

# Tractor Pull

## Part 1

- Form a team of 2 or 3.
- Collect baseline data
  - Create a new program with a single **Roll** block:



- Place Sphero at the start of the track.
- Aim Sphero to travel straight down the 5m track.
- Run the program.
- Record the time it takes Sphero to travel 5m at speed 150.

\_\_\_\_\_ sec

Describe the forces are acting upon Sphero while...

... at rest: \_\_\_\_\_

... moving: \_\_\_\_\_

## Part 2

- Gather building materials and design a Sphero-driven tractor that is capable of transporting an added weight five meters.
- What kinds of things are you considering in your design?

---

- How will the tractor affect Sphero's movement (kinetic energy)?

---

- Predict the time it will take the Sphero-driven tractor to travel 5m:

\_\_\_\_\_ sec (at speed 150 without an added weight)

\_\_\_\_\_ sec (at speed 150 with an added weight)

- Aim the Sphero-driven tractor to travel straight down the track.
- Run the program.
- Record the actual times:

\_\_\_\_\_ sec (at speed 150 without an added weight)

\_\_\_\_\_ sec (at speed 150 with an added weight)

What happened? \_\_\_\_\_

How do you account for any differences between the baseline and each of the other two runs?

---

---

## Part 3

- Discuss with your team:
    - Which forces were acting upon the Sphero in Part 2 while...  
...at rest?  
...moving?
    - How did this affect Sphero's movement (kinetic energy)?
    - What changes can be made to improve Sphero's movement?
  - Describe how the mass of Sphero plus the mass of the tractor affected its movement.
- 

## Part 4

- How can you make it go faster?
    1. Change the **speed**
      - Predict what will happen if you increase the speed by 50 and 100.
- 

2. Change the **mass**

- Predict what will happen if you decrease the mass of the tractor.
-

- Run the tests

### 1. Change the **speed**

- ▶ Predict the time it will take the Sphero-driven tractor to travel 5m:

\_\_\_\_\_ sec (at speed 200 with an added weight)

\_\_\_\_\_ sec (at speed 250 with an added weight)

- ▶ Record the actual times:

\_\_\_\_\_ sec (at speed 200 with an added weight)

\_\_\_\_\_ sec (at speed 250 with an added weight)

### 2. Change the **mass**

- ▶ Reduce the tractor's mass by redesigning your tractor with fewer materials.
- ▶ Predict the time it will take the Sphero-driven tractor to travel 5m after the redesign:

\_\_\_\_\_ sec (at speed 150 with an added weight)

- ▶ Record the actual times:

\_\_\_\_\_ sec (at speed 150 with an added weight)

By increasing Sphero's speed, what also increased? \_\_\_\_\_

Describe the relationship between Sphero's mass and speed.

---

---