JAVA ARRAY FLASH CARDS

v120 by Dave Slemon

Q1. How would you explain in plain English to a friend what an array is.

Provide your friend with a good analogy.

A1. How would you explain in plain English to a friend what an array is.

Imagine a street with houses on it. Each house has its own unique house number starting at "0". That's what an array is.

Q2a. What's another word for this?

[ ]

A2a. What's another word for this?

[ ]

Array

All mean the same: built-in array, Python List, 1-dimensional array or Vector

Q2b. What's another word for this?

[ ] [ ]

A2b. What's another word for this?

[ ] [ ]

2-dimensional Array

Q2c. How do you read this?

int [ ] num;

A2c. How do you read this?

int [ ] num;

integer array num

Q2c. Instantiate a 1000 element integer array called, **num**.

A2. Instantiate a 1000 element integer array called, **num**.

int [ ] num = new int[1000];

Recommended: type in the solutions to an ongoing big java program as you go along.

Start your BigJavaProgram now .....

```
public class BigJavaProgram
{

      public static void main(String[] args)
      {
            int[ ] num = new int[1000];

      }


}
```

Q3. Declare 4 primitive data types in Java and provide a value for each.

Note primitive data types all start with a lowercase letter.

A3. Declare 4 primitive data types in Java and provide a value for each.

Note primitive data types all start with a lowercase letter.

```
int x = 10;
long y = 1000000;
double pi = 3.14159;
boolean w = true;
char ch = 'A';
```

Q4. Using a property offered with built-in arrays, output the length of array, **num**

A4. Using a property offered with built-in arrays, output the length of array, **num**

```
//length of num array
System.out.println( num.length );
```

Q5. Declare a boolean array and then write a loop to initialize all 50 elements of the array, **b** below to: true. note: boolean arrays default to false.

```
boolean[ ] b = new boolean[50];
```

A5. Declare a boolean array and then write a loop to initialize all 50 elements of the array, **b** below to: true. note: boolean arrays default to false.

```
boolean[ ] b = new boolean[50];
for ( int i=0;  i< 50;  i++ )
    b[i] = true;
```

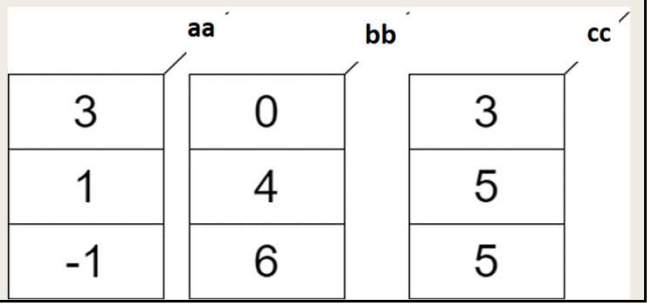
Q6. When you declare a String array and before you populate the array with values,

what value exists in each element?

A6. When you declare a String array and before you populate the array with values, what value exists in each element? **This is true for all objects, not just String**

null

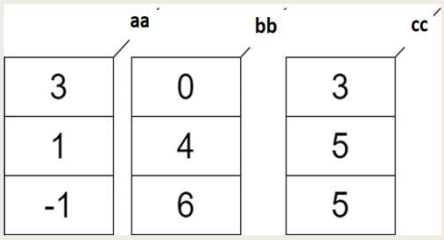
Q7. Add the corresponding values in arrays, **aa & bb** and place their sum in array **cc** for each corresponding cell.



aa	bb	cc
3	0	3
1	4	5
-1	6	5

A7.

```
int[ ] aa = { 3, 1, -1 };
int[ ] bb = { 0, 4, 6 };
int[ ] cc = new int[ aa.length ];

for(int i=0; i < aa.length; i++)
  cc[i] = aa[i] + bb[i];
```



aa	bb	cc
3	0	3
1	4	5
-1	6	5

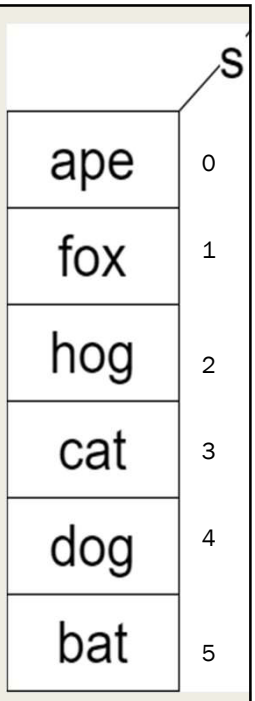
Q8a. Consider the String array, **s**. Declare and populate the array and Then display the following sentence using array elements where possible

The fox chased the cat

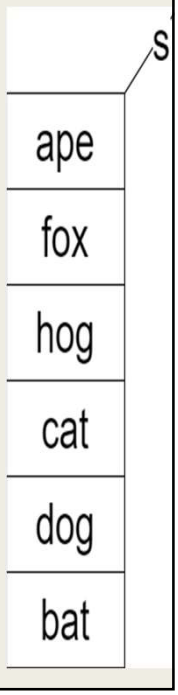
A8a

//The fox chased the cat

```
String[ ] s = {“ape”, ”fox”, ”hog”, ”cat”, ”dog”, ”bat”};
System.out.println (“The “ + s[1] + “ chased the “ + s[3] );
```

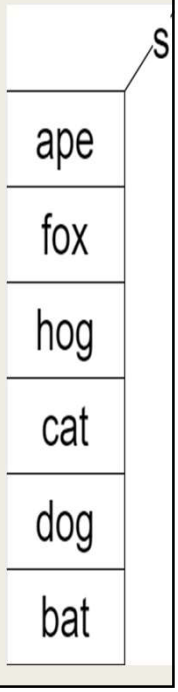


Q8b. Using an array property, output the number of elements in array, **s**

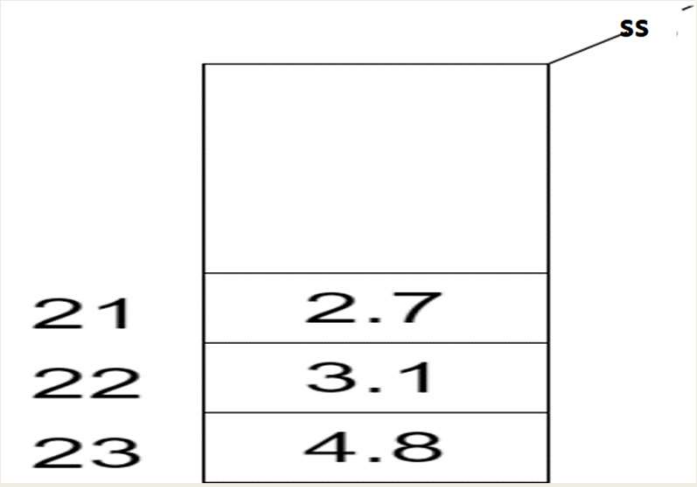


A8b. Using an array property, output the number of elements in array, **s**

System.out.println(s.length);

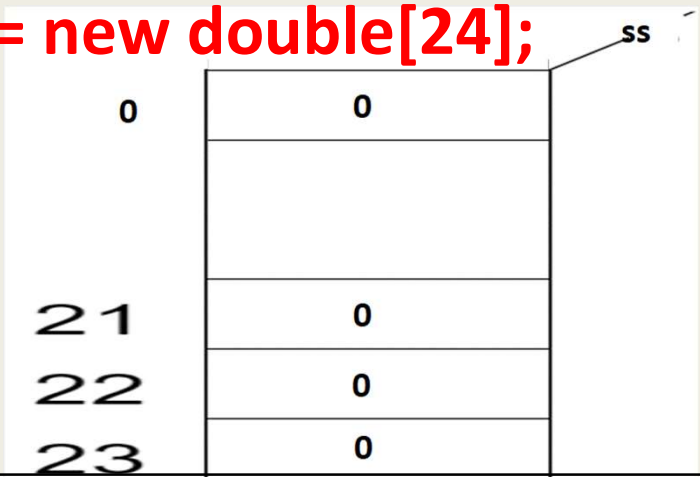


Q9a. Instantiate but don't populate array, SS



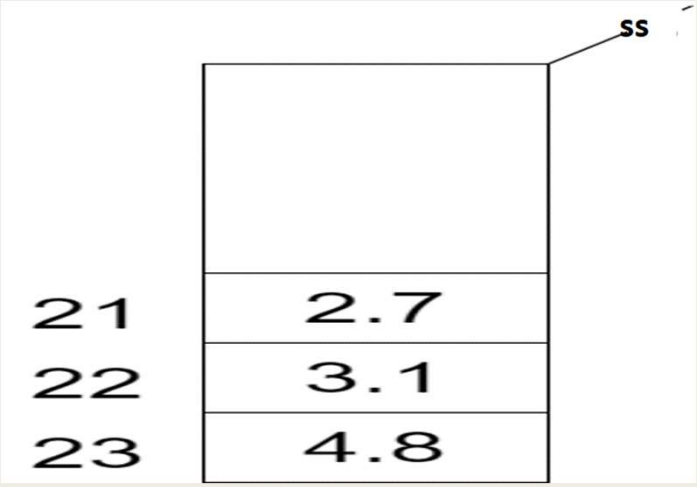
A9a. Instantiate but don't populate array, SS

double [ ] ss = new double[24];



