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Worksheet – Understanding Big-O

If there are multiple loops in an algorithm following one another, their respective Big O's are added together. With loops that are nested, their respective Big O's are multiplied together.

For example, for an algorithm as follows:

```
Loop1
Loop2
Loop3
{
      Loop4
}
Loop5
{
      Loop6
      {
            Loop7
      }
}
```

The Big O would be

```
O( Loop1bigO +
   Loop2bigO +
   (Loop3bigO * Loop4bigO) +
   (Loop5bigO * Loop6bigO * Loop7bigO) )
```

For the following selections of code, knowing n is the number of elements being dealt with, **determine the Big O:**

1.

```
int sum = 0;
for(int i = 0; i < n; i++)
{
      sum += i;
}
System.out.println("The sum is " + sum);
```

2.

```
for(int i = 0; i < n; i *= 2)
{
      for(int j = 1; j < 1000; j++)
      {
            number += i * j;
      }
}
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3.

```
for(int i = 100; i < n * n; i++)
{
	number += i;
}
```

4.

```
int x =5432;
for(int i = 0; i < x; i++)
{
	for(int j = n; j >=0; j--)
	{
		for(int k = 0; k <= n; k *= 4)
		{
			number += (i + j * k);
		}
	}
}
```

5.

```
for(int i = 0; i < n; i++)
{
	for(int j = 0; j < n; j++)
	{
		for(int k = 0; k <= n; k++)
		{
			number += k;
		}
	}
}
```

6.

```
for(int i = n; i >= 10; i--)
{
	for(int j = 0; j < (n * 2); j++)
	{
		number += j;
	}
}
```