SEE AND BE SEEN

Active Transportation Safety and Healthy Living STEAM-based Curriculum

lancaster ca
it's positively clear

OTS
CALIFORNIA OFFICE OF
TRAFFIC
SAFETY

GO SAFELY CALIFORNIA

CALIFORNIA OFFICE OF TRAFFIC SAFETY

SEE AND BE SEEN

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INTRODUCTION

According to the 2017 Office of Traffic Safety (OTS) Crash Rankings, Lancaster ranked 3/58 for Total Fatalities and Injuries of Pedestrians under the age of 15. Statewide Integrated Traffic Records System (SWITRS) data for the same year shows that 27 of the victims in pedestrian collisions were school age, four of which were severely injured and two of which were killed. Of the 31 bicycle collisions in 2017, all bicyclists were injured and nine of them were school age. For both bike and pedestrian (PED) collisions involving school age children, the vast majority of the collisions occurred because the victim wasn't utilizing the facilities properly (crosswalks, sidewalks, and bike lanes) or there were no facilities for them to utilize.

Over the last decade, the City of Lancaster has been hard at work acquiring funding to implement its Safe Routes to School Master Plan, Master Plan of Complete Streets, Master Plan of Trails and Bikeways, and Safer Streets Action Plan to improve these statistics. While the City continues to commit to making routes safer to be used, there are still thousands of students walking and biking to school every weekday that are at risk simply because they have not been educated or encouraged to utilize the facilities properly.

In January 2018, the City of Lancaster determined that in addition to continuing to utilize engineering and operational countermeasures, it needs to also be engaged in traffic safety outreach and education. "Traffic safety is a shared responsibility. For this reason, the City of Lancaster is committed to educating and informing the public regarding safe ways to traverse our community," said Lancaster Mayor R. Rex Parris. "Our residents get around in a variety of ways, including by bike and on foot. Therefore, it is of the utmost importance that we be aware of one another and do our part to help everyone reach their destination safely."

The first idea born from this commitment was the SEE AND BE SEEN bike and pedestrian traffic safety signal cabinet wrap campaign. By securing an OTS grant, the City was able create artistic cabinet wraps focused on bike/PED safety education and Safe Routes to School wayfinding to address the high bicycle and pedestrian collision rates in the heart of the city.

The design concept of the wrap series was created through valuable input from local school districts and law enforcement. Each of the wraps includes one of the following safety messages, in addition to a wayfinding map that highlights where the City's bikeways and crosswalks are located.

- **Make Eye Contact**
- **Eyes Up, Phone Down**
- **Ride RIGHT in the Bike Lane**
- **Keep in Mind, Walk Between the Lines**

The SEE AND BE SEEN campaign is the first signal cabinet wrap program in the nation to integrate traffic safety education with the artistic wrapping of signal cabinets.

Encourage students to practice safe walking and biking to school by having them watch this video:

https://youtu.be/8qkn0aw1xWg

What started with a single corridor concept has grown into a multifaceted campaign with 35 wrapped cabinets throughout the City, school outreach education, and a social media campaign. The wraps have provided a proactive educational platform to bring awareness to bike/PED safety to everyone traveling in Lancaster. The campaign is resonating with the community and taken on a life of its own as it has garnered interest from other entities, public and private, that are interested in becoming partners with the City to continue to grow the next phase of the campaign.

SEE AND BE SEEN Today

In 2020, the City received a second OTS grant for the purpose of expanding the SEE AND BE SEEN campaign into a complete active transportation and healthy living program that would include full-length STEAM-based assemblies in all Lancaster public schools, a student art contest for the next phase of SEE AND BE SEEN signal cabinet wraps, an art exhibition, a social media campaign, and so much more.

However, due to the impact that COVID-19 had on education, the City had to adapt and find methods of applying the intent of its original goals in the grant to distance learning. Through collaboration with the local public school districts, the City was able to create the following set of curriculum that teaches active transportation safety and encourages healthy living. The activities also address important S.T.E.A.M. (Science, Technology, Engineering, Art, Math) and Physical Education topics. To make the implementation of these assignments as seamless as possible, the activities include California State Standards (where applicable) and worksheets. High-res versions of the worksheets can be found at cityoflancasterca.org/seeandbeseen. Furthermore, each one offers suggested student-friendly language for posting in distance learning platforms and has been tailored to consider potential resource limitations of students' distance learning environments.

This curriculum is the first of its kind, and the City will continue to evolve it based on the feedback received from educators. To provide feedback or request more information about the SEE AND BE SEEN program, email SeeAndBeSeen@cityoflancasterca.org.

AWARDS

The SEE AND BE SEEN campaign has been recognized locally, regionally, and nationally for its creative approach to traffic safety education:

American Public Works Association

- National Exceptional Performance Award in Safety 2020
- Southern California Chapter B.E.S.T. Creative and Innovative Project of the Year 2019
- High Desert Branch Innovative Design of the Year 2019

Coming Soon! SEE AND BE SEEN will be featured at the Municipal Management Association of Southern California Annual Conference.

