Note: Correct responses are based on Java, J2sdk v 6.0, from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise guessd (i. e. `error` is an answer choice) and any necessary Java 2 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used.

QUESTION 1

What is 33_{14} plus 11_{11} ?

A. 60_{10} B. 212_{5} C. 59_{10} D. 112_{7} E. 63_{10}

QUESTION 2

What is output by the code to the right?

A. 14 B. 10

C. 25 D. 24

E. There is no output due to a syntax error.

```
int a = 7 + 8 % 10 - 5;
System.out.println(a);
```

QUESTION 3

What is output by the code to the right?

A. 1.67 B. 1 C. 0 D. 3.00

E. There is no output due to a syntax error.

```
double b = 10 / 3;
System.out.printf("%.2f",b);
```

QUESTION 4

What is output by the code to the right?

A. 0 B. 1

C. 2 D. -1

E. There is no output due to a syntax error.

```
int c = 0;
for(c = 20; c>1; c=c-2)
{
   c=c-3;
   c++;
}
System.out.print(c);
```

QUESTION 5

What is output by the code to the right?

A. 7"\4 B. 7"\\4

C. 7\\4 D. 74

E. 7\"\\4

```
String d = "7\"\\\\4";
System.out.print(d);
```

QUESTION 6

What is output by the code to the right?

A. 2 B. 5

C. 4 D. 3

E. There is no output due to a runtime exception.

```
long[] ray = {1,5,6,3,2,8,9,5};
ray[0] = ray[ray.length-1];
ray[ray.length-1] = ray[0];
out.println(ray[ray.length-1/2]);
```

QUESTION 7

What is output by the code to the right?

A. yes B. no

C. false D. true

E. There is no output due to a syntax error.

```
boolean one = true;
boolean two = one & true;
two = !two;
two = two | !one;
System.out.println( two );
```

QUESTION 8

What is output by the code to the right?

A. `newellsimon`

B. `nEwElLsImOn`

C. `NeWeLlSiMoN`

D. `78e90e76l73i77o77`

E. `78e87e76l83i77o78`

```
String s1 = "newellsimon";
String s2 = "";
for(int i=0;i<s1.length();i++)
{
   char c = s1.charAt(i);
   if(i%2 == 0)
      s2 += c-'a'+'A';
   else
      s2 += c;
}
out.println(s2);
```

QUESTION 9

What is output by the line marked `//1` in the client code to the right?

A. `DOG`

B. `CAT`

C. `PIG`

D. `CHICKEN`

E. There is no output due to a syntax error.

QUESTION 10

What is output by the line marked `//2` in the client code to the right?

A. `DOG`

B. `CAT`

C. `PIG`

D. `CHICKEN`

E. There is no output due to a syntax error.

```
public class CrunkCar{
   private Color color;

   public CrunkCar(Color c)   {
      color = c;
   }

   public String getIt(){
      if(color.equals(Color.RED))
        return "DOG";
      if(color.equals(Color.GREEN))
        return "CAT";
      if(color.equals(Color.BLUE))
        return "PIG";
      return "CHICKEN";
   }
}

////////////////////////////////////////
//client code
CrunkCar c = new CrunkCar(Color.BLUE);
out.println(c.getIt());   //1

c = new CrunkCar(Color.YELLOW);
out.println(c.getIt());   //2
```

QUESTION 11

What is output by the code to the right?

A. `>==`

B. `<`

C. `==`

D. `><`

E. `<==`

```
Character dog = new Character('7');
Character cat = new Character('X');

if(Character.isDigit(dog))
   System.out.print(">");
if(Character.isDigit(cat))
   System.out.print("<");
System.out.print("==");
```

QUESTION 12

What is output by the code to the right?

A. `0`

B. `F`

C. `66`

D. `f`

E. There is no output due to a syntax error.

```
System.out.printf("%c",102);
```

QUESTION 13

What is output by the code to the right?

A. `3`

B. `3 2`

C. `3 4 2`

D. `4 2`

E. There is not output due to a runtime error.

```
ArrayList<Integer> li;
li = new ArrayList<Integer>();

li.add(3);
li.add(4);
li.add(2);

Iterator<Integer> it = li.iterator();
while(it.hasNext()){
   if( it.next() < 4 )
      out.println(it.next());
}
```

QUESTION 14

What is output by the line marked `//1` in the client code to the right?

A. `36`

B. `294`

C. `40`

D. `100`

E. `180`

```
public static int doIt(int times)
{
  int val = 0;
  for(int i=0; i<times; i++)
    for(int j=0; j<times; j++)
      val = val + i + j;
  return val;
}

////////////////////////////////////////
//client code
out.println(doIt(7));   //1
```

QUESTION 15

What is output by the code to the right?

