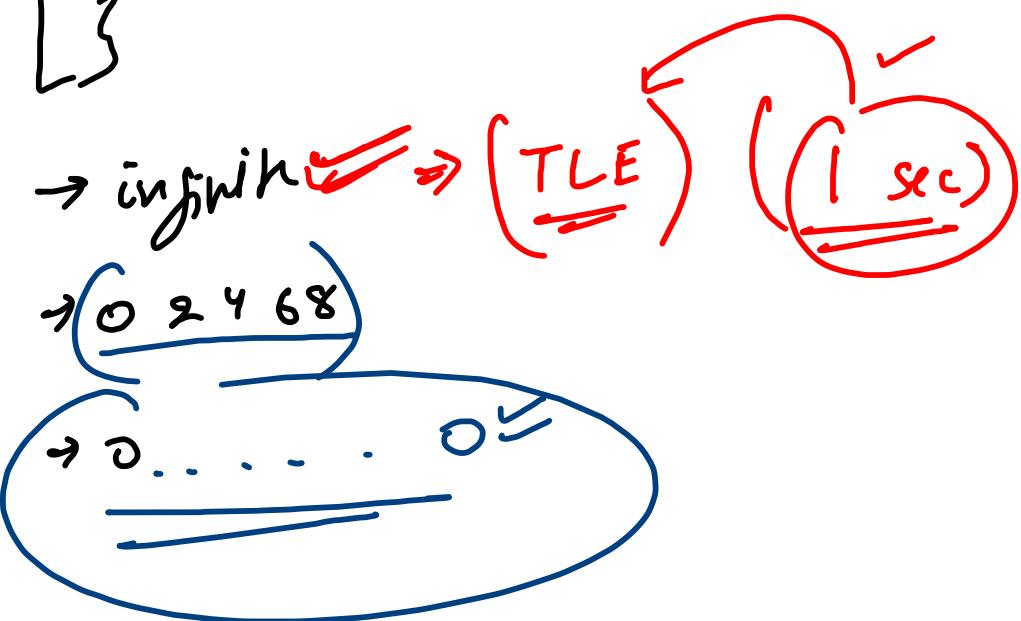
 ↳ Sys

```

for (int I i=0; i<10; i = i*2) {
    System.out.println(i);
}

```

$$i = 0 \times 2 = 0$$



```

int i = 5
for ( ; true; ) {
    if (i > 10) {
        break;
    }
    System.out.println(i);
    i = i + 3;
}

```

~~j = 5~~
~~i = 5 < 8~~
~~(iii) ||~~

i = 5
 8
 .|| 5
 .|| 8

loops / iterative → for / while

int i;

→ for (i=0 ; i<lo ; i=i+1) {
System.out.println(i);
}

lo

10

i=0 X X X X X X X X X X 10

→ int i=10; ↘

→ for (~~i=0~~ i=0 ; i<lo ; i=i+1) {
System.out.println(i);
}

Error
→ (cannot find symbol)

Input
↳ number



65784383

1
5
7
8
4
3
8
3

~~(no of digit)~~ \rightarrow $m-1$

$$10^{m-1} \Rightarrow 10^{4-1} \Rightarrow \overbrace{10^3}$$

Input Output

1234 \Rightarrow 1
 2
 3
 4

I $\left[\begin{array}{l} \underline{1234} / \underline{1000} = 1 \\ 1234 / .1000 = 234 \end{array} \right] \Rightarrow 1$

~~(no of digits)~~

(Math. pow(10, 3))

10^3

II $\left[\begin{array}{l} \underline{234} / \underline{100} = 2 \\ 234 / .100 = 34 \end{array} \right] \Rightarrow 2$

III $\left[\begin{array}{l} \underline{34} / \underline{10} = \frac{3}{4} \\ 34 / .10 = \frac{34}{10} \end{array} \right] = 3$

IV $\left[\begin{array}{l} \underline{9} / \underline{1} = \frac{9}{10} \\ 9 / .1 = \frac{90}{10} \end{array} \right] = 7$

```

Count++;
Count = Count + 1;
int num = scn.nextInt(); // 1234

```

// Logic

```

// 1. count of digits
int temp = num;
int count = 0;

while(temp != 0){
    temp = temp / 10;
    count++;
}

```

temp
1234
↓
123
↓
12
↓
1
↓
0

$$123\cancel{4}/10 = 123.\cancel{4}$$

≈ 123

num: 1234

$$\boxed{\begin{array}{c} \text{Count} = \cancel{0} \times \cancel{1} \times \cancel{2} \times \cancel{4} \\ \hline \end{array}}$$

$$\left(\cancel{\text{no. of digits}} \right) = 4$$

$$\boxed{\underline{\underline{\text{div} = 1000}}}$$

	num	div	num/div	num % div
I	1234	1000	$1234/1000 = 1$	$1234 \% 1000 = 234$
II	234	100	$234/100 = 2$	$234 \% 100 = 34$
	34			

```

int num = scn.nextInt(); // 1200
// logic

// 1. count of digits
int temp = num;
int count = 0;

while(temp != 0){
    temp = temp / 10;
    count++;
}

while(div != 0){
    int digit = num / div;
    System.out.println(digit);

    // preparation for next iteration
    num = num % div;
    div = div / 10;
}

