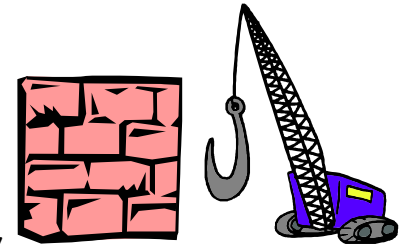


Grade Level(s): One and Two
Lesson Title: Build a Stronger Wall



Focus: (Concept or skills to be emphasized)

Experimentation, construction methods, predicting, critical thinking, Computer Aided Design (CAD) software

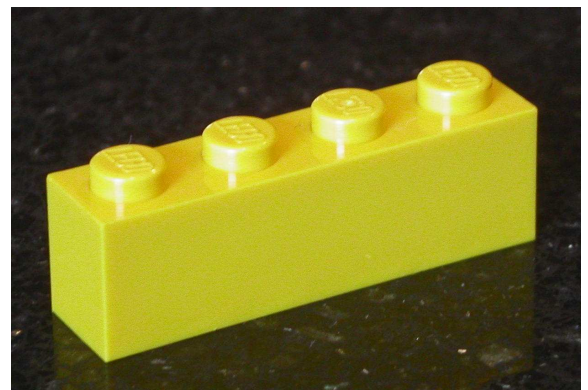
Objectives: See end of lesson for objectives and standards achieved.

Background Information:

The classic story of *Peter and the Wolf*, by the Russian composer Sergei Prokofiev, is a musical tale in which each character in the story is represented by an instrument of the orchestra. Peter is represented by the violins, Grandfather by a bassoon, the duck by an oboe, the cat by a clarinet, the hunters by the woodwinds, the bird by a flute, and the wolf is represented by the French horns. The story takes place in a meadow filled with many living and non-living things. One non-living thing in the story is a high stone wall from which Peter lassos the wolf. The purpose of this lesson is for students to discover how some walls are built and the characteristics that make walls strong.

Activities (Procedures):

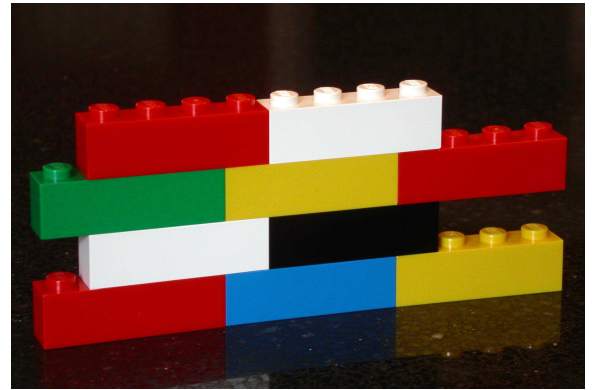
1. Read the story of *Peter and the Wolf*, as found on the WVSO CD ROM in The Verizon Literacy Resource Section with your class. Ask students to pay special attention to the parts of the story when the wall is mentioned, and to think about what makes a wall strong.
2. Explain that students are going to build a "stone wall" using interlocking building blocks. *SC.1.3.2, SC.2.3.2, SC.2.5.1*
 - a. Show students two types of construction using 1 X 4 interlocking building blocks: fully overlapping and partially overlapping (see figures). Ask students to predict and justify which type of construction will provide the greatest strength to a wall. Tell students to record their predictions.
 - b. Form groups of 2-3 students, and assign the roles of reporter, recorder and constructor. *SS.1.2.1* Ask each group, under the direction of the constructors, to experiment with different construction methods and



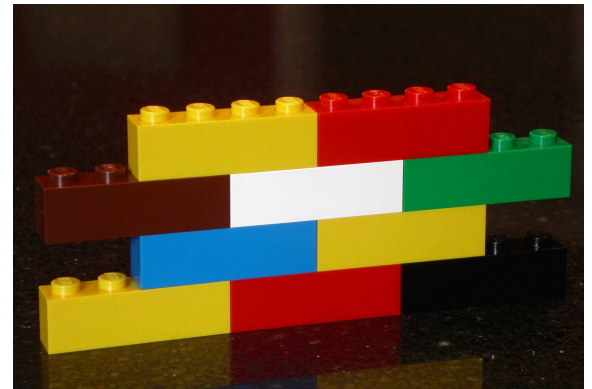
1 x 4 interlocking building block

predict which will make the strongest wall. *SC.1.6.1, SC.2.6.1* Ask students to record their predictions.

