Programming a Robot to Follow a Path

1) Use the image above to program a sprite to move right when the right arrow key is pressed.

2) Program the sprite to move left when the left arrow is pressed.

3) Program the sprite to move up when the up arrow is pressed.

4) Program the sprite to move down when the down arrow is pressed.

HINT: The stage in Scratch is a coordinate plane. The x-axis goes side to side and the y-axis goes up and down. The sprite’s position is its (x, y) coordinate.
5) Change the appearance of the sprite. You can make it look like whatever you want.

6) Create a track for the sprite to follow that looks like the track pictured to the right. If you select the stage you will see that instead of a costume tab it has a background tab. The background tab will give you options to change the background appearance.

7) Try using the arrow keys to follow the track.

8) You can tell if the sprite is on the line by checking if the color of the sprite is over the color of the line. If the sprite is \( \square \) and the line is \( \square \) the code below will move the sprite if the sprite is on the line.

```
when [clicked] forever
if [color] is touching [?]
    move [10] steps
```

Make the sprite follow the line.
9) Add some curves to your track.

10) Try having your sprite follow the line again. Does it still follow the line correctly?

So far, the sprite always moves in the same direction, but now you need it to change direction to stay on the line. You can make your sprite change direction by telling it to turn

\[ \text{turn 5 degrees left} \]

will make your sprite turn 5 degrees left.

When should the sprite turn? It needs to turn when it starts wandering off the line. If the sprite is one color can we tell which direction it needs to turn? How can we tell which direction it has wandered off the line in?

Change your code so that the sprite can follow a curved line.

HINT: We need to be able to tell when to turn left and when to turn right. It is very important that the sprite in our picture has two different colored antennas. What does it mean when the yellow antenna touches the line? What does it mean when the red antenna touches the line?