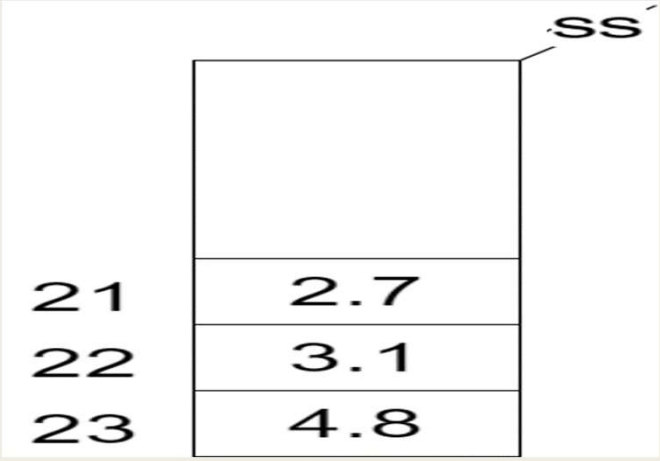
Note: all of the cells of the array will default to 0

Q9b. Populate the last 3 values as shown

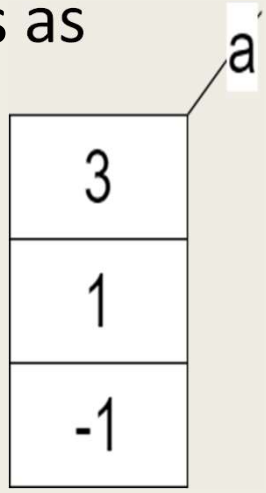


A9b. Populate the last 3 values as shown

ss[21] = 2.7;
ss[22] = 3.1;
ss[23] = 4.8;

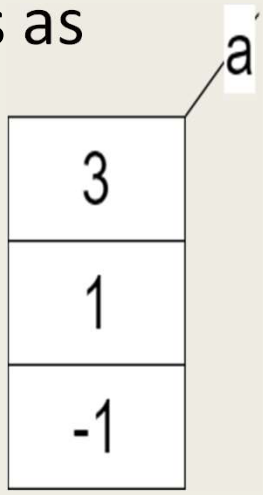


Q10. Instantiate and populate array, “a” in as few java code lines as possible.

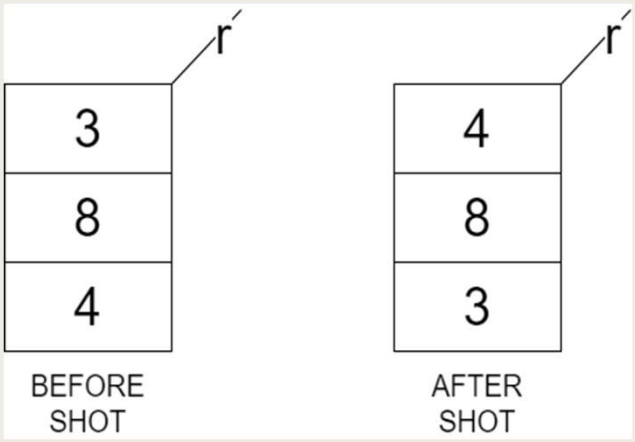


A10. Instantiate and populate array, “a” in as few java code lines as possible.

```
int [ ] a = { 3, 1, -1 };
```

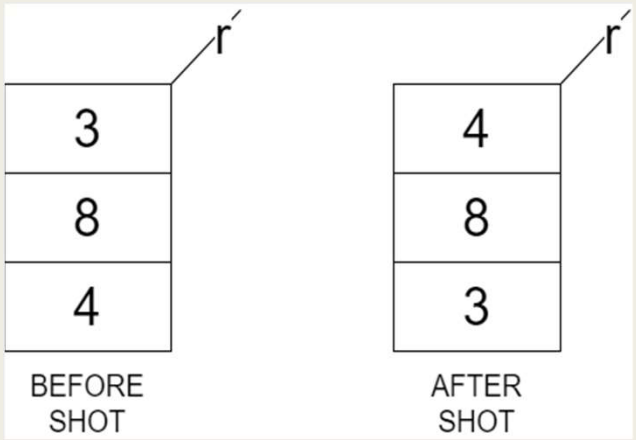


Q11. Declare and populate array 'r'. Using a single variable, **temp**, switch the 3 and 4 values as shown below in the array r

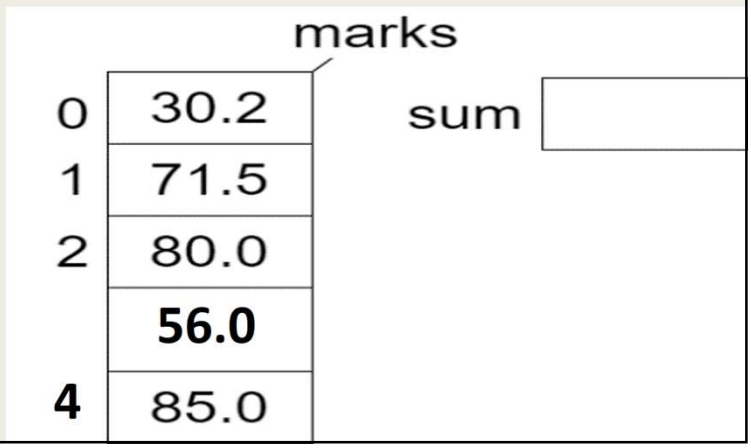


Q11. Declare and populate array 'r'. Using a single variable, **temp**, switch the 3 and 4 values as shown below in the array r

```
int[ ] r = {3, 8, 4};

int temp = r[0];
r[0] = r[2];
r[2] = temp;
```

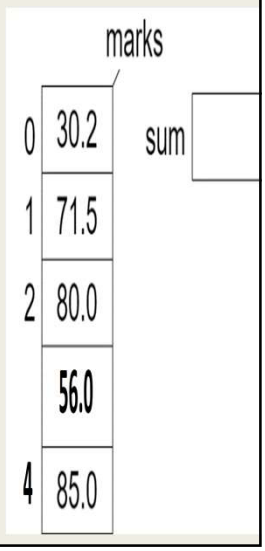


Q12a Declare and populate marks array, then write a loop to calculate and display the "**sum**" all of the entries in the **marks** array.

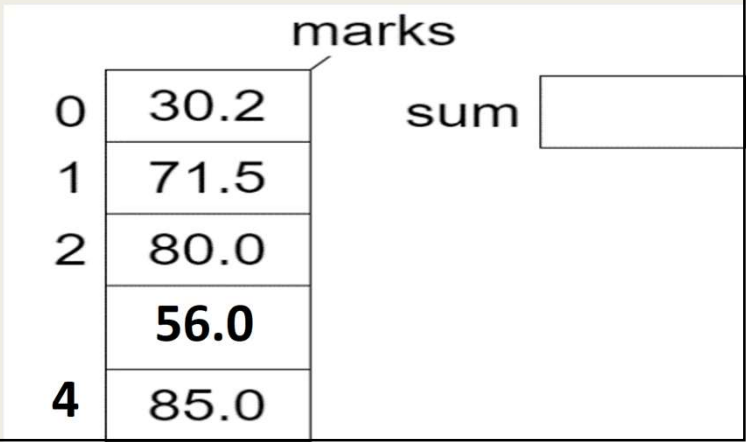


A12a Declare and populate marks array, then write a loop to calculate and display the "**sum**" all of the entries in the **marks** array.

