SONOMA RACEWAY

Friedman's HOME IMPROVEMENT

OBJECTIVES

Your child will:

- Discover the Sonoma Raceway STEAM activity through a letter
- Build content vocabulary (gravity, drag, friction) and oral language skills
- Determine accuracy of text-dependent claims
- Calculate sums and differences
- Think critically about physical forces
- Practice letter writing

You will need:

- Challenge Letter from Sonoma Raceway
- Gravity Power *Kid Scoop News* Worksheet
- Engineer's Journal—have your child use a notebook or make one by stapling blank pages together.

LESSON 1

GRAVITY POWER

START YOUR ENGINES!

ASK: *If I told you we were going outside today to have "races," what kind of races might we have?* (Chart responses—relay races, running races, hopping races, jumping races, skipping races, etc.)

Create a blank **WHO, WHAT, WHEN, WHERE, WHY** chart. Do a second chart with answers (see below).

SAY: *I have received an interesting letter from your friends at Sonoma Raceway that has a challenge for you for a different kind of race. Listen carefully for the answers to "WHO, WHAT, WHEN, WHERE and WHY," while I read their letter to you.*

	SAMPLE ANSWERS FROM LETTER
WHO	Your friends at Sonoma Raceway
WHAT	Invites students to design and build the fastest car that runs only on gravity.
WHEN	Spring 2020
WHERE	At home. (Talk with your child about where you could race your car. See tips for building a ramp, page 31)
WHY	To discover how science, technology, engineering and math affect a car's speed!

ASK your child to help you complete the chart. Review responses. **SAY:** *Are you ready to start your engines and take up the challenge?*

GO!

SAY: *Here is a question to guide your work: How can you design and build the fastest gravity-powered car?*

SAY: *Let's begin by finding out what you already KNOW about NASCAR racing and gravity and what you NEED to KNOW to complete this project.* (Allow time to brainstorm; chart responses on a piece of paper. The "Need to Know" elements will be answered during the project.)

KNOW	NEED TO KNOW
Example: *NASCAR race cars are low to the ground.*	Example: *Why are they built so low?*

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LESSON 1

GRAVITY POWER

REVIEW Gravity Power Worksheet

READ the "claims" on the chart below. Predict whether they are TRUE or FALSE. Then complete the worksheet.

SAY: *As you read and complete the worksheet, decide if these claims from the reading are TRUE or FALSE.*

CLAIMS	TRUE	FALSE
a. Gravity can pull a car down a ramp.		
b. Gravity has the same pull on all cars in a race.		
c. Friction causes gravity.		
d. A car moving through air causes friction.		
e. A car shaped like a box has less drag than a car that is streamlined and smooth.		
f. Sonoma Raceway is a "road course" with hills and different directions.		
g. Race cars are designed to have more drag.		

ANSWERS: a. TRUE, b. TRUE, c. FALSE, d. TRUE, e. FALSE, f. TRUE, g. FALSE

VICTORY LANE!

1. **Chat it UP!** Explain the difference between *gravity* and *drag*. Discuss why it is important to understand these forces to design the best race car.

2. **Imagin-eer!** In your Engineer's Journal, draw two cars—one with lots of drag and another with very little drag. Describe the features of your car with less drag. What makes it a better design?

3. **Write On!** Write a letter in reply to Sonoma Raceway and the Publisher of *Kid Scoop News*. Tell them your feelings about the project and some of your initial plans.

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SONOMA RACEWAY

LESSON 1
CHALLENGE LETTER

Dear Students,

The famous Sonoma Raceway has a challenge for you. Sonoma Raceway is a place where professional drivers compete in races with cars that are designed by top engineers to meet the challenges of speed and sharp racetrack turns.

But today we have a different challenge!

Sonoma Raceway is looking for young engineers to help design the *ultimate* fuel-efficient race car—so efficient that it runs on *no fuel at all*—only gravity! Are you up for this challenge?

Rev up your engines and discover the fun of science, technology, engineering and math!

We'd like to invite you to "think like an engineer" and design a small gravity-powered car *completely out of clean trash*. Your small car will be not only fuel-efficient but will re-use trash that might otherwise have been headed to the landfill.

This STEAM Family Learning Guide will assist you through every step of the process while teaching you key Science, Technology, Engineering and Math (STEM) concepts. And, because you will be using unusual items to build your car, it's a chance to show off your artistic skills as well. That makes this a STEAM (Science, Technology, Engineering, ART and Math) project!

Begin the challenge by completing these eight lessons that will help you understand the dynamics of race car design including creation of a "cereal box" car of your own! Then turn to the ULTIMATE CHALLENGE to think outside the "cereal box" to build your unique car ready for NASCAR racing on an inclined ramp that *makes gravity do the work!* You may need to make some adjustments to your design, but that's all part of the learning fun—and seeing what doesn't work is how real engineers make their designs better.

But, don't stop there! Once you're finished, we want to see what you've created! Take pictures and videos of your cars, go to sonomaraceway.com/STEAM and send them to us. If we do schedule our annual gravity-powered racing event at the track, you'll be ready to roll.

We look forward to seeing your cars and discovering your clever ideas on how to make a gravity-powered car zip down the track. So … rev up your engines as you discover how much fun the combination of creativity, science, and engineering can be, and how it's part of our lives each and every day!