SEE AND BE SEEN

SCIENCE Performance Expectations

Next Generation Science Standards Performance Expectations:

Grades K-2
Students who demonstrate understanding can analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. Source: https://www.nextgenscience.org/pe/k-ps2-2-motion-and-stability-forces-and-interactions

Grades 3-5
Students who demonstrate understanding can plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Source: https://www.nextgenscience.org/pe/3-ps2-1-motion-and-stability-forces-and-interactions

Grades 6-8
Students who demonstrate understanding can use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. ("What Do You See" Lesson) Source: https://www.nextgenscience.org/pe/ms-ps4-1-waves-and-their-applications-technologies-information-transfer

Students who demonstrate understanding can develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. ("How Does Light Travel" Lesson) Source: https://www.nextgenscience.org/pe/ms-ps4-2-waves-and-their-applications-technologies-information-transfer

Grades 9-12
Students who demonstrate understanding can use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. Source: https://www.nextgenscience.org/pe/hs-ps4-1-waves-and-their-applications-technologies-information-transfer

LESSON
Exploring Ramps, Angles, and Friction

OBJECTIVE

Students will be able to recognize the effects of friction in a real-world application by building and testing various ramps.

THE CHALLENGE

Young kids learn by exploring, observing, and figuring out the way things work by experimenting. Exploring ramps and friction encourages all the above. Students will learn that friction can be two surfaces rubbing against one another. We experience this when we rub our hands together when they are cold. Friction is also the resistance an object meets when moving over another surface. The materials you attach to the ramps change the surface of the ramp. The different cars will experience different amounts of friction when going down these ramps causing the cars to speed up or slow down some.

MATERIALS

- Materials to make ramps; you can use cardboard or wood planks
- Variety of toy cars, balls, other rolling toys, etc.
- Variety of textured materials to create friction, e.g. hand towel, sandpaper, rubber “grippy” mats, foil or parchment paper, a piece of rug, or even dirt
- Tape to secure materials if necessary so they do not slip off the ramps
- Stopwatch and measuring tape

ACTIVITY

1. Watch the “Types of Friction” video: https://youtu.be/H877C_5BMkI
2. Allow students to explore the bare ramp as they wish. They are going to be super excited to play, so it is often best to let them explore the activity freely for a bit first. You can also test out angles at this point. Which ramp angles are faster or slower? Which cars move faster? Heavier, lighter, longer, or shorter cars move at different speeds. This is a great way to get them thinking about the way things move.
3. When the kids are ready, move on to your textured ramps. Let the student feel the textures and describe them to you. This is a great time to remind them of the concept of “friction” that they learned about in the video.
4. Before they test out the cars, invite the student to guess which texture might slow down the car or speed it up as it goes down the ramp. Make predictions on which cars will go faster or slower. Let the student race cars down the different ramps. If appropriate, you can use a measuring tape to see how far the cars travel off the ramp. Which car goes the farthest? Which car is the slowest? Which car crashes, falls off the ramp, or doesn’t make it to the end?
5. Have the student draw a picture and write a short (appropriate to grade level) description about their experience.

Note: You may want to split this activity into two learning times since exploring the ramps is great fun all in itself and is still a simple physics lesson.

LESSON
Exploring Ramps, Angles, and Friction

GRADES K-4: STUDENT INSTRUCTIONS

1. Look around the house for items you can use to create a ramp (cereal boxes, shoe boxes, pieces of wood, etc.)
2. Gather some of your toys that roll or have wheels (toy cars, balls, marbles, etc.)
3. Determine how many materials you want to test and how many ramps you want to have available. This can be performed inside or outside!
4. Determine how you will set up the ramps (on stairs, stack of books, etc.). Use your ramps to explore different angles (moving the top of your ramp higher or lower) and use your toys to test out how they move at different speeds based on how you place your ramp. While you play, think about these questions:

    a. Which ramp positions make the toys move faster or slower?
    b. Why do some toys move faster or slower than others (think about factors like weight and length)?

5. Look around the house for textured materials (a hand towel, sandpaper, foil, bubble wrap, etc.)
6. Take time to feel the textured materials and think about how these may affect the speed of your toys on the ramp. While you feel them, think about these questions:

    a. Which item will slow the toys the most? Will any of the items make the toys move faster?

7. Use tape to secure the texture items to your ramp and start rolling your toys down the ramp.

    a. Which texture slowed the toys down the most?
    b. Did any texture make the toys move faster?
    c. Do any of the toys get stuck on the ramp?
    d. Do any of the toys fall off the ramp?
    e. If you can, use a measuring tape or stopwatch to measure these differences.

8. Draw a picture and write a short description about your experience with testing toys on the ramp then turn it into your teacher.

