Platform Design Brief for Students

Context and Need:
The scientists will need to make long-term observations of plant and animal marine life to get the answers to their research questions. Limitations on diving time due to decompression problems make this impossible in many cases. By living and working underwater, the scientists will be able to have as much time as they need to make their observations. Still, living and/or working underwater is not a simple task, but designing a safe, convenient environment can solve many of these problems.

The self-sustaining research station to be built off the east coast will require a platform to serve as the foundation for the structure. The platform has to be able to withstand the movement of sediment and the water and not collapse, thus, losing or damaging the payload. This offshore platform can be a fixed or floating, underwater, partially underwater, or above the water structure.

Challenge:
Construct a stable platform to serve as the foundation for the research station.

Specifications:
The platform must:

- Be no larger than 30.5 cm x 25.4 cm x 30.5 cm;
- Be able to hold a designated payload (150 g);
- Be able to withstand the movement of sediment and water simulated in the tank and not collapse; and
- Be constructed with the materials provided.

During the engineering design process,

1. Complete a detailed design and sketch before constructing your model
2. Test, evaluate, and improve your model within the allotted time (remember to sketch each iteration of your model)
3. Record your data
4. Present a final design solution, justifying your selection **based on the data collected**

Resources:

People:
You will be working with your teammates as Oceanographer Engineers.

Tools/Machines
You may use any tool or machine provided.

Materials per group:
30 Straws
10 Coffee stirrers
30 Craft sticks
10 Plastic building sticks (e.g., Mod-L-Stix)
2 Empty plastic water bottles
2 Pool noodle sections
4 Plastic or Styrofoam cups
1 Glue guns and glue
1 Glue stick
1 Spool of twine/string
1 Roll of duct tape
1 Metric ruler
Washers (various sizes)
Nuts and bolts (various sizes)
Paper and binder clips (various sizes)
5 Pipe cleaners
5 Cable ties
2 Styrofoam plates,
1 Egg cartons
1 Piece of 8.5x11" Cardboard
20 Straight pins

Time:
Your group has 45 minutes to design, test, and redesign and retest your platform.

Evaluation Rubric

Your design will be evaluated based on the following criteria

Specifications	**3** Meets	**2** Partially meets criteria	**1** Does Not Meet
Journal Content	Journal provides a detailed record of planning, construction, testing, modification, reasons for modifications, sketches and some reflection about the strategies used and the results	Journal is missing a detailed record about one of the following aspects: planning, construction, testing, modification, reasons for modifications, sketches and some reflection about the strategies used and the results	Journal is missing a detailed record about more than one of the following aspects: planning, construction, testing, modification, reasons for modifications, sketches and some reflection about the strategies used and the results
Final Design Sketch	All model design and dimensions included	Some model design or dimensions included	No model design or dimensions included
Final Design Sketch- Forces	Uses directional arrows to correctly identify at least three forces acting on the system	Uses directional arrows to correctly identify two forces acting on the system	Uses a directional arrow to correctly identify one force acting on the system
Final Design Sketch-Energy Transference	Correctly labels two points of energy transference	Correctly labels one point of energy transference	Incorrectly labels points of energy transference, or no labels at all.
Data	Supporting data recorded more than two times	Supporting data recorded at least twice	Supporting data recorded only once or not at all
Presentation-Justification	Explicitly presents a reason for the model selected that is based on the data collected. Evidence is clearly presented to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object	The reason for the model selection is not clear and the selection is not supported by the data collected. Evidence is also not clear to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object	The reason for model selection is not provided, and no collected data is included to support the selection. There is also no evidence provided to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object
Dimensions	Within specified dimensions		Outside specified dimensions
Payload	Holds target payload of 150 g or more	Holds partial target payload of 75 g to 149 g	Holds no payload, or a partial target payload of 0 g to 74 g
Construction-Materials and Tools	Appropriate materials and tools were selected and used according to established safety rules	Appropriate materials and tools were selected, but used in an unsafe manner according to established safety rules	Inappropriate materials and/or tools were selected and/or used in an unsafe manner according to established safety rules

Sediment and Water Movement	Structure does not collapse with sediment and water movement for 10 seconds with a 150g payload	Some portion of the structure collapses with sediment and water movement for 10 seconds with a 150g payload	Structure fully collapses with sediment and water movement for 10 seconds with a 150g payload