

CURRICULUM GUIDE: **BACKPACK MATH**



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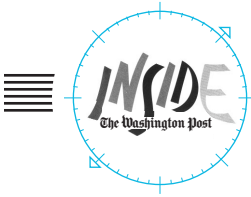
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Backpack Math

KidsPost Article: The World on your shoulders: Experts say kids pack too much into backpacks.

Lesson: Use students' backpacks to learn about percentage and to talk about health

Level: Middle to Advanced

Subjects: Mathematics

Related Activity: Health, English, Language Arts

Procedure

At the start of the day, invite students to stand on a scale wearing or holding their backpacks. Record each student's weight with the backpack, and then again without it. Some students will be sensitive about their weight. Write each student's weight on a piece of paper, and give it to the student to use with the "Finding Percentage" worksheet.

Read

Read the KidsPost article and sidebars.

Discuss

The following questions are to be answered and discussed.

1. Many students use backpacks. What percent of their body weight is suggested that students in fourth grade and younger not exceed in their backpacks?

2. Do any students not use a backpack? Why? What do they use to carry their books and belongings?

Make a list of student responses on the board and discuss.

3. What problems may result from carrying too heavy a load on your back?

4. Why is carrying too heavy a backpack daily a health concern?

Backpack Health

On the Web

<http://www.washingtonpost.com/wp-dyn/education/kidspost/nie/A5126-2001Aug27.html>

Backpack Fitness: Rx for Heavy Class Loads

A Few Smart Moves Could Make Students' Academic Loads Easier to Bear, Orthopedic Surgeons' Organization Says

The author reports "many doctors in the AAOS survey identified 20 percent of the child's body weight as the point at which backpacks become a clinical problem." This very informative Post article includes back-strengthening exercise suggestions.

www.amerchiro.org/about_chiro/backpacks.html

Consumer Tips

The American Chiropractic Association press release and tips for students and hikers.

<http://www.spine-health.com/topics/cd/pack/bp01.html>

Backpacks and back pain in children

An evaluation of current studies of impact of heavy backpacks on children, suggestions for watching the weight carried and ways to be a proactive parent.

http://orthoinfo.aaos.org/fact/thr_report.cfm?Thread_ID=105&topcategory=Pediatrics

Kids and Backpacks

Prevent Injuries America! is a program of the American Academy of Orthopaedic Surgeons. "More than 13,260 injuries related to backpacks were treated at hospital emergency rooms, doctor's offices and clinics in 2000, according to estimates and projections of the U.S. Consumer Product Safety Commission." In response AAOS provides guidelines for preventing injuries.

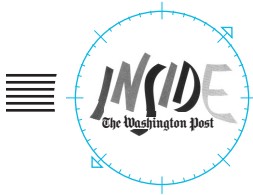
<http://www.vnh.org/NHB/HW9705Posture.html>

Navy Health Book

A quick reference that provides specific information about the back, posture and discomfort.

<http://rothmaninstitute.com/spine/anatomy.htm>

Excellent drawing of the spine, labeled.



Practice

List the four types of backpacks on the board. Add “other type of bag” and “none” to the list. Of the types of backpacks, which are used by students in your class? Record the number after each of the six choices. Compute the percentage of students who use each type of backpack or none.

Do the Math

Using the “Finding Percentage” worksheet, have students record their weight, and the weight of their backpack. (Younger students may need help with determining the weight of their backpacks.)

Have students categorize the items in their backpacks, then estimate the weight of each item.

Using a calculator, show students how to calculate the percentage of their backpack weight to their body weight.

Direct students to work in small groups to brainstorm ideas for reducing the weight of their backpacks and improving the health of their spines.

Complete the Crossword Puzzle

After you have completed the crossword puzzle, write a paragraph about backpacks in which you use five or more words found in the crossword puzzle.

Conduct a Survey

KidsPost wants to know what your students’ backpacks weigh. Select a week between now and the end of January 2002 to record backpack weight daily. See “Me and My Backpack” reproducible for use during the week.