- c. Bring students back into a full group and ask reporters to explain which type of construction they found to be the strongest.
- d. Test the types of construction by forming two large groups and have each group build walls of equal heights using the same number of blocks.
- e. Evaluate the strengths of the walls by turning them onto their sides and spanning them between two desks. Ask students to predict how much weight each wall will withstand and which they think will be the strongest and record their predictions.
- f. Gradually add weights to the first wall until it fails. Record how much weight the wall withstood, record this on a chart, and then repeat with the other wall. Repeat building and testing, and record the results.
- g. Ask students to compare the actual results with their predicted results. If they differ, ask students to speculate why. Ask students to predict which type of construction would produce the strongest wall if they built another one. *MA.1.5.3, MA.2.5.2*



Partial overlap



Full overlap

3. Allow students to use the LEGO™ digital designer (found at www.lego.com, or directly at <http://www.lego.com/eng/create/digitaldesigner/>) to experiment with different construction methods. This tool is a simple, yet powerful, tool to introduce students to CAD (computer aided design) software systems. *TEC.1.1.1, TEC.1.1.2, TEC.1.1.3, TEC.2.1.2, TEC.2.6.1*

Assessment/Evaluation*:

1. Student written predictions about the strengths of different construction methods.
2. Completed chart of strengths of walls created by whole group.

Supplemental Materials and Equipment Needed:

Story of *Peter and the Wolf* (as found in the WVSO CD ROM)

1 X 4 sized Interlocking building blocks (such as LEGO™ or Mega Bloks™)

Set of weights (coins, marbles, balance weights, etc.)

Resources:

How to build a rock wall:

<http://www.thisoldhouse.com/toh/knowhow/yardandgarden/article/0,16417,203319,00.html>

http://www.easy2.com/cm/easy/diy_ht_index.asp?page_id=35694907#overview

LEGO™ Digital Designer™ and games:

<http://www.lego.com>

National Standards:***Science***

Content Standard A

Abilities necessary to do scientific inquiry:

- Ask a question about objects, organisms, and events in the environment
- Communicate investigations and explanations
- Identify questions that can be answered through scientific investigations.
- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.
- Develop descriptions, explanations, predictions, and models using evidence.
- Think critically and logically to make the relationships between evidence and explanations.

Mathematics

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them:

- Pose questions and gather data about themselves and their surroundings
- Represent data using concrete objects, pictures, and graphs.

Technology

1. Use input devices (e.g., mouse, keyboard, remote control) and output devices (e.g., monitor, printer) to successfully operate computers, VCRs, audiotapes, and other technologies.
4. Use developmentally appropriate multimedia resources (e.g. interactive books, educational software, elementary multimedia encyclopedias) to support learning.
8. Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.

Social Studies

V. Individuals, Groups, and Institutions

- a. identify roles as learned behavior patterns in group situations such as student, family member, peer play group member, or club member.

WV Content Standard Objectives:*First-Grade*

- SC.1.3.2 use models as representations of real things.
- SC.1.6.1 listen to and be tolerant of different viewpoints while working in collaborative groups.
- MA.1.5.3 conduct simple experiments and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated.
- TEC.1.1.1 use a keyboard to input information using letters, numbers, arrow key, and delete key; begin to use left/right hand position.
- TEC.1.1.2 use a mouse to click and drag.
- TEC.1.1.3 start and exit programs as well as locate files.
- SS.1.2.1 identify and practice various group roles (e.g., group leader, recorder, reporter, collector) in the classroom.

Second-Grade

- SC.2.3.2 use models as representations of real things.
- SC.2.5.1 recognize that common objects and events incorporate science (e.g., CD players, velcro, weather) to solve human problems and enhance the quality of life.
- SC.2.6.1 listen to and be tolerant of different viewpoints while working in collaborative groups
- MA.2.5.2 conduct simple experiments with more than two outcomes and use the data to predict which event is more, less, or equally likely to occur if the experiment is repeated.
- TEC.2.1.2 utilize the skill of right clicking with a mouse.
- TEC.2.6.1 begin to identify the different purposes among software applications (e.g., puzzles, writing tools, graphing tools).

