Overview

In this lesson, you will learn how to control whether the turtle draws lines as it moves. This is done by changing the turtle's **pen state**. Understanding pen up and pen down is essential for controlling when lines appear on the screen.

Important Information

The turtle has a pen attached to it, similar to a real pen touching paper.

There are two pen states:

- **Pen down** → the turtle draws lines as it moves
- **Pen up** → the turtle moves without drawing

By default, the turtle starts with the pen **down**.

Pen Down

To ensure the turtle is drawing, use:

```
t.pendown()
```

When the pen is down:

- Any movement creates a visible line
- This includes `forward`, `backward`, `goto`, and rotations combined with movement

Pen Up

To move the turtle without drawing, use:

```
t.penup()
```

When the pen is up:

- The turtle moves normally
- No lines are drawn
- This is useful for repositioning the turtle before drawing something new

Shorthand Commands

There are also shorter versions of these commands:

- `pu()` → pen up
- `pd()` → pen down

These work exactly the same as the full versions.

Set Up

Create a new Python file called `turtle_pen.py`.

Copy, Change, Challenge

Copy

Copy and run the following code.

```
import turtle

t = turtle.Turtle()

t.forward(100)

t.penup()
t.forward(100)

t.pendown()
t.forward(100)

turtle.done()
```

Observe:

- The first movement draws a line
- The second movement does not
- The third movement draws again

Change

Modify the program so that:

- The turtle lifts the pen before moving backward
- The turtle puts the pen down before moving forward again

Run the program and observe where lines do and do not appear.

Challenge

Create a program where the turtle:

- Moves to at least three different locations
- Draws lines in some places
- Moves without drawing in others