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Homework #1 for Gizmo Project

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Problem Statement:

Through the use of simple machines and transportation technologies demonstrate various physical principles as associated with construction.

Criteria and constraints:

* Safety
* Cost
* Third grade understanding
* Aesthetic
* Ease of construction
* Ease of use
* Portable
* Durable for third grades

List of possible Gizmos:

1. Flat bed lift
2. Crane
3. Pulley

Final decision matrix:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Criteria | Weight | Flat bed lift | Weighted | Crane | Weighted | Pulleys | Weighted |
| Safety | 5 | 5 | 25 | 5 | 25 | 5 | 25 |
| Cost | 5 | 4 | 20 | 3 | 15 | 1 | 5 |
| Third grade understanding | 3 | 4 | 12 | 5 | 15 | 3 | 9 |
| Aesthetic | 1 | 2 | 2 | 4 | 4 | 1 | 1 |
| Ease of construction | 2 | 4 | 8 | 2 | 4 | 2 | 4 |
| Ease of use | 3 | 5 | 15 | 3 | 9 | 4 | 12 |
| Portable | 3 | 5 | 15 | 3 | 9 | 2 | 6 |
| Durable | 4 | 4 | 16 | 5 | 20 | 3 | 12 |
| Total |  |  | 105 |  | 101 |  | 74 |

Explanation for the rating in Matrix:

Flat bed lift:

* Safety: No harm.
* Cost: Since we get some things for free for this Gizmo, it rate high.
* Third grade understanding: Kids see them everyday.
* Aesthetic: Due to the fact that it is merely a strip of wood with a weight and syringes, it is not aesthetically pleasing and as such we gave it a 2.
* Ease of Construction: All we need to construct this gizmo is some pieces of wood, nails, a mass, and syringes.
* Ease of use: All they need to do is push in the syringe
* Portable: It has two pieces to transport both of which are small
* Durable: It is made of wood and as such won’t break easily

Crane:

* Safety: No harm.
* Cost: The wood wouldn’t be too expensive compare with others.
* Third grade understanding: Kids see them at almost every construction site.
* Aesthetic: It looks cool as compared to the other options.
* Ease of Construction: The construction would be very complex and as such it rated low.
* Ease of use: Since we need to adjust the length of the arm, it would not be that easy for third grade kids to use.
* Portable: It is of a medium size but due to the connections it can be transported easily.
* Durable: It is made of wood and as such won’t break easily

Pulley:

* Safety: No harm.
* Cost: The pulleys are very expensive and along with the rope and the equipment we need to set up and make it portable. It might go over the budget.
* Third grade understanding: Pulleys are common but the ideas beyond the phenomenon might be too complex.
* Aesthetic: With too many ropes the pulley system would not be very aesthetic.
* Ease of Construction: Attaching the rope to the pulleys may be easy, but attaching the pulley system to a portable unit might be complex.
* Ease of use: All they need to do is to pull the rope.
* Portable: With the large pulley system it probably would not be very portable as the ropes might be tangled.
* Durable: According to the complexity and equipment, the pulley system is easy to be broken during experiment with third grade kids.

The title of the winning design:

***BISON TRUCK***

Description: In order to work our flatbed, a person will have to push a filled syringe in, as such the water in this syringe will flow through the surgical tubing and into another syringe, pushing the plunger out and as such lifting the flatbed to a new angle. As such the material with which we filled the flatbed would fall out.