MATERIALS

- Materials to make ramps (cereal boxes, shoe boxes, wood planks, etc.)
- Variety of toy cars, balls, other rolling toys, etc.
- Variety of textured materials to create friction, (hand towel, sandpaper, rubber “grippy” mats, foil or parchment paper, a piece of rug, or even dirt)
- Tape to secure materials
- Stopwatch and measuring tape

LESSON
Exploring the Science of Retroreflectivity

OBJECTIVE

Students will be able to recognize how light travels and changes with different mediums by testing different conditions.

THE CHALLENGE

There is more to transportation safety than meets the eye! There is science behind everything we see. Students will learn various aspects of retroreflection, including common characteristics of light, such as reflection, refraction, absorption, diffusion, and transmission to control light in a way that makes signs and roadway markers more visible to drivers and our streets and highways safer for everyone.

LESSON 1A: What Do You See?

MATERIALS

- Four pieces of different color construction paper
- Flashlight
- What Do You See Lab Worksheet

ACTIVITY

Students will shine flashlights at various colors of construction paper to determine color and will rank the various colors according to the amount of visible absorption and reflection on the lab sheet. Any color construction paper may be used. The room will need to be as dark as possible for students to perform the investigation. Explain the differences between reflection and absorption or have the students define them prior to this activity. Black should absorb the most and reflect the least. White should be the opposite: absorbing the least and reflecting the most. Students have an explanation on their sheet about why each object is the color that it is. Objects appear white when the light reflects; conversely, we see all the colors as the white light bounced back. In black, all the colors are absorbed, and we see no color. The darker colors should have higher absorption while the lighter colors should have higher reflection.

KEY VOCABULARY

- Absorption: light is not reflected, but instead, taken in and converted to heat.
- Reflection: light waves bouncing off of a surface.

HELPFUL VIDEOS

- Understanding Absorption of Light – Why do we see different colors?: https://youtu.be/VwNKPgo3oxA
- Color and Refraction: https://youtu.be/5U1vOWjC4uA

LESSON 1A
Exploring the Science of Retroreflectivity (What Do You See?)

GRADES 4-12: STUDENT INSTRUCTIONS

1. Gather four sheets of construction paper in different colors and a flashlight.
2. Find a dark, windowless room (like a closet) – or perform this experiment inside, after sunset.
3. Place the construction paper on a flat surface.
4. With the lights off and in the darkest room in your house, shine the flashlight on the center of each color and rank the colored paper from brightest (1) to the least bright or dimmest (4).
5. Fill out the What Do You See Lab Worksheet based on your findings and turn it into your teacher.

MATERIALS

- Four pieces of different color construction paper
- Flashlight
- What Do You See Lab Worksheet

HELPFUL VIDEOS

- Understanding Absorption of Light: **https://youtu.be/VwNKPgo3oxA**
- Color and Refraction: **https://youtu.be/5U1vOWjC4uA**

Comparison of Colors, Reflection, and Absorption

Place the pieces of construction paper on the desk or table in front of you. With lights off, shine the flashlight on the center of each color and rank the colored paper from brightest (1) to the least bright or dimmest (4).

PAPER COLOR	WAS MORE LIGHT ABSORBED OR MORE LIGHT REFLECTED?	RANK

1. Does absorption or reflection make an object appear brighter? Explain your thoughts.

2. If objects that absorb light convert the light energy to heat energy, which color object would absorb the most light and increase in temperature most easily? Explain your answer.

3. In conclusion, explain how reflection and absorption determine which colors we see and how bright a color appears to our eyes. You may use an example to help explain your answer.

LESSON 2A
Exploring the Science of Retroreflectivity (How Does Light Travel?)

MATERIALS

- Straws or popsicle sticks
- Flashlight or Laser Pointer (ideal)
- Drinking glasses
- Water
- How Does Light Travel Lab Worksheet

ACTIVITY

Students will examine how light travels. They will view light reflecting from straws, as well as light from a laser pointer as they create images in clear drinking glasses containing water. What happens to the appearance of the straw in the water from different positions? What happens to the path of the light? This investigation illustrates refraction: how would you explain and define refraction? Refraction is the bending of light as it is changes speed. As it travels through different objects (the water), the light changes speed and turns as it slows down or speeds up. Rain on signs and pavement marking creates refraction, making them more difficult to see.

The angle of refraction changes with the interaction between the light and the particles in the medium including temperature and wavelength of the light. The light in these examples, as shown by the straw and the laser, bend when they pass through the center of the glass and even more as they pass through closer to the outside of the glass or beaker.

KEY VOCABULARY

- Diffusion: scattering of light as it passes through a medium or is reflected from one.
- Refraction: the bending of light as it passes through a medium

HELPFUL VIDEOS

- Light: Crash Course Astronomy #24: https://youtu.be/jjy-eqWM38g
- What is Light – Physics (Simple Explanation): https://youtu.be/BUYeQa_-ojk
- Tour of the EMX 01 – Introduction: https://youtu.be/lwfJPc-rSXw

LESSON 2A
Exploring the Science of Retroreflectivity (How Does Light Travel?)