Kentucky Program of Studies:

S-P-SI-1

Students will ask simple scientific questions that can be answered through observations.

S-P-SI-2

Students will use simple equipment (e.g., aquariums), tools (e.g., magnifiers, spoons), skills (e.g., observing, pouring), technology (e.g., video discs), and mathematics in scientific investigations.

S-P-SI-3

Students will use evidence (e.g., observations) from simple scientific investigations and scientific knowledge to develop reasonable explanations.

M-P-PS-9

Students will read and compare data on student invented graphs.

Ohio Academic Content Standards:

First-Grade

Y2003.CSC.S04.GKG-02.BB.L01.I02

Understanding Technology /

02. Explain that when trying to build something or get something to work better, it helps to follow directions and ask someone who has done it before.

Y2003.CSC.S04.GKG-02.BB.L01.I07

Abilities To Do Technological Design /

07. Explore that several steps are usually needed to make things (e.g., building with blocks).

Y2003.CSC.S05.GKG-02.BA.L01.I01

Doing Scientific Inquiry /

01. Ask "what happens when" questions.

Y2003.CSC.S05.GKG-02.BA.L01.I02

Doing Scientific Inquiry /

02. Explore and pursue student-generated "what happens when" questions.</p></div>

Y2003.CSC.S05.GKG-02.BC.L01.I04

Doing Scientific Inquiry /

04. Work in a small group to complete an investigation and then share findings with others.

Y2003.CSC.S05.GKG-02.BB.L02.I07

Doing Scientific Inquiry /

07. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, non-breakable thermometers, timers, rulers, balances and calculators and other appropriate tools).

Y2003.CSS.S06.GKG-02.BA.L01.I01

Participation /

01. Demonstrate the importance of fair play, good sportsmanship, respect for the rights and opinions of others and the idea of treating others the way you want to be treated.

Y2003.CSS.S07.GKG-02.BC.L01.I05

Communicating Information /

05. Communicate information orally or visually.

Y2003.CSS.S07.GKG-02.BD.L01.I06

Problem Solving /

Display courtesy and respect for others in group settings including:

- a. Staying on the topic;
- b. Focusing attention on the speaker.

Second-Grade

Y2003.CSC.S05.GKG-02.BA.L02.I01

Doing Scientific Inquiry /

01. Ask "how can I/we" questions.

Y2003.CSC.S05.GKG-02.BA.L02.I02

Doing Scientific Inquiry /

02. Ask "how do you know" questions (not "why" questions) in appropriate situations and attempt to give reasonable answers when others ask questions.

Y2003.CSC.S05.GKG-02.BA.L02.I03

Doing Scientific Inquiry /

03. Explore and pursue student-generated "how" questions.

Ohio Academic Content Standards: (continued)

Y2003.CSC.S05.GKG-02.BC.L02.I05

Doing Scientific Inquiry /

05. Use evidence to develop explanations of scientific investigations. (What do you think? How do you know?)

Y2003.CSC.S05.GKG-02.BB.L02.I07

Doing Scientific Inquiry /

07. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, non-breakable thermometers, timers, rulers, balances and calculators and other appropriate tools).

Y2003.CSC.S05.GKG-02.BC.L02.I10

Doing Scientific Inquiry /

10. Share explanations with others to provide opportunities to ask questions, examine evidence and suggest alternative explanations.

Y2003.CSC.S06.GKG-02.BC.L02.I04

Science and Society /

04. Demonstrate that in science it is helpful to work with a team and share findings with others.

Y2003.CMA.S05.GPK-02.BD.L02.I07

Probability /

07. List some of the possible outcomes of a simple experiment, and predict whether given outcomes are more, less or equally likely to occur.

Y2003.CSS.S06.GKG-02.BA.L02.I01

Participation

01. Demonstrate skills and explain the benefits of cooperation when working in group settings:

- a. Manage conflict peacefully;
- b. Display courtesy;
- c. Respect others.

Y2003.CSS.S07.GKG-02.BD.L02.I06

Problem Solving /

06. Use problem--solving/decision-making skills to identify a problem and gather information while working independently and in groups.

*All Assessments are to be at the expected state assessment standard; in West Virginia this is mastery level; in Ohio this is benchmark level; and, in Kentucky, this is academic expectations level.