

Is Your Backpack Too Heavy for You?

Name(s): _____

Many students develop back problems. Doctors believe that these problems are caused by the heavy backpacks students carry. Sometimes the way students carry their backpacks also hurts their backs.

If you did the activity *Who Has the Heaviest Backpacks?*, you looked at which students carry the heaviest backpacks. In this activity you'll decide which students are carrying backpacks that are *too* heavy.

The data you'll look at were collected by students. They went to one classroom in each grade at a school and had students weigh themselves and their backpacks.

At right is the data for Angie, a girl in first grade. The card shows that she weighs 45 pounds and her backpack weighs 4 pounds. (The "lb" you see in the **Unit** column is the abbreviation for pounds.)

Attribute	Value	Unit
Name	Angie	
Gender	F	
Grade	One	
BodyWeight	45	lb
PackWeight	4	lb
PercentWt	9	%

Think About It

Before you look at data, think about what you expect to see. You probably already have some ideas about what these data look like.

1. About how heavy can a student's backpack safely be? (If you can, discuss this with a partner.)

2. Do you think that some students can safely carry heavier backpacks than other students? Explain.

3. Doctors recommend that a student's backpack should weigh no more than 15% of his or her body weight.

a. What is the heaviest safe backpack weight for a student who weighs 100 pounds?

_____ pounds

b. What is the heaviest safe backpack weight for a student who weighs 150 pounds?

_____ pounds

Plot and Investigate

Now you'll look at the data to see what they say.

4. Open the document **Too Heavy Backpacks.tp**. You should see a plot and a stack of data cards like the one on the previous page. Look at the attribute on the bottom row of the data cards. This attribute is named *PercentWt*. It tells you what percentage a student's backpack weight is of his or her body weight.
5. First you'll look at which students carry backpacks that are too heavy. Make a graph that lets you quickly find these students. (*Hint: To make your graph and answer the next question, you might use reference lines, dividers, or the percent button. These features are on the upper plot toolbar.*)
6. About what percentage of the students carry backpacks that are too heavy (more than 15% of their body weight)?

Students in the higher grades (grades 5 and 7) carry heavier backpacks than students in the lower grades. But students in higher grades also tend to weigh more than students in lower grades. What do you find if you look at percent weight? Find out if students in the higher grades carry heavier backpacks for their body weight than students in the lower grades.

7. Make a graph that helps you see whether students in the higher grades carry heavier backpacks for their body weight than students in lower grades. Include a copy of your graph with your assignment.

8. What percentage of students in the higher grades (grades 5 and 7) carry backpacks that are too heavy (more than 15% of their body weight)?

9. What percentage of students in the lower grades (grades 1 and 3) carry backpacks that are too heavy?

10. Which students tend to carry backpacks that weigh more for their body weight—students in higher grades or students in lower grades? Explain. Your answer should say how your graph backs up your conclusion. Also include any other conclusions you can make from your graph and explain how your graph supports them.