John Cafarella

Unit - Structures

Activity - INDEX CARD Structure

Students will use index cards to build a skyscraper exactly 60 cm tall that can support a test weight on its roof. They can use up to but not more than 40 index cards
(No tape, glue or support. It must be free standing)

Depending on the group you may tell them they can bend the cards.

No other instructions.

If you have no ruler or measuring tape, how will they measure it?
Bring some measuring tapes or rulers just in case.

Did they plan or did they just start? – a point for discussion.

Observe the interactions of the groups.

After construction is underway, pretend you "forgot" to tell them that "oh yes, the building will have to support a weight. The weight will be a film canister with 10 pennies inside. It must be placed on the top of the structure.

(Possibly allow for visiting "consultants" to go to other groups and "observe". They will watch each other group anyway.

60 cm. will be very difficult. After building the structure, it will probably be 60.5 or 59.5.

Next steps:

Develop a materials cost system- 1.00 per card. 1.50 for folded cards (since they can't be used again- if you're really mean you can charge them by the fold, i.e. if they fold a card once - 1.50, twice, 2.00, three times 2.50, and so on). Give them a maximum budget (you decide). Let them work out a budget.
Writing suggestion. How important is the budget? Would it matter if the building was a parking garage or a school or????
Connect to real-world situations
Follow-ups: they must now design a building that will:
support twice as much weight
or
be earthquake proof (shake the table)
or
(using a room fan at a given distance) be hurricane proof
or
other teacher devised tortures

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This activity is based on the New York State Learning Standards for Mathematics, Science and Technology.

Engineering Design

1. Engineering Design is an iterative process involving modeling and optimization used to develop technological solutions to problems within given constraints.

Students:

- Generate ideas for possible solutions, individually and through group activity; apply age-appropriate mathematics and science skills; evaluate the ideas and determine the best solution; and explain reasons for the choices.
- Plan and build, under supervision, a model of the solution using familiar materials, processes, and hand tools.

Discuss how best to test the solution; perform the test under teacher supervision; discuss orally why things worked or didn’t work.