Section 9: Loops

Introduction: A loop allows us to execute the same block of code multiple times until a specified conditional expression becomes `false` (i.e. "do `<something>` until `<condition>` fails"). Similar to multiple function calls, loops tend to be most useful when they are used to execute *similar* (not *identical*) sets of instructions. You may find it helpful to think of a loop as a *condensed* form of repeated, similar code.

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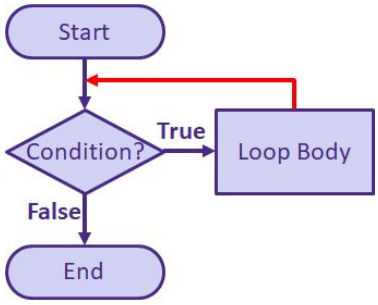
while-loops: This type of loop repeatedly runs the code inside of it while a conditional expression is `true`:

```
while ( condition ) {
    body;  // while-loop body
} // jump back to top of while loop
```



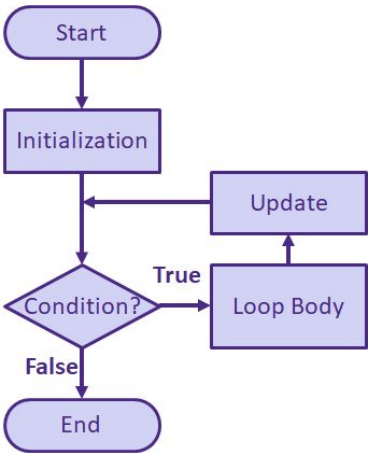
Notice how the code inside the loop is contained within curly braces, just like the code in a function! In general, curly braces denote a "block" of code.

Example:

```
int x = 1;
while( x < 10 ) {
   x = x * 2;
}
```

The above loop will execute the statement `x = x * 2` four times, with the final value of `x = 16`:

Iteration	x	Condition `(x < 10)`	Result
1	1	`true`	Execute `x = 1 * 2;`
2	2	`true`	Execute `x = 2 * 2;`
3	4	`true`	Execute `x = 4 * 2;`
4	8	`true`	Execute `x = 8 * 2;`
5	16	`false`	Exit loop



Exercises:

1) Describe what the loop below does.

```
int pos = 0;
while ( pos < min(width, height) ) {
   rect(pos, pos, 50, 50);
   pos = pos + 50;
}
```

2) Complete the loop below to find the **smallest power of 3 greater than 100**. Your answer should be stored in the variable `answer` *after* the loop has executed:

```
int answer = _____;

while ( ____________________ ) {

   answer = ____________________;

}
```

3) Complete the loop below that calculates the **sum of all *even* integers from 50 to 100, inclusive**. Your answer should be stored in the variable `sum` *after* the loop has executed:

```
int sum = _____;

int i = _____;

while ( i <= _____ ) {

   sum = ____________________;

    i = i + _____;

}
```

4) Find a partner, brainstorm Creativity Project ideas, and get started on "Creativity Planning." [*partners*]