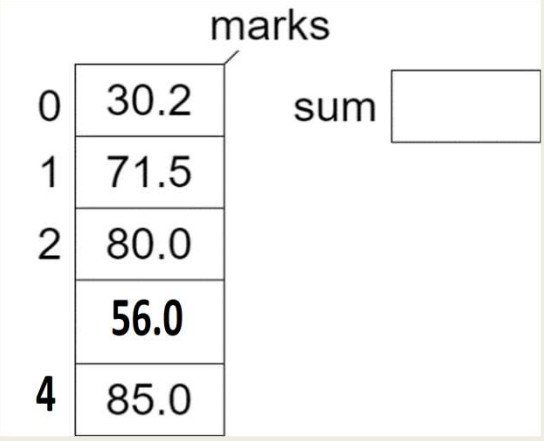
```
double[ ] marks = {30.2, 71.5, 80.0, 56.0, 85.0};
double sum = 0.0;
for(int i=0; i < marks.length; i++)
   sum = sum + marks[i];
System.out.println ("Standard for sum = " + sum);
```



Q12b Write an ENHANCED for loop to calculate and display the "**sum**" all of the entries in the **marks** array.

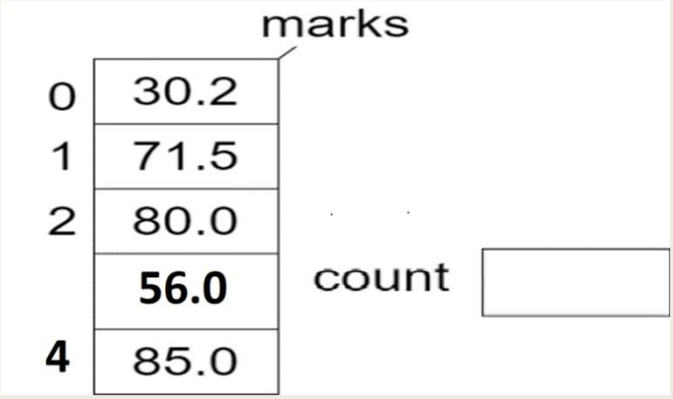


A12b Write an ENHANCED for loop to calculate and display the "**sum**" all of the entries in the **marks** array.




```
sum = 0.0;
for(double m : marks)
    sum = sum + m;
System.out.println("Enhanced for sum = " + sum);
```

Q12b Write a loop to calculate and display "**count**" which is the number of entries where the array's value is greater or equal to 50.0

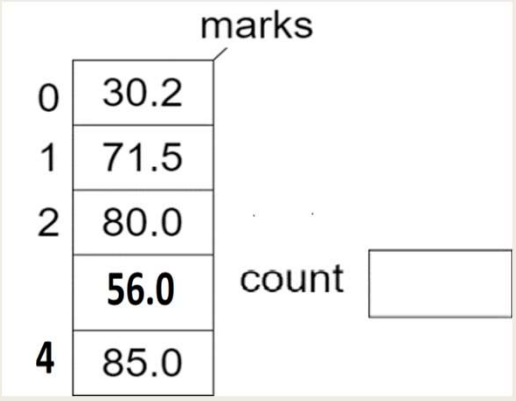


A12b Write a loop to calculate and display "**count**" which is the number of entries where the array's value is greater or equal to 50.0

```
int count = 0;

for(int i=0; i < marks.length; i++)
    if (marks[i]  >=  50.0)
        count = count +  1;

System.out.println("Standard for count = " + count);
```

OR

```
for(double m : marks)
    if (m >= 50.0)
        count = count +  1;

System.out.println("Enhanced for count = " + count);
```

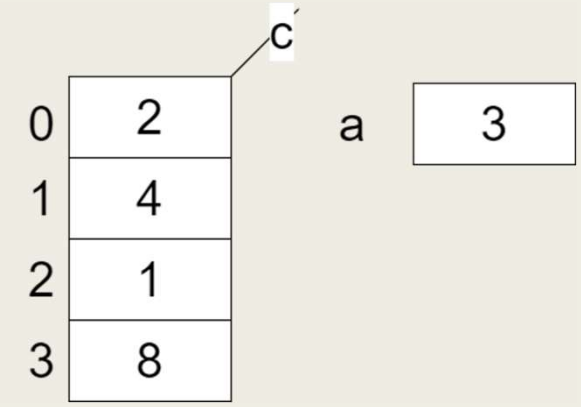


Q13 What is displayed if the following are output to the console?

a) c[2] _____

b) c[a] _____

c) c.length _____

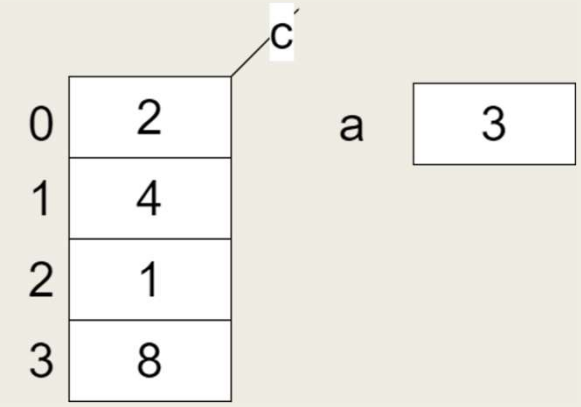


A13 What is displayed if the following are output to the console?

a) c[2] ___1____

b) c[a] _____

c) c.length _____

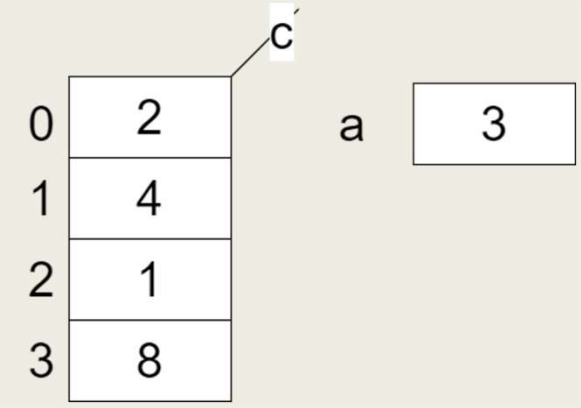


A13 What is displayed if the following are output to the console?

a) c[2] ___1____

b) c[a] ___8____

c) c.length _____

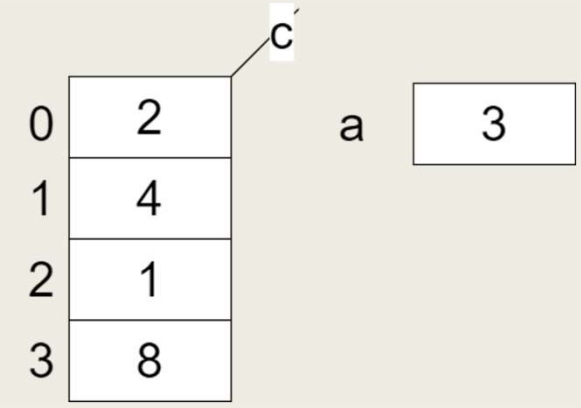


A13 What is displayed if the following are output to the console?

a) c[2] ___1____

b) c[a] ___8____

c) c.length __4___

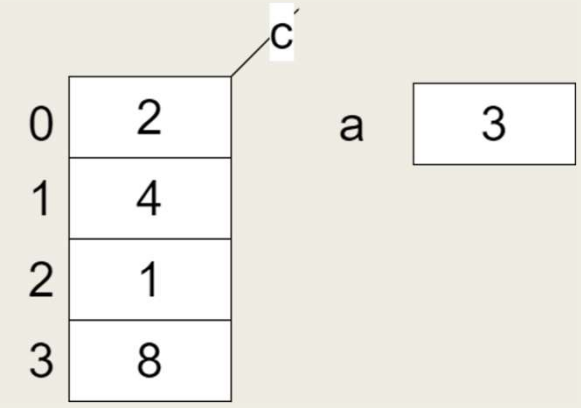


Q13 What is displayed if the following are output to the console?

