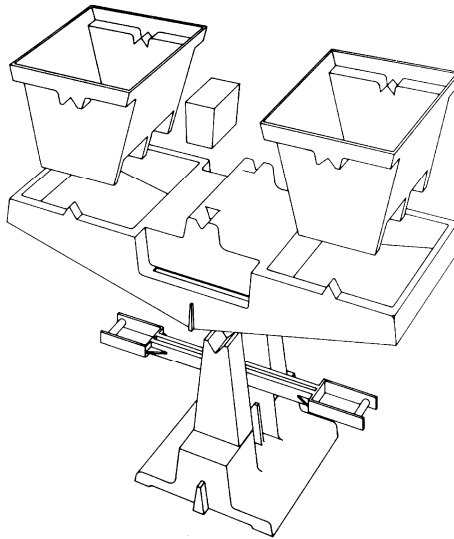




# PRIMER BALANCE ACTIVITY GUIDE



## Primer Balance

Accurate, simple to use, easy to clean and student proof.  
Your students' first introduction to the principles of balancing  
are best demonstrated with this new design primer balance.  
2000 g capacity, 1 g sensitivity.

# PRIMER<sup>®</sup> BALANCE ACTIVITY GUIDE

## INTRODUCTION

Children develop measurement concepts through interactions with objects in their environment. They gain these concepts by climbing trees, lifting toys, touching hot and cold surfaces, and doing a multitude of things called "everyday life". The teacher's role is to help the student integrate what he or she knows about the world with the formal lessons taught in the classroom.

An important part in helping students to integrate and expand their knowledge of measurement is to present lessons in a concrete form. A suggested teaching sequence for accomplishing this goal is shown below:

MODEL FOR ACTIVITY MEASUREMENT PROGRAMS	
STAGE OF MEASURE	GRADE LEVEL
	K 1 2 3 4 5 6 7 8
Making direct comparisons between objects	—————
Comparing an object with a non-standard unit	—————
Comparing an object with a standard unit (SI metric)	—————

## SEQUENCING ACTIVITIES FOR MEASURING MASS

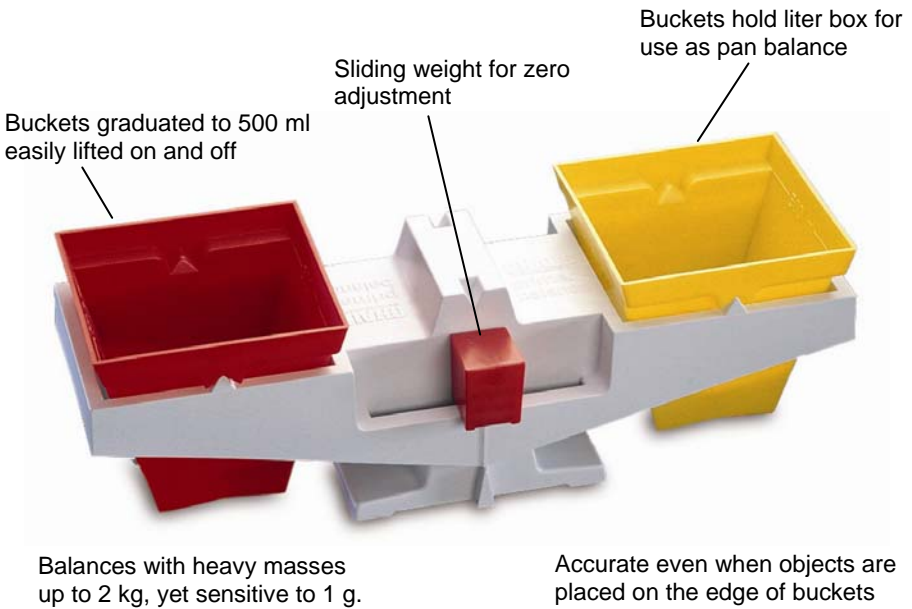
The chart above implies that students of any age should have experiences comparing the relative mass of objects using direct comparison techniques (using all five senses). If students are unable to decide which of two materials has the greater mass, they may elect to use a balance to resolve the problem.

Initial work with the balance can be carried out successfully using nonstandard units of measure. The student can use almost any available object as his unit for comparison. Later, for convenience and accuracy, comparisons can be made using standard units.

## USING THE PRIMER<sup>®</sup> BALANCE

The Primer Balance is rugged and can be used by students with the knowledge that it will not be damaged through normal use. The balance may be taken apart to see how it is constructed. Each of the balance pans may be loaded with all types of materials: sand, water, books, rocks, etc. Since there is very little that will damage the Primer Balance, students may be given freedom to explore how it works.

After they have had an opportunity to explore the working of the balance on their own, the activities in this guide may be duplicated and introduced.



