

Operators

+	addition	$(10+20) = 30$
-	subtraction	$(20-10) = 10, (10-20) = -10$
*	multiplication	$(10 \times 20) = 200$
/	division	$(20/2) = 10$ (floor value)
%	modulo	$(5\%2) = 1$ ↓ no just before decimal

```
public static void main(String[] args){  
    System.out.println(x: "10+20");  
    System.out.println(10+20);  
}
```

constant values / literals

`System.out.print("10+20" + 30 + 10);`
→ 10+203010

```
System.out.println(10-20); → -10  
System.out.println(10*20); // 200 → 200  
System.out.println(5/2); → 2 [2.5] = 2  
System.out.println(4/2); → 2
```

% \Rightarrow remainder as output

$$3 \div 2 \Rightarrow 2 \times 1 + 1 \Rightarrow 1$$

quotient remainder

$$19 \div 3 \Rightarrow 6 \times 3 + 1 \Rightarrow 1$$

$$24 \div 5 \Rightarrow 4 \times 5 + 4 \Rightarrow 4$$

$$30 \div 5 \Rightarrow 6 \times 5 + 0 = 0$$

$$a \% n \Rightarrow$$

$$\min = 0$$

$$\max = n - 1$$

$1 \% 5 \rightarrow 1$	$6 \% 5 \rightarrow 1$
$2 \% 5 \rightarrow 2$	$7 \% 5 \rightarrow 2$
$3 \% 5 \rightarrow 3$	$8 \% 5 \rightarrow 3$
$4 \% 5 \rightarrow 4$	$9 \% 5 \rightarrow 4$
$5 \% 5 \rightarrow 0$	$10 \% 5 \rightarrow 0$

$$a \% 10 \Rightarrow 0 \text{ to } 9$$

$$101239 \% 10 = 9$$

$$\downarrow$$

$$10123 \times 10 + 9$$

9 9

$\hookrightarrow ++, --$
 \swarrow increment
 \searrow decrement
 op^+ op^-

$$10++ \Rightarrow 10+1 \Rightarrow 11$$

\rightarrow $=$, $==$
 \downarrow
 assignment op^r compare operator

Literals \Rightarrow fixed value that we use directly

\rightarrow integer
 \rightarrow decimal
 \rightarrow character = 'a', 'b', 'c', 'd' ...

Data Types \Rightarrow

`int a = 10;`
 \swarrow \downarrow \rightarrow assignment op^r
 data types variable name Statement terminator
 \searrow \rightarrow literal / constant value

Primitive

	Type	Default value	Size	Range
numeric value	byte	0	1	2^{n-1} to $2^{n-1} - 1$
	short	0	2	
	int	0	4	
	long	0	8	
decimal value	float = 0.0	0.0	4	
	double = 0.0	0.0	8	
character value	char = 'a', 'b', 'c', 'd', '\$', ''	"	2	
Boolean	Boolean = true, false	false	no size	

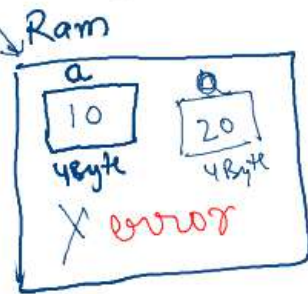
1 \rightarrow 8 Bit

Variables

`int a = 10;`
↑ data type ↑ variable name ↑ literal ↑ terminator
↓
assignment

`int a;` = declaration of variable
↑
`a = 10;` ⇒ initialization

`int a = 20;` `sys0(a);`

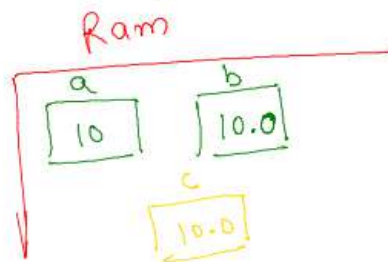


10.0 = double
✓ 10.0f = float
double

`int a = 10;`

✓ `double b = 10.0;`

`float c = 10.0f;`



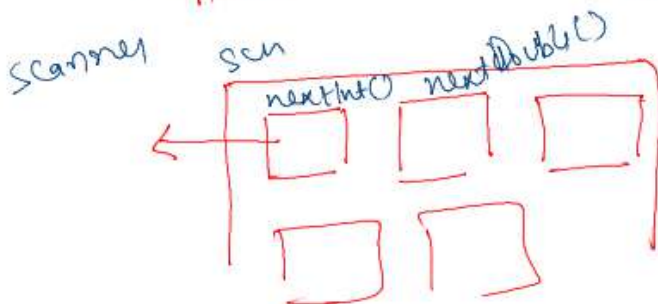
class animal {

// properties

`int height = 25;`
`int weight = 60;` }

Scanner

`Scanner` `scn = new Scanner(System.in);`
 ↓ class name ↓ variable ↓ to allocate memory ↓ class name ↓ take input

