

$$(n)_{10} \longrightarrow ( \quad )_b$$

$$( \quad n \quad )_b \longrightarrow ( \quad )_{10}$$

$$(1011101)_2 \longrightarrow (\quad)_{10}$$

1      0      1      1      1      0      1

$$1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$64 + 0 + 16 + 8 + 4 + 0 + 1$$

$$\begin{array}{r} 2 \\ 64 \\ 16 \\ 8 \\ 4 \\ 1 \\ \hline 93 \end{array}$$

$$(162)_8 \rightarrow (114)_{10}$$

$$\begin{array}{r} 1 \\ 64 \\ 48 \\ 2 \\ \hline 114 \end{array}$$

$$1 \times 8^2 + 6 \times 8^1 + 2 \times 8^0 = 64 + 48 + 2 = 114$$

`(int) Mash.pow(b, pow);`

ans = 0

162

162  $\rightarrow$  16  $\times$  10  $= 160$

16  $\rightarrow$  1  $\times$  10  $= 10$

1  $\rightarrow$  1  $\times$  1  $= 1$

162  $\rightarrow$  1  $\times$  100 + 6  $\times$  10 + 2  $\times$  1 = 114

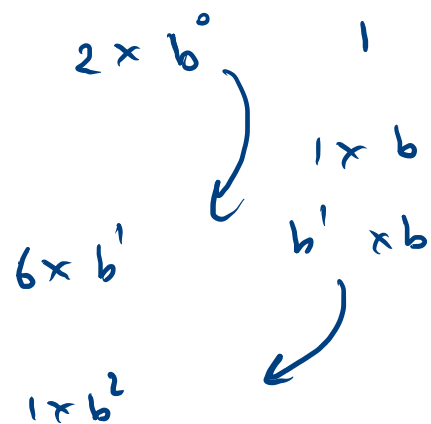
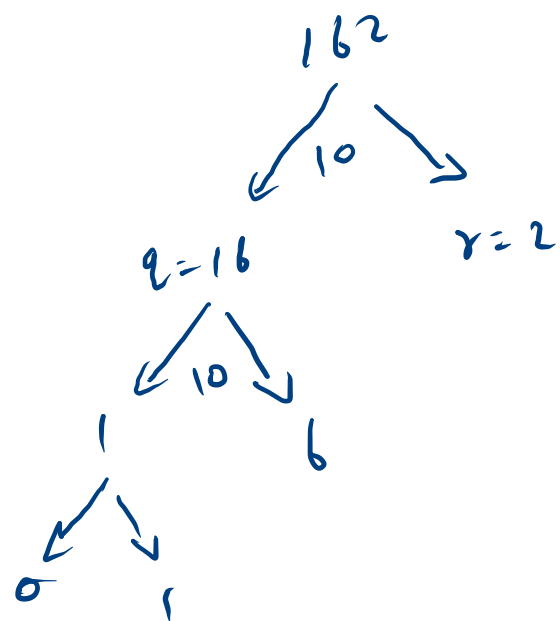
$$(162)_8 \rightarrow (\textcircled{114})_{10}$$

$$1 \quad 6 \quad \textcircled{2}$$

$$1 \times 8^2 + 6 \times 8^1 + 2 \times 8^0$$

$$64 + 48 + 2$$

$$\text{multi} = b^0 = 1$$



$$\text{multi} = 1$$

$$\text{ans} = 0$$

while ( n != 0 ) {

$$q = n / 10$$

$$r = n \% 10$$

$$\text{ans} = \text{ans} + r \times \text{multi}$$

$$\text{multi} = \text{multi} \times b$$

$$n = q$$

}

N.V.

