

# SPIKE™ Prime

7

## Projects



# 21

## LESSON PLANS

### Teacher Guide



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**Published by LKD Educational Resources**

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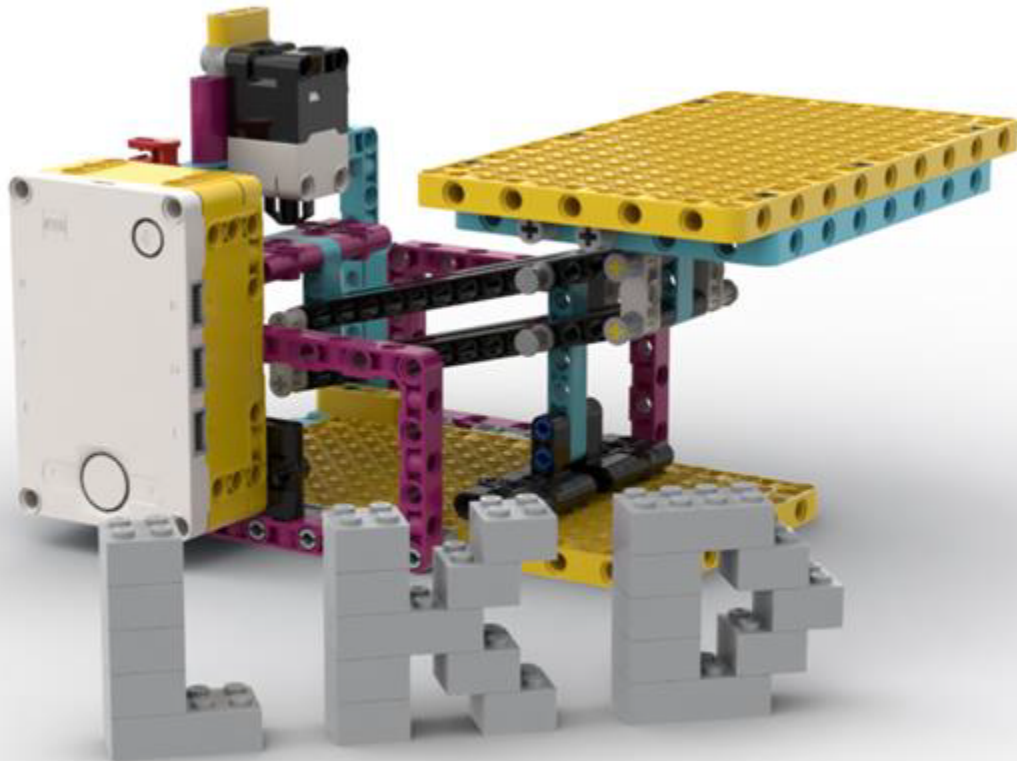
Units	Unit Title	Courses Name
Unit 1	Getting Started + Going the Distance	LEGO APP
Unit 2	Guitar Tunes	LKD PROJECT
Unit 3	Weight Scale	LKD PROJECT
Unit 4	Place Your Order	LEGO APP
Unit 5	Out of Order	LEGO APP
Unit 6	Smart Compass	LKD PROJECT
Unit 7	Track Your Packages	LEGO APP
Unit 8	Keep it Safe	LEGO APP
Unit 9	Keep it Really Safe	LEGO APP
Unit 10	Spin the Wheel	LKD PROJECT
Unit 11	SPIKE Sandclock	LKD PROJECT
Unit 12	Automate It	LEGO APP
Unit 13	This is Uphill	LEGO APP
Unit 14	Time for Squat Jumps	LEGO APP
Unit 15	Assembling an Advanced Driving Base (open project)	LEGO APP
Unit 16	My Code, Our Program (open project)	LEGO APP
Unit 17	<b>SPIKE / Python (4 Lessons)</b>	<b>LKD PROJECTS</b>
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Lessons 2	Shadow Printer	LKD PROJECT
Lessons 3	Mole Whacker	LKD PROJECT
Lessons 4	Rock-Paper-Scissors	LKD PROJECT

# Weight Scale

Teacher Book - SPIKE Prime Project

**Can you create a device to measure the weight and mass of different objects?**

A weighing scale traditionally consisting of two plates or bowls suspended at equal distances from a fulcrum is used to measure weight or mass.



