1. Log in
2. Working in Unit 2
- Scanner Input & Decimal Formatting
- If Statements & Relational Operators
- For and While Loops
- Recursion

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Remember the for-loop ...

```
for(int g=1 ; g<7 ; g++)
    System.out.println(g);


for(int i=3 ; i<=12 ; i+=4)
    System.out.print(i);


for( int t=15 ; t>=8; t--)
      {
         System.out.print(t);
         if(t==12)
           break;
      }
```

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We need to master the ...

Nested For-Loop

Simply stated is a for-loop that is inside another for-loop. Hence, a for-loop nested inside another.

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

Carefully walk through this!!!

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

m is 1 and is a "global variable" ... it can be used inside AND outside the for-loop!

Output:

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

Let's start the looping!!!

* This loop will iterate 3 times (when i=1, i=2, i=3)

Output:

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

HOLD ON!!!

Right now i=1 and we need to start a new loop!

This new loop (k) will iterate 2 times (k=1,k=2).

Output:

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

Careful now!

i=1, k=1, m=1 ... print m (1)

Output: 1

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

Adjust so ... i=1, k=1, m=2

When done, check the k-loop

k++ so now ... i=1, k=2, m=2

Output: 1

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

now i=1, k=2, m=2

Print m (2)

After printing, m++ and k++

So i=1, k=3, m=3

Output: 12

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

HOLD ON!!!

k=3 so the k-loop is DONE!

Output: 12

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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

right now i=1, k=3, m=3

Move on and print i

... println is used so "newline!"

and we finish the first "i-loop"

Output: 1 2 1

now waiting here

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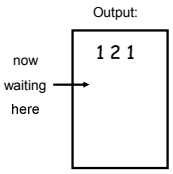
Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

right now i=2, k=3, m=3

loop all this stuff again!



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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

reset k to 1, so

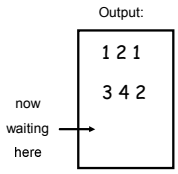
right now i=2, k=1, m=3

and the k-loop only runs twice.

Print m (3), do m++ so m=4

Print m (4), do m++ so m=5

Print i (2)



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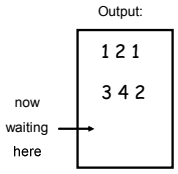
Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

Return to the first loop

Now i=3, k=3, m=5

Run this one more time ...



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Lets start "easier" ...

```
int m=1;
for(int i=1 ; i<4 ; i++)
{
   for(int k=1 ; k<3 ; k++)
   {
      System.out.print(m);
      m++;
   }
   System.out.println(i);
}
```

reset k to 1, so

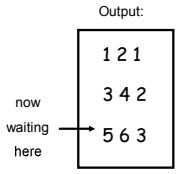
right now i=3, k=1, m=5

and the k-loop only runs twice.

Print m (5), do m++ so m=6

Print m (6), do m++ so m=7

Print i (3)



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So, nested for loops can be tricky!!!

```
for(int i=1 ; i<=5 ; i++)
{
   for(int p=1 ; p<=5 ; p++)
   {
      if(p==i)
         System.out.print(p);
      else
         System.out.print("x");
   }
   System.out.println("");
}
```

Output:

```
1xxxx
x2xxx
xx3xx
xxx4x
xxxx5
```

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Things to do ...

1. WS03 Should be wrapped up
   (Relational & Logical Operators and If-Statements)
2. Working on WS04 - For-Loops & modified Password
3. Today's WS05 - Nested For-Loops

Oct 16-9:12 AM