GRADES 4-12: STUDENT INSTRUCTIONS

1. Gather your materials.
2. Fill each drinking glass 2/3 full with water.
3. Place a straw or popsicle stick in each glass and observe how the straw or stick changes when placed at different angles in the glass.
4. Answer the questions on the How Does Light Travel Lab Worksheet based on your observations.
5. Next, remove the straws or sticks from the glasses and discard.
6. Place the glasses in front of a white wall or white sheet of paper.
7. Using your flashlight or laser pointer, shine light through the water (from the side of the glass) and look through the top of the glass. Examine how the light path changes in the water as you move your flashlight or laser pointer up and down the side of the glass.
8. Answer the questions on the How Does Light Travel Lab Worksheet based on your observations and turn it in to your teacher.

MATERIALS

- Straws or popsicle sticks
- Flashlight or Laser Pointer (ideal)
- Drinking glasses
- Water
- How Does Light Travel Lab Worksheet

HELPFUL VIDEOS

- Light: Crash Course Astronomy #24: https://youtu.be/jjy-eqWM38g
- What is Light – Physics (Simple Explanation): https://youtu.be/BUYeQa_-ojk
- Tour of the EMX 01: https://youtu.be/lwfJPc-rSXw

Refraction

Using a clear drinking glass, fill it 2/3 with water. First place a straw in the middle of the glass.

Looking beside the glass from the front, draw what you see in the water below. Repeat for number 2, placing the straw closer to the edge of the glass.

1 2

Describe what you see in each glass.

1. Glass #1:

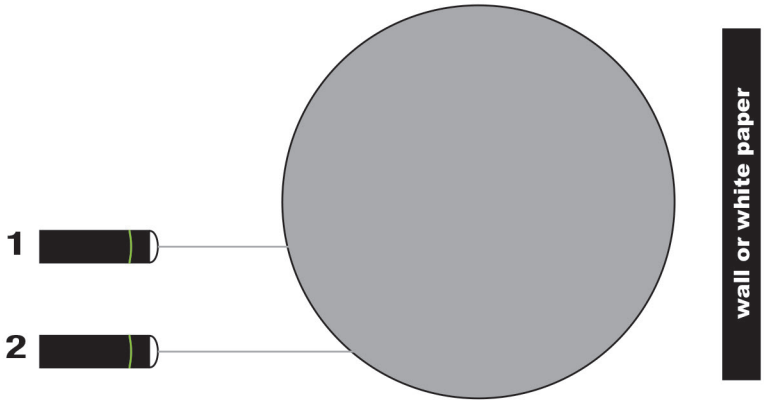
2. Glass #2:

3. What do both paths have in common?

4. Which path shows the greatest difference from the actual straw? **Explain.**

Shine a laser light through the liquid and look through the top of the glass. First shine the light through the middle and then through closer to the side.

Draw the path of the laser light for each below.



Describe what you see in each glass above.

1. Laser #1:

2. Laser #2:

3. What do both paths have in common?

4. Which shows the greatest difference from the entry light? **Explain.**

LESSON 3A
Exploring the Science of Retroreflectivity (Can We Change What We See?)

MATERIALS

- Different colored marbles (one clear marble needed)
- Flashlight or laser pointer (ideal)
- Can We Change What We See Lab Worksheet

ACTIVITY

Students will place marbles of five different colors (one clear and four additional colors of their choice) onto a white or light colored surface, shine the flashlight into them, and record what they see. They will rank them from 1–5 on how brightly they reflect light.

KEY VOCABULARY

- Retroreflection: light reflected back to its source with a minimum of scattering or diffused light

HELPFUL VIDEOS

- Retroreflective Materials: https://www.youtube.com/watch?v=rDRTmymuNyE
- Retroreflectivity 101: https://youtu.be/PLdk9OyrdI4
- Night Lights: How Retroreflectivity Makes Our Roads Safer: https://youtu.be/K--ibtOrcgI

LESSON 3A
Exploring the Science of Retroreflectivity (Can We Change What We See?)

GRADES 4-12: STUDENT INSTRUCTIONS

1. Gather your materials.
2. Place the five colored marbles on a white or light-colored surface.
3. Holding the flashlight in front of your chin, shine the light at each marble and record what you see on your worksheet.
4. Describe how the light retroreflected each color and rate them 1-5, brightest=1, dimmest=5.
5. Fill out the Can We Change What We See Lab Worksheet based on your observations and turn it in to your teacher.

