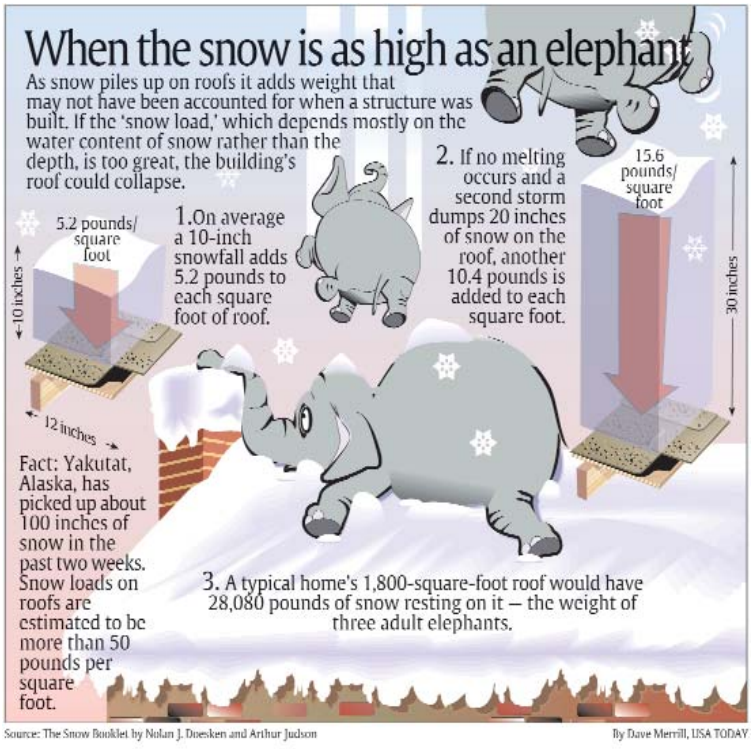
Math TODAY™
Student Edition

USA TODAY
NO. 1 IN THE USA

When the snow is as high as an elephant



Activity Overview:

Snow is nothing more than frozen, crystallized water, but its white beauty has the ability to transform a rather bleak and drab landscape into a sparkling wonderland. It also creates an entirely different set of problems for the average homeowner than its fluid parent. The USA TODAY infograph "When the snow is as high as an elephant" helps us understand snow from a more practical point of view. You will answer several questions about the different components of the graphic. Then, you and your classmates will have the opportunity to do some fieldwork by measuring the depth of snowfall and finding its weight. You will combine your data with your classmates' data to make estimates more accurate. You will then use the combined data to make estimates of various weights that roofs in your area can support.

Focus Questions:

- How much does snow weigh per square foot?
- How much weight does the average roof have to support?
- Does all snow weigh the same?
- What style of roof will support the most weight?

This activity was created for use with Texas Instruments handheld technology.

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Procedure:

Step 1
Using a piece of cardboard, cut out a shape that has an area of at least 1 sq. foot (144 sq. inches). This shape will be your base. Find the area of your base and record it on your assessment sheet.

Step 2
As soon as possible after a snowfall, find a patch of snow and trace your base shape in the snow. Avoid drifts caused by unusually high snow and pavement because it tends to hold heat and may have melted some of the snow.

Step 3
Take three or four measurements of the depth of your base by pushing your ruler or yardstick all the way to the ground. Take you measurements to the nearest half inch. Record your average on the assessment sheet.

	Measurement
1	
2	
3	
4	
Avg.	

Step 4
Scoop the snow from your area into a bucket or plastic lined box. You may want to "cut' your block out by running your ruler/yardstick around the perimeter of your base keeping the straightedge perpendicular to the ground. Using a scale, weigh your snow. (Remember to pre-weigh your bucket or box and to subtract its weight from your scale reading or zero out your scale.) Round your weight to the nearest quarter pound. Record the weight of the snow on your assessment sheet.

Step 5
Enter your average snow depth, area of your base and weight of the snow on the class data collection sheet.

Step 6
Get the class data by either typing in the information into the List Editor or by linking and downloading the lists. Use L1 for snow depth, L2 for area of the base and L3 for weight. Calculate and store pounds per cubic foot in L4.

Step 7
Run one variable statistics on L4.

Step 8
Complete your assessment and evaluation sheet.

Data Source:

The Snow Booklet by Nolan J. Doesken and Arthur Judson

Materials:

- TI-73 family, TI-83 Plus family or TI-84 Plus family
- Ruler or yardstick
- Bucket or box lined with a plastic trash bag
- Scoop or shovel
- Scale

Additional Information:

- Volume = A_B * H
- To make easy unit conversations, use the SciTools App on your handheld.

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Assessment and Evaluation

Reading and Analyzing the USA TODAY Infograph
Round all of your answers to two decimal places.

Q. Look at #1 on the USA TODAY infograph "When the snow is as high as an elephant." Calculate the volume of snow prism drawn. Use cubic feet as your units. Then calculate the weight of the snow per cubic ft.

A. Volume =_____inches^3=_____ feet^3 Weight =_____lb/ft^3

Q. Look at #2 on the USA TODAY infograph. Calculate the volume of snow prism drawn. Use cubic feet as your units. Then calculate the weight of the snow per cubic foot.

A. Volume =_____inches^3=_____feet^3 Weight =_____lb/ft^3

Q. Explain how #3 arrived at a total weight of 28,080.

A.

Q. Read the "Fact" in the lower left hand corner of the USA TODAY infograph. What is the exact number of inches needed to make the snow load 50 pounds per square foot? Show your work.

A.

Q. According to the USA TODAY infograph, how much does the average adult elephant weigh?

A. Weight=_____lbs

Working the Experiment
Round all of your answers to two decimal places.

Q. What was the area of your base? The average depth of the snow? The weight of the snow?

A. A_B =_____ Avg. Depth =_____ Weight =_____

Q. What is the volume of your block of snow? A. Volume =_____ft^3

Q. How much does the snow weigh per cubic foot? A. Weight = _____per cubic foot

Q. What are the mean and median weights per square foot?

A. Mean =_____ Median=_____

Q. Using either the mean or median calculate the weight currently on a typical roof of 1800ft^2. Show your work.

A. Mean =_____ Median=_____