d) c[a-1] _____

e) a + c[3] _____

f) c[0] + c[3] _____



A13 What is displayed if the following are output to the console?

d) c[a-1] ___1___

e) a + c[3] _____

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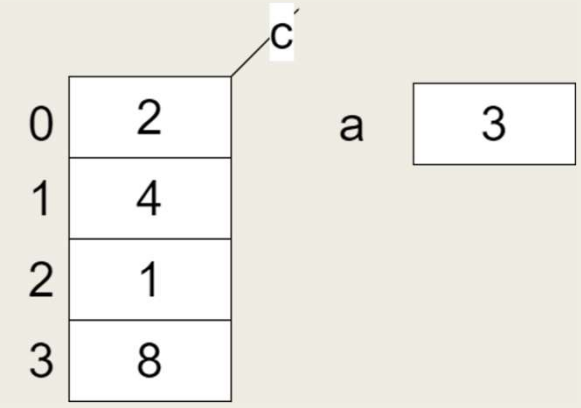
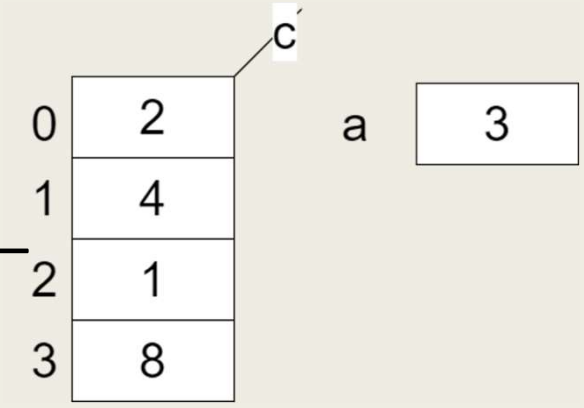


A13 What is displayed if the following are output to the console?

d) c[a-1] ___**1**___

e) a + c[3] ___**11**___

f) c[0] + c[3] _____

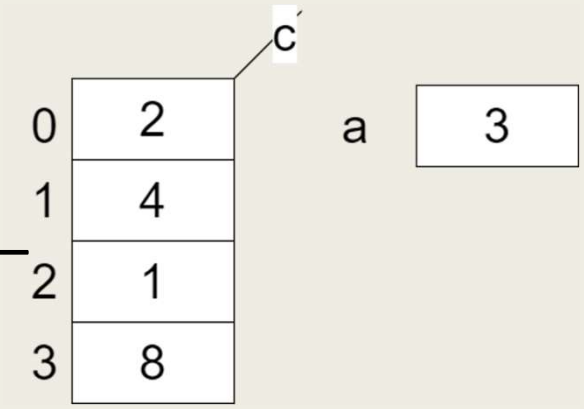


A13 What is displayed if the following are output to the console?

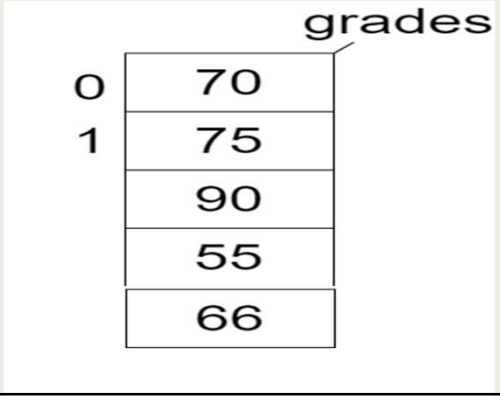
d) c[a-1] ___**1**___

e) a + c[3] ___**11**___

f) c[0] + c[3] ___**10**_____

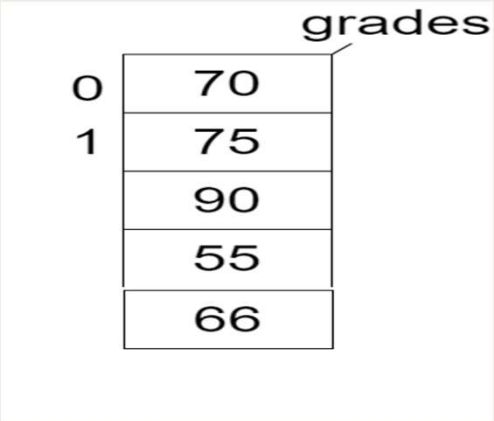


Q14 Instantiate and then calculate the average mark in the array of student grades. Assume the array is populated with grades.



A14

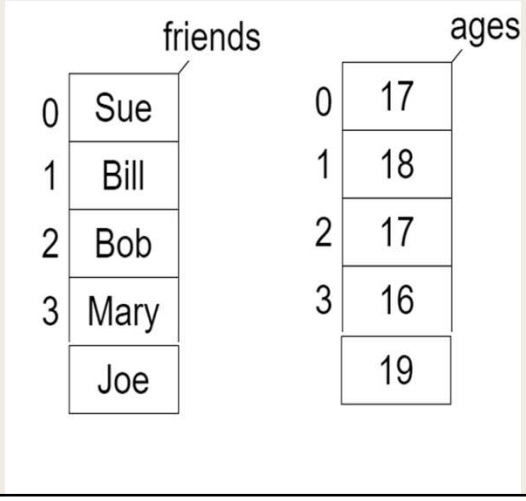
```
double[ ] grades = new double[5];

double sum=0.0, count = 0.0, avg = 0.0;
for(int i=0; i < grades.length; i++)
{
   sum = sum + grades[i];
   count = count + 1;
}
avg = 0.0;
if (count > 0.0)
  avg = sum / count;
```



Q15 Instantiate a 5 element **String** array called, **friends**. Also create a 5 element integer array called, **ages**. Begin by populating the two arrays with this data.

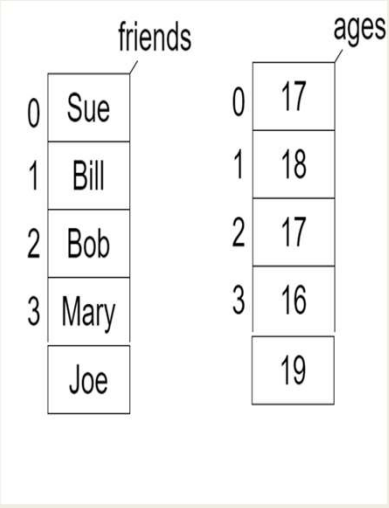
For example, Sue's age is 17

a)Write code which outputs your youngest friend(s) by name.



A15 Write code which outputs your youngest friend(s) by name.

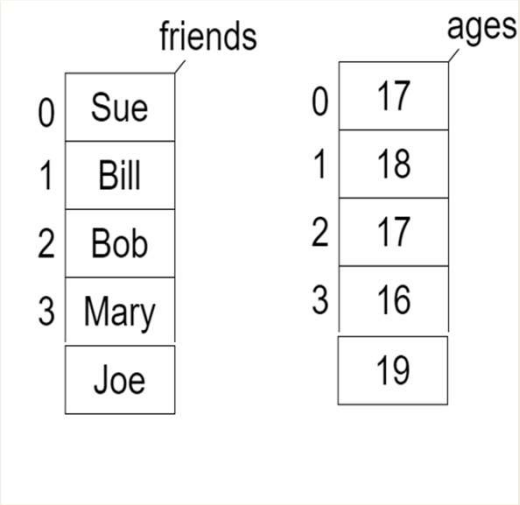
```
String[ ] friends = {"Sue","Bill","Bob","Mary","Joe"};
int[ ] ages = {17,18,17,16,19};

//first find the youngest age
int youngest = 999;
for(int i=0; i < ages.length; i++)
  if (ages[i] < youngest)  youngest = ages[i];

//output all friends with the youngest age
for(int i=0; i < friends.length; i++)
    if (ages[i] == youngest)
        System.out.println(friends[i]);
```



Q15 The two arrays are populated with this data.