# Any Base To Any Base

$$(n)_{b_1} \longrightarrow (?)_{b_2}$$

$$n = 111001$$

$$b_1 = 2$$

$$b_2 = 3$$

$$(111001)_2$$



$$(?)_3$$

2010

$$b = 8$$

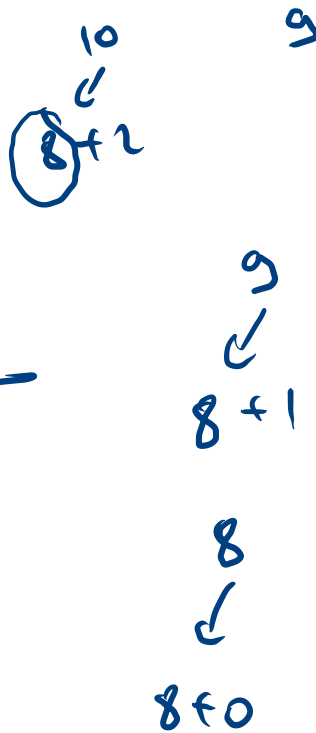
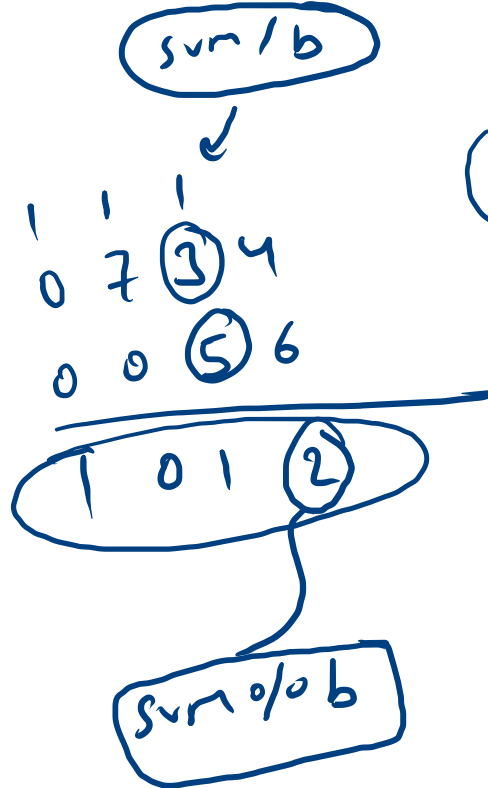
$$h1 = 734$$