A. `0` B. `4` C. `3` D. `2` E. `1`

```
String j = "scratch";
out.print(j.charAt(0)-j.charAt(2));
```

QUESTION 16

What is output by the code to the right?

A. `6` B. `4`

C. `0` D. `3`

E. `8`

```
int bernie = 2+3*3/3;
switch(bernie){
  case 2 : bernie = 4; break;
  case 3 : bernie = 6; break;
  case 4 : bernie = 8; break;
  case 5 : bernie = 0; break;
}
System.out.println(bernie);
```

QUESTION 17

What is output by the code to the right?

A. `9604`

B. `9601`

C. `9801`

D. `9816`

E. `9999`

```
int k = 99;
int j = 0;
int t = 0;

while( t != k ){
  j += ( 1 + t * 2 );
  t++;
}
out.println(j);
```

QUESTION 18

What is output by the code to the right?

A. `false` B. `true` C. `stop` D. `0` E. `1`

```
boolean k=true, m=true, p=false;
System.out.println(k ^ m && (k || p));
```

QUESTION 19

What is output by the code to the right?

A. `[3, 2, 7, 1, 4, 5]`

B. `[2, 3, 4, 1, 8, 5]`

C. `[7, 1, 8, 3, 5, 2]`

D. `[2, 3, 7, 1, 8, 5]`

E. There is no output due to a runtime error.

```
ArrayList<Integer> list;
list = new ArrayList<Integer>();
list.add(7);
list.add(1);
list.add(0,4);
list.add(8);
list.set(0,3);
list.add(5);
list.add(0,2);
System.out.println(list);
```

QUESTION 20

What is output by the code to the right?

A. `7.0` B. `8.0` C. `7` D. `9` E. `9.0`

```
double dbl = Math.round(Math.sqrt(50));
System.out.print(dbl);
```

QUESTION 21

What is output by the code to the right?

A. `2` B. `4` C. `9` D. `3` E. `6`

```
System.out.println(9 ^ 8 | 11 & 3);
```

QUESTION 22

```
Integer[] n = {4,2,4,2,1};
```

What is returned by `dup(n)`?

A. `1` B. `2` C. `3` D. `4` E. `5`

QUESTION 23

```
Integer[] n = {54,102,32,59,102,32,18,54,59};
```

What is returned by `dup(n)`?

A. `18` B. `32` C. `54` D. `60` E. `102`

```
public int dup(Integer[] n)
{

   int x = 0;
   for(int i=0; i < n.length; i++)
      x = x ^ n[i];
   return x;
}
```

QUESTION 24

What is returned by the method call `YEP.doh(7.0)` ?

A. `14.0` B. `20.0`

C. `28.0` D. `21.0`

E. There is no output due to a runtime error.

```
public class YEP
{
  public static double doh(int x){
    return 3*x;
  }
  public static double doh(double x){
    return 2*x;
  }
}
```

QUESTION 25

What is returned by the method call `mask(6)` ?

A. `360` B. `6` C. `30` D. `120` E. `720`

QUESTION 26

What is returned by the method call `mask(3)` ?

A. `360` B. `6` C. `30` D. `120` E. `720`

```
public static int mask(int x)
{
  if(x<1)
    return 1;
  else
    return mask(x-1) * x;
}
```

QUESTION 27

Method `go` is which standard sorting algorithm?

A. bubble sort
B. selection sort
C. merge sort
D. quick sort
E. insertion sort

QUESTION 28

Which of the following could replace **`<*1>`** in the code to the right so that `br` could be passed to any of the methods of class `MASK`?

A. `Integer`
B. `Comparable`
C. `Number`
D. A and B only
E. A, B, and C

QUESTION 29

Assuming that **`<*1>`** is filled correctly, what is output by the line marked `//1` in the client code to the right?

A. `1`
B. `6`
C. `3`
D. `2`
E. `5`

QUESTION 30

Assuming that **`<*1>`** is filled correctly, what is output by the line marked `//2` in the client code to the right?

