Unit 1: Definite Loops

Loops are helpful for iteration, such as iterating through arrays or collections of objects. There are 3 types of loops that you may see on the AP exam.

Loop Syntax

For Loops:

for(initialization; termination condition; update statement){

Statements //body of loop

}

While Loops:

while(Boolean test){

Statements //body of loop

}

For-each Loops are specifically used to iterate over an array or collection:

for(SomeType element: collection){

Statements //body of loop

}

Nested Loop Syntax

Nested For Loops:

for(first initialization; first termination condition; first update statement){

for(second initialization; second termination condition; second update statement){

Statements //body of loop

}

}

**Please note**:

1. Brackets are optional, but without them, only one of code in the statement body is executed.
2. It’s possible for a for loop or a while loop to never be executed. A for loop is never executed if its termination condition is met before the loop is entered, and a while loop will never run if its Boolean test is false before the loop is entered.

Examples:

|  |  |
| --- | --- |
| for(int i=0; i<5; i++){  System.out.print(i+” ”);  } | 0 1 2 3 4 |
| int i = 10  while(i>0){  System.out.print(i+” ”);  i-=2;  } | 10 8 6 4 2 |
| int[] arr = {3, 7, 15};  for(int number: arr){  System.out.print(number+” ”);  } | 3 7 15 |
| for(int i=1; i<5; i++){  for(int j=1; j<3; j++){  System.out.print(i\*j+” ”);  }  System.out.println;  } | 1 2 3  2 4 6  3 6 9  4 8 12 |

Unit 1: Definite Loops - Problems

1. Consider the following code segment

int value = 15;

while(value < 28){

System.out.println(value);

value++;

}

What are the first and last numbers output by the code segment?

First Last

1. 15 27
2. 15 28
3. 16 27
4. 16 28
5. 16 29

Question 2 and 3 refer to the following code segment

int k = *a random number such that* 1 <= k <= n

for (int p = 2; p <= k; p++)

for(int r = 1; r < k; r++)

System.out.println(“Oh hey there”);

2. What is the minimum number of times that “Oh hey there” will be printed?

1. 0
2. 1
3. 2
4. n-1
5. n-2

1. What is the maximum number of times that “Oh hey there” will be printed.
2. 2
3. n-1
4. n-2
5. (n-1)2
6. n2

1. Consider the following code segment

int num1 = 0;

int num2 = 3;

while((num2 != 0) && ((num1 / num2) >= 0){

num1 = num1 + num2;

num2 = num2 - 1;

}

What are the values of num1 and num2 after the while loop completed its execution?

1. num1 = 0, num2 = 3
2. num1 = 8, num2 = -1
3. num1 = 4, num2 = 1
4. num1 = 6, num2 = 0
5. The loop will never complete its execution because a division by zero will generate an ArithmeticException
6. Consider the following two static methods, where f2 is intended to be the iterative version of f1.

public static int f1(int n) {

   if(n < 0){

return 0;

}else{

Return (f1(n-1) + n\*10);

}

}

public static int f2(int n) {

int answer = 0;

while(n > 0){

answer = answer + n\*10;

n--;

}

return answer;

}

The method f2 will always produce the same results as f1 under which of the following conditions?

1. n < 0
2. n = 0
3. n > 0
4. I only
5. II only
6. III only
7. II and III only
8. I, II, and III

1. Consider the following output:

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

1 2 3 4 5 6

Which of the following code segments will produce the output shown above?

1. for (int j = 1; j <= 6; j++){

for(int k = 1; k < j; k++)

System.out.print(“ ”+k);

System.out.println();

}

1. for (int j = 1; j <= 6; j++){

for(int k = 1; k <= j; k++)

System.out.print(“ ”+j);

System.out.println();

}

1. for (int j = 1; j <= 6; j++){

for(int k = 1; k <= j; k++)

System.out.print(“ ”+k);

System.out.println();

}

1. for (int j = 1; j < 6; j++){

for(int k = 1; k <= j; k++)

System.out.print(“ ”+k);

System.out.println();

}

1. for (int j = 1; j < 6; j++){

for(int k = 1; k < j; k++)

System.out.print(“ ”+k);

System.out.println();

}