$$h2 = 56$$

$$r1$$
  

$$r2$$
  

$$sum = r1 + r2 + carry$$



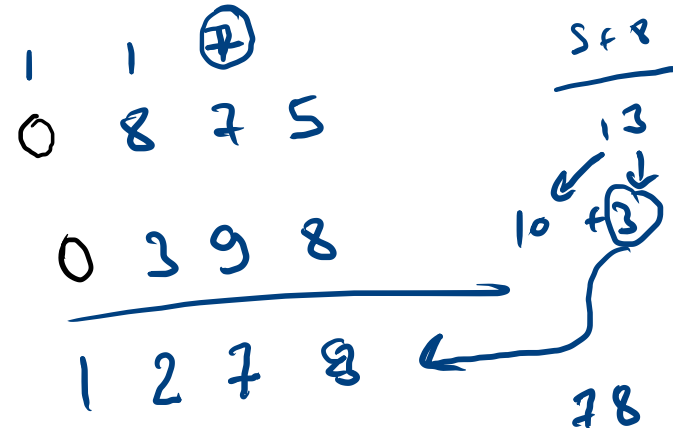
$$19 / 8 \rightarrow 2$$
  

$$19 \div 8 \rightarrow 3$$

$$9 / 8 \rightarrow 1$$
  

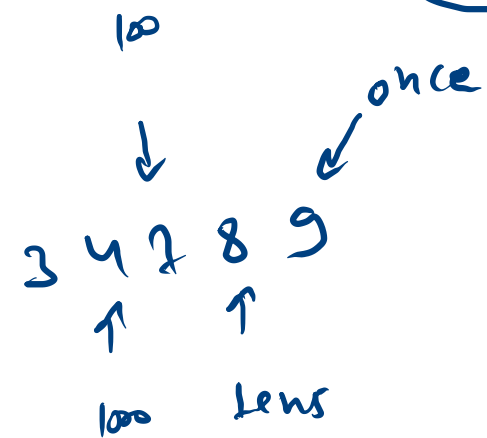
$$9 \div 8 \rightarrow 1$$

$$b = 10$$



$$7(10) + 8$$
  

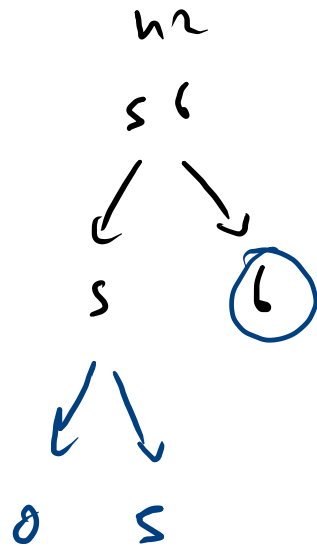
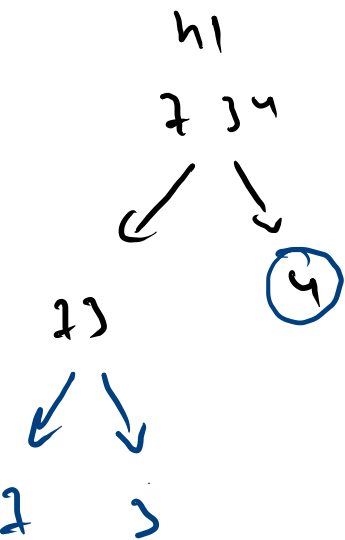
$$10 \div 10 = 1$$



$$b = 8$$

$$n1 = 734$$

$$n2 = 56$$



$$\begin{array}{r} 11 \\ 734 \\ \underline{56} \\ 1012 \end{array}$$

$$\begin{array}{l} 2 \times 10^0 \\ 1 \times 10^1 \\ 0 \times 10^2 \end{array}$$

multi

$$\text{digit} = 2 \times 10^0$$

$$\text{digit} = 1 \times 10^1$$

$$\text{digit} = 0 \times 10^2$$

$$\begin{array}{l} \text{ans} = 0 \\ (\text{ans}) = 0 \\ \text{multi} = 1 // 10^0 \end{array}$$

while ( ??? ) {

$$\begin{array}{l} q1 = n1 / 10 \\ r1 = n1 \% 10 \\ q2 = n2 / 10 \\ r2 = n2 \% 10 \end{array}$$

$$\text{sum} = r1 + r2 + \text{carry}$$

$$\text{digit} = \text{sum} \% b$$

$$\text{carry} = \text{sum} / b$$

$$\text{ans} = \text{ans} + \text{digit} \times \text{multi}$$

$$\text{multi} = \text{multi} \times 10$$

$$\begin{array}{l} n2 = q2 \\ n1 = q1 \end{array}$$

}

$$\begin{array}{r}
 n1 \rightarrow \quad 12 \textcircled{2} \\
 n2 \rightarrow \quad 0 \textcircled{1} \\
 \hline
 124
 \end{array}$$

$n1 > 0 \quad || \quad n2 > 0 \quad || \quad \text{carry} > 0$

$$\begin{array}{r}
 n1 \rightarrow \quad \begin{array}{|c|} \hline 1 \\ \hline 0 \\ \hline 0 \\ \hline \end{array} \begin{array}{c} 9 \\ 0 \\ 0 \end{array} 5 \\
 n2 \rightarrow \quad \begin{array}{|c|} \hline 1 \\ \hline 0 \\ \hline 0 \\ \hline \end{array} \begin{array}{c} 9 \\ 0 \\ 0 \end{array} 5 \\
 \hline
 1 \quad 0 \quad 0
 \end{array}$$



