

2008 PHYSICS OLYMPICS

Bowling Ball Bonk

Objective: To move a bowling ball around a course with the smallest number of impulses in the shortest amount of time.

Equipment:

1 bowling ball (we will use either a 14 or 16 lb ball). Teachers, Bowling Alleys will give you old balls for free if you explain that you are a physics teacher. Or give your students extra credit for donating a ball.

1 or more rubber mallets (we will have to standardize this) You can buy a cheap rubber mallet from Harbor Freight or Home Depot for less than \$5.

Rules:

Each team will move a bowling ball around a course using only hits from a rubber mallet.

- The ball must move around each of the pylons (pop bottles). If a pylon is knocked over (regardless of how this happens) a time penalty of 10 seconds will be added to the overall time.
- Each time the ball is contacted by any other object (except a wall or other stationary object) there will be a time penalty of 10 seconds added to the overall time. (This will be at the discretion of the judge who is counting the hits.)
- The students can ONLY move the ball by hitting it with the rubber head of the mallet. The Ball must be HIT, NOT Pushed. The judge will determine if the ball was pushed and will give a 10 second penalty for each push.
- The raw score will be calculated as follows:

$$Raw_Score = \frac{1000}{(time_in_Seconds) * (\#of_hits)}$$

For example, a team that uses 20 hits and completes the course in 32 seconds will have a raw score of 1.56

- The final score will be normalized out of 100 points:

$$Final_Score = \frac{(Raw_Score) * 100}{(Best_Raw_Score)}$$

Procedure: [this event can easily be done in 40-50 minutes]

1. [5-10 minutes] Teams will spend this time to look at the course and plan their strategy.
2. The teams will each complete trial one. The order of the teams will be selected randomly.
3. The teams will run the course a second time with the teams selected in the reverse order

Optional rules

1. You can make a rule that each team member must hit the ball at least once. This makes it much more exciting, and it takes more planning and cooperation.
2. If you have each team member hit the ball, you can provide each team member a hammer. That makes it easier.

