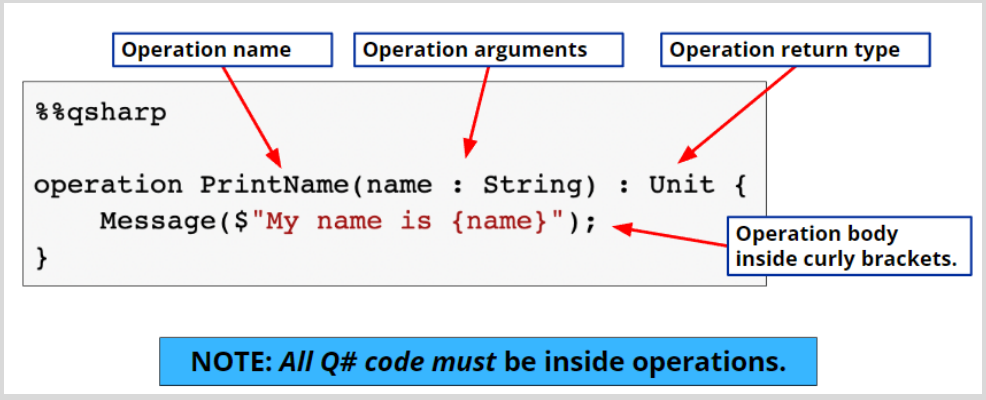
Useful Q# Commands

Operations

1. Declaring an operation in Python:

```
HelloWorld: any = None
```

2. Operations in Q#:



Loops

```
for i in 0 .. Length(array) - 1 {
    Message($"{array[i]}")
}
```

If-Statements

```
if arr[i] == true {
        Message($"{i}");
    }
```

Data Types

Data Type	Declaration
Immutable **Primitives**	`let a = 3;`
Mutable **Primitives**	`mutable a = 3;` `set a = a + 1; //reassign a`
Immutable **Arrays**	`let a = [3, size = 2];`
Mutable **Arrays**	`mutable a = [3, size = 2];` `set a w/= 0 <- 2; //reassign a[0] to 2`
Single **Qubit**	`use q = Qubit();`
Qubit Arrays	`use qs = Qubit[5];`

Qubit operations

Operation	Single Qubit	Multiple Qubits

Gates	`H(q);`
	`Z(q);`
	`X(q);`
		`CX(q0, q1);`

Measurement	`M(q);`	`MultiM(qs);`

Useful Python Commands

- Local (Microsoft) simulation:

```
HelloWorld.simulate()
```

- Print all targets available:

```
print("Your available targets:")
for target in targets:
    print(target.id)
```

- Pick a target:

```
qsharp.azure.target("ionq.simulator")
```

- Submit your code to a remote simulator

```
result = qsharp.azure.execute(ImplementCircuit, shots = 100,
jobName = "Exercise #3.5", timeout = 5000)
```

- Visualizing Results:

```
pyplot.bar(result.keys(), result.values())

pyplot.title("Result")
pyplot.xlabel("Measurement")
pyplot.ylabel("Probability")
pyplot.xticks(rotation = 90)

pyplot.show()
```

Navigating Azure