MATERIALS

- Different colored marbles (one clear marble needed)
- Flashlight or laser pointer (ideal)
- Can We Change What We See Lab Worksheet

HELPFUL VIDEOS

- Retroreflective Materials: https://www.youtube.com/watch?v=rDRTmymuNyE
- Retroreflectivity 101: https://youtu.be/PLdk9OyrdI4
- Night Lights: How Retroreflectivity Makes Our Roads Safer: https://youtu.be/K--ibtOrcgI

Does Color Matter?

Place the five various colored marbles on a white or light colored surface. Holding the flashlight in front of your chin, shine the light at each marble and record what you see. Describe how the light retroreflected with each color and rate them 1-5, brightest=1, dimmest=5.

COLOR:	COLOR 1:	COLOR 2:	COLOR 3:	COLOR 4:
Clear				
_____	_____	_____	_____	_____
RANK	**RANK**	**RANK**	**RANK**	**RANK**
_____	_____	_____	_____	_____

LESSON 4A
Exploring the Light of Retroreflectivity (Can We Control What We See?)

MATERIALS

Get creative! These are just some suggestions.

- Marbles
- Clay or Playdoh
- Manila folders
- Construction paper
- Aluminum foil
- Rulers
- Scissors
- Glue
- Clear tape
- Can We Control What We See Lab Worksheet

ACTIVITY

Students will put their understanding of the engineering design process to work by experimenting with a variety of ideas to make a sign with high retroreflective properties. All students should have the same criteria, constraints, and materials for each sign; however, they should be encouraged to use their imaginations as well. The STUDENT DIRECTION simply calls for a directional sign. Some variations to their signs might be spacing of the marbles, depth of the marbles in the sign materials, color of the bead, the background of the sign behind the beads (e.g., plain, foil background, foil molded around the bottom portion of each marble prior to placement).

KEY VOCABULARY

- Effective: successful in producing the desired result.
- Criteria: rule(s) or principle(s) for evaluation.

HELPFUL VIDEOS

- What is Engineering?: https://youtu.be/btGYcizV0iI
- Corner Cube Mirrors & Retroreflectors: https://youtu.be/S4vYq31cpyc
- Mythbusters Moon Hoax Retroreflectors: https://www.youtube.com/watch?v=VmVxSFnjYCA

LESSON 4A
Exploring the Light of Retroreflectivity (Can We Control What We See?)

GRADES 4-12: STUDENT INSTRUCTIONS

The goal of this activity is to design and build a directional sign to achieve maximum retroreflection to the driver with headlights at night. Working with your teacher and classmates, you will determine what it is you're trying to accomplish with your sign. Then, you will work alone to build the sign.

1. Use the Can We Control What We See Lab Worksheet to brainstorm some ideas on what will help you achieve the challenge that has been set by your teacher.
2. Moving on to the next portion of your worksheet, begin to create your sign using the materials you've gathered. Think about the science of retroreflectivity when choosing which materials will make up your signs. Be honest about the pros and cons of your design and fill out the worksheet accordingly.
3. After your classmates have presented their design concepts, your teacher will instruct you to move onto the next section of the worksheet to utilize the group's ideas in order to create the best version of the sign. Fill out the worksheet accordingly.
4. Consider the pros and cons of the redesign and make note of any improvements that could be made.
5. Complete the worksheet based on your findings and experience with the engineering process and turn it in to your teacher.

MATERIALS

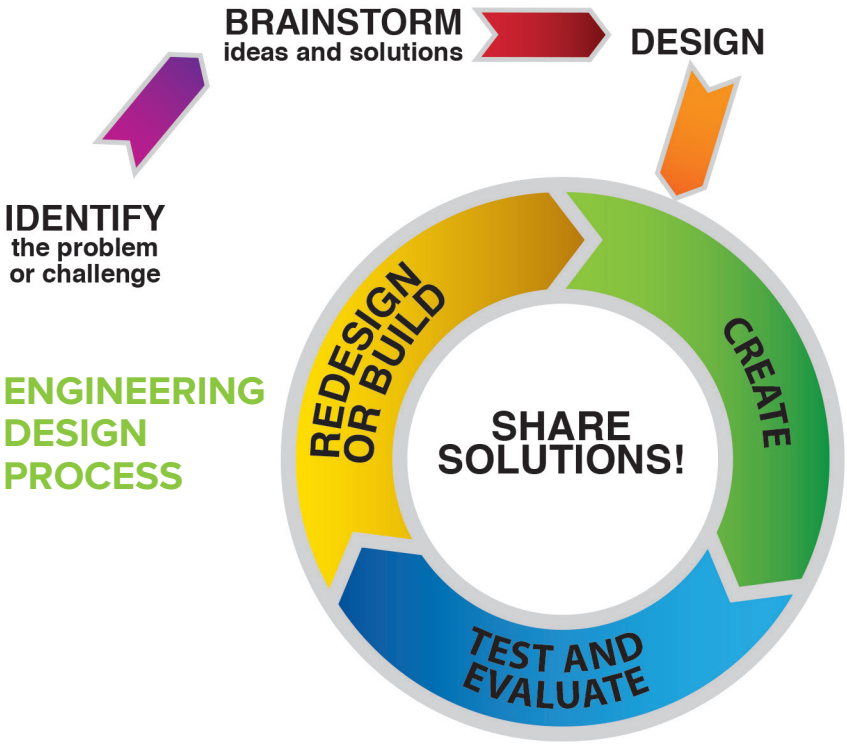
Get creative! These are just some suggestions. Use whatever you have on hand (with parent/guardian approval)