# does it balance?

**OBJECTIVE:** To make accurate comparisons of the mass of two similar objects.

**MATERIALS:** Primer Balance  
Pairs of objects that have similiar but unequal mass.

For example:

- 2 rubber erasers (used)      2 pebbles
- 2 oranges                              2 pencils (used)
- 2 crayons (used)                      2 potatoes

**PROCEDURE:**

1. Check the reading on the front of the balance to see if it is in alignment. If it is out of balance, have your teacher show you how to adjust it.
2. Use a marking pen to mark each pair of objects. (Mark one object "A" and the other "B".) Weigh each pair of objects. List them and record the results by placing an "A" or "B" in the proper column in the following chart.

Objects	Heaviest	Lightest

# fruits and vegetables

**OBJECTIVE:** To use a balance to order objects by mass.

**MATERIALS:** Primer Balance  
One each:  
Banana  
Apple  
Grapefruit

Potato  
Lemon  
Carrot

- PROCEDURE:**
1. Look at the fruits and vegetables: list them in order from the lightest to the heaviest. Record your guess in the following chart.
  2. Compare the weight of the fruits and vegetables to see if your guess is correct.

	Order by Guessing	Order by Weighing	
Lightest			Lightest
Heaviest			Heaviest

*Nonstandard*

# nails

**OBJECTIVE:** To make comparisons of mass using a nonstandard unit of measure.

**MATERIALS:** Primer Balance  
Six small paper cups  
Enough of the following material to each fill one cup:  
Beans                                      Breakfast Cereal  
Rice                                         Salt  
Cornmeal                                 Water  
A cup of nails as mass pieces

**PROCEDURE:**

1. Measure a cup of each of the materials provided in this activity.
2. Guess the number of nails it will take to balance each of the materials.
3. Make a record of what you found. Use the following chart.

Your Guess (Number of Nails)	Material	Actual Number of Nails
	Beans	
	Rice	
	Cornmeal	
	Breakfast cereal	
	Salt	
	Water	

*Nonstandard*

# how many cards?

**OBJECTIVE:** To make comparisons of mass using a nonstandard unit of measure.

**MATERIALS:** Primer Balance  
A deck of playing cards  
Some round objects:

Tennis ball	Ping Pong ball
Golf ball	Super ball
Marble	Ball bearing

- PROCEDURE:**
1. Guess the number of playing cards that will equal the mass of the objects listed below.
  2. Record your guess and then find the number using the balance.

Your Guess (Number of Playing Cards)	Material	Actual Number of Cards Needed to Balance the Object
	Tennis ball	
	Golf ball	
	Marble	
	Ping pong ball	
	Super ball	
	Ball bearing	

*Nonstandard*

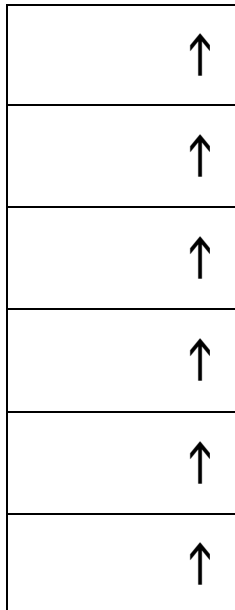
# a lump of clay

**OBJECTIVE:** To gain an awareness of the relation that exist between the space occupied by material (volume) and the mass of that material.

**MATERIALS:** Primer Balance  
1 large lump of clay  
Plastic cups  
6 or 8 plastic bags with ½ gallon capacity  
A supply of the following materials:  
Styrofoam packing material  
Nuts (with shell on)  
Breakfast cereal  
Cornmeal  
Beans  
Salt

## PROCEDURE:

1. Place the lump of clay in one of the pans. Then fill a plastic bag with an amount of material that will cause the scale to come into balance. You may need more than one plastic bag for some material.
2. Order the filled bags according to the amount of space the material takes up inside each bag. Use the chart at right.
3. Explain why some materials take up more space than others.



Material That Took Up the Least Space

Material That Took Up the Most Space



# heavy water

**OBJECTIVE:** To use the mass of a liquid to make comparisons of mass with solid materials.

**MATERIALS:** Primer Balance  
Metric measuring cups  
Plastic cups  
A collection of solid materials such as:

- |        |              |        |            |
|--------|--------------|--------|------------|
| Potato | Large pebble | Orange | A baseball |
| Apple  | Coffee mug   | Banana | Math book  |

- PROCEDURE:**
1. Place a cup (250 ml) of water in one of the balance pans.
  2. Before comparing the mass of each object in your collection with the water, record your guess whether the object will have a mass that is "less than", "greater than", or "the same as" the water.
  3. Measure and record your findings. Use the following chart.