## Ignite a Discussion

Start a discussion by asking relevant questions, like:

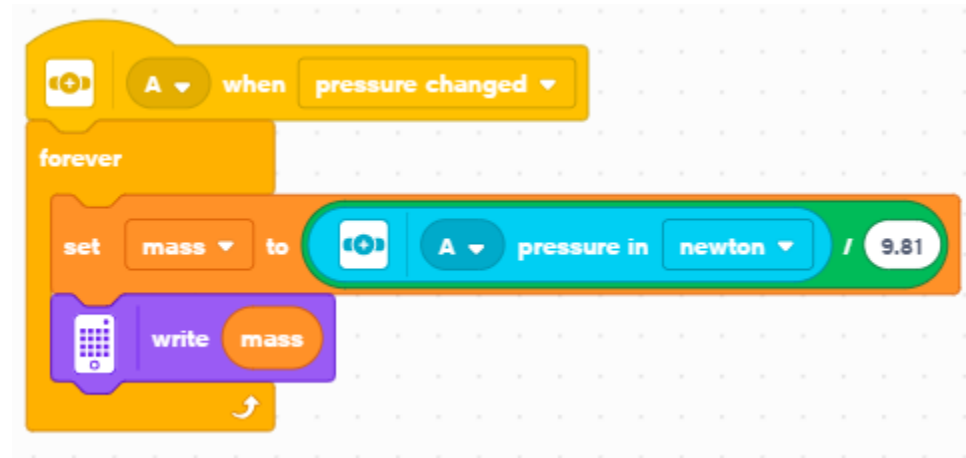
- What is the difference between mass and weight?
- What are the SI units for mass and weight?
- What could a balance scale be used for?

Have your students watch the video to see what they are about to do.

## Build your Weight Scale.

This weight scale measures mass in kilograms or grams.

Let's try this code first.



This program converts the force measured by the force sensor into mass based on this formula:

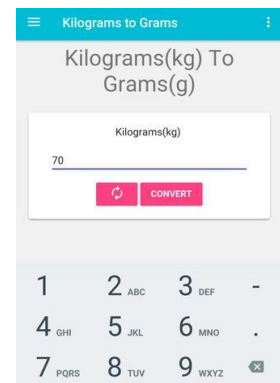
$$\text{Force} = \text{Mass} * \text{Acceleration of Gravity (g)}$$

## Now display mass in grams.

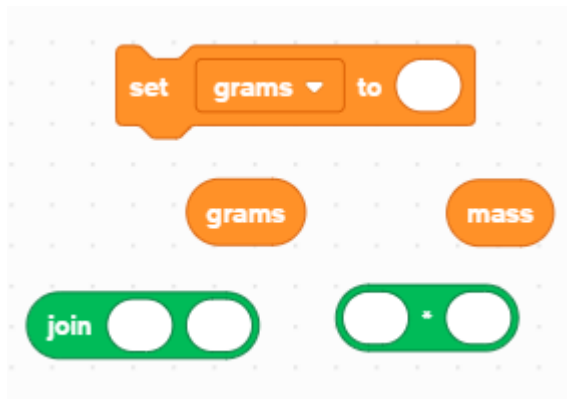
Convert the mass from kilograms to grams.