```

Count = 4

↓ ↓ ↓ ↓

num	div	num/div	anum'.div
1200	1000	1	200
200	100	2	0
0	10	0	0
0	1	0	0
0	0	-	-

num = 1200
 Count = 4
 div = $10^3 = 1000$

1
2
0
0

~~type cast~~ → Compiles → int.

int div = (int) Math.pow(10, count-1);

return double

Datatypes

→ int → 1, 12, 13, 14

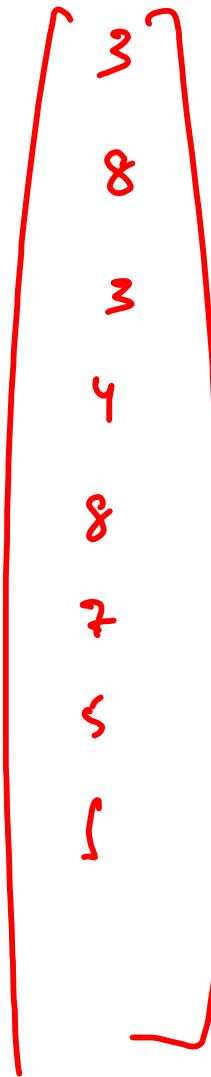
→ double / float → 0.01, 12.38,

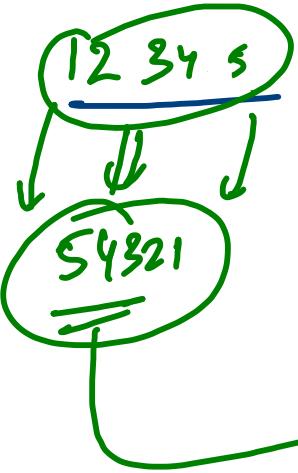
→ boolean → true, false

→ char = 'a', 'b'

→ string = "abcd"

65784383





$\rightarrow \checkmark 5 \checkmark$
 $\checkmark 4 \checkmark$
 $\checkmark 3 \checkmark$
 $\checkmark 2 \checkmark$
 $\checkmark 1 \checkmark$

digit ↗ *num* ↘

num	num $\cdot 10$	num/ 10
12345	$12345 \cdot 10 = 5$	$12345 / 10 = 1234$
1234	$1234 \cdot 10 = 4$	$1234 / 10 = 123$
123	$123 \cdot 10 = 3$	$123 / 10 = 12$
12	$12 \cdot 10 = 2$	$12 / 10 = 1$
1	$1 \cdot 10 = 1$	$1 / 10 = 0$

logic

rotate a number

→ number
→ rotate

5 6 2 9 8 4

rotation
→ -ve
→ +ve
→ k can be very large

562984
2

4 5 6 2 9 8

8 4 5 6 2 9

true rotation n. \Rightarrow k%n \Rightarrow

-8%5 \Rightarrow -2

$$K = 31 \\ = 30 + 1 \\ = 6(5) + 1 \\ \frac{6}{5} \text{ trn}$$

0 = 1 2 3 4 5
+1 = 5 1 2 3 4
+2 = 4 5 1 2 3
+3 = 3 4 5 1 2
+4 = 2 3 4 5 1
+5 = 1 2 3 4 5
6%5=1+6 = 5 1 2 3 4
8%5=2+7 = 4 5 1 2 3

+5
+1 = -1 = 2 3 4 5 1
+2 = -2 = 3 4 5 1 2
+3 = -3 = 4 5 1 2 3
+4 = -4 = 5 1 2 3 4
-5 = 1 2 3 4 5
-6 = 2 3 4 5 1
-7 = 3 4 5 1 2