Your Guess (Less Than, or The Same)	Object	Actual Mass of the Object: (check the correct column)		
		Less Than the Water	Same as the Water	More than the Water

# small things

**OBJECTIVE:** To gain an awareness of how the mass of familiar objects compares to one gram.

**MATERIALS:** Primer Balance  
10 to 15 one gram mass pieces.  
A collection of objects, such as:  
Paper clips (small and large)  
Brass paper fasteners  
Coins (penny, nickel, dime, quarter, etc.)  
Playing cards  
Rubber bands (long ones and thick ones)

**PROCEDURE:**

1. Determine the number of objects (identical objects) that have a mass of a single object by dividing the number of objects it takes into 10 grams and record your findings. Use the chart below.
2. List the objects that have a mass of nearly one gram.

Number of Objects Equal to a 10 Gram mass	Object	Mass of a Single Object
	Penny	
	Nickel	
	Dime	
	Quarter	
	Small paper clip	
	Large paper clip	

# the average egg

**OBJECTIVE:** To use averages to make decisions related to how an object is categorized.

**MATERIALS:** Primer Balance  
3 small and 3 large eggs (hardboiled)  
100 one-gram mass pieces

- PROCEDURE:**
1. Use a felt tip pen to mark the size on each egg: "s" for small and "l" for large.
  2. Find the mass of each egg according to its size: then calculate the average number of grams for each egg size. (To find the average, add the total mass of the eggs and divide the number of eggs.) Record your answers. Use the following chart.
  3. Discuss whether or not weighing is a good way to determine egg size.

Small Eggs	Mass
Egg #1	_____ grams
Egg #2	_____ grams
Egg #3	_____ grams
Average mass of a small size egg = _____ grams	

Large Eggs	Mass
Egg #1	_____ grams
Egg #2	_____ grams
Egg #3	_____ grams
Average mass of a small size egg = _____ grams	

*Standard*

# paper towels

**OBJECTIVE:** To solve problems that require accurate comparisons of mass.

**MATERIALS:** Primer Balance  
One-gram mass pieces  
3 or 4 different brands of paper towels

**PROCEDURE:** To decide which brand of paper towel is better able to pick up spilled water:

1. Write each paper towel's brand name on the chart.
2. Weigh the dry paper towel. Then soak up as much water as you can with the towel and weigh it again. Make a record of your measures for each towel in the chart.

Brand Name of Towel	Measures of mass
	Dry towel _____ grams Water soaked towel _____ grams Amount of water in the towel _____ grams
	Dry towel _____ grams Water soaked towel _____ grams Amount of water in the towel _____ grams
	Dry towel _____ grams Water soaked towel _____ grams Amount of water in the towel _____ grams
	Dry towel _____ grams Water soaked towel _____ grams Amount of water in the towel _____ grams

# balancing with water – i

**OBJECTIVE:** To discover the special relationship that exists between the weight and the volume of water.

**MATERIALS:** Primer Balance  
100 one-gram mass pieces  
A medicine dropper

- PROCEDURE:**
1. Place the number of mass pieces indicated in the following chart in one of the balance pans. Bring the scale into balance by adding or taking away some of the water with the medicine dropper.
  2. When the water and the mass pieces are in balance, pour the water from the balance pan into a graduated cylinder. Record the volume in milliliters.
  3. Explain how you could use the relationship that exists between mass (weight) and volume of water to accurately measure the mass of an object.

Number of One Gram Mass Pieces	Volume of the Water in Milliliters
10 grams	_____ ml
20 grams	_____ ml
30 grams	_____ ml
50 grams	_____ ml
100 grams	_____ ml

*Standard*

# balancing with water – ii

**OBJECTIVE:** To measure the mass of an object by using a volume of water as the basis of comparison.

**MATERIALS:** Primer Balance  
A cylinder or beaker (graduated in ml)  
A medicine dropper  
Some objects to weigh, such as:

- |               |                |
|---------------|----------------|
| Orange        | Rock           |
| Apple         | Piece of chalk |
| Wooden block  | Sea shell      |
| Piece of clay | Bag of sand    |

**PROCEDURE:** Estimate the mass of each of the objects you wish to measure in grams. Then using the balance, find the amount of water needed to balance the object. Measure the volume of the water to determine the mass of the object. Make a record of what you find.

Mass (Your Guess)	Object	Actual Mass

*Standard*

# other activities

Duplicate the following activities and assign them as motivators.

## **ORANGE JUICE**

How much juice can you get from an orange? See if you can determine the cost of fresh orange juice.

*(Standard)*

## **USED PENCILS**

Each time a pencil is sharpened it loses some mass. What decimal fraction of your pencil have you used?

*(Standard)*

## **CHANGE FOR ONE DOLLAR**

What is the most and the least amount of mass that one dollar's worth of change can have?

*(Standard)*

## **A BEAN CONTEST**

See who can predict the mass of 100 beans by weighing at least five beans.

*(Standard)*



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