*1 kilogram (kg) is equal to 1000 grams (g).*

**What is the heaviest mass calculated by the scale?**

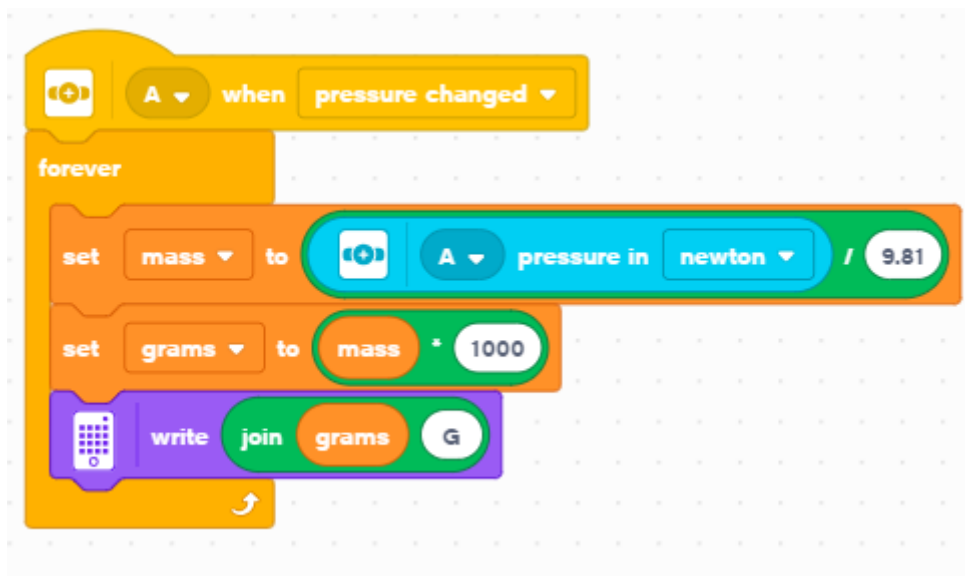


## (HINTS)



Think about using these code blocks.

