Engineering Design Challenge Basic Supply Kit

Engineering has been included as a major component of the new Next Generation Science Standards, adopted by California in September 2013. Children are also natural engineers – they often start building and solving problems before they start school. Engineering projects tap into things they enjoy doing and can feel like play, while simultaneously teaching important concepts. Engineering is also interdisciplinary and can be a valuable tool to connect Common Core math and ELA standards with science and the NGSS. There is also an increasing demand for engineers; helping students become familiar with, and excited about, engineering can help direct them into fields of employment with increasing demand for skilled employees. Additionally, critical thinking, communication and problem solving skills are developed and honed through these types of activities.

This list of supplies would allow a teacher or librarian to do multiple engineering experiments with 20 – 30 students. Possible activities include: building boats, bridges, and other structures; making catapults; egg drop challenges; parachute testing and many others.

- 1 box gallon sized zip lock bags (to make kits for students)
- 10 packs - index cards 3x5 (card towers, bridges)
- 10 rolls of masking tape
- 3 boxes of unwrapped straws
- 36 Large washers (and/or sand and/or pennies) (to use as weights)
- 2 boxes (~400) small (2-3oz) paper or plastic cups (parachutes, structures)
- 2 rolls aluminum foil
- 4 rolls of twine
- 1 box (1000ct) 4-1/2" x 3/8" Craft sticks
- 1 box (500ct) 6” tongue depressors
- 1 box (1000ct) 5-1/2” stirring sticks
- 1 container (~500ct) rubber bands, various sizes
- 4 yards felt
- 4 yards cotton, other light cloth material (parachutes)
- 1 box (60+) plastic garbage bags, tall kitchen
- 4 boxes (~400) jumbo or large paper clips
- 4 lbs (64 oz) plasticine - ~2 oz / student (to make boats - buoyancy)
- 4 bags cotton balls
- 2 boxes (~96) plastic spoons
- 2 bags (~200) 12” pipe cleaners
- 3 boxes filter paper, various sizes – larger is best (parachutes)
- 4 packs (~400 sheets) 20” x 26” tissue paper (parachutes)
- Rulers (1/student)
- Glue sticks (1/student)
- 1 Table / box fan (to test structures resistance to wind)
- 6 (1/group) plastic shoebox-sized boxes (should hold water)
- 16 ping-pong balls (some will get lost)

Materials students can bring from home:

- Clean styrofoam plates, trays
- plastic strawberry containers, other small plastic containers
- old CDs
- twist on plastic bottle caps (from soda and water bottles)
- pieces of cardboard (ideally at least 12” x 12”)
- cardboard tubes, TP tubes, paper towel tubes

Fun Engineering Design Challenges & Links Sample plans for each:

Catapults:

- http://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_catapult/cub_catapult_lesson01.xml

Parachutes:

- http://www.tryengineering.org/lesson-plans/playing-parachutes

Plasticine boat:

- http://www.teachengineering.org/view_activity.php?url=collection/duk_/activities/duk_float_mary_act/duk_float_mary_act.xml
- http://www.wonderville.ca/asset/float-like-a-boat

Bridge building:

- https://www.exploratorium.edu/science_explorer/card_bridge.html

Structure, strength testing:

- http://www.centexeweek.org/activities/card-structure

General structural challenges:

- http://www.asceville.org/activity-structural-challenges.html

Egg drop:

- http://www.nasa.gov/offices/education/programs/national/summer/education_resources/engineering_grades7-9/E_egg-drop.html
- http://www.stem.neu.edu/programs/k-12-school-field-trips/egg-drop/
- http://teachers.egfi-k12.org/lesson-egg-drop/