

# Tower volumes

## An inquiry into shape, volume, and dimensions

Materials needed: cardboard (lots of it!), sturdy tape (duct tape would be best), scissors (or box cutters), rulers.

Create small groups that will work together to build 5 different boxes (cubes or rectangular prisms).

The objective of 'tower volumes' is to build a tower with your 5 boxes that will do well in the 3 tests on the next page: (Height, Sturdiness, & Strength)

Here are the rules:

- Not all of your 5 boxes need to be the same shape or have the same volume.
- Each box should have a length, width, and height that is a whole number (no decimals!)
  - You calculate the volume of a box by using the formula  $(L \times W \times H)$
  - An example: Let's say you construct a box that has a length of 20cm, a width of 10 cm, and a height of 20cm. You'll calculate its volume by plugging your measurements into the formula:  $20 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm} =$  a box with a volume of  $4,000\text{cm}^3$
- No single box can exceed a volume of  $5,000\text{cm}^3$
- Write each box's volume on the box in black marker.

Sketch your ideas for your tower's design in the box below. Label it with some of your thoughts, too!



# Tower testing

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## Test 1: Height:

Which tower in the class was the tallest?

Which tower was the tallest? What was its height? \_\_\_\_\_

What was the tower's total volume? \_\_\_\_\_

What was the relationship between volume, shape, and height? Write your thoughts below:

## Test 2: Earthquake

Shake each tower with the same force. Continue to add force until there is only one tower remaining.

Which tower was the last one standing? \_\_\_\_\_

What was the tower's total volume? \_\_\_\_\_

What was the relationship between volume, shape, and stability? Write your thoughts below:

## Test 3: Weight

Add the same amount of weight to the top of each tower (i.e. books). Continue to add books until there is only one tower remaining.

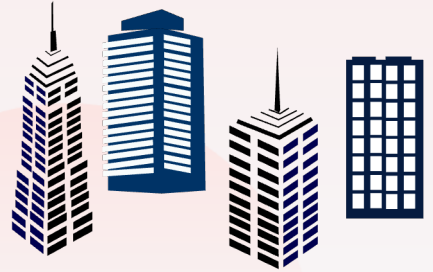
Which tower was the last one standing? \_\_\_\_\_

What was the tower's total volume? \_\_\_\_\_

What was the relationship between volume, shape, and strength? Write your thoughts below:

# Tower reflection

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**Reflections:**

Think about the process of building your tower. What were the strengths of your tower?

How did your tower do in the tests? What conclusions can you make about the tests and your tower?

Describe some of the relationships between volume, height, sturdiness, and strength.

If you could do it again. How would you build your tower. Sketch your ideal tower below- label it with your ideas/reasonings.

