Animation
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This is Method Man. He is part of the Wu Tang Clan. 😊
Learning Goals

1. Feel more confident debugging
2. Write animated programs
You will be able to write Bouncing Ball
Goal
Great foundation
Move to Center
private void run() {
    // setup

    while(true) {
        // update world

        // pause
        pause(DELAY);
    }
}
Animation Loop

private void run() {
    // setup
    while(true) {
        // update world
        // pause
        pause(DELAY);
    }
}
The animation loop is a repetition of heartbeats

```java
private void run() {
    // setup
    while(true) {
        // update world
        // pause
        pause(DELAY);
    }
}
```
private void run() {
    // setup

    while (true) {
        // update world
        // pause
        pause(Delay);
    }
}

Each heart-beat, update the world forward one frame
private void run() {
    // setup

    while(true) {
        // update world

        // pause
        pause(DELAY);
    }
}
private void run() {
    // setup
    GRect r = makeRect();
    while (!isPastCenter(r)) {
        // update world
        r.move(1, 0);
        // pause
        pause(Delay);
    }
}
Bouncing Ball

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Milestone #1
Bouncing Ball

First heartbeat

**Velocity**: how much the ball position changes each heartbeat
Bouncing Ball

First heartbeat

The GOval `move` method takes in a change in x and a change in y
Bouncing Ball

Second heartbeat

\(vx\)

\(vy\)
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Third heartbeat

vx

vy
Bouncing Ball

What happens when we hit a wall?
Bouncing Ball

We have this velocity

\[ \text{vy} \]

\[ \text{vx} \]
Bouncing Ball

Our new velocity

\[ \text{vy} = -\text{vy} \]

\[ \text{vx} \]
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Seventh heartbeat
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Eighth heartbeat

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Ninth heartbeat

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We want this!
Bouncing Ball

This was our old velocity
Bouncing Ball

This is our new velocity

When reflecting horizontally: \( vx = -vx \)
When reflecting horizontally: $v_x = -v_x$
Bouncing Ball

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A Sticky Situation

The ball is above the bottom so we reverse its vy

The ball is below the bottom so we reverse its vy
Learning Goals

1. Feel more confident writing methods
2. Write animated programs