

## GRADE ONE-CONTENT STANDARD #5 EXTENDED LESSON B

Permission Granted

### Comparing Weights

#### Introduction

**Objective** → Children will determine the heaviest object from a group of objects.

**Context** → Children know the terms *heavier* and *lighter*. They have had experience with balances. This lesson might be a last lesson in a unit on weight.

#### NCTM Standards Focus

This lesson is different from typical lessons on measuring and comparing weights.

Asking children to compare the weights of two objects and decide which is heavier and which is lighter is as far as most lessons go. This lesson, while focusing on comparing weights, is really a problem-solving activity. Children are required to use their problem-solving skills and their reasoning and proof skills and to communicate effectively as they explore comparing weights of objects.

**Problem Solving** Given a set of four identical looking bags of different weights and a balance with only two pans, children determine which bag is the heaviest. They work in groups to develop their own strategies for solving the problem.

**Reasoning and Proof** Children develop their own theories about how to determine the heaviest object. They test their ideas in order to justify their conclusions.

**Communication** Children discuss ways to solve the problem in small groups. They present their solutions to the class and listen to the solutions of other groups.

#### Teaching Plan

**Materials** → Student pages A.79-80; for each group, four bags of marbles, beans, or other filler that are relatively close in weight and a pan balance

ALLOW CHILDREN TO WORK on this problem-solving activity in small groups. Give each group a pan balance and four bags, labeled A, B, C, and D. Children should not be able to see inside the bags. Their goal is simply to determine which of the four bags is the heaviest.

This problem-solving activity might initially seem difficult for the children, as there are four bags but only two pans on the balance. For children having a hard time getting

### A.75

[Source: [Connect to NCTM Standards 2000-First Grade](#), Creative Publications]

started, suggest they begin by weighing two bags. *What will you learn by weighing two of the bags?* (That one is heavier than the other.)

Observe the children as they work in their groups. Group discussions should focus on how to keep track of the results and how to be sure that the one bag they think is the heaviest really is the heaviest.

Two questions you might ask as you circulate among the groups are: *What did you learn from that last weighing? What is your plan for what two bags to weigh next?* These questions will keep children focused on the goal, as well as provide you with some insight into the intermediate steps a particular group uses. Children's responses will allow you to assess children's progress through the activity.

### **Methods Children Might Use**

- Children might first weigh two of the bags and identify the heavier bag. Next, they might weigh the other two bags, and again identify the heavier bag. Then they might weigh the two heavier bags. In this instance, the heavier bag would be the heaviest bag of the four.
- Children might weigh two of the bags, and keep the heavier bag on its pan. Next, they might replace the lighter bag with one of the other two bags, again keeping the heavier bag on its pan. Finally, they might replace the lighter bag with the fourth bag. The heavier of the two bags is the heaviest bag of the four.
- Children might weigh all possible pairs of bags and record each result. Then they would use their logical reasoning skills to determine which bag is the heaviest.
- Children might randomly weigh different pairs of bags until they notice that one bag in particular always seems heavier than the bag it is compared against.

ONCE CHILDREN HAVE DETERMINED which bag is the heaviest, have them present their results to the class. This discussion will really bring out the reasons for the emphasis on the process standards. Children have to communicate clearly their methods for determining the heaviest bag. The other children have to evaluate and question those methods if they are not satisfied that the group has proven which bag is the heaviest.

## **A.76**

[Source: [Connect to NCTM Standards 2000-First Grade](#), Creative Publications]

This discussion incorporates both the reasoning and the proof aspects of the process standard. You may have to help children evaluate groups' methods, as they might not entirely comprehend the group's presentation, nor possess enough language to question effectively.

Depending on the amount of time remaining, you might want children to do some additional activities. Some options follow.

### **Activity 1**

If you feel that your children are not ready for more advanced thinking, and could benefit from another activity at the same level, you can have children do the same activity, but this time determine which bag is the lightest.