11.5

# Any Base Multiplication

$b = 10$   
 $n1 = 528$   
 $n2 = 34$

$$\begin{array}{r} 528 \leftarrow n1 \\ 134 \leftarrow n2 \\ \hline 12312 \quad \times 10^0 \\ 12340 \quad \times 10^1 \\ 52800 \quad \times 10^2 \\ \hline 26452 \end{array}$$

$$\begin{array}{r} 11 \\ 14 \\ \hline 10+4 \\ 14+2 \\ 16 \\ \hline 10+6 \end{array}$$

$$\begin{array}{r} 233 \\ 528 \\ \hline 2312 \end{array}$$

28+2  
21  
20+2  
23

$$\begin{array}{r} 122 \\ 528 \\ \hline 1734 \end{array}$$

24  
21+2  
23  
17

$$\begin{array}{r} 528 \\ 1 \\ \hline 528 \end{array}$$

$$b = 8$$

$$n1 = 12 \rightarrow (1)_8$$

$$n2 = 324 \rightarrow (1)_8$$

pro = multipl with single digit (b, n1, n2)

ans here addition (b, an1, pro x multi)

$$\textcircled{a \times b} \leftarrow \text{decimal}$$

$$\textcircled{a \times b} \leftarrow$$

$$\begin{array}{r} 12 \leftarrow n1 \\ 324 \leftarrow n2 \\ \hline 50 \times 10^0 \\ + 24 \times 10^1 \\ + 36 \times 10^2 \\ \hline 4110 \end{array}$$

$$\begin{array}{r} 12 \leftarrow n1 \\ 324 \leftarrow n2 \\ \hline 50 \times 10^0 \\ 240 \times 10^1 \\ \hline 310 \\ 3600 \times 10^2 \\ \hline 4110 \leftarrow \end{array}$$

$$\begin{array}{r} 8 \\ 1 \\ 8 + 0 \\ \hline 12 \\ 4 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 12 \\ \times 2 \\ \hline 24 \end{array}$$

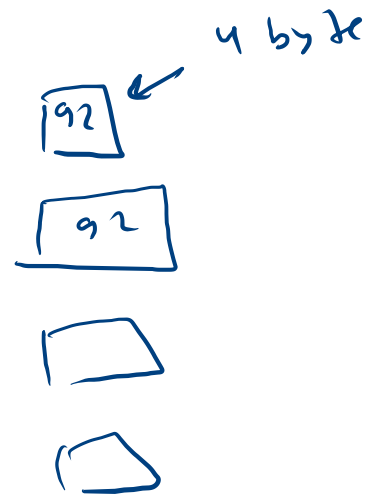
$$\begin{array}{r} 12 \\ 3 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 1310 \\ 3600 \\ \hline 4110 \end{array}$$

$$\begin{array}{r} 9 \\ 8 - 1 \end{array}$$

mark1 + mark2  
mark1 \* 2

```
int mark1 = 92
int mark2 = 92
;
```



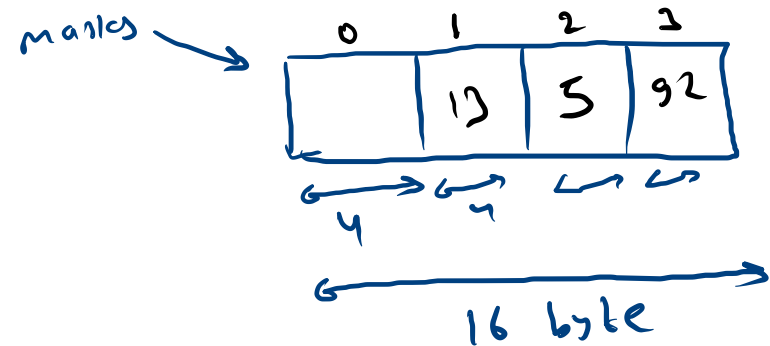
mark12

```
int marks[] = new int[4];
```

```
marks[2] = 5
```

```
marks[3] = 92
```

```
int sum = mark[1] + mark[2]
```



4  
0... (4-1)

