Rotational Derby…let the races begin!

RACE SET-UP:

Make a ramp with the dry-erase board and use your books for the support. Set up the ramp with an angle of about 10o.

RACE #1: Select two balls. **Predict** which ball will reach the bottom of the ramp in the shorter time. Record your prediction. Describe the two balls you picked. Place a meter stick across the ramp near the top, and rest the balls on the stick. Quickly remove the stick to allow the balls to roll down the ramp. Record your results.

Description of two balls:

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Repeat the race with another pair of balls.

What do you conclude about the time it takes for two solid steel balls with different diameters to roll down the same incline?

RACE #2: Repeat the race for two hollow cylinders (empty cans). Record your predictions and results.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Repeat the race for the other pairs of hollow cylinders.

What do you conclude about the time it takes for two hollow cylinders with different diameters to roll down the same incline?

RACE #3: Repeat the race for two solid cylinders (filled cans with non-sloshing contents). Record your predictions and results.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Repeat the race for the other pairs of solid cylinders.

What do you conclude about the time it takes for two solid cylinders with different diameters to roll down the same incline?

RACE #4: Repeat the race for a hollow cylinder and a solid one. Before trying it, predict which cylinder will reach the bottom of the ramp first.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Repeat the other pairs of hollow vs. solid cylinders.

What can you conclude about the time it takes for a hollow and a solid cylinder to roll down the same incline?

How do you explain the results you observed for the hollow and solid cylinders?

RACE #5: Repeat the race for a solid ball and a solid cylinder. Record your prediction and result.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What do you conclude about the time it takes for a solid ball and a solid cylinder to roll down the same incline?

RACE #6: Repeat the race for a solid ball and a hollow cylinder. Record your prediction and result.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What can you conclude about the time it takes for a solid ball and a hollow cylinder to roll down the same incline?

RACE #7: Repeat the race for two soup cans, one with liquid (sloshing) contents and the other with solid (non-sloshing) contents. Record your prediction and results.

Predicted winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Actual winner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How can you explain the results you observed for the sloshing vs. non-sloshing kinds of soup?

Overall Results:

Of all the objects you tested, which took the least time to roll down the incline?

Gravity caused the objected to turn faster and faster – that is, they had rotational acceleration. Of the objects you tested, what type had the greatest rotational inertia – that is, greatest *resistance* to rotational acceleration? Explain.