

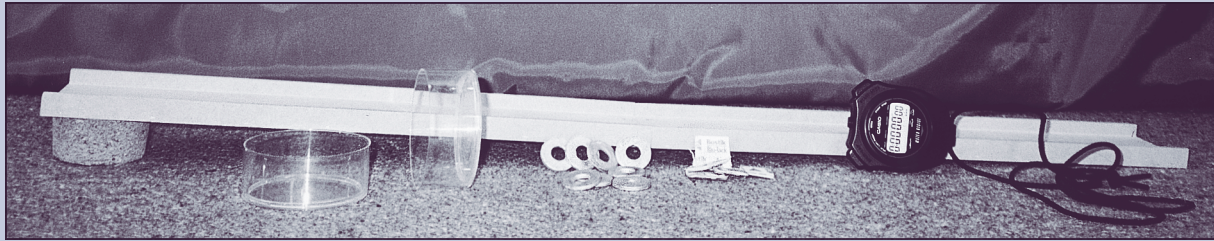
Wheel Race

Approach: Team

Level: Year 8 only

Focus: Co-operatively plan, carry out and report on an experiment involving the effects of mass and rotational inertia on the acceleration of a wheel.

Resources: 2 wheel cases, 8 washers, 2cm blutak, test track, cork, red pen, blue pen, large paper (for planning), stop watch, instruction card.



Questions/instructions:

I want you to imagine that you are a team of scientists who design wheels. You are to experiment and conduct tests with different kinds of wheels to find one that will gain speed most easily. You will need to think about the weight of the wheels. You also need to think about how you can arrange the washers inside the wheels. The washers act as weights. To help you with your work, you have two containers that can act as wheels, 8 washers that can be used as weights in the wheels, some blutak for joining and arranging washers in the wheels, a cork and a test track for checking the speed of the wheels that you design. A stop watch is also available if you want to use it.

Show students each of the supplies, but don't give them out yet.

So that everyone takes part in the reporting, I'm going to ask [name students 1 and 2] to report to me on what you did, later I'll ask [name students 3 and 4] to tell me your results and the best way to make a wheel that gains speed most easily. You can have a couple of minutes now to talk about what you will say in your explanations to me. This card describes the three things your team is asked to do.

Place the card for all students to see, then read it to the team.

Give the planning sheet and the blue pen to the students. Teacher withdraws, and allows students time to plan their explanations.



Wheel Race

Team Instructions

Your job is to design a wheel that will gain speed most easily. You will use very small bits of blutak to join and arrange the washers in the wheels. Follow steps 1-5

1. Work together as a team so the **everyone** is taking part.
2. **Talk about how** you will do your experiment. Agree on a plan.
3. **Write down your plan** and the planning sheet. Use a blue pen.
— Tell your plan to the teacher —
4. **Try out your plan** and do the experiment. If you make changes to the plan, use the **red pen**.
5. Talk about your results:
 - a. How good was your plan?
Are there ways that it could be improved?
 - b. What is the best way to make a wheel that gains speed most easily?

[Name students 1 and 2] I want you to tell me the plan of your experiment. The others can help with the explanations if that would be helpful.

% responses
y8

Allow time.

Planning:

to try different arrangements of washers to achieve consistent set up and release of wheel on ramp to achieve accurate measurement of speed/time to check consistency by replication to involve all students

44
7
19
4
56

Report on planning:

clear, accurate, full reasonably clear, accurate

9
54

You have 10 minutes to work through your experiment. If you make changes, use the red pen to write these down on your planning sheet. After that I will ask you to report to me on what you did, to tell me your results, and to explain what is the best way to make a wheel that gains speed most easily. Use all of your time well, so that you get the best results.

Give students the equipment. Take in the blue pen and give students the red pen. Allow 10 minutes for the experiment.

[Name students 3 and 4]: I want you to tell me your results and to explain the best way to make a wheel that is fast at picking up speed. The others can help with the explanations if that would be helpful.

Experimentation:

tried several different arrangements of washers systematically set up and released wheel consistently measured speed/time carefully included replication of most/all trials high participation

% responses
y8
31
25
25
22
60

Report on experiments:

clear, accurate, full reasonably clear and accurate

2
24

Commentary:

The apparatus for this task was not easy to use, which perhaps accounts for the modest proportions of teams who achieved high standards in the different aspects of experimentation. Important aspects were often not considered in the planning.