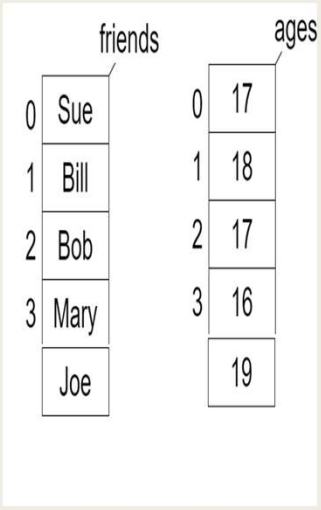
For example, Sue's age is 17

b) Output the names of your friends who are exactly 19 year old.

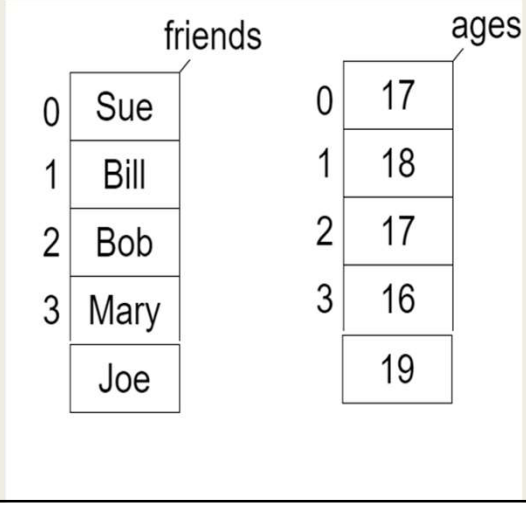


A15b Output the names of your friends who are exactly 19 year old.

```
for(int i=0; i < friends.length; i++)
 if (ages[i] == 19)
      System.out.println( friends[i] );
```



Q15c A year goes by, write code which increases the age of each friend by 1 year.



A15c A year goes by, write code which increases the age of each friend by 1 year.

```
for(int i=0; i < ages.length; i++)
   ages[i] = ages[i] + 1;
```

Q16 You have to store 3 colours into an array called, **colours**. The colours are #FFFFFF, #000000 and #DEDEDE.

Instantiate an array with an appropriate datatype and populate it with these 3 colours.

A16 You have to store 3 colours into an array called, colours. The colours are #FFFFFF, #000000 and #DEDEDE.

```
String [ ] colours = new String[3];
colours[0] = "#FFFFFF";
colours[1] = "#000000";
colours[2] = "#DEDEDE";
```

(there's also another better answer … can you guess what it may be?

A16 You have to store 3 colours into an array called, colours. There are #FFFFFF, #000000 and #DEDEDE.

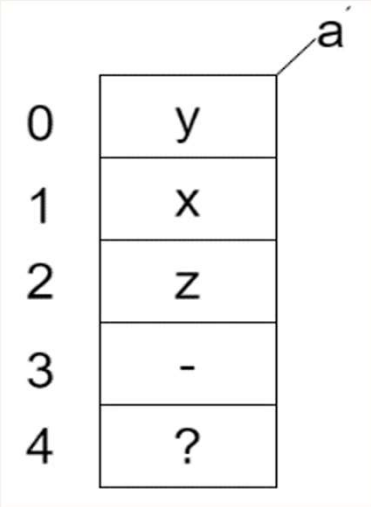
```
import javafx.scene.paint.Color;

Color[ ] colours = new Color[3];

 colours[0] = Color.web("#FFFFFF",1.0);
 colours[1] = Color.web("#000000",1.0);
 colours[2] = Color.web("#DEDEDE",1.0);
```

Note: The alpha value defines the transparency of a color and can be represented by a float value in the range [0.0,1.0] or [0,255]

```
 colours[0] = Color.web("#FFFFFF",1.0);
 colours[1] = Color.web("#000000",1.0);
 colours[2] = Color.web("#DEDEDE",1.0);
```

Q17 a) create the "a" array

(but do not populate it)

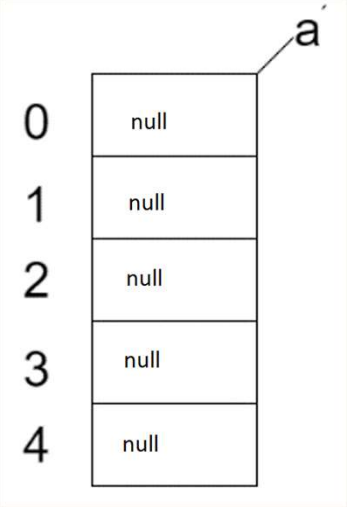


Note: remember when you create an array, the default value for all elements is **null**

A17 a) instantiate the "a" array

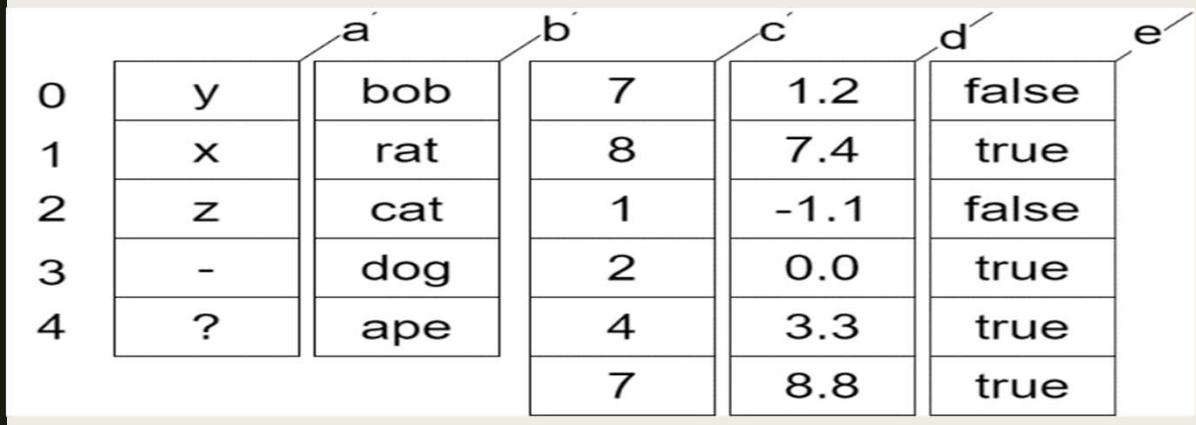
(but do not populate

char [ ] a = new char[5];



Q17 b) what would be displayed

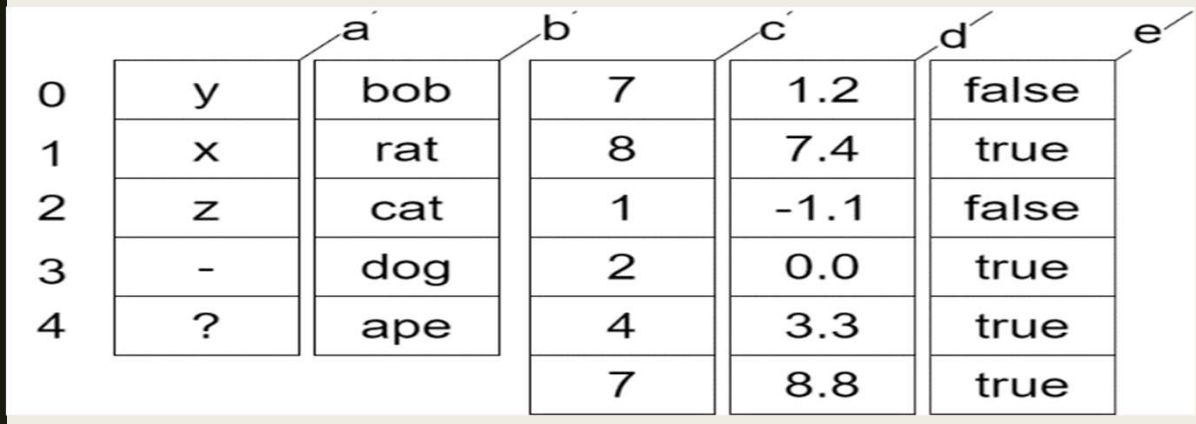
b[4] _____ d[2] _____



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A17 b) what would be displayed