A. `1`
B. `6`
C. `8`
D. `2`
E. `5`

```
public class TestIt
{
  public static void go(Comparable[] list)
  {
     int end = list.length-1;
     go(list, 0, end);
  }


  private static void go(Comparable[] list,
                         int low, int high)
  {
     if(low < high)
     {
        int p = how(list, low, high);
        go(list, low, p);
        go(list, p+1, high);
     }
  }


  public static int how(Comparable[] list,
                         int low, int high)
  {
     Comparable p = list[low];
     int b = low-1;
     int t = high+1;
     boolean run = true;
     while(run)
     {
        do{
           --t;
        }while(list[t].compareTo(p) > 0);

        do{
           ++b;
        }while(list[b].compareTo(p) < 0);

        if (b >= t){
           run = false;
        }
        else{
           Comparable temp = list[b];
           list[b] = list[t];
           list[t] = temp;
        }
     }
     return t;
  }
}

////////////////////////////////////////
//client code

<*1> [] br = {3,5,6,8,2,1,4,9,7,0};


TestIt.how(br, 0, 8);
out.println(br[br.length/2]);    //1


TestIt.go(br);
out.println(br[br.length/2]);    //2
```

QUESTION 31

What is output by the line marked `//1` in the code to the right?

A. `WIL`

B. `SAM`

C. `2`

D. `3`

E. `FRODO`

QUESTION 32

What is output by the line marked `//2` in the code to the right?

A. `4`

B. `3`

C. `9`

D. `6`

E. `5`

```
String x = "0SAM1BEN2WIL3FRODO4lives5";
String[] group = x.split("\\D+");

out.println(group[3]);                //1
out.println(group.length);            //2
```

QUESTION 33

```
int[] a = {5,4,3,2,1};
```

What is returned by `tall(a,0)`?

A. `-1` B. `0` C. `1` D. `2` E. `3`

QUESTION 34

```
int[] a = {5,4,3,2,1,4,7,1};
```

What is returned by `tall(a,2)`?

A. `-1` B. `1` C. `3` D. `5` E. `7`

```
public int tall(int[] a, int x)
{
   for(int i=x-1;i>=0;i--)
   {
       if(a[i]>a[x])
          return i;
   }
   return -1;
}
```

QUESTION 35

Assume `a` is a random array of *distinct* integers of size `n` and `p` is between `0` and `n-1`. What is the probability that a call to `tall(a,p)` will return `-1`?

A. `1/p`

B. `1/(p+1)`

C. $(1/2)^p$

D. `(n-p)/n`

E. `log(p+1)`

QUESTION 36

Assume that method `superSort(Object[] objs)` is $O(N^3)$ where N = `obj.length`. When method `superSort` is passed an Object array of length 10000 it takes 0.50 seconds for method `superSort` to complete. If method `superSort` is passed an Object array of length 20000, how many seconds would it take `superSort` to complete?

A. 1.00 B. 1.50 C. 2.00 D. 4.00 E. 3.00

QUESTION 37

Using the client code at the right, how many nodes are in the subtree `t.root.right`?

A. `0` B. `8` C. `9`

D. `10` E. `12`

QUESTION 38

Using the client code at the right, how many nodes are in the subtree `t.root.mid.left`?

A. `0` B. `2` C. `8`

D. `9` E. `10`

QUESTION 39

Using the client code at the right and assuming that all strings of size 2 consisting of lowercase letters from the alphabet are inserted into a `TernaryTrie` in lexicographical order, what is the height of the tree? (Assuming a tree with only the root has a height of 1)

A. `1` B. `2` C. `26`

D. `32` E. `52`

QUESTION 40

Which of the following is true about a TernaryTrie?

A. For any string `s` that is inserted into a TernaryTrie, the node containing the character s_i will always be at depth `i`.

B. TernaryTrie is a balanced tree.

C. TernaryTrie is a ternary heap.

D. If more than one distinct string is inserted into a TernaryTrie, the number of distinct paths from the root to a leaf will always be greater than one regardless of the set of strings inserted.

E. If more than one distinct string is inserted into a TernaryTrie, the number of distinct paths from the root to a leaf can be one depending on which set of strings were inserted.

```
class Node{
  Node left, mid, right;
   char key;

  public Node(char key){
    this.key = key;
   }
}

class TernaryTrie{

 Node root;
 public TernaryTrie()
 {
   root = null;
 }

 public void add(String str)
 {
   root = add(str, root);
 }

 public Node add(String str, Node n)
 {
    if(str.length()==0) return n;

    if(n == null){
      n=new Node(str.charAt(0));
      n.mid=add(str.substring(1), n.mid);
      return n;
    }

    char c = str.charAt(0);
    if( c < n.key )
      n.left=add(str, n.left );
    else if( c > n.key )
      n.right=add(str, n.right);
    else
      n.mid=add(str.substring(1), n.mid);

    return n;
 }
}

//////////////////////////////////////////
//client code
TernaryTrie t = new TernaryTrie();
t.add("bob");
t.add("bea");
t.add("bak");
t.add("bobby");
t.add("beaaa");
t.add("baaad");
```