

# Balancing and Weighing Concept Storyline

## Unifying Concept

The physical world is made of substances, materials, and objects that may be identified by their unique properties.

## Unit Concept

The weight of an object is a force that is related to its mass and the force of gravity; the volume of an object is dependent on its size.

## Grade-Level Concept

Objects have many properties, including volume and weight. These properties can be investigated using tools, such as balances.

### Subconcept 1

On a beam balance, balance is dependent on the relative mass of objects, the location of the fulcrum, and the relative lengths of the arms of the beam.

Lesson 1: Pre-Unit Assessment: Thinking about Balance

*Students use simple materials to explore the relationship between balance and mass.*

Lesson 2: Building Structures that Balance

*Students build structures that balance using a beam, fulcrum, and Unifix Cubes™.*

Lesson 3: Exploring the Beam Balance

*Students explore the relationship between balance and mass by varying the number and position of Unifix Cubes™.*

Lesson 4: Moving the Fulcrum

*Students explore the relationship between balance and mass by changing the position of the fulcrum.*

Lesson 5: Building Mobiles

*Students apply their understanding of the beam balance to build simple and complex mobiles.*

### Subconcept 2

The equal-arm balance may be used to compare the mass of two objects.

Lesson 6: Exploring the Equal-Arm Balance

*Students build an equal-arm balance and compare it to the beam balance.*

Lesson 7: Using the Equal-Arm Balance to Compare Objects

*Students compare the masses of objects and discuss the concept of fair comparisons.*

### Subconcept 3

The weight of an object is dependent on its mass.

Lesson 8: Developing Strategies for Placing Objects in Serial Order

*Students use the equal-arm balance to place four objects in serial order from lightest to heaviest.*

Lesson 9: Placing Six Objects in Serial Order

*Students add two objects to their group of four.*

Lesson 10: Balancing with Unifix Cubes™

*Students discover that weighing is the process of balancing the mass of an object against a certain number of standard units.*

Lesson 11: Graphing the Weights of the Objects

*Students examine the differences between comparing mass with an equal-arm balance and weighing against standard units as strategies for placing objects in serial order from lightest to heaviest.*

### Subconcept 4

The weight of an object is determined by its volume, density, and the ambient force of gravity. The mass of an object is determined by its volume and density.

Lesson 12: Describing the Four Foods

*Students observe and compare the properties of four foods.*

Lesson 13: Comparing Cupfuls of Food

*Students predict the serial order, from lightest to heaviest, of the four foods, test their predictions, and discuss the results.*

Lesson 14: Weighing Cupfuls of Food

*Students weigh cupfuls of food and record their findings on a class line plot.*

Lesson 15: Which Food Occupies the Most Space?

*Students discover that equal weights of food occupy different volumes.*

Lesson 16: Where Are the Six Marbles?

*Students design and carry out an investigation that demonstrates their understanding of comparing and weighing.*

Lesson 17: Post-Unit Assessment: Sharing What We Have Learned about Balancing and Weighing

*Students discuss and reflect on what they have learned.*