SCIENCE	TECHNOLOGY	ENGINEERING	ART	MATHEMATICS

STEAM LESSON

SCIENCE	TECHNOLOGY	ENGINEERING	ART	MATHEMATICS

*** TASK: CON 05 ***

Paper Table

STEAM	✓	INSTRUCTIONS
SCIENCE		**AIM:** To design and build a table out of newspaper tubes. Make it at least 20 centimetres tall and strong enough to hold a heavy book. **REF:** http://www-tc.pbskids.org/designsquad/pdf/parentseducators/DS_Act_Guide_PaperTable.pdf
TECNOLOGY		
ENGINEERING		
ART		
MATHEMATICS		

OUTCOMES	✓	DIGITAL TECHNOLOGY
ST2-2DP-T		selects and uses materials, tools and equipment to develop solutions for a need or opportunity
ST2-3DP-T		defines problems, describes and follows algorithms to develop solutions
ST2-11DI-T		describes how digital systems represent and transmit data
ST3-2DP-T		plans and uses materials, tools & equipment to develop solutions for a need or opportunity
ST3-3DP-T		defines problems, and designs, modifies and follows algorithms to develop solutions
ST3-11DI-T		explains how digital systems represent data, connect together to form networks & transmit data

COMMENTS

PAPER TABLE - EQUIPMENT

- 1 piece of cardboard or chipboard (A4 size: approximately 20 x 30 centimetres)
- heavy book (e.g., a textbook or telephone book)
- masking tape
- 8 sheets of newspaper

BRAINSTORM AND DESIGN

Look at your materials and think about the questions below. Then sketch your ideas on a piece of paper or in your design notebook.

1. How can you make a strong tube out of a piece of newspaper? (This challenge uses tubes because it takes more force to crumple paper when it's shaped as a tube.)
2. How can you arrange the tubes to make a strong, stable table?
3. How can you support the table legs to keep them from tilting or twisting?
4. How level and big does the table's top need to be to support a heavy book?

BUILD - TEST - EVALUATE AND REDESIGN

Use the materials to build your table. Then test it by carefully setting a heavy book on it. When you test, your design may not work as planned. If things don't work out, it's an opportunity—not a mistake! When engineers solve a problem, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign. For example, if:

- the tubes start to unroll — Re-roll them so they are tighter. A tube shape lets the load (i.e., the book) push on every part of the paper, not just one section of it. Whether they're building tables, buildings, or bridges, load distribution is a feature engineers think carefully about.

- the legs tilt or twist — Find a way to stabilize and support them. Also check if the table is lopsided, too high, or has legs that are damaged or not well braced.

- a tube buckles when you add weight — Support or reinforce the weak area, use a wider or thicker-walled tube, or replace the tube if it's badly damaged. Changing the shape of a material affects its strength. Shapes that spread a load well are strong. Dents, creases, and wrinkles that put stress on some areas more than others make a material weaker.

- the table collapses — Make its base as sturdy as possible. Also, a table with a lot of triangular supports tends to be quite strong. A truss is a large, strong support beam. It is built from short boards or metal rods that are arranged as a series of triangles. Engineers often use trusses in bridges, buildings, and towers.

EXTENSION

- If a little is good, a lot is better! Build a table that can hold two or more heavy books.
- The sky's the limit. Build a table that can hold a heavy book 16 inches above the ground.
- Matching furniture! Build a chair out of newspaper.