Quotient K=-3
(i) Tryn K=-3
(ii) -k K, K=+4

Counters, K=-81
B (i) -k K, K=-26
(ii) Tryn, K=-1

C $\left[\begin{matrix} A/B \\ \times \end{matrix} \right]$

```

Scanner scn = new Scanner(System.in);
int n = scn.nextInt(); // 12345
int k = scn.nextInt(); // 13

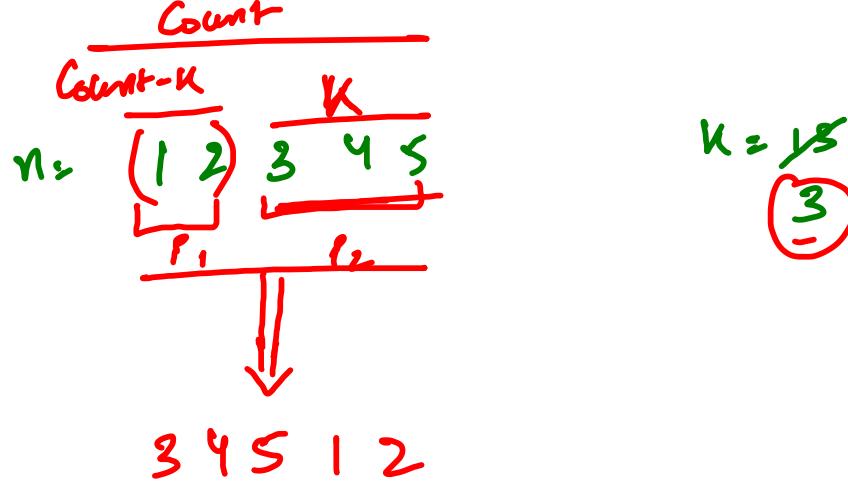
// Logic
// 0. number of digits
int tmp = n, count = 0;

while(tmp != 0){
    tmp = tmp/10;
    count++;
}

// 1. true rotation number
k = k % count;

// 2. handle -ve rotation
if(k < 0){
    k = k + count;
}

```



$$\left[
 \begin{array}{l}
 \frac{\text{num} / 10^K}{12345 / 100} = 12(P_1) \\
 \frac{\text{num} / 10^K}{12345 / 1000} = 345(P_2)
 \end{array}
 \right]$$

$$\begin{array}{r}
 345 \times \underline{100} \rightarrow 34500 \\
 + 12 \\
 \hline
 34512
 \end{array}$$

$$\underline{\underline{P_2 \times 100 + P_1 \rightarrow (345 \times 100) + 12 \rightarrow 34500 + 12 \rightarrow 34512}}$$

n = 12345

k = 3

Count = 5

$$\text{div} = 10^3 = \underline{1000}$$

$$P_1 = 12345 / 1000 = 12$$

$$P_2 = 12345 \mod 1000 = 345$$

$$\text{mul} = 10^{5-3} = 10^2 = 100$$

$$\text{ans} = \underline{(345 \times 100)} + 12$$

$$\Rightarrow 34500 + 12$$

$$\Rightarrow \underline{\underline{34512}} =$$

```

// 3. num : p1 + p2 #split
int div = (int) Math.pow(10, k);
int p1 = n / div;
int p2 = n % div;

// 4. ans : p2p1 #merge
int mul = (int) Math.pow(10, count - k);
int ans = (p2 * mul) + p1;

System.out.println(ans);

```

34512



$$\left(\underline{p_2} \times \underline{10000} + p_1 \right)$$

5680000

$$\begin{array}{r}
 +1237 \\
 \hline
 \underline{\underline{5681237}}
 \end{array}$$


```

int num1 = scn.nextInt();    30
int num2 = scn.nextInt();    18

// Logic
int tn1 = num1, tn2 = num2;

while(tn1 % tn2 != 0){
    int rem = tn1%tn2;
    tn1 = tn2;
    tn2 = rem;
}
int gcd = tn2;

```

t_{n_1}	$+t_{n_2}$	(rem) t_{n_1}, t_{n_2}
30	18	12
18	12	6
12	6	0

$$8 \sqrt{30} \quad | \quad 1$$

$$\underline{18}$$

$$12$$

$$12 \sqrt{18} \quad | \quad 1$$

$$\underline{12}$$

$$6$$

$$6 \sqrt{12} \quad | \quad 2$$

$$\underline{12}$$

$$0$$

```

int a = scn.nextInt();
int b = scn.nextInt();
int c = scn.nextInt();

// a is largest side
boolean exp1 = ((a*a) == ((b*b)+(c*c)));

// b is largest side
boolean exp2 = ((b*b) == ((a*a)+(c*c)));

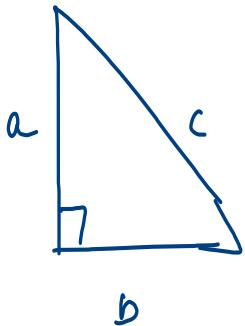
// c is largest side
boolean exp3 = ((c*c) == ((b*b)+(a*a)));

boolean isTriplet = exp1 || exp2 || exp3;

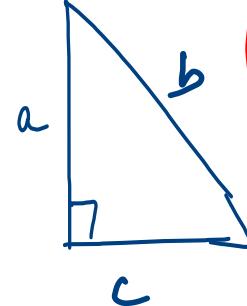
System.out.println(isTriplet);

```

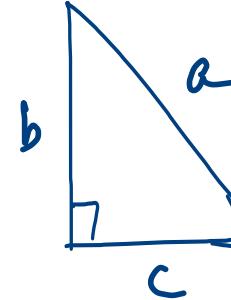
5 3 4



$$c^2 = a^2 + b^2 \quad E1$$



$$b^2 = a^2 + c^2 \quad E2$$



$$a^2 = b^2 + c^2 \quad E3$$