Write: Write a letter to your principal. In this letter tell the principal about your week-long survey, the results from your class and conclusions you have reached. Include whether or not you think students are making healthy decisions. If you are concerned about the weight of backpacks, do you have a suggestion to improve the situation?

More Activities

If time allows, here are additional activities to do with your students after they have completed the “Finding Percentage” worksheet.

Be a time traveler

Tell students: You can travel back in time with your backpack. How far back will you go, and what civilization will you visit? What items will you need to pack into your backpack? What might other children your age be carrying in their own backpacks if they had them? Describe how their backpacks might look.

You might want to specify a place and time for the student to travel, depending on the unit of study being covered at this time.

What Goes Where?

Ask students to create three different personalized backpacks and give the total weight of each. At the top of their sheets, they draw items that might go into each backpack with the individual weight of each item listed. Giving clues to match the personalities of each backpack owner, the children design a worksheet for their classmates to match the items to the correct backpack. This activity is best for students who enjoy the challenge of creating their own worksheets. This could also be done in pairs or small groups.

Fit the Backpack to the Back: A Matching Game

Students of Sharon Rowe at Lane Elementary in Fairfax County created a game using five different characters and five different backpacks. They assigned a weight to each person and to each backpack. Their partners were to match the backpacks to the students for whom they would be an appropriate fit, using the 10-15% of body weight rule. Students used calculators for this activity, as this is a new skill in fifth grade.



NAME _____

Finding Percentage

Get the facts

Use a scale to get the following information.

1. _____ pounds My weight
2. _____ pounds My weight holding my backpack
3. _____ pounds My full backpack weighs
4. List the contents of your backpack.

Books	School Supplies	Other
Weight:	Weight:	Weight:

Estimate how much each item weighs. (Make sure that when it is totaled, it is close to the weight you wrote in Answer 3.)

Your backpack should not be heavier than 10 - 15% of your body weight.

To compute the percentage, divide the weight of your backpack by the your body weight. Your answer will appear as a decimal. Multiply that number by 100 to get the percentage of your backpack's weight to your body's weight.

TRY IT! _____

NAME _____

Me and My Backpack

KidsPost wants to know how much your backpack weighs. We'll compile the results and print them in a future issue. You can do this as a class project or on your own. Simply keep a log for a week of what your backpack weighs in the morning. It doesn't matter which week it is, but we need the data for a whole week (unless you're sick one day, in which case you may skip that day).

Backpack Weight Record

From _____ to _____, I weighed my backpack.

Here are the results.

_____ pounds, _____ ounces	Monday's backpack weight
_____ pounds, _____ ounces	Tuesday's backpack weight
_____ pounds, _____ ounces	Wednesday's backpack weight
_____ pounds, _____ ounces	Thursday's backpack weight
_____ pounds, _____ ounces	Friday's backpack weight
_____ pounds, _____ ounces	My weight

Backpack Contents

These three items are always in my backpack:

- 1.
- 2.
- 3.

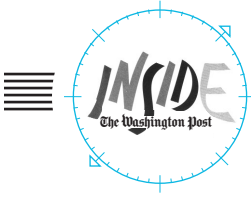
The heaviest item in my backpack is

I carry my backpack

_____ Only going to school and coming home
_____ Most of the school day
_____ Other:

This is usually true:

_____ I carry only the items I need for a certain class. Other books and stuff stay in my locker.
_____ I carry the items I need for the morning with me, then switch to items
_____ I need in the afternoon.
_____ I carry everything in my backpack all day.