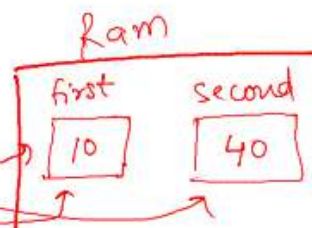


`int a = scn.nextInt();`
`double b = scn.nextDouble();`

```

Scanner scn = new Scanner(System.in);
int first = scn.nextInt();
int second = scn.nextInt();
System.out.println(first+second);
System.out.println(first-second);
  
```

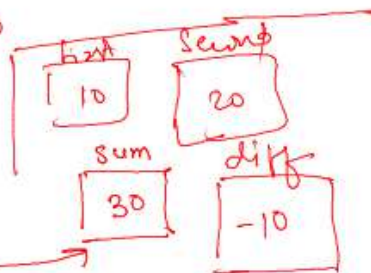
10 40
 10 40
 50



```

Scanner scn = new Scanner(System.in);
int first = scn.nextInt();
int second = scn.nextInt();
int sum = first + second;
int diff = first - second;
System.out.println(sum);
System.out.println(diff);
  
```

-30
 10 20
 10+20
 10-20
 30
 -10

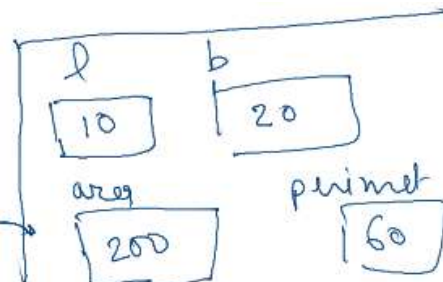


=
 ↓
 assignment


```

Scanner scn = new Scanner(System.in);
int l = scn.nextInt(); ✓
int b = scn.nextInt();
int area = l*b; → 10*20
int perimeter = 2*(l+b); → 2*(10+20)=60
System.out.println(area);
System.out.println(perimeter);

```



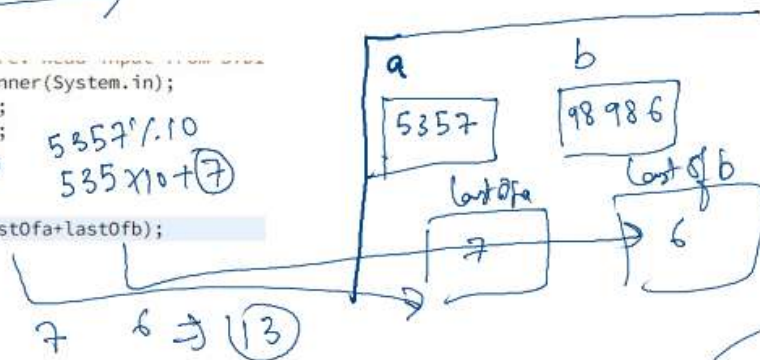
Handwritten calculation for the last digit of 5357:

$$\begin{array}{r}
 535 \\
 10 \overline{) 5357} \\
 \underline{50} \\
 35 \\
 \underline{30} \\
 50 \\
 \underline{50} \\
 0
 \end{array}$$

```

Scanner scn = new Scanner(System.in);
int a = scn.nextInt();
int b = scn.nextInt();
int lastOfa = a%10; → 5357%10 = 7
int lastOfb = b%10; → 98986%10 = 6
System.out.println(lastOfa+lastOfb);

```



Room 48

Handwritten code snippet:

```

System.out.println((10+20)+"10+20");

```

Handwritten calculation for the output of the code snippet:

$$3010+20$$

$$c = \frac{(f-32) \times 5}{9}$$

$$c = \frac{((f-32) \times 5)}{9}$$