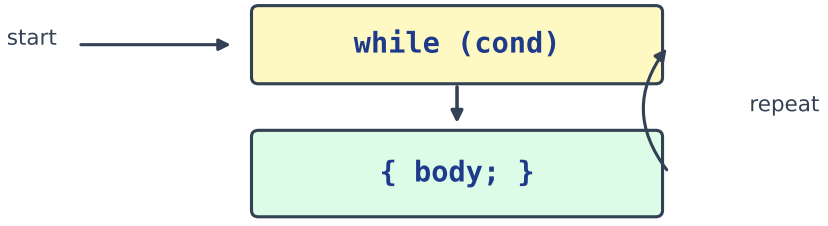
Loops

Java Reference

while loops

A `while` loop repeats while a condition is true. Change something inside, or it loops forever.

```
public class Main {
    public static void main(String[] args) {
        int n = 1;
        while (n <= 3) {
            System.out.println(n);
            n++;
        }
    }
}
```



Exam tip: condition is checked before each pass; body must eventually make it false

while checks the condition before each pass of the body

for loops

A `for` loop packs the start, the condition, and the step into one line. Best when you know the count.

```
public class Main {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i++) {
```

```
            System.out.print(i + " ");
        }
        System.out.println();   // 0 1 2 3 4
    }
}
```

Accumulation

The accumulator 累加器 pattern: start a variable before the loop, then update it each turn.

```
public class Main {
    public static void main(String[] args) {
        int total = 0;
        for (int i = 1; i <= 5; i++) {
            total += i;
        }
        System.out.println(total);   // 15
    }
}
```

Nested loops

A loop inside a loop is a nested loop 嵌套循环. The inner loop runs fully on each turn of the outer one.

```
public class Main {
    public static void main(String[] args) {
        for (int r = 0; r < 3; r++) {
            for (int c = 0; c < 3; c++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

Common mistakes

- `for (int i = 0; i < n; i++)` runs `n` times (`0` to `n - 1`); using `<=` runs one extra.
- Do not put a semicolon right after `for (...)` or `while (...)` — it makes an empty loop.
- Declare the counter in the `for` header so its scope ends with the loop.