Backpack Crossword Puzzle

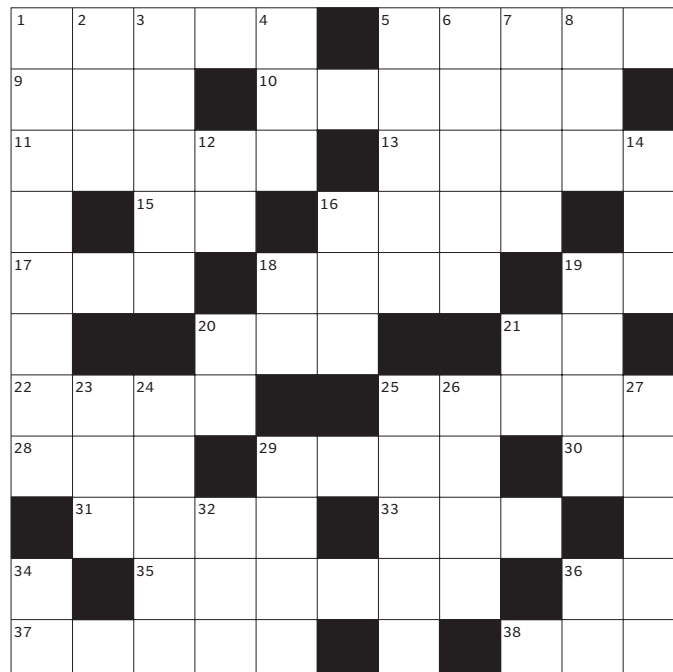
Complete the crossword puzzle using the clues.

ACROSS

1. Porous, calcified connective tissues
5. The supporting axis of the body
9. Large, tailless primate
10. One rich, bisquitlike pastry (two words)
11. Hold while moving
13. Uncles and _____
15. Nickname: "The Green Mountain State" (postal abbrev.)
16. Hispanic/Latino News Service (abbrev.)
17. Dessert
18. Something required or wanted
19. Registered Nurse (abbrev.)
20. Neither he _____ I can attend.
21. Preposition
22. Money
25. Bring it in your backpack or buy it at school
28. Kentucky Fried Chicken (abbrev.)
29. To fall in drops from the clouds
30. Kenya (Internet zone code)
31. Haul or carry; kind of bag
33. Eli Whitney invented the cotton _____ in 1793.
35. Measure of the heaviness of an object
36. Avenue (abbrev.)
37. Collection of maps
38. Opposite of night

DOWN

1. A knapsack
2. Online Privacy Alliance (abbrev.)
3. Sensitive tissue in the pulp of a tooth
4. Express
5. Used to measure weight or mass of an object
6. 16 ounces
7. Small hotels
8. Catch a butterfly in a _____.
12. Right (abbrev.)
14. Transgression
16. Third person singular objective pronoun
18. Opposite of yes
19. Stone
20. Nickname: "The Granite State" (abbrev.)
21. Nickname: "The Volunteer State" (postal abbrev.)
23. American Federation of Teachers (abbrev.)
24. Look of disapproval
25. Opposite of heavy
26. Group acting as a whole; a _____ of study
27. Weighs a lot
29. Regional Economic Information System (abbrev.)
32. Boston _____ Party
34. Nickname: "Bay State" (postal abbrev.)
36. American Airlines (abbrev.)



NAME _____

I Read It in the Post

Daily newspapers let us know what is happening in our world. We learn about local and faraway places by reading the newspaper. We meet people and learn how they react to circumstances and respond to one another. During one week in November, backpacks were included in Washington Post stories. Read the excerpts from five stories to learn what they reveal about events and attitudes in fall of 2001.

A. By Maria Glod and Jennifer Lenhart

... Loudoun Sheriff's Office officials said students approached administrators Tuesday morning and told them that they had seen their classmate with the gun on Monday. The administrators questioned the boy and found a gun in his backpack, school officials said. ...

B. By Paul Schwartzman

The lawyer stashes directions to a friend's country cabin in her purse and keeps a backpack and cat carrier by the front door of her Dupont Circle apartment. ...

The financial consultant stows a bag in her car, packed with a pair of jeans, a sweat shirt, aspirin, Tums, water, three lighters, paper matches and her favorite video ("Clueless"). Her evacuation plan: driving to her family's river house two hours south in Virginia. ...

C. By K.C. Summers

... People entering department stores and museums must submit to handbag and luggage inspections.

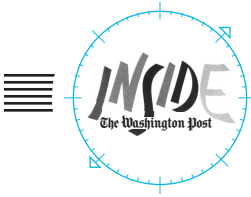
National museums are patrolled inside and out, and all visitors must pass through metal detectors and have their handbags and backpacks inspected.

