

• Laboratory Investigation

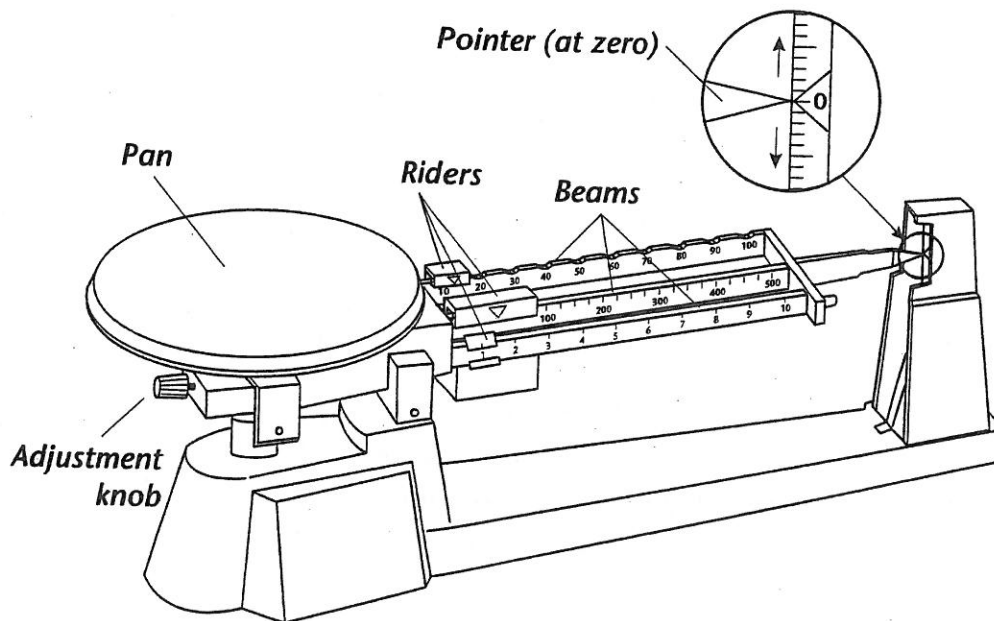
How to Use a Balance

Problem

What is the proper way to use a triple-beam balance to measure the mass of different objects?




Skills Focus

measuring, observing, calculating, inferring



Materials

triple-beam balance	small scoop
100-mL graduated cylinder	table salt
3 different small, solid objects	200-mL beaker
weighing paper	

Procedure    Review the safety guidelines in Appendix A.

Before you measure the mass of any object, be sure that the riders on the balance beams are moved all the way to the left and the pointer rests on zero. If necessary, slowly turn the adjustment knob until the pointer rests on zero. This is called "zeroing" the balance.

Part 1 Measuring Mass Directly

1. Place a small, solid object on the balance pan. The beams will rise and the pointer will point above zero.
2. Move the rider on the middle beam one notch at a time until the pointer drops and stays below zero. Move the rider back one notch.
3. Move the rider on the back beam one notch at a time until the pointer again drops and stays below zero. Move the rider back one notch.

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How to Use a Balance *(continued)*

4. Slide the rider along the front beam until the pointer stops at zero. The mass of the object is equal to the sum of the readings on the three beams.
5. Record the mass to the nearest tenth of a gram in Data Table 1.
6. Remove this object, and repeat steps 1–5 twice, using two other solid objects.

Data Table 1

Object	Mass (g)

Part 2 Finding Mass by Difference

7. Find the mass of an empty 250-mL beaker. Record the mass in Data Table 2.
8. Using the graduated cylinder, obtain 50 mL of water.
9. Pour the water into the beaker and find the mass of the beaker and the water. Record the mass in Data Table 2.
10. Calculate the mass of the water. Record the mass in Data Table 2.

Data Table 2

Mass of Empty Beaker (g)	Mass of Beaker With 50 mL of Water (g)	Mass of Water (g)

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Part 3 Measuring Out a Chemical Substance

11. Place a piece of weighing paper on the balance pan and find its mass. Record the mass in Data Table 3.
12. Add 5 g to the mass of the weighing paper and move the riders to this number.
13. Obtain a sample of table salt from your teacher. Using the scoop, add small amounts of salt at a time to the paper until the pointer rests on zero. Record the total mass of the weighing paper and salt in Data Table 3.
14. Dispose of the table salt in the container provided by the teacher.

Data Table 3

Mass of Weighing Paper (g)	Mass of Weighing Paper and Table Salt (g)

Teacher's Initials

Analyze and Conclude

Write your answers in the spaces provided.

1. What is the mass of 50 mL of water? How did you find this mass?

2. Which rider on the balance should always be moved first when finding the mass of an object? Why?

3. What is the mass of the largest object your balance is able to measure?

4. What is the mass of the smallest object your balance is able to measure accurately?

5. What does it mean when the pointer of the balance reads "zero"?

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Critical Thinking and Applications

Write your answers in the spaces provided.

6. Suppose you did not zero the balance before finding the mass of an object. How might that affect your measurement?

7. In this lab, you found the mass of 50 mL of water. Calculate the mass of 1 mL of water without using the balance.

8. Describe how you could find the mass of a certain quantity of milk that you poured into a drinking glass.

9. If you were baking a dessert and the recipe called for 250 g of sugar, how could you use the triple-beam balance to obtain this amount?

More to Explore — *DO NOT DO.*

Design a balance that finds mass by comparing the mass of a known object to the mass of an unknown object. Study the triple-beam balance used in this activity and think about how you could balance two or more objects. Construct your balance and use it to find the mass of an object. How could you improve your balance? *Obtain your teacher's permission before carrying out your investigation.*

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