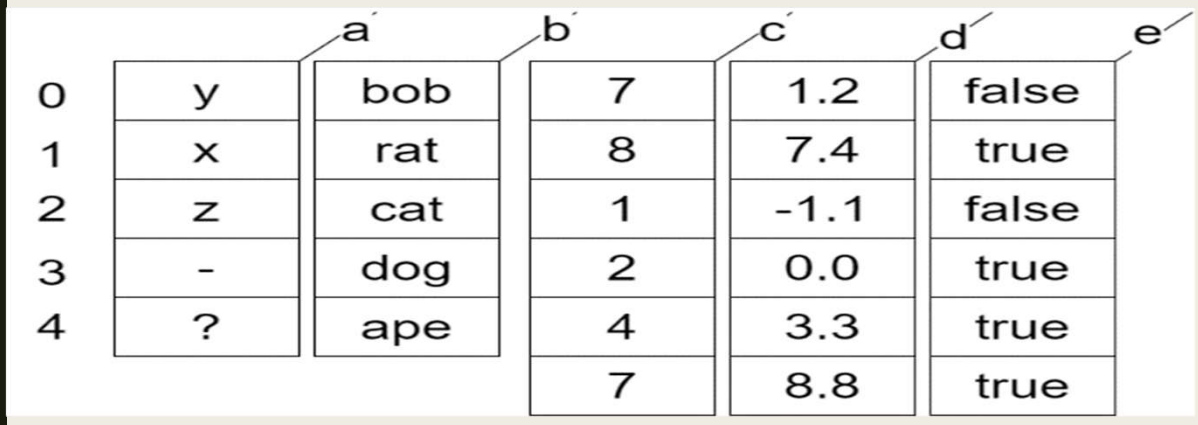
b[4] __ape_____ d[2] _____



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A17 b) what would be displayed

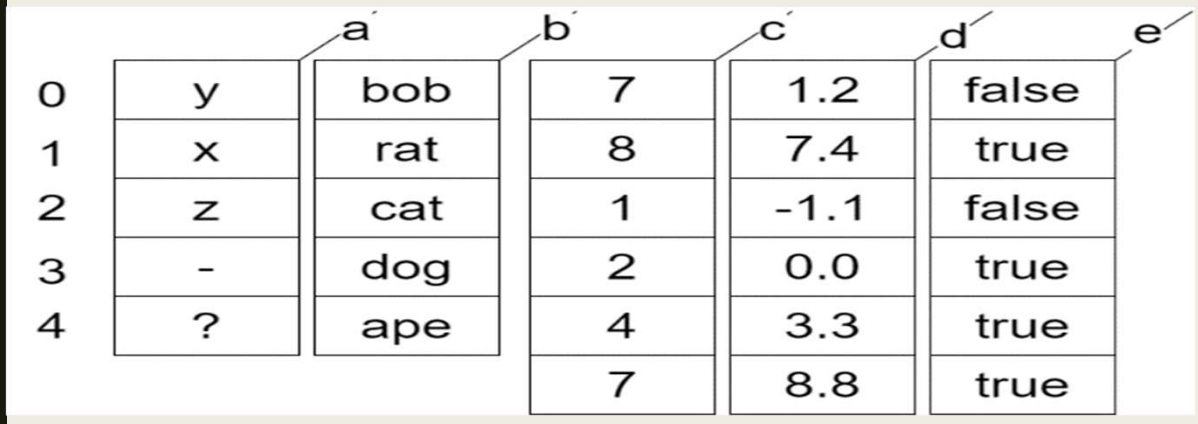
b[4] __**ape**_____ d[2] __**-1.1**___



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

Q17 c) what would be displayed

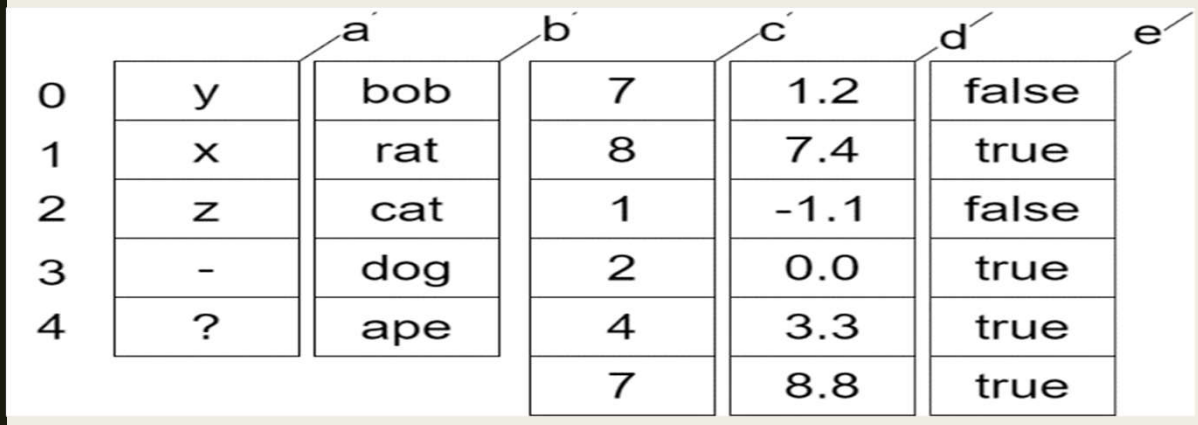
e[2] _____ d[c[2]] _____



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A17 c) what would be displayed

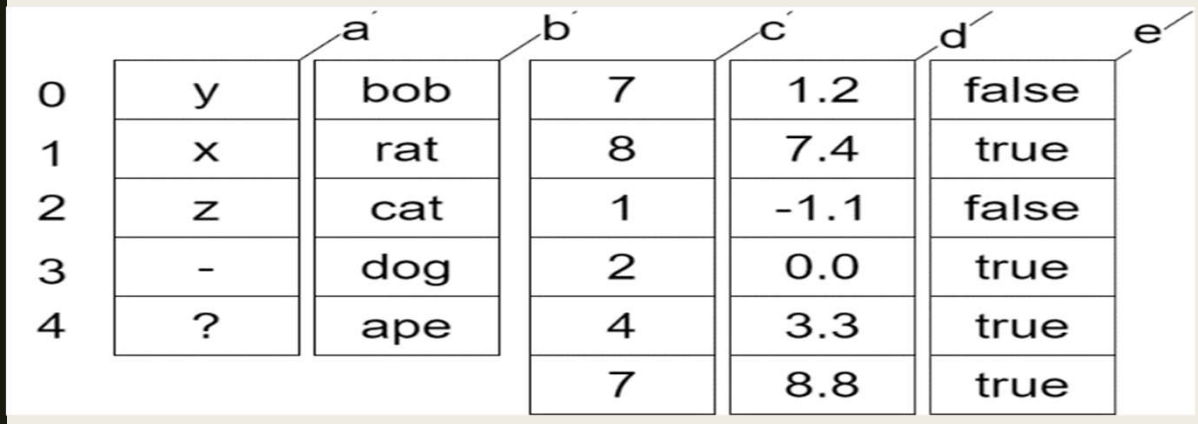
e[2] __false___ d[c[2]] _____



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A17 c) what would be displayed

e[2] __false___ d[c[2]] ___7.4__



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

Q18 Write a loop to subtract 1 from each value contained in the "c" array

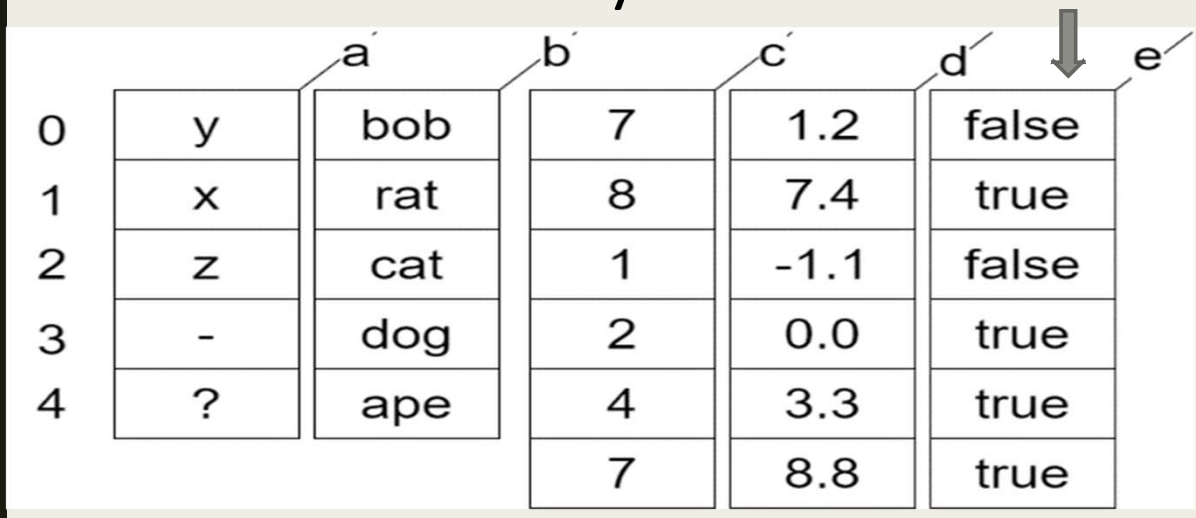
	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A18 Write a loop to subtract 1 from each element of the "c" array

```
for(int i=0; i< c.length; i++)
    c[i] = c[i] – 1;
```

