Simple Machines

Number of Participants: 2

Time: 30 Minutes

Description: Create a Rube Goldberg contraption using as many simple machines as possible. Students initiate the first movement, the marbles and simple machines do the rest. The winner will be the team that moves a marble into a cup with the greatest variety of simple machines as well as number of simple machines.

1. The following materials will be provided for each team at the field day:
   For building: 2’ X 1 1/2” Cardboard
   4 Marbles
   4 3oz Dixie Cups
   2 Empty Paper Towel Rolls
   2 Empty Toilet Paper Rolls
   2 Plastic Rolls (from empty cellophane tape roll)
   50 cm thin cotton string
   1 cardboard empty egg carton
   20 Plastic straight Drinking Straws
   For construction only:  
   Ruler
   Scissors
   Gift Wrapping Tape, as needed

2. Each team will need to bring their own boxes from home on the day of the competition. Boxes are for support only, may be marked, **but may not be cut before or during the event**. They may not be used as a simple machine.

3. Students will also need to bring in a blueprint (drawing or photo) of their contraption design with all six of the simple machines labeled (inclined plane, wedge, wheel, pulley, screw, lever). The blueprint will be retained by the captains.

4. The wedge must be used to do the work of a wedge it may not be used for support. The wedge must be used to propel the marble forward. It can be used to separate two objects or portions of an object, or lift it up. It may not be used for support, for example to support a lever.

5. The screw must be used to do the work of a screw, which is to change rotational motion into vertical motion. An inclined plane wrapped around a cylinder will not be counted as a screw, it will be counted as an inclined plane.

6. Teams will be allowed 20 minutes to build their contraption. They will be timed. Any time remaining from the 20 minutes will be added as points to the total score.

7. Machines may not be pre-made. All must be assembled on site.

8. You may bring your own supplies, however you may not add to the supply list – only substitute.
9. After contraption has been completed, the team will demonstrate their contraption for the team captain. They will have 3 chances to move a marble into a cup. Only adjustments/repairs will be allowed during the final demonstration. No major redesigns, such as cutting and adding tape are allowed due to time constraints. Teams will have a maximum of 5 minutes to move marble into cup.

10. Team scores will be determined as follows:

+ 1 point for each simple machine used
This score will be multiplied:
   X 1 if only one type of simple machine used
   X 2 if 2 types of simple machines used
   X 3 if 3 different types of simple machines used
   X 4 if 4 different types of simple machines used
   X 5 if 5 different types of simple machines used
   X 6 if 6 different types of simple machines used

+ 10 points will be added to the final score if team brought in a design blueprint with simple machines label.
If teams finish early, their remaining time will be added to the final score. (1 min left, 1pt)
If marble does not get into cup within 3 attempts, team is NOT eligible for an award.

11. The team with the highest scores will be the winners!

12. Due to space, all teams must take their boxes home. Teams may not re-enter the room at any time.

The above contraption includes 3 total simple machines and 3 different types of simple machines = 3 X 3 = 9. If a labeled blueprint was turned in + 10 points = 19. If finished 10 minutes early + 10 = Total score 29

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