This last directive sounds like a formula for long lines, but on a Friday afternoon at the Louvre, it took only about five minutes for a handful of visitors to pass through a metal detector and run their bags through an X-ray machine. Purses and backpacks were hand-inspected, but only cursorily. Then we pretty much had the run of the place. ...

D. By Tom Ashbrook

... A new Canadian friend and I celebrated with a feast in the streets. A few hours later I was nearly dead of meat poisoning, losing everything, losing blood.

My Canadian friend got me to the U.S. Embassy (now destroyed by Taliban mobs) and then to the public hospital, a mud-walled warren of stark, dirt-floor rooms that looked unchanged since the British Raj. I had lost my senses and was soon thrashing and howling on a narrow bed. Suddenly there was a doctor, a syringe of morphine and the improbable vision of two smiling young women, Afghan candy-stripers, student nurses in crisp, pink-striped uniforms, hovering over me in my delirium, helping to pump my stomach, wiping my brow and, very gently over the next two days, nursing me, an American stranger with nothing but a backpack and human vulnerability, back to health. ...



E. By Liza Mundy

The other day my kindergartener came home and announced, “Mom, I voted!” It was an unusually precise piece of intelligence about her school day. Like most 6-year-olds, my daughter tends to develop total amnesia the minute she takes her backpack off. Either that or she delivers vague, random insights at vague, random times; while she is getting ready for bed she might say something like, “Mom, there’s a boy in my class who can burp the alphabet!”

Questions for a close reading

1. The news story (A) relates concerns about backpack content. In what way did students respond to their environment? Why were backpacks searched? Do administrators have the right to search students’ backpacks? If this happened in your school, what action would you take? What would you want the principal and police to do?

2. The travel story (C) also relates concern about backpack content. Why are searches taking place in department stores and museums? How do you know Summers is in Paris? How thorough are the searches? What does “cursory” mean? What does the reporter convey when he says after inspections were finished, the museum visitors “had the run of the place”?

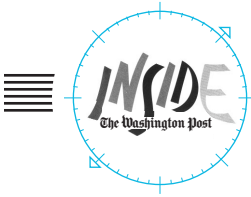
3. Which writers use the first person? Do you feel like the two writers are speaking to you? The feature writers hope so. Does Mundy make you laugh? Why?

4. How does the other writer make you feel? Ashbrook is reflecting on a trip he took many years ago in Afghanistan. He includes many details. What do each of these details add to the article?

- Now destroyed
- Public hospital
- Mud-walled warren
- Since the British Raj
- Improbable vision
- Crisp, pink-striped uniforms

How do these help to give a sense of past and present conditions? When you find out that he has “nothing but a backpack and human vulnerability,” how do you feel about his condition? What idea is he presenting in this anecdote?

5. Can you think of a title for excerpt B? Why do you think these people and others in the story have packed bags? Has your family talked about an evacuation plan? If your parents wanted you to pack your backpack for a quick departure from your home, what would you put in it?



Word Study: A look at carry

A person sees an object. The person leans over, picks it up and moves to another area.

Using “carry” as the verb, write a sentence that gives the same information but provides more detail. Who is the person? What is the object? Where does the person go?

Share your sentences. Do you have a variety of situations? “Carry” is a very useful verb to relate a universal action. What does “carry” mean in the sentences your classmates have written?

Were all of the actions in your sentences literal? You can see the objects and the movement. “Carry” can also be used to express actions that are figurative? Nothing is physically being held; holding or maintaining is implied. In the following sentences, identify the literal use of “carry” and the figurative use of “carry.”

- A mother carried her baby to the bassinet.
- The football player carried the ball for a 10-yard gain.
- The gasoline tank carries 20 gallons when full.
- I am carrying a heavy backpack.
- My brother is carrying a heavy academic load in college.
- The news was carried in every newspaper on September 12 in banner headlines.
- Our VCR carries a two-year warranty.