- Marbles
- Clay or Playdoh
- Manila folders
- Construction paper
- Aluminum foil
- Rulers
- Scissors
- Glue
- Clear tape
- Can We Control What We See Lab Worksheet

HELPFUL VIDEOS

- What is Engineering?: https://youtu.be/btGYcizV0iI
- Corner Cube Mirrors & Retroreflectors: https://youtu.be/S4vYq31cpyc
- Mythbusters Moon Hoax Retroreflectors: https://www.youtube.com/watch?v=VmVxSFnjYCA

Engineering is about developing new solutions to problems and challenges in our world. The Texas A&M Transportation Institute works every day towards solutions in all aspects of transportation. They conduct over 700 research projects each year on the land, sea and in the air.



ENGINEERING DESIGN PROCESS

The engineering design process is fluid. It does not have to begin or end at a particular point. One important aspect of the process is to share solutions along the way with others. Engineering is the design and building of new ideas.

TEAM CHALLENGE:

Design and build a directional sign to achieve maximum retroreflection to the driver with headlights at night.

Materials:

- 12 marbles
- Clay or Play-Doh
- Rulers
- Aluminum foil
- 8"x 11" manila folder
- Construction paper
- Scissors
- Glue
- Clear tape

KEY VOCABULARY

As a class, define each of the following words and determine how they are important components of engineering.

Effective:

Criteria:

Can We Control What We See? Lab Worksheet

PART ONE: Define the problem or challenge

With your team, state your challenge. What is it that you are trying to accomplish? Decide this as a group.

Once you have defined the problem or challenge as a team, you will work **alone** on the next two steps.

BRAINSTORM: ALL ideas are good ideas at this stage. Here is where creativity is needed and no reasonable idea is bad or wrong. This part of the process helps us use what we know and combine it with imagination. Did you ever hear the saying, " two heads are better than one?" Well here EACH team member should come up with their own idea or ideas to share with the group. **Work independently and write down all your ideas here.**

PART TWO: Design

INDIVIDUAL: Continue to work alone to complete your design. Now it is time to work through all of the pros and cons of each idea. Here you will design a sign that tells drivers to turn right. You can use pictures or words or both on your sign. Make sure your sign fulfills the criteria and uses only the materials allowed. This design is your very own idea that you will share with the group after completing your design and answering the first two questions below. Be creative.

YOUR PERSONAL IDEAS FOR THE SIGN:

What do you like best about your personal idea? Why?

What do you have the most concern about your personal idea? Explain.

PART THREE: Team Design

With your team, design again. Combine each member's design into one so that you maximize your great ideas for a successful design that meets the criteria. Be very detailed in your drawing and label all items. While not every idea will be a part of the team sign, all ideas help generate solutions. Part of the engineering design process is working through ideas to find the best solutions to the problem. 3M Engineer Tim Hoopman said, "Be a risk taker. Let your failures be your education and your successes be your legacy."

TEAM SIGN DESIGN (everyone should have the same sign here)

MATERIALS LIST: Be very specific; example: 3 red marbles. Remember you can ONLY use materials from the original list.

CREATE: Make a sign using the team's best ideas.

TEST & EVALUATE: Test out your sign and evaluate the results. Record all positive and negative results.

REDESIGN: Redesign to solve any problems with your sign. Document some things you might change to the design. Did you consider varying the depth of marbles, adjusting the spacing between marbles, or changing what is behind each marble or marbles?

FINAL TEAM SIGN DESIGN

SHARE SUCCESS:

Share successful solutions with the class, not only the finished product, but the steps you took along the way.

What are some features that successful projects have in common?

What was the best retroreflective feature on your project? Why?

What was the best retroreflective feature of another project? Why?

How could we combine all the team's best work for even better retroreflective results?

If you had more time, or other resources, how could you improve your sign?

SEE AND BE SEEN

LESSON
Egg Drop Project

OBJECTIVE

Students will be able to use various tech and materials to design a structure to prevent a raw egg from breaking.

THE CHALLENGE

This is the classic egg drop experiment. Students try to build a structure that will prevent a raw egg from breaking when dropped from a significant height. They should think about creating a design that would reduce the amount of energy transferred from potential to kinetic energy on the egg shell. Some ways to do this would be to decrease the final speed of the egg using air resistance, increasing the time of the collision using some sort of cushion, transferring the energy into something else, or whatever else they can think of.

