# Worksheet: Ramp It Up

Introduction to Mobile Robotics > Anytime Activities > Ramp It Up

This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.

## Construct: Uphill


**Answering the following:**

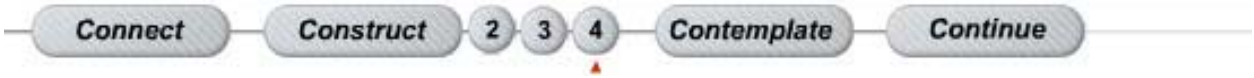
1. What happens when you try to let go of the robot?

## Construct: Vehicle Stability


**Check your understanding:**

2. What is an object's Center of Mass?
3. What is an object's support polygon?
4. Describe how you can tell whether a robot will be able to stand upright, or whether it will flip over.

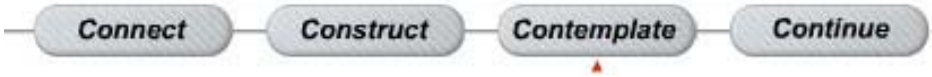
## Construct: Improved Stability




**Check your understanding:**

5. Did the robot stay upright now?
6. How did the change affect the robot's Center of Mass?
7. Why did this change affect the robot's ability to remain upright on the slope?

## Contemplate

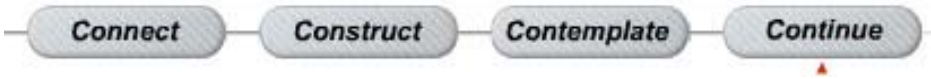



**8.** Find your own center of mass. Stand with your side from your shoulder to your foot up against a wall. Place your other foot right next to your first foot, so that they are touching. Now try to lift the second foot…
What happened? Why?

**9.** Why is the Center of Mass of your robot so close to the midpoint of the NXT?

**10.** Name some real world vehicles or robots that are built to go over rough terrain and steep slopes? How are they built to handle this?

## Continue




**11.** Why do the robot's wheels slip on the downhill but not on the uphill?

**12.** What needs to happen to the robot's weight distribution to solve this problem?

**13.** Brainstorm at least 2 ways you might be able to change the robot's weight to achieve this goal.

**14.** Modify your robot with the solution you think will work best. How successful was your solution?

**15.** How does your solution affect the robot's ability to climb the hill now?