If you lived in the Southern United States, you might have written the sentence: My father carried our family to the park. This is an idiom. Dad did not have the strength to pick up his whole family in his arms. In this region, “carry” means “to transport someone in a motor vehicle.” This meaning is very close to the original meaning of “carry.” The Latin noun *carrus* means cart. It is the root of “carriage,” “car” and “carry.”

“Carry” is also a phrasal verb. When it has a preposition after it, its meaning changes. Some of the phrasal verbs have two to four meanings. This makes English more complicated to learn. Use the following in sentences, then try to explain what they mean.

carry away carry on carry out carry through

Thank you for carrying out instructions.

Source: American Heritage Dictionary

Portable Baggage

Think about it. What do you call the item in which something is placed and carried to another location? Well, it depends on what you are carrying and who is carrying the item.

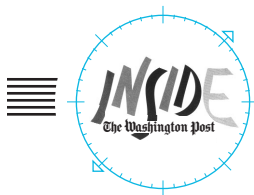
What do you know about the following items? Read the dictionary or an encyclopaedia for more information.

Who used each item?

When was it used?

What was placed in the item?

Backpack
Bag
Basket
Carrying Case
Cradleboard
Crate
Creel
Crocus sack
Dispatch box
Gunny sack
Haversack
Knapsack
Poke
Pouch
Purse
Rucksack
Sack
Quiver



Academic Content Standards

The main lesson addresses these academic content standards of:

Maryland

Mathematics

Knowledge of Number

Relationships and Computation (6.0): Students will describe, represent and apply numbers and their relationships and will estimate and compute using mental strategies, paper/pencil and technology. 6.5.1: By the end of grade 5, students will know and be able to read, write and represent simple fractions, decimals and percents using symbols, words and models. 6.5.7: By the end of grade 5, students will apply strategies to solve problems with fractions and decimals; identify and describe the relationships among fractions, decimals and percents; compute percentages of 10, 20, 25, 50 and 100 percent of a number.

Language Arts

Writing (3.0): Students produce informational, practical, persuasive and narrative writing that demonstrates an awareness of audience, purpose and form using stages of the writing process as needed (i.e., pre-writing, drafting, revising, editing and publishing). By the end of grade 5, students know and are able to create a clear organizing structure that includes descriptions placed in a logical, chronological or narrative sequence in ways that help the reader follow the line of thought.

A complete list of State Content Standards of Maryland can be found at <http://www.mdk12.org/mspp/>.

Virginia

Mathematics

Mathematics, Computation and Estimation 5.3: The student will create and solve problems involving addition, subtraction, multiplication and division of whole numbers, using paper and pencil, estimation, mental computation and calculators. Number and Number Sense 6.1 The students will identify representations of a given percent and describe orally and in writing the equivalence relationship between fractions, decimals, and percents.

English

Writing 5.7: The student will write for a variety of purposes to describe, to inform, to entertain and to explain.

- Organize information.
- Use vocabulary effectively.
- Vary sentence structure.
- Revise writing for clarity

A complete list of Standards of Learning of Virginia can be found on the Web at <http://www.pen.k12.va.us/>.

Washington, D.C.

Mathematics

Number and Operation, Content Standard 1: The student interprets and understands multiple uses and forms of numbers and how they relate to each other; fluently uses computational tools and strategies; estimates when appropriate; and solves real-life and career-related problems. Grade 6: The student computes and solves problems involving the addition and subtraction, multiplication and division of whole numbers, fractions and decimals. The student computes and solves problems using percent. The student interprets percent as part of 100.

English

Language as Literature, Content Standard 3: Students use language and symbol systems (e.g., timelines, maps, graphs and charts) to define problems and organize information. Grade 3: The student produces a report that

- develops a controlling idea or theme that conveys a perspective on a subject;
- includes appropriate facts and details;
- excludes extraneous and inappropriate information;
- uses a range of appropriate strategies, such as providing facts and details, describing or analyzing the subject, and a relevant anecdote.

The student produces a narrative of procedure that establishes a context and develops a reader interest.

A complete list of Standards for Teaching and Learning of the District of Columbia Public Schools can be found at <http://www.k12.dc.us/>.