### **Activity 2**

If your children are ready for more advanced thinking, you can have the children order the four bags from heaviest to lightest. Children could take a couple of approaches to this problem. One way would be that they could first find the heaviest bag, as in the original activity, then find the heaviest of the three remaining bags, then the heavier of the other two bags.

### **Activity 3**

Give the children five bags, and have them determine which one is the heaviest.

### **Activity 4**

Give children five bags and have them rank the bags from heaviest to lightest.

The point here is *How much more work does the one extra bag create?*

### **Student Pages**

Student page A.79 contains reasoning exercises similar to the problem-solving activity in the lesson, but using only three bags. Student page A.80 contains some reasoning exercises similar to the problem-solving activity, using four bags.

## **A.77**

[Source: [Connect to NCTM Standards 2000-First Grade](#), Creative Publications]

## Assessment

As the children worked in their groups, you were able to observe how each was able to participate and how well groups were able to work together. You also observed how well their problem-solving skills were developing and evaluated the kinds of reasoning that was taking place. As children presented their methods, you evaluated their communication skills and the validity of their reasoning.

## NCTM Standards Summary

This problem-solving activity really brought out what the process standards are about. Children were presented with an interesting problem to solve, and had to use their reasoning skills and their communication skills to come up with a solution. It is these kinds of experiences that are so valuable to children, especially at the early grade levels, where these skills are not often emphasized.

## Answers

*Page A.79*

1. A
2. B
3. C

*Page A.80*

1. A
2. B
3. A

## A.78

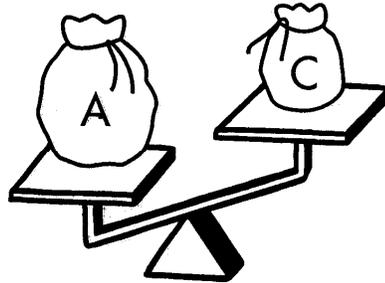
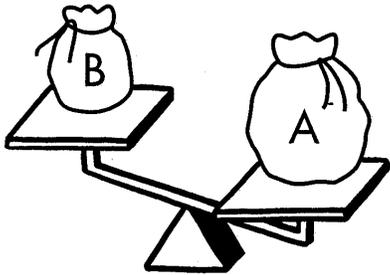
[Source: Connect to NCTM Standards 2000-First Grade, Creative Publications]

## Comparing Weights

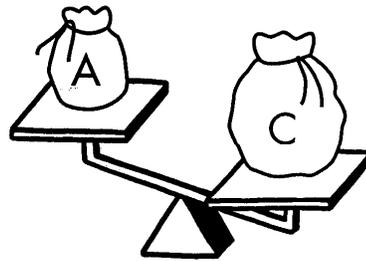
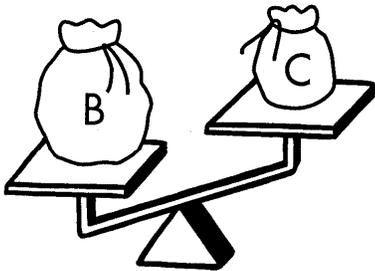
Use the clues.

Decide which bag is the heaviest.

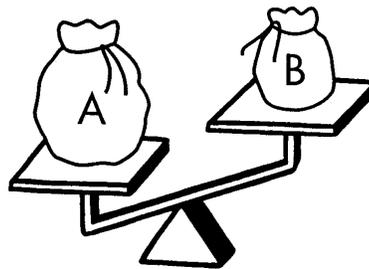
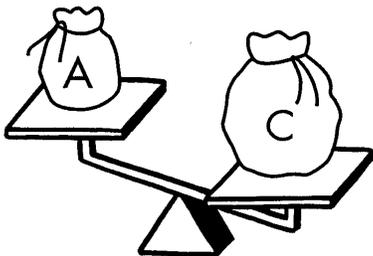
1. Which bag is the heaviest? \_\_\_\_\_