$n=4$

10	15	3	12
----	----	---	----

// Scanned

4

10

15

3

12

6 15 30 40 4 11  
9

0	1	2	3	4	5
15	30	40	4	11	9

Span  $\rightarrow$  max - min  
40 - 4

= 36

36
----

✓ step 1 max, min

✓ step 2  $\rightarrow$  span

step 3  $\rightarrow$  print

0	1	2	3	4	5
15	30	40	4	11	9

$\text{max} = \text{arr}[0]$   
 $\text{min} = \text{arr}[0]$

$\text{max} =$  ~~15~~ ~~30~~ 40

$\text{min} =$  ~~15~~ 4

32 ← int

32 bit

8 bit → 1 byte

1024 bytes → 1 kb

1024 kb → 1 Mb

1024 Mb → 1 Gb

8 Gb →  $8 \times 1024 \text{ Mb}$

$| 8 \times 1024 \times 1024 \times 1024 \times 8 \rightarrow \text{bit}$

$i \leftarrow 1 \text{ to } n-1$

$4 > 40$   
 $\left[ \begin{array}{l} \text{if } (\text{arr}[i] > \text{max}) \\ \text{max} = \text{arr}[i] \end{array} \right.$

$4 < 15$   
 $\left[ \begin{array}{l} \text{if } (\text{arr}[i] < \text{min}) \\ \text{min} = \text{arr}[i] \end{array} \right.$

int n = 10

int arr[] = new int[4];

