ENGINEERING DESIGN CHALLENGE OPTIONS

Egg drop:

Materials: the only allowable materials are:
-one raw egg still in its shell
-wood toothpicks 3 1/2" long or shorter (no umbrellas, no fancy toppers)
-glue: elmer's, glue gun sticks, glue sticks, rubber cement,

Requirements:
No additional materials may be used
Quantity of toothpicks is unlimited
Some portion of the egg must be visible from outside the structure
The glue must not touch the egg at any point
The egg must arrive raw, at room temperature and whole for "the drop test"
Project must be made completely by the students

Rules:
Protect the egg with the toothpicks
Project will be dropped from it's lowest point holding the egg with the fat part downward so all eggs will be dropped in the same orientation
Egg will be dropped one initial time onto the floor from a specified height that will vary by grade level
K-1: 1.5 feet
2-3: 2 feet
4-6: 3 feet
All eggs that do not break open (egg whites or yolks seep out of the egg) will move on to the next level.
If an egg is cracked but shows NO signs of whites or yolks escaping from the egg it WILL move on to the next level.
Each level will increase by one foot for K-3, two feet increments for grades 4-6 until there is one egg left at each grade level.
If the drop level exceeds the height of the ceiling the projects will be brought outside to drop on the asphalt, weather permitting.

For your board please provide drawings, photographs or notes demonstrating your design process and how you came up with your strategy for covering the egg. Be sure to include a photograph of the final solution so classmates can see what the egg looked like prior to being destroyed.
Completed projects will be displayed after the contest in whatever state they are in at the fair on plastic plates so please do not discard until after the fair.

Judging – See rubric. The egg that is dropped from the highest height in each grade level gets extra structural integrity points.

Bridge Challenge:
The object is to construct a bridge that will carry the heaviest load while still meeting the given specifications. Bridges may be loaded until they fail so some bridges may not be returned to the students or displayed in their original condition so please photograph your entries for the board display. Entries can be submitted by a group or individually.

Materials: the only allowable materials are:
-plain spaghetti (raw, cooked, cut, etc)
-glue: elmers, glue gun, glue sticks, etc.
-No piece of spaghetti may have glue applied its entire length to fix it to another piece of spaghetti
-no tape or rubber bands allowed, no painting or staining of the spaghetti

Requirements:
- Create a bridge out of the allowable materials that will withstand at least 1 pound of weight placed in the center of the bridge.
- The bridge shall be free standing
- There must be a clear area of 2" wide, 5" long and 3" high in the center of the bridge in which the weight shall be placed.
- Weight will be placed in a small container in the center of the bridge for 10 seconds and then removed. Make sure you have a sturdy flat surface for this container.
- If the bridge holds, it moves on to the next round of testing. Weight will be added in increments to achieve higher strength scores.
- The bridge will be placed on two "mountains" measuring 8" x 8" x 8" for testing.
- Maximum length of bridge shall be 26".
- maximum width of bridge shall be 6" including the portions that will rest on the provided "Mountains".
- Actual span (Length) between the two "Mountains" will be 18".
- Your bridge must be able to sit securely on the mountains in order to be tested

For your board please provide drawings, photographs or notes demonstrating your design process and how you came up with your strategy. Be sure to include a photograph of the final solution so classmates can see what the bridge looked like prior to being destroyed.

Completed projects will be displayed after the contest in whatever state they are in at the fair so please do not discard until after the fair.

Sample truss bridge types to try:

Baltimore Truss

Bailey Truss

Bowstring Truss

Camelback Truss

Warren Quadrangular,
or Lattice Truss

Whipple Truss

Parker Truss

Pennsylvania Petit Truss

Pauli, or lenticular Truss

Thatcher Truss