2. Which bag is the heaviest? \_\_\_\_\_



3. Which bag is the heaviest? \_\_\_\_\_

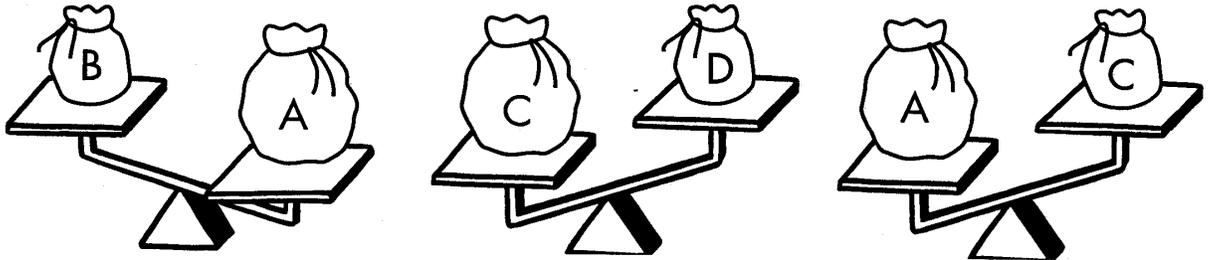


## Comparing Weights

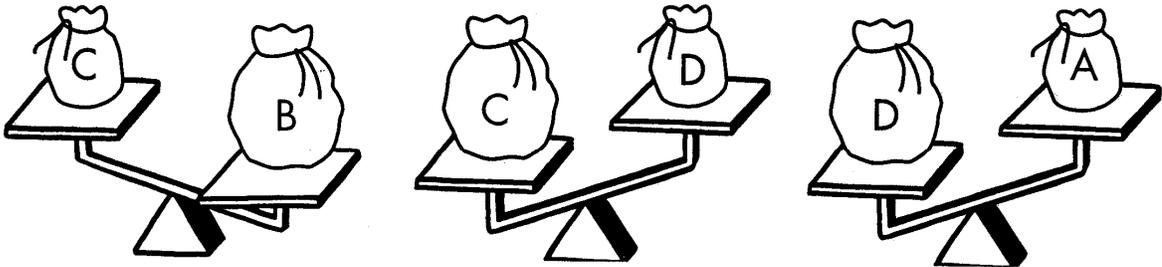
Use the clues.

Decide which bag is the heaviest.

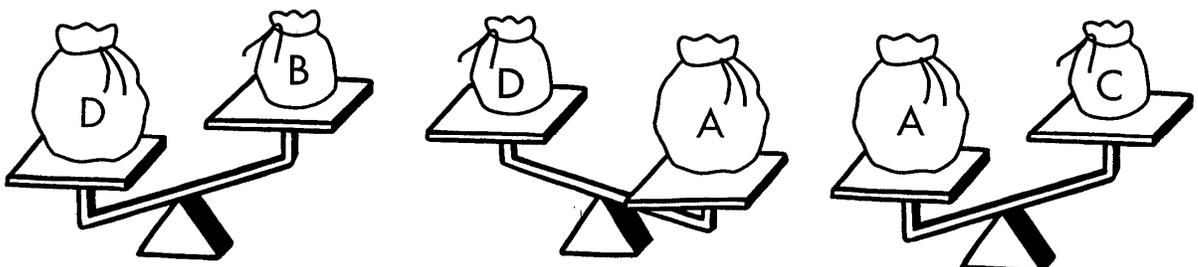
1. Which bag is the heaviest? \_\_\_\_\_



2. Which bag is the heaviest? \_\_\_\_\_



3. Which bag is the heaviest? \_\_\_\_\_



😊 Name \_\_\_\_\_

I think bag \_\_\_\_\_ is the  
heaviest because \_\_\_\_\_

\_\_\_\_\_

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