PRACTICE

Activity 2: Volume of Solids

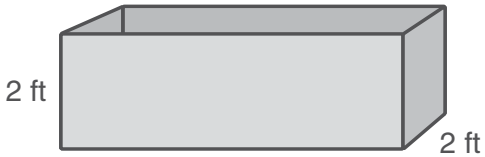
Name Date Class

Calculating Volume

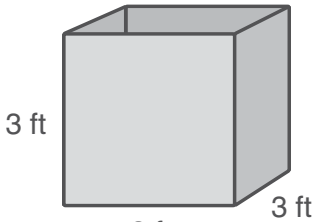
Remember that the *volume of a rectangular solid = (length)* x *(width)* x *(height)*

1. A young child built a solid using wooden blocksthat were 1 cm on each side. The solid was 6 blocks long, 5 blocks wide, and 10 blocks high. What was the volume of the solid?

2. Imagine that you are helping a friend build a box to hold his sports equipment. Your friend asks you to help him determine which size box to build. The dimensions are in feet.



Box A



Box B

Which box will hold more sports equipment? Show your work and include units.

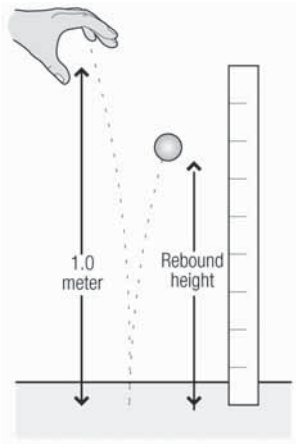
Interpreting Measurements: An Experiment with Highly Elastic Rubber Balls

(Questions 3–8) Jorge is shopping at the mall and sees displays for two different rubber balls. The makers of these two new highly elastic balls both claim that they are "bouncier" than the best selling elastic rubber ball on the market, which is the "Doinkster." Jorge purchases both of the new rubber balls, the "Bouncinator" and "Zwingmax," to test their makers' claims with the Doinkster he has at home.

To see if either of the two new elastic rubber balls is bouncier than the Doinkster, Jorge designs an experiment. He drops each ball three times from a one-meter (100cm) height above a hard tile floor, and then measures how high each ball rebounds from the floor surface. Each ball has the same volume and mass, and all other variables are controlled, such that Jorge conducts a fair test.

To answer questions 3-4, choose from the following responses:

- the surface the elastic balls bounce off of
- the type of elastic ball
- the mass of the elastic balls
- the height from which the elastic balls are dropped
- the rebound height of the elastic balls



3. What is the *manipulated (independent) variable*?

_____

4. What is the *responding (dependent) variable*?

_____

The rebound heights of the balls recorded by Jorge are shown in the Table below.

Table: Various Elastic Rubber Balls and their Rebound Heights

Rebound Height (cm)	Rubber Ball		
	Doinkster	Bouncinator	Zwingmax
Trial 1	81	83	84
Trial 2	82	81	86
Trial 3	79	82	86
Best Value			
Uncertainty			

5. Calculate the best values and uncertainties for Jorge's data, and write these values in the table to the right. You may refer to *How to Make and Interpret Experimental Measurements* in your workbook.

To make the numbers easier to work with, *round each number to the nearest centimeter* so there are no digits after the decimal point. (For example, an uncertainty calculation of 2.5 cm or 2.6 cm would each be rounded up to 3 cm.)

6. Complete the blanks in the sentences below by calculating the highest and lowest values of the range for each elastic rubber ball.

a) The true value of the Doinkster's rebound height is probably within the range between _____ cm (lowest value) and _____ cm (highest value).

b) The true value of the Bouncinator's rebound height is probably within the range between _____ cm (lowest value) and _____ cm (highest value).

c) The true value of the Zwingmax's rebound height is probably within the range between _____ cm (lowest value) and _____ cm (highest value).

For **Questions 7-8**, choose one of the following two conclusions and complete the blank with the name of the highly elastic rubber ball with 1" diameter:

____ ***Conclusion 1:*** Since there is no overlap between the ranges of height values when taking into account their best values and uncertainties, I conclude that the two values are *different*. Thus, the claim that the _____ is bouncier than the Doinkster is probably *valid*.

____ ***Conclusion 2:*** Since there is an overlap between the ranges of height values when taking into account their best values and uncertainties, I conclude that the two values could be the *same*. Thus, the claim that the _____ is bouncier than the Doinkster is probably *not valid*.

7. Based on Jorge's data, can you conclude that the Bouncinator is bouncier than the Doinkster? Select and complete the correct conclusion statement above.

8. Based on Jorge's data, can you conclude that the Zwingmax is bouncier than the Doinkster? Select and complete the correct conclusion statement above.

More Practice Calculating Volume (Questions 9-11)

9. A contractor digs a rectangular hole for the basement of a house. The hole measures 12 m long, by 7 m wide, by 3 m deep. What volume of dirt is removed for the basement of the house?

10. Recall that you can think of the volume relationship for a rectangular solid as:

$$Volume = (area\ of\ base) \times (height)$$

A backyard has an area of 12 m^2 that would be an ideal spot to build a pool. The pool will be 4 m deep. What volume of water will be needed to fill this pool?

11. The relationship *volume* = (*area of base)* × (*height)* can be used for other solids. For a cylindrical solid, the base is a circle. The area of a circle with radius r is πr^2. Suppose you have a large cylindrical container. Its radius is 10 cm and its height is 60 cm. What would be the volume of sand that would fill the container?