

It's All Downhill From Here

GOAL

- Create the fastest rolling object with a 5" diameter that will travel down a 6' incline.

MATERIALS

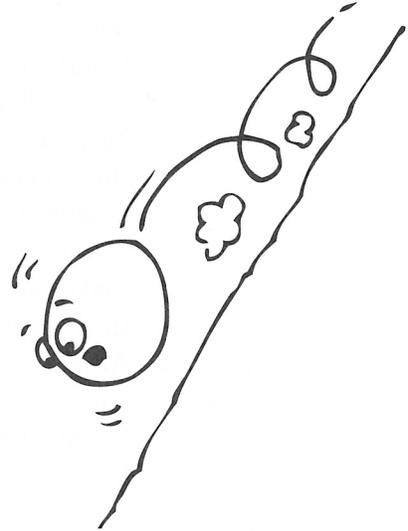
- Paper
- Straws
- Tape
- Rulers

TIME TO CREATE

- 15 minutes

INDIVIDUAL ACTIVITY

Read the following information and respond to the questions.

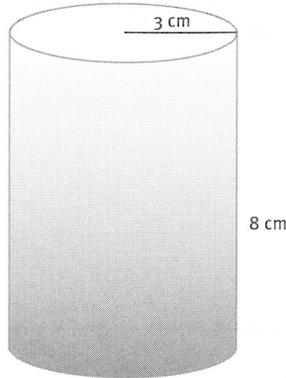


When you ride your bike down a hill, it's easy to go fast. Gravity is handling the work, so you don't have to exert much energy. The length and steepness of the hill can increase your speed—the steeper and longer the hill, the faster you go. The distribution of your mass and the incline of the slope will also affect the speed of movement.

When describing the motion of objects, we're actually describing kinetic energy, energy characterized by the movement of an object. Understanding kinetic energy helps us to use natural forces and/or create machines to improve the quality of our lives.

You will apply your understanding of kinetic energy in today's team challenge. However, before you begin the challenge, you'll need to refresh your memory on some geometric principles.

1. Define circumference. _____
2. What is half of a diameter called? _____
3. What is the value of pi? _____
4. To find the circumference of a circle, multiply pi by the: _____
5. What is the formula to find the area of a circle? _____
6. Find the circumference and area of a circle with a 3-inch radius. _____
7. Define surface area. _____
8. What is the formula for finding the surface area of a cylinder? _____
9. Imagine taking apart the cylinder on the following page. You would have the top, bottom, and middle. This is called a net. Think about the shapes of each part. Draw the net and include the measurements for the radius on the top and bottom, and the length and width of the middle.



10. Find the area of the: top: _____ bottom: _____ middle: _____
11. What is the surface area of this cylinder? _____
12. What is the formula for finding the volume (inside area) of a cylinder? _____
13. Use this formula to find the volume of the cylinder in Question 9. _____

TEAM CHALLENGE

Participants will work in teams of two or three to create a rolling object with a 5" diameter within an allotted time of 15 minutes. A 6' slope of approximately 45 degrees will be provided by the teacher, and all of the teams will use this slope. The goal is to have the roller that travels the fastest down this slope.

Start Time ____ : ____ + 15 Minutes = ____ : ____ End Time

1. For each race, record the times of each team's rollers. Find the sum of each column.

Roller #1: ____ : ____	Roller #2: ____ : ____	Roller #3: ____ : ____
Roller #4: ____ : ____	Roller #5: ____ : ____	Roller #6: ____ : ____
Roller #7: ____ : ____	Roller #8: ____ : ____	Roller #9: ____ : ____
Roller #10: ____ : ____	Roller #11: ____ : ____	Roller #12: ____ : ____
Roller #13: ____ : ____	Roller #14: ____ : ____	Roller #15: ____ : ____
Column sums: ____ : ____	____ : ____	____ : ____

2. Using the column sums, compute the average of all rollers. Show your work.

Average time: _____ : _____

3. What do you think contributed to one roller being faster than another? Support your ideas.

4. If you were to create the roller again, what would you do differently and why?

5. In what real-life situations might this information be useful?