Sincerely,

Your Friends at Sonoma Raceway

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STUDENT NAME:_____

Race cars without engines?

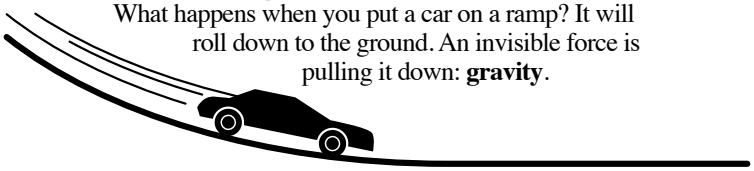
"Drivers start your engines!" is something you normally hear at an automobile race like NASCAR or the Indy 500.

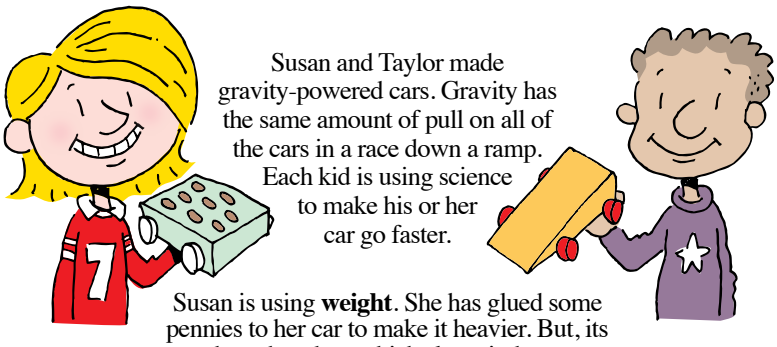
But, what if a car had no engine? How would it move? Could it still be a race car?

The answer is "YES!" if you know your science!

Gravity Power

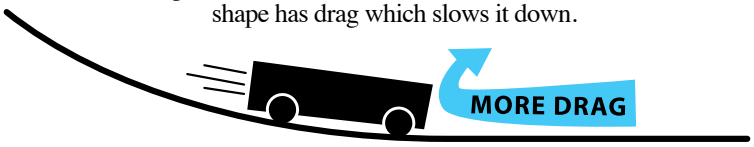
What happens when you put a car on a ramp? It will roll down to the ground. An invisible force is pulling it down: **gravity**.



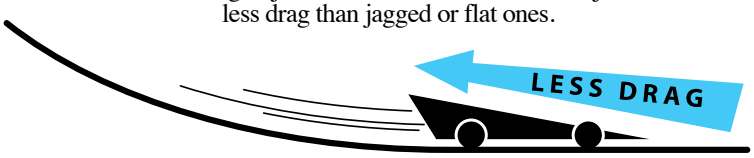


Susan and Taylor made gravity-powered cars. Gravity has the same amount of pull on all of the cars in a race down a ramp. Each kid is using science to make his or her car go faster.

Susan is using **weight**. She has glued some pennies to her car to make it heavier. But, its shape has drag which slows it down.



Taylor has engineered his car to have less **drag**. When a car moves through the air, it causes **friction**. Friction causes drag, a force that slows a moving object. Streamlined and smooth objects have less drag than jagged or flat ones.



Science at Sonoma Raceway

The track at Sonoma Raceway is different from other race tracks. Other tracks are large, sloped ovals. Sonoma Raceway is a "road course." That means it turns in different directions and travels up and down over small hills. This makes understanding gravity a part of how a driver decides to drive the course.

A Note to Parents

Discuss with your child how understanding gravity is important for a race car driver on a track that changes elevation.

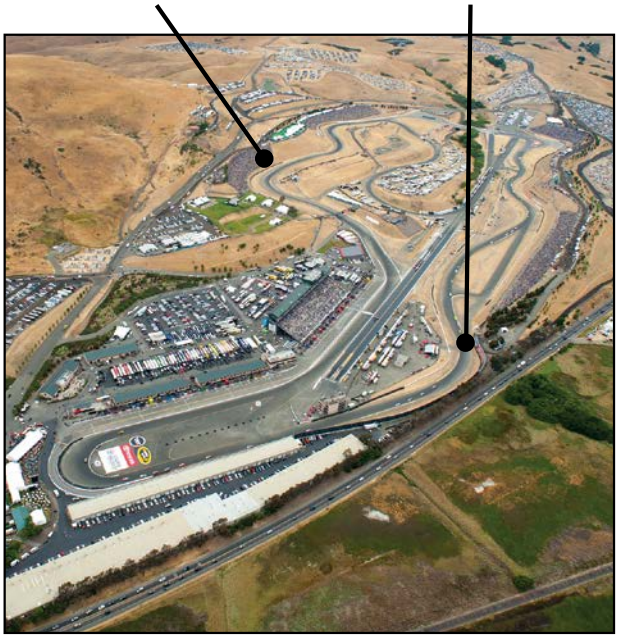
Sonoma Raceway Fast Facts

Do the math to discover the facts about the unique track at Sonoma Raceway!

Sonoma Raceway features more than 100 + 20 + 40 = ____ feet of elevation change from its highest to lowest points.

The highest point is Turn 3a. It is 75 + 25 + 74 = _____ feet in elevation.

The lowest point, Turn 10, is just 7 + 7 = _____ feet in elevation.



What is the difference between Turn 3a and Turn 10? _____ feet!

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