ScienceCube

Measuring the weight of an object

Learning Objectives

1. Measure the weight of substances with the same shape and explain the reason.
2. Measure the weight of objects with the same substance but different shapes and explain the reason.

Should I think about it?

How does the shape of an object affect its weight?

Learning Content

1. What is an Object?

An object has a shape and occupies a certain space. Examples of objects around us are books, desks, bags, toys, etc.

2. Materials That Make Objects

1) Many objects around us are made of materials such as rubber, glass, fabric, plastic, etc. The materials used to make objects are called substances.

2) Objects made of the same material

[Wood] Desk, chair, toothpick, chopsticks, bookshelf, etc.

[Glass] Glass cup, aquarium, window, vase, etc.

[Metal] Nail, scissors, frying pan, kettle, knife, clip, etc

[Paper] Calendar, book, notebook, colored paper, paper cup, etc.

[Plastic] Cup, keyboard, etc.

[Rubber] Eraser, balloon, rubber gloves, etc.

3) Classifying Objects

Classification is grouping objects based on their similarities and differences.

- Classification by shape
- Classification by use
- Classification by substance

3. Force Sensor

- Can measure forces in the ranges of -10N~+10N and -80N~+80N.
- Set the desired range using the sensor's switch, then set the measuring range in the program and zero the sensor.
- Be cautious as the sensor will reset to the default range if disconnected from the interface.

Experimental Activities

Materials Needed

Interface, Science# program (smart device), force sensor, balance scale pan, 3 balls of different materials but the same size, 3 pieces of modeling clay, double-sided tape

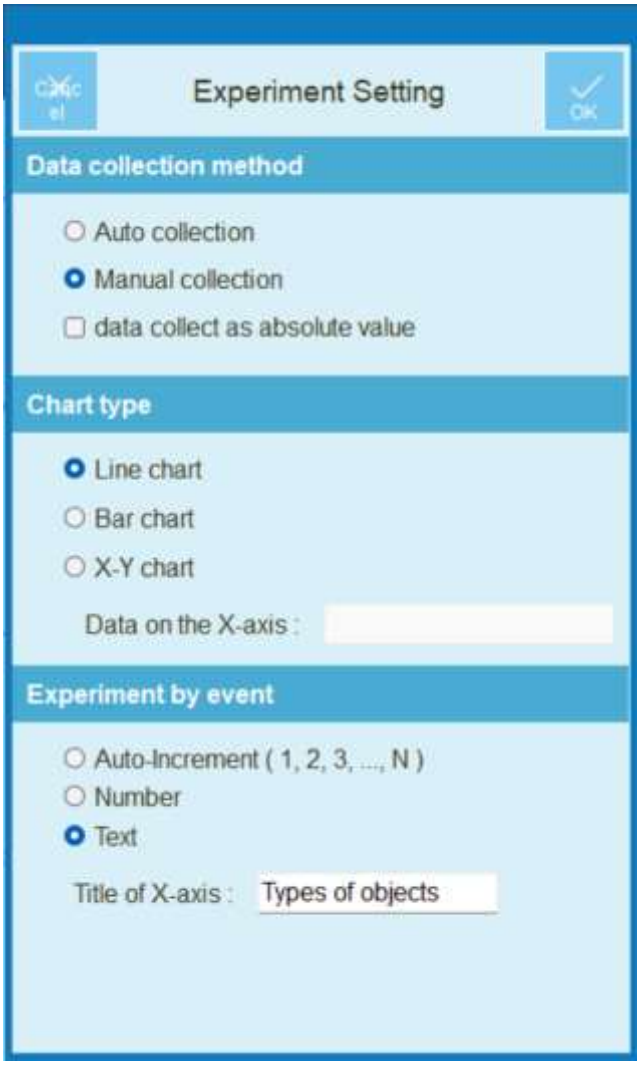
Experiment Procedure

Preparing the Equipment

1. Run the Science# program on the smart device and connect it to the powered interface via Bluetooth or cable.

2. Connect the force sensor to the interface.

3. Press the button  on Science# to automatically set up  the experimental environment as shown below.



[Experiment 1] Comparing Weights of Objects with the Same Shape

1. Set up the stand and secure the force sensor with a clamp.

2. Hang the balance scale pan from the hook of the force sensor. Apply double-sided tape to the center of the pan to prevent objects from falling off.

3. When the scale stabilizes, press the button  to zero the sensor.

4. Press the button  to start data collection.

5. Place a ball on the pan and, once the value stabilizes, press the button  to measure the weight and record the substance in the text input box (e.g., metal, rubber, wood, plastic).

6. Measure and record the weights of the other two balls in the same manner.

7. Press the button  to end the experiment.

8. Press the button  , then go to <Chart Properties> - <Other Properties> and enter the chart title (e.g., Comparing Weights of Objects with the Same Shape).

[Experiment 2] Comparing Weights of Objects with Different Shapes

1. Shape the 3 pieces of modeling clay into a circle, triangle, and square.

2. Press the button  to create a new chart, then press the button  to start data collection.

3. Place the circular clay on the pan and, once the value stabilizes, press the button

 to measure the weight and record the shape in the text input box (e.g., circle, square, triangle).

4. Measure and record the weights of the other two shapes in the same manner.

5. Press the button  to end the experiment.

6. Press the button  , then go to <Chart Properties> - <Other Properties> and enter the chart title (e.g., Comparing Weights of Objects with Different Shapes).

Experimental contents

1. Measure the weights of three balls with the same shape but different materials, plot them on a bar graph, and complete the table below.

Substance Type			
Weight (N)			

2. Measure the weights of different shapes made of clay, plot them on a bar graph, and compare them.

Experimental results

1. Based on the experiment results, identify what affects the weight of an object.

2. Consider whether it is lighter to carry ice or water.