arr[0] = 5

arr[1] = 7

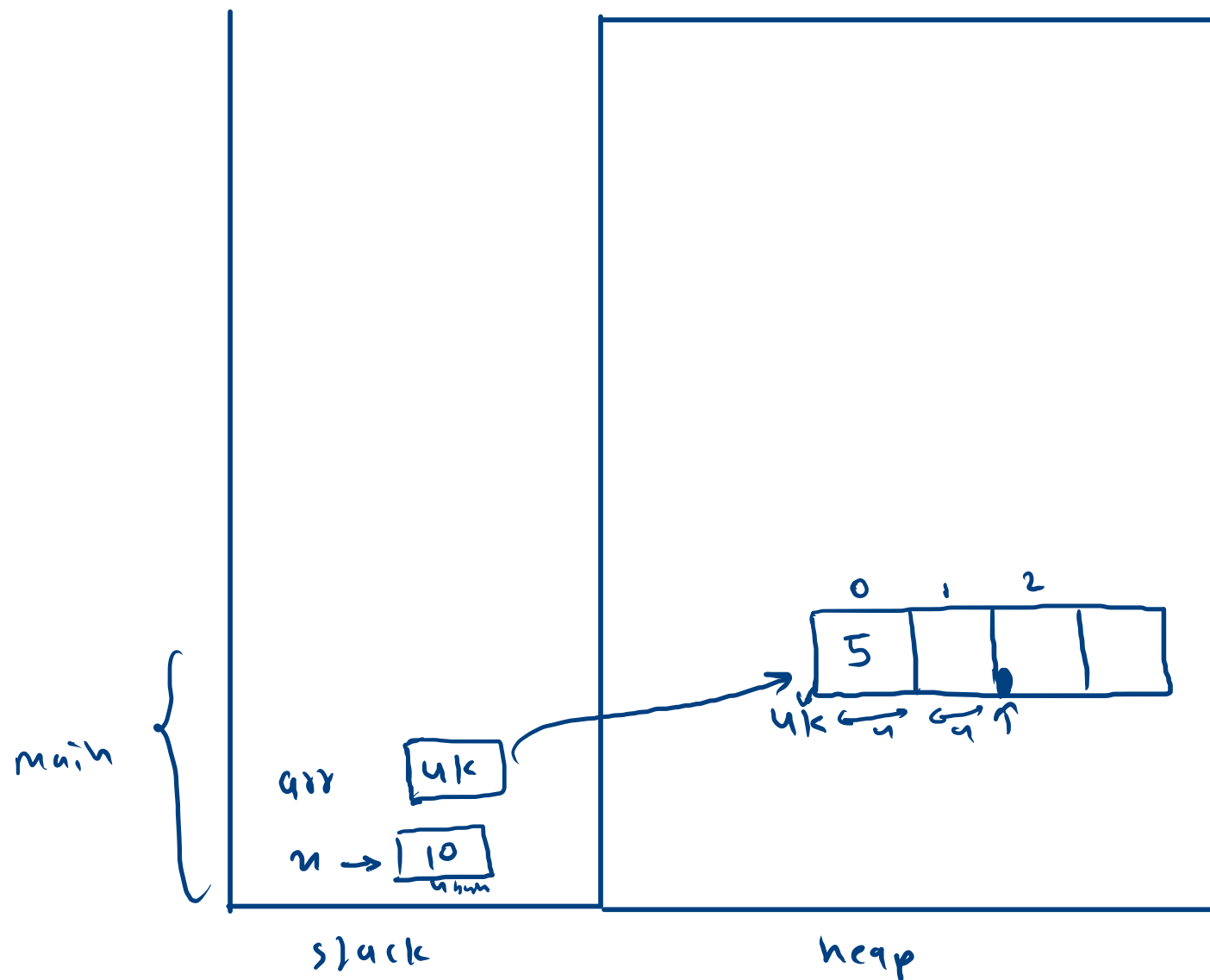
arr[i] = n

$4K + i \times \boxed{\text{size}}$

$4K + 0 \times$

$4K + 2 \times 4$

$4K + 8$



scope  
miss?