	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

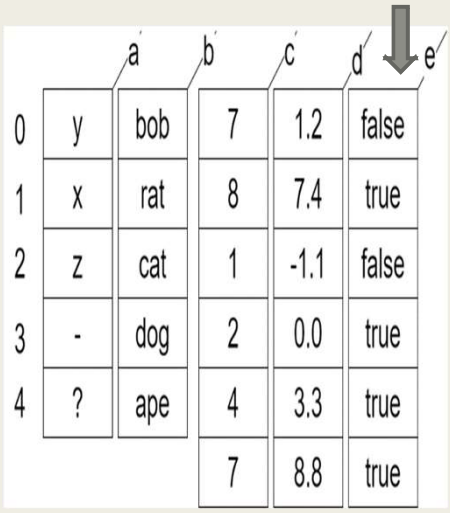
Q19 Output how many “true” values exist in the “e” array



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

A19 Output how many “true” values exist in the “e” array

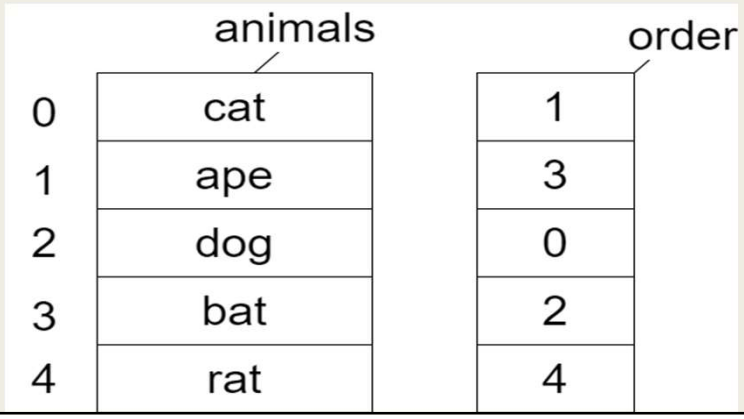
```
int count = 0;
for(int i=0; i< e.length; i++)
    if ( e[i] )
        count++;

System.out.println(count);
```



	a	b	c	d	e
0	y	bob	7	1.2	false
1	x	rat	8	7.4	true
2	z	cat	1	-1.1	false
3	-	dog	2	0.0	true
4	?	ape	4	3.3	true
			7	8.8	true

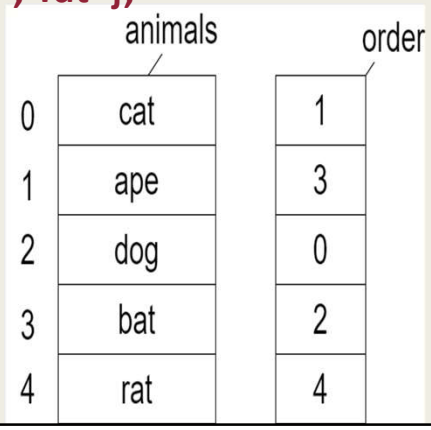
Q21 Begin by creating the ***animals*** and ***order*** arrays with the exact values shown . The integer ***order*** array is populated in such a way that its values are the subscripts belonging to the ***animals*** array such that it puts the ***animals*** array in alphabetical order.

Write a for loop which prints the animal names out in alphabetical order.

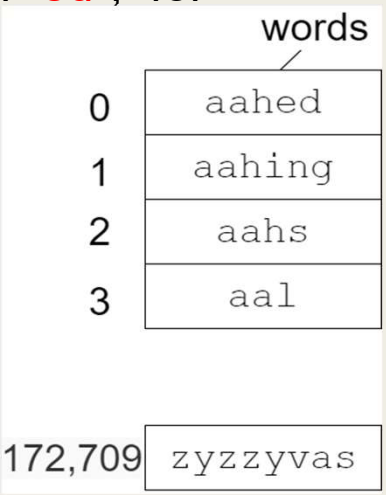


A21 **Write a for loop which prints the animal names out in alphabetical order.**

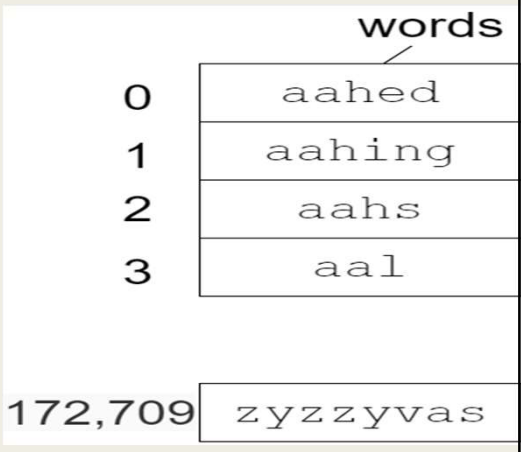
```
String [ ] animals = {"cat","ape","dog","bat","rat"};

int [ ] order = {1,3,0,2,4};
int index = 0;
for (int i=0; i< order.length; i++)  {
   index = order[i];
   System.out.println( animals[index] );
```



Q22 The array **words** contains every word in the dictionary, i.e. all 172,710 of them. Write a loop which outputs ONLY the words which end in "ed", for example, selected




```
String w = "";
 int lastPos = 0;

for (int i=0; i < words.length; i++)
{
   w = words[i];
   lastPos = w.length() - 1;
   if (w.charAt(lastPos-1) == 'e'  && w.charAt(lastPos) == 'd' )
      System.out.println(w);
}
```



Q24 Copy each letter from the secretWord into a char array. Output the char array with two spaces between each letter both forwards and backwards in lower case, then output the number of vowels, i.e. aeiou

String **secretWord = "HALLOWEEN"**

h a l l o w e e n

n e e w o l l a h

Vowels = 4

```
char[ ] ch = new char[ secretWord.length( ) ];
int vowels = 0;
for(int c=0;  c < secretWord.length( ); c++) {
        ch[c] = secretWord.toLowerCase().charAt(c);
        if (ch[c] == 'a' || ch[c] == 'e' || ch[c] == 'i' || ch[c] == 'o' || ch[c] == 'u')
            vowels++;
}
//forwards
    for(int i=0; i < ch.length; i++)
       System.out.print ( ch[i] + "  " );
    System.out.println();
//backwards
   for(int i=ch.length-1; i >= 0; i--)
      System.out.print ( ch[i] + "  " );
   System.out.println();
   System.out.println("Vowels = "+vowels);
```

A24

h a l l o w e e n

n e e w o l l a h

Vowels = 4

```
char[ ] ch;
ch = secretWord.toCharArray( );


//forwards
    for(int i=0; i < ch.length; i++)
       System.out.print ( ch[i] + "  " );
    System.out.println();H


//backwards
   for(int i=ch.length-1; i >= 0; i--)
      System.out.print ( ch[i] + "  " );
   System.out.println();
   System.out.println("Vowels = "+vowels);
```

Here's a simpler way

A24

h a l l o w e e n

n e e w o l l a h

Vowels = 4

Q25 What is display if the following program is executed?

```
public static void main()
{
  int[] ch = {1,2,1,2,1,2,1,0,0};
  int amount = 0;
  for(int j = ch.length - 1; j > 0; j--)
    amount = amount + ch[j];
  System.out.println("amount: " + amount);
}
```