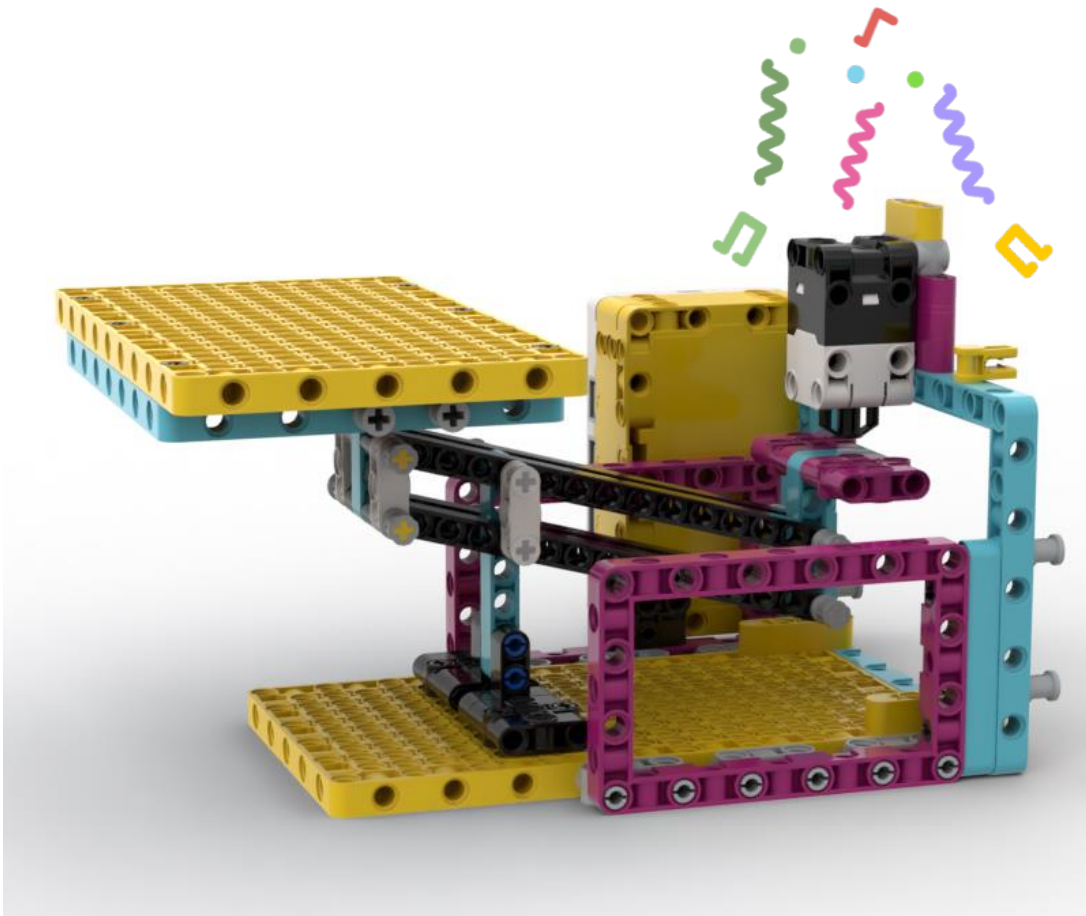
## Possible Solution



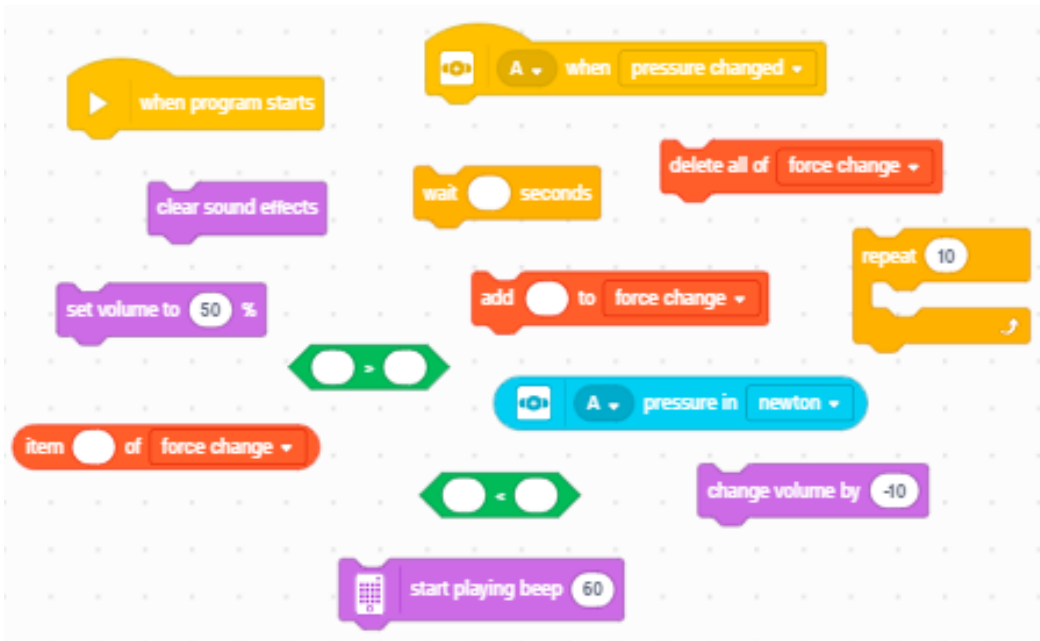
## EXTRA CHALLENGE

### Noisy Scale

Have your scale play a beep noise when pressure changes on force sensor. Increase the volume as the weight measured increases and decrease the volume if weight measured decreases.



**(HINTS)**



Think about using these code blocks.

## Possible Solution

1. This program will reset all sound effects
2. When pressure changes
3. Create list called 'force change' and clear it
4. Save 2 different force readings into the list
5. Compare the 2 force readings:
6. If force 1 > force 2:  
Play beep and change volume by -10
7. If force 2 > force 1:  
Play beep and change volume by 10

```
when program starts
  clear sound effects
  set volume to 50 %

when pressure changed
  delete all of force change
  repeat 2
    add A pressure in newton to force change
    wait 2 seconds
  if item 1 of force change > item 2 of force change then
    start playing beep 60
    change volume by -10
  else
    if item 2 of force change > item 1 of force change then
      start playing beep 60
      change volume by 10
```

The image shows a Scratch script on a grid background. It starts with a 'when program starts' block containing 'clear sound effects' and 'set volume to 50 %'. This is followed by a 'when pressure changed' block. Inside this block, there is a 'delete all of force change' block, a 'repeat 2' loop containing an 'add A pressure in newton to force change' block and a 'wait 2 seconds' block. After the loop, there is an 'if' block with the condition 'item 1 of force change > item 2 of force change'. The 'then' branch contains 'start playing beep 60' and 'change volume by -10'. The 'else' branch contains another 'if' block with the condition 'item 2 of force change > item 1 of force change', which leads to 'start playing beep 60' and 'change volume by 10'.



## Differentiation

Simplify this lesson by:

- Suggesting a selection of objects to weight using the scale

Take this lesson to the next level by:

- Having your students redesign the scale.

## Assessment Opportunities

### Teacher Observation Checklist

Create a scale that matches your needs, for example:

1. Partially accomplished
2. Fully accomplished
3. Overachieved

Use the following success criteria to evaluate your students' progress:

- Students can describe the function of an object.
- Students can describe the benefit of an object's features against needs.
- Students can construct effective arguments.

### Self-Assessment

Have each student choose the brick that they feel best represents their performance.

- Blue: I can describe how things work
- Yellow: I can describe in detail how things work and I can highlight what it's good at.
- Violet: I can convince someone that I've invented the coolest thing in the world.



### Peer-Assessment

Encourage your students to provide feedback to others by:

- Having one student score the performance of another using the colored brick scale above.
- Asking them to present constructive feedback to each other so that they can improve their group's performance during the next lesson.

**You did it!**