The purpose of this project is to help students think about the importance of bike helmet technology. The egg hitting the ground is a collision between the earth and the egg, like when someone is in a collision or falls off of their bicycle – it is a collision between the earth (or other hard surface) and the head. When collisions occur, two properties of the colliding bodies are changed and/or transferred: their Energy and Momentum. This change and transfer is mediated by one or many forces. If the force is too strong, it can cause the shell of the egg to crack and break – just like one's head would if it is not protected by a helmet.

MATERIALS

Get creative! Use what you have on hand.

Listed below are just some examples of materials you could use.

- Cardboard tubes
- Newspaper
- Old boxes
- Paper
- Tape, glue, rubber bands
- Popsicle sticks
- Baggies
- Straws
- Feathers
- Cotton balls
- Worksheets

LESSON: Egg Drop Project

ACTIVITY

Students will come up with ideas about the types of containers that can protect an egg from a 10 ft. drop. After they build their contraption using their materials, students will fill out the Egg Drop Challenge Worksheet. Next, have the students present their contraptions to classmates on a group video call. Students will fill out the Egg Drop Recording Sheet, where they can predict whether their classmates' contraptions will protect the egg. Now it's experiment time! Working with an adult, students will find a safe place to test their contraption and perform the egg drop. When the class comes together again to share the results, students will complete the Egg Drop Recording Sheet to see if their predictions were correct. Have students turn in both worksheets for credit.

Want to take the project even further? Here are more activities to inspire creativity and critical thinking for various ages:

- Have students drop the egg from increasing heights and report back if/when their contraption eventually stops working?
- Have students whose initial designs did not work redesign them and try to improve them. Then, have them report back if their changes made the contraption more successful.
- Limit the types and/or numbers of materials that each student is allow to use so that they are all having to be creative within these limits.

HELPFUL VIDEOS

Grades K-4

- Technology for Kids: Transportation: https://youtu.be/QPg6NBbBQB8
- The importance of wearing a bicycle helmet (comparison of head to egg illustrated): https://youtu.be/olPmaGPSQVc
- Egg Drop Challenge! Try not to break it!: https://youtu.be/vMDtiYhoymc
- Importance of wearing helmets while riding bikes: https://youtu.be/JHUldejMvj4
- Kids Bike Helmet Sizing and Adjustment: 5 Easy Steps: https://youtu.be/QhDk3d99BdA

Grades 5-8

- An Animated History of Transportation: https://youtu.be/FaLCQo8NJFA
- The importance of wearing a bicycle helmet (comparison of head to egg illustrated): https://youtu.be/olPmaGPSQVc
- Importance of wearing helmets while riding bikes: https://youtu.be/JHUldejMvj4
- You Make The Call, Bike Helmet Safety: https://youtu.be/C8qp8KZbqrM
- How to fit a bicycle helmet: https://youtu.be/VyCNrC8RZDI

LESSON
Egg Drop Challenge

GRADES K-8: STUDENT INSTRUCTIONS

1. Gather your materials. Come up with some ideas on how you can create a container to protect an egg from a high fall. Don't test out your egg drop yet!
2. Build your container, place the egg inside, and fill out the first page of the Egg Drop Challenge worksheet.
3. With the instruction from your teacher, you will share your contraption with your classmates and see what other students came up with.
4. Using the second page of your worksheet (Egg Drop Recording Sheet), fill out spaces in the first three columns to predict the success of your classmates' contraptions. Make sure to leave a row blank for your own contraption.
5. Next, work with an adult to find a safe place where you can drop an egg from an approximate 10 ft. height. Drop the egg from this spot (be sure it's safe and an adult is with you).
6. After you drop the egg, look and see if your egg cracked or remained intact (remember to wash your hands after touching raw egg!)
7. Record your results in the row you left blank on the Egg Drop Recording Sheet.
8. With the instruction from your teacher, share your results with your classmates, and fill out the rest of your Egg Drop Recording Sheet to see if your predictions for your classmates' contraptions were correct or incorrect.

MATERIALS

- Cardboard tubes
- Newspaper
- Old boxes
- Paper
- Tape, glue, rubber bands
- Popsicle sticks
- Baggies
- Straws
- Feathers
- Cotton balls
- Worksheets

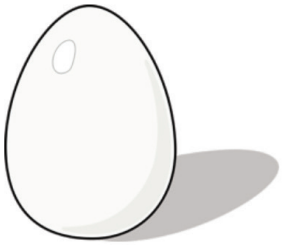
HELPFUL VIDEOS

Grades K-4

- Technology for Kids: Transportation: https://youtu.be/QPg6NBbBQB8
- The importance of wearing a bicycle helmet: https://youtu.be/olPmaGPSQVc
- Egg Drop Challenge! Try not to break it!: https://youtu.be/vMDtiYhoymc
- Importance of wearing helmets while riding bikes: https://youtu.be/JHUldejMvj4
- Kids Bike Helmet Sizing and Adjustment: 5 Easy Steps: https://youtu.be/QhDk3d99BdA