A25 What is display if the following program is executed?

```
public static void main()
{
  int[] ch = {1,2,1,2,1,2,1,0,0};
  int amount = 0;
  for(int j = ch.length - 1; j > 0; j--)
    amount = amount + ch[j];
  System.out.println("amount: " + amount);
}
```

amount: 9

Q26 In the array below, output any value within the array that repeats? A value in the array can only repeat at most ONCE.

for example,

Original: 1 2 3 5 5 7 8 8 9 9 2

Repeats: 2 5 8 9

A26 In the array below output any value within the array that repeats? A value in the array can only repeat ONCE.

```
public static void main()
  {
     int[] A = {1,2,3,5,5,7,8,8,9,9,2};

     //output the original
      System.out.print("Original: ");
      for(int i=0; i< A.length; i++)
          System.out.printf("%d ", A[i] );
      System.out.println();
```

Original: 1 2 3 5 5 7 8 8 9 9 2

Repeats: 2 5 8 9

```
System.out.print("Repeats: ");
      for(int i=0; i< A.length; i++) {
          for(int j=i+1; j < A.length; j++)  {
              if ( A[i] == A[j] ) {
                  System.out.printf("%d ", A[i] );
              }
          }
      }
      System.out.println();
  }
```

Q27 Separate the 1s and 0s from the array below.

```
 public static void main()
{
      int[] nums = {0,1,0,0,1,1,1,0,1,0};

      System.out.print("Original:  ");
      for(int i=0; i< nums.length; i++)
          System.out.printf("%d ",nums[i]);
      System.out.println();

}
```

sample output,

Original: 0 1 0 0 1 1 1 0 1 0

Separated: 0 0 0 0 0 1 1 1 1 1

A27 Separate the 1s and 0s from the array below.

```
public static void main() {

    int[] nums = {0,1,0,0,1,1,1,0,1,0};

    System.out.print("Original:  ");
    for(int i=0; i< nums.length; i++)
      System.out.printf("%d ",nums[i]);
    System.out.println();

    separate(nums);

    System.out.print("Separated: ");
    for(int i=0; i< nums.length; i++)
      System.out.printf("%d ",nums[i]);
    System.out.println();
  }
```

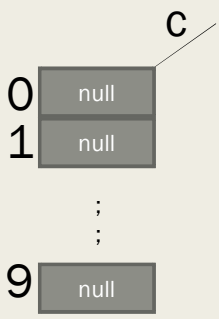
```
public static void separate(int[] nums)
{

    //count number of 0s
    int zeros = 0;
    for(int i=0; i< nums.length; i++)
      if (nums[i] == 0) zeros++;


    for(int i=0; i< zeros; i++)
      nums[i] = 0;

    for(int i=zeros; i< nums.length; i++)
      nums[i] = 1;
  }
```

Q28 Instantiate an array called “c”, of **Circle** to 10 elements.

Then draw a picture of this array.

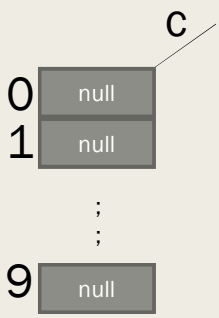
A28 Instantiate an array called, “c” of Circle to 10 elements. Then **draw a picture of this array.**

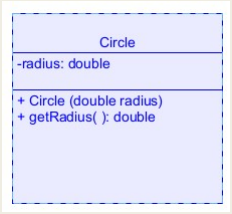
```
Circle [ ]  c  = new Circle [10];
```



Q29 Assume the **Circle** class has a constructor which accepts the radius of the circle. Populate the array c, with 10 circles with a radius of 2.

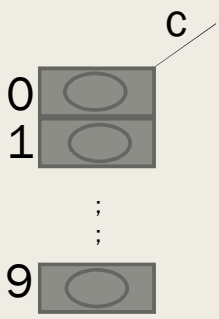
```
Circle [ ]  c  = new Circle [10];
```



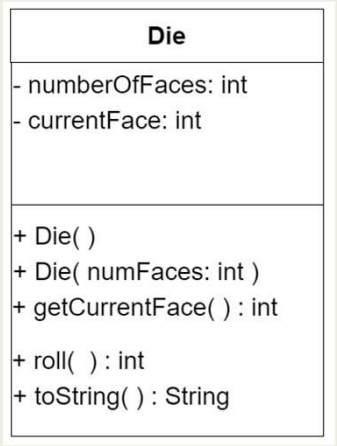


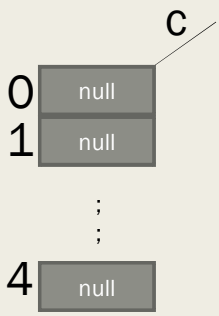
A29 Assume the **Circle** class has a constructor which accepts the radius of the circle. Populate the array c, with 10 circles with a radius of 2.

```
Circle [ ]  c  = new Circle [10];

for(int i = 0; i < c.length; i++)
   c[ i ] =  new Circle(2);
```



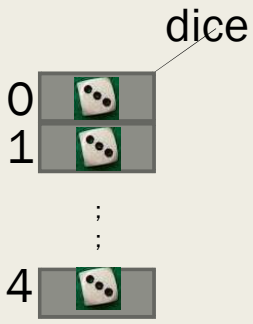
Q30 Assume the Dice class has a constructor which specifies the number of faces a die has. Populate the array **dice**, with 5 six-sided dice.





A30 Assume the Dice class has a constructor which specifies the number of faces a die has. Populate the array **dice**, with 5 six-sided dice.

```
Dice [ ]  dice   = new Dice [5];
for(int i = 0; i < dice.length; i++)
{
   dice[ i ] =  new Dice(6);
}
```



Q31 Write a single Java statement to declare and create an array of 5 integers without specifying values to those integers.

A31 Write a single Java statement to declare and create an array of 5 integers without specifying values to those integers.

int[ ] a = new int[5];

Q32 Write a single Java statement to declare and create an array containing the following 3 strings, “Bat”, “Bee”, “Bug”

A32 Write a single Java statement to declare and create an array containing the following 3 strings, “Bat”, “Bee”, “Bug”

String[ ] a = { “Bat”, “Bee”, “Bug”} ;

Q33 Write a single Java statement to print the length of an array named, a.

Write a statement to print the 3rd element of an array named, a

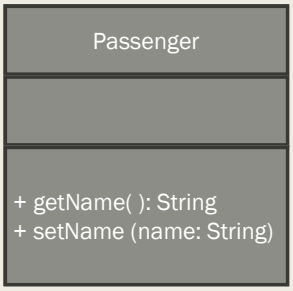
A33 Write a single Java statement to print the length of an array named, a.

System.out.println (a.length);

Write a statement to print the 3rd element of an array named, a

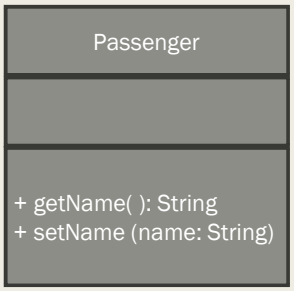
System.out.println (a[2]);

Q34 Suppose you have a variable named passengers which stores an array of objects of type Passenger. Write a statement which calls the getName() method for the first Passenger object in the passengers array.

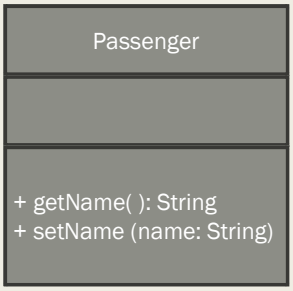


A34 Suppose you have a variable named passengers which stores an array of objects of type Passenger. Write a statement which calls the getName() method for the first Passenger object in the passengers array.

```
System.out.println( passengers[0].getName( ) );
```



Q35 Using the passengers variable, write an enhanced for loop to set the name of every Passenger object in the array to “Sally”



A35 Using the passengers variable, write an enhanced for loop to set the name of every Passenger object in the array to “Sally”

```
for ( Passenger p:  passengers ) {
    p.setName(“Sally”);
}
```