

# Fruit Basket Measurement

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- Strand:** Measurement and Geometry
- Topic:** Estimating and measuring weight/mass in U.S. Customary units
- Primary SOL:** 4.8 The student will
- b) estimate and measure weight/mass and describe the result in U.S. Customary and metric units;
  - c) given the equivalent measure of one unit, identify equivalent measures of length, weight/mass, and liquid volume between units within the U.S. Customary system.

## Materials

- A variety of fruits, several of each, including, if possible, bananas, apples, oranges, pears, kiwis, grapes, mangoes, peaches, cantaloupes, and plums
- A variety of weight measurement tools, including a balance scale, a spring scale, or a digital scale
- Weights for each team of two students, including ounce and pound weights
- Fruit Basket Recording Sheet, one per pair of students, two-sided (attached)

## Vocabulary

*digital scale, estimate, equivalent measure, mass, ounce, pound, U.S. Customary system, weight, spring scale*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Present the following word problem to the class: “John loves fruit. Everybody in fourth grade knows that fruit is his favorite food. He eats fruit all the time. Anyone who brings fruit in a lunchbox always gives the fruit to John, and he is always grateful! John has been sick, and he is going to be out of school for several more days. His classmates want to do something nice for him, so they are going to prepare a nice basket of mixed fruit to take to him. How can they prepare a basket of fruit that weighs exactly 10 pounds?”
2. Display the collection of different fruits. Discuss what the class feels is a reasonable U.S. Customary unit of weight to measure an apple. Students will need to come to the realization that an apple is a dense fruit but would not normally weigh more than 1 pound, so a smaller weight unit would be best to use (ounces). Model the thought process in selecting a weight tool to weigh the apple. A balance scale or spring scale would be appropriate, because the apple would fit in a bucket of a balance scale or would be small enough to use a small spring scale. Then perhaps a digital scale could be used to double-check for accuracy. Ask students to estimate the weight of the apple and write it on their papers. Then weigh the apple and compare the estimate to the actual weight. Discuss the following questions: “*Were estimates close to the actual?*” “*If not, what might help refine estimates in the future?*” “*How are ounces and pounds related?*” “*Would it help to know how many ounces were equivalent to one pound in order to refine estimates?*” Discuss the equivalency of 1 pound to 16 ounces. Students may

benefit from seeing a demonstration of how 16 1-ounce weights in one bucket of a balance scale would be equivalent to a 1-pound weight in the other bucket of the scale. Discuss relative sizes and weights of a banana, a plum, and other available fruits in comparison to an apple. Doing so will help them make a more reasonable weight estimate for step 3.

3. Arrange students in pairs. Distribute a Fruit Basket Recording Sheet to each pair. Have partners select an appropriate U.S. Customary weight unit and estimate the weight of one of each of the available fruits for the basket. Allow pairs to select an appropriate weight measurement tool (balance scale or spring scale) to weigh one of each of the available fruits and record these weights. All estimates and units used should be recorded on the Fruit Basket Recording Sheet. Monitor students closely for accuracy in using measurement tools and selection of the appropriate unit of measurement for each fruit.
4. After estimates and actual weights are recorded, allow students to determine the collection of fruit they would like to place in the basket for John so that the total collection of fruit weighs exactly 10 pounds. Students can represent their basket in a labeled drawing and/or organized list on the back of the Fruit Basket Recording Sheet. Encourage students to try to please John in their combinations of fruit for the basket. Note that a grape weighs approximately 3 ounces, but that John would certainly prefer *not* to receive a basket containing 50 grapes! (This estimate takes into consideration the estimated weight per grape of 3 ounces, which would be 5 grapes per pound so 5 grapes  $\times$  10 pounds equals 50 grapes.)
5. After each pair has completed their proposals for their fruit basket for John, have them make the basket and weigh the entire basket using a digital scale. Discuss with each group why or why not their basket weight was what they expected. Some questions to consider are as follows:
  - Are all of the available fruits of each type the exact same size and shape? Would differences in size or shape affect the weight of the fruit?
  - Are there any fruits that could be added or removed to make the weight closer to 10 pounds?
6. Have partnerships present their combinations for the fruit baskets. Presentations should include comparing the estimated total to the actual total weight and what caused any differences in these weights. Celebrate groups with the closest estimates to 10 pounds.

### Assessment

- **Questions**
  - Which weight measurement tool was most accurate for this activity? Why do you think that is the case?
  - Did any of the actual weights for fruits surprise you, based on your estimated weight? Why?
  - What things should be considered to make a reasonable estimate of weight?
  - What things should be considered when selecting a unit of weight to use for a particular object?

- How many ounces are equivalent to 1 pound? 2 pounds? One-half pound? 10 pounds? Show how you figured each of these equivalences.
- **Journal/writing prompts**
  - Think of another way that a fruit basket could be created for John that would have an estimated weight of 10 pounds. Draw a representation of this different basket of fruit and write a justification for your estimated weight.
  - Did all pieces of like fruit weigh exactly the same? How would fruit not weighing the same affect the determination of how many of each piece to use in the basket?
- **Other Assessments**
  - Observe students as they select units for estimation, as they are estimating weights of fruits, and as they use measurement tools to measure actual weights. Look for creative combinations of fruits to reach the desired 10-pound weight. Note discussions and conversations, listening for appropriate and accurate mathematical vocabulary and noting correct use of balances and weights.
  - Does the size of an object always determine how much it weighs? Give examples of small objects that weigh a lot. Give examples of large objects that do not weigh a lot.
  - Find five items around school or at your home that weight about 1 ounce and five items that weigh about 1 pound. Make a list of the items.
  - Explain the difference between weight and mass.

### **Extensions and Connections**

- Write a letter to John explaining how you chose the fruit for his basket.
- Discuss whether all pieces of fruit of the same kind weigh the same. Have students estimate the weight of each piece of the same kind of fruit, record the estimates, and compare the estimated weights with the actual weights.

### **Strategies for Differentiation**

- Work one on one or in groups of no more than three students to work with each measuring tool, one at the time. As you work with the students, help them develop written steps on how to use it each tool to weigh and object.
- Limit the number of fruit choice.
- Develop benchmarks for an ounce, a pound, and a half-pound by weighing objects and then let the students hold the objects.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

### Fruit Basket Recording Sheet

Name of Fruit	Estimated Weight of 1 piece	Actual Weight of 1 piece

## Fruit Basket Recording Sheet

### Fruit Basket Contents

Draw a representation and/or create an organized list of the proposed contents of John’s 10-pound fruit basket. Record what the estimated total weight of the fruit basket will be.

Estimated Total Weight of the Fruit Basket: \_\_\_\_\_

### Combined Weight Discussion

Compare the estimated weight of the fruit basket to the actual weight of the fruit basket.

Discuss these results considering the following focus questions:

- How close was the difference in the estimate and actual weights of the fruit basket?  
What was the reason for the difference if there was one?
- What could be added or removed to get closer to the 10-pound maximum weight of the basket?

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