

Science Olympiad National Tournament

Junkyard Challenge

-C Division-

Challenge 1: Using only materials that you brought in the standard-sized cardboard box (as described in the rules), construct a device to accomplish the following challenge.

Position four 3 oz paper cups 90 degrees apart in a compass-arrangement of North, South, East and West around a central 12-16 oz paper or plastic cup. The center of the compass will be the center of the central cup. The bottoms of all 5 cups must sit on the tabletop or floor space provided. The distance between the edge of the central cup and the closest edge of each outside cup will be specified at the competition and will range from 50 to 125 cm. When the Event Supervisor gives the signal, a Team member will start the device by dropping a large marshmallow into the central cup. The device must transfer the marshmallow from the central cup to one of the 4 outside cups. When the transfer is complete, the Team member notifies the Event Supervisor and receives permission to drop a second marshmallow into the central cup, to be transported to a second outside cup. This process repeats until 4 marshmallows have been dropped and all 4 outside cups contain a marshmallow or until the team calls time. The order in which the cups are filled will be specified at the competition. The device's maximum operating time is 3 minutes after the first marshmallow is dropped. Actions occurring after 3 minutes will not be scored.

The following points will be awarded:

- 35 points if the first marshmallow is put in the correct cup.
- 70 points if the second marshmallow is put in the correct cup.
- 105 points if the third marshmallow is put in the correct cup.
- 140 points if the fourth marshmallow is put in the correct cup.
- 50 points for each of the four marshmallows that make it from the central cup to an outer cup.

Penalties will be assessed as follows:

- 15 points for each time the device is touched while a marshmallow is being transported.
- 30 points each time the device is touched after a marshmallow transport has failed or been completed but before the next marshmallow is dropped.
- 15 points for each centimeter the distance between any outside cup and the central cup is less than or greater than specified. (nearest and straight-line distance, rounded to closest cm.)

If the angles between the outside cups are off by more than 5 degrees from the specified 90 degrees, the device will score in a lower tier.

Ties will be broken using the shortest time of operation.

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Challenge 2: Using only materials that you brought in the standard-sized cardboard box (as described in the rules), construct a device to accomplish the following challenge.

Position four 3 oz paper cups 90 degrees apart in a compass-arrangement of North, South, East and West around a central 12-16 oz paper or plastic cup. The center of the compass will be the center of the central cup. The bottoms of all 5 cups must sit on the tabletop or floor space provided. The distance between the edge of the central cup and the closest edge of each outside cup will be specified at the competition and will range from 50 to 125 cm. When the Event Supervisor gives the signal, a Team member will start the device by dropping a large marshmallow into one of the outer cups. The device must transfer the marshmallow from the outer cup and place it into the central cup. It must then transfer the marshmallow from the central cup to the outer cup opposite the first cup. Next, a second marshmallow will be dropped into another outer cup and the device must transfer it to the central cup and then to the remaining cup. The order in which the cups are to be filled will be specified at the competition (North to South, South to North, East to West or West to East). The device's maximum operating time is 3 minutes after the first marshmallow is dropped. Timing stops when the task is completed or the last marshmallow can not continue. Actions occurring after 3 minutes will not be scored.

The following points will be awarded:

- 50 points for each outer cup that is within 1 cm. or less of the specified distance from the central cup.
- 50 points for each of the two transfers of a marshmallow to the central cup.
- 75 points for each of the two transfers of a marshmallow from the central cup to next correct cup.
- 35 points for each of the four transfers that takes between 10 and 20 seconds to go from cup to cup.

Penalties will be assessed as follows:

- 15 points for each time the device is touched while a marshmallow is being transported.
- 30 points each time the device is touched after a marshmallow transport has failed or been completed but before the next marshmallow is dropped.
- 15 points for each centimeter the distance between any outside cup and the central cup is less than or greater than specified. (nearest and straight-line distance, rounded to closest cm.)

If the angles between the outside cups are off by more than 5 degrees from the specified 90 degrees, the device will score in a lower tier.

Ties will be broken using the shortest time of operation.