Rotational Derby Lab

**Purpose:** Quantify rotational inertia and be able to predict the outcome of events based on physical properties of objects.

1. Experiment and gather data. Keep note of everything, size, mass, radius, weight, incline, etc.
2. Some experiments to perform: which reaches the bottom first? Which rolls the longest? Which is the hardest to push? Which is less likely to slip?
3. Pool data and look for trends. Analyze data to come up with general rules that apply to all objects.

**Assessment:** Check grading breakdown below.

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**Paper-trail:** Your work should be easy to follow, read, and understand. Please adhere to the following minimums.

1. Explain experimental set-up (include diagram).
2. Write hypothesis (clearly label).
3. Record results (neat table or other organizational tool).
4. Analyze results (compare to hypothesis and note discrepancies/additional information).

Each student needs to have their OWN set of data. When working on the final 'class race' you will not be able to share data but may use your own.

You may use your phones for slow-motion video recording if you must, but if you need such precision to gather data, there may be errors that affect your data that you have not considered. Instead, it may be better to alter the experimental setup.

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**Homework:** Using Google docs, combine all data and come up with relevant trends that will help you determine the outcome of the ‘class race.’

Make sure you include your experimental setup when sharing your data with other groups. Some experimental setups may have too many possible sources of error to be useful, or may include some information that is needed to understand other people’s data. The more detailed you make your contribution, the more useful it will be (hopefully).
Assessment: The components that make up your grade are outlined below.

Please add your group's data to your shared class spreadsheet sooner rather than later. Spreadsheets will be graded three days after the start of the lab, so the day we do the 'class race,' which is the day after the second day of collecting data. Grade is based on the following:

• Class spreadsheet (10pts.)
• Group contribution to class spreadsheet (9pts.)
• Individual answers to 'class race' questions (11pts.)

DETAILS - CLASS SPREADSHEET GRADING BREAKDOWN

• Overall spreadsheet [class grade, everybody in the class gets the same score] 10 pts. (total)
  - procedures (clear, easy to follow, repeatable, noting sources of error, listing hypothesis/goal) (2 pts.)
  - significance of data (numerical/quantitative [t=1.25sec.] vs. qualitative [red won]) (2 pts.)
  - calculations are clear (columns are labeled with headings/units/relevant information) (2 pts.)
  - analysis (observations and trends are supported with data, logic explained, easy to follow) (2 pts.)
  - summary page (overall findings summarized, viability of data included) (2 pts.)

EXAMPLE OF SUMMARY PAGE CONTENT:
• all data supports that blue objects are the quickest to reach the bottom of the incline regardless of angle, mass, density, etc.
• group's x, w, and z's data support that radius is irrelevant for cylinders in terms of rolling distance before stopping, however group y's data shows that for cylinders with r ≥ 0.2m, distance covered before stopping increases as radius increases

DETAILS - GROUP CONTRIBUTION GRADING BREAKDOWN

• Overall group contribution [group grade, everybody in the group gets the same score] 9 pts. (total)
  - procedures (clear, easy to follow, repeatable, noting sources of error, listing hypothesis/goal) (2 pts.)
  - significance of data (numerical/quantitative [t=1.25sec.] vs. qualitative [red won]) (2 pts.)
  - calculations are clear (columns are labeled with headings/units/relevant information) (2 pts.)
  - analysis (observations and trends are supported with data, logic explained, easy to follow) (2 pts.)
  - Group member's names are easy to find, spreadsheet is without spelling mistakes (1 pts.)

DETAILS - INDIVIDUAL ANSWERS TO 'CLASS RACE' QUESTIONS 11 pts. (total)

• 11 questions, 1 points each. 1/2 point for accuracy, 1/2 point for reasoning/explanation/correct reference of data