scope

```
public static void main(String[] args) throws Exception { 3
```

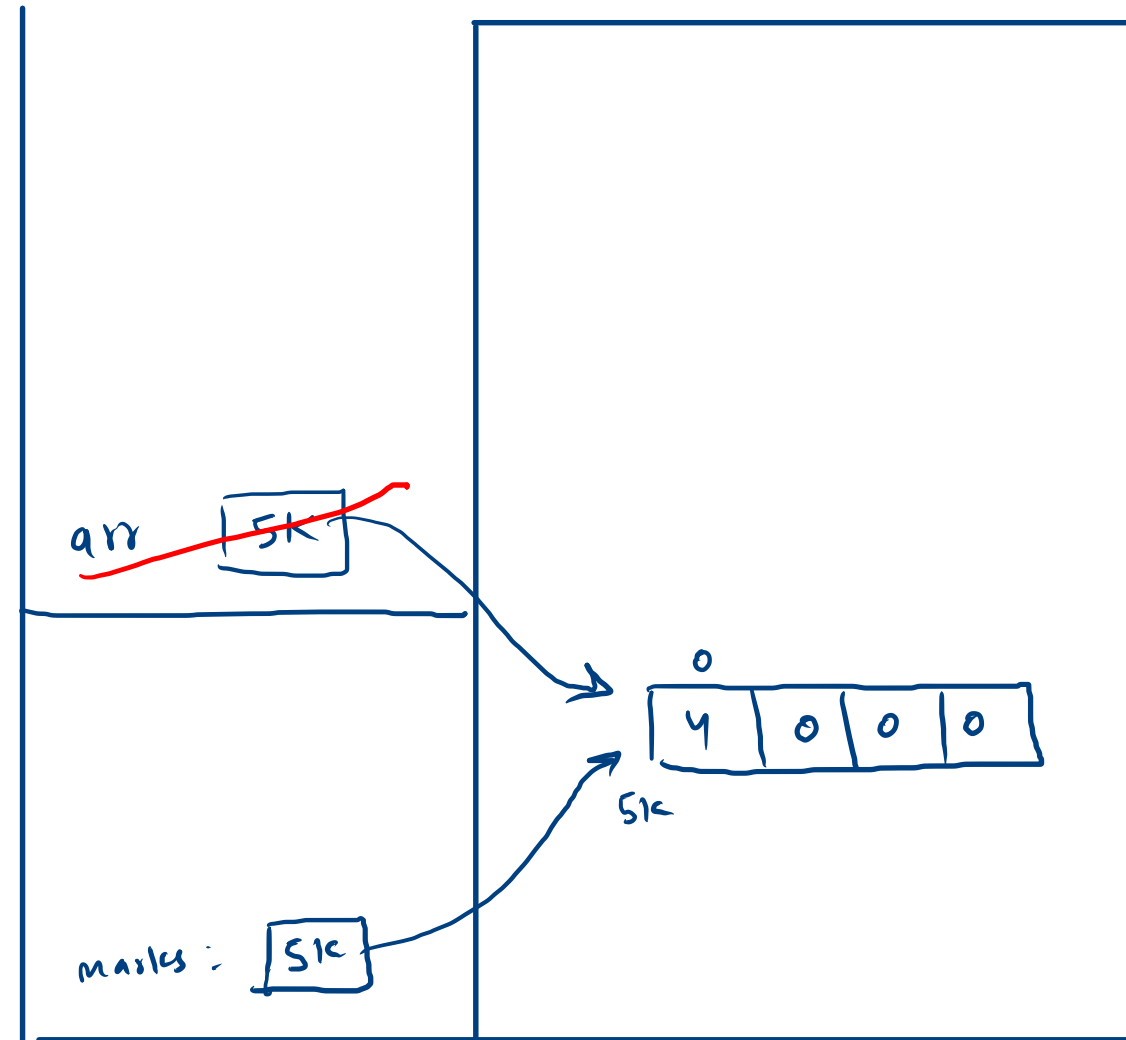
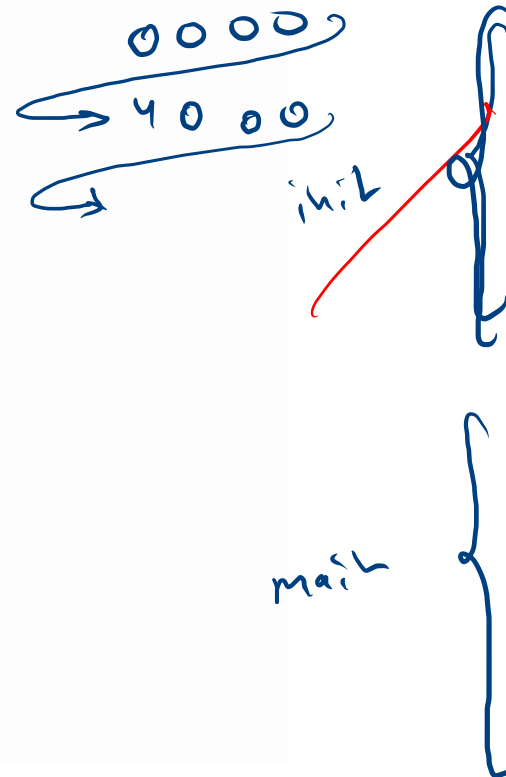
```
✓ int marks[]; // declaration  
✓ marks = new int[4]; // initialization
```

```
for(int i=0; i<marks.length; i++){  
    System.out.print(marks[i]+" ");  
}  
System.out.println();
```

```
✓ init(marks);
```

```
for(int i=0; i<marks.length; i++){  
    System.out.print(marks[i]+" ");  
}  
System.out.println();  
}
```

```
public static void init(int arr[]){  
    arr[0] = 4;  
}
```





$$n = 6$$

0	1	2	3	4	5
15	30	40	4	11	9

$$d = 40$$



$$\begin{array}{c} \hline 2 \end{array}$$

$$d = 44$$



$$\begin{array}{c} \hline -1 \end{array}$$

6 15 30 40 4 11  
9 40

0	1	2	3	4	5
15	30	40	4	11	9

index = -1

d = 4 → 3  
-1

d = 44 →

```

for(int i=0; i<n; i++){
    if(arr[i] == d){
        println(i); index = i
        break;
    }
}
// print (-1)

```

0	1	2	3	4	5	X
15	30	40	4	11	9	

```
✓ int d = scn.nextInt();  
✓ int index = -1;  
  for(int i=0; i<n; i++){  
    if(arr[i] == d){  
      index = i;  
      break;  
    }  
  }  
  
  System.out.println(index);
```

d = 44  
index = -1

-1