Grades 5-8

- An Animated History of Transportation: https://youtu.be/FaLCQo8NJFA
- The importance of wearing a bicycle helmet: https://youtu.be/olPmaGPSQVc
- Importance of wearing helmets while riding bikes: https://youtu.be/JHUldejMvj4
- You Make The Call, Bike Helmet Safety: https://youtu.be/C8qp8KZbqrM
- How to fit a bicycle helmet: https://youtu.be/VyCNrC8RZDI



EGG DROP CHALLENGE

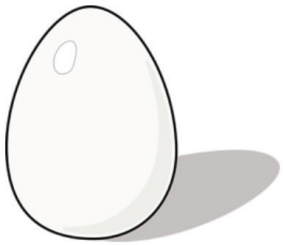
Objective: Design a system to protect an egg from cracking or breaking from a high fall.

Materials: Use anything you would like! Some ideas include: paper towels, straws, tape, cardboard tubes, paper, popsicle sticks, baggies or old boxes.

Illustrate your design in this box:

Explain why you think your design will protect an egg from breaking from a fall:

Eggs aren't the only things that can crack! Always wear a helmet when riding a bike, skateboarding, or scootering and remember to SEE AND BE SEEN.



EGG DROP RECORDING SHEET

Egg Drop Contraption	Will this contraption protect the egg:	Why or why not?	Was your prediction correct?

LESSON
Transportation Trends and Technologies

OBJECTIVE

Students will be able to synthesize information related to transportation tech in order to present findings in a medium of their choosing.

THE CHALLENGE

This project allows students to conduct online research to learn more about a topic of interest related to transportation trends and technologies and to further educate an audience of their peers. The final product for this project is a presentation that may include other students, teachers, and/or parents. A rubric is provided to guide development of the presentation.

MATERIALS

- Computer or laptop
- Presentation software (PowerPoint, Notes, etc.)

ACTIVITY

For this project, students could be assigned to teams of 2-4 students to develop their research projects. This research project requires that students are assigned (or select) a topic to pursue (listed below), and then develop a presentation through web-based research to showcase a transportation trend or technology. It is expected that student teams will require 60-90 minutes to complete this activity (after topic selection).

1. Connected Vehicles: A connected car is a car that can communicate bidirectionally with other systems outside of the car (LAN). This allows the car to share internet access, and hence data, with other devices both inside and outside the vehicle.
2. Autonomous Vehicle: A vehicle that is capable of sensing its environment and moving safely with little or no human input.
3. Hyperloop: A sealed tube or system of tubes with low air pressure through which a pod may travel substantially free of air resistance or friction.
4. Positive Train Control (PTC): A system of functional requirements for monitoring and controlling train movements and is a type of train protection system.
5. Technological innovations in transportation for people with disabilities
6. “UBER” for trucking

...continued on following page

7. Alternative fuels/vehicles (ex. innovations in diesel engines; hybrid technologies; etc.): Non-conventional and advanced fuels are any materials or substances that can be used as fuels, other than conventional fuels like; fossil fuels (petroleum (oil), coal, and natural gas) / a motor vehicle that runs on alternative fuel, an energy other than traditional petroleum fuels (petrol or Diesel fuel); and also refers to any technology of powering an engine that does not involve solely petroleum (e.g. electric car, hybrid electric vehicles, solar powered).
8. Innovations in E-commerce: The activity of electronically buying or selling of products on online services or over the Internet
9. Smart Cities: An urban area that uses different types of electronic Internet of things (IoT) sensors to collect data. Insights gained from that data are used to manage assets, resources and services efficiently; in return, that data is used improve the operations across the city.
10. Amazon 'Beehive' (Prime Air): A drone delivery service currently in development by Amazon. The service uses delivery drones to autonomously fly individual packages to customers.
11. Another topic of your choosing (must be approved by instructor)

Students will prepare a 5-7 minute presentation that provides the following information about their topic and 'sells' the trend.

a. A detailed description of the trend/technology so that someone completely unfamiliar with this topic will be able to understand what it is.

b. Identify the advantages and disadvantages of this trend/technology from the following perspectives:
   i. Safety
   ii. Efficiency
   iii. Environmental impact
   iv. Cost v. Access/connectivity

c. Explain any policy or regulatory requirements or considerations related to this trend/technology.

d. Identify career pathways for someone interested in working in this area (i.e., what kinds of jobs are available, what kinds of skills are required, what kinds of professionals are needed?)

e. Conclude with key challenges or areas of research that are currently being pursued for your trend/technology and how solving these problems might impact our society in the future. (And why transportation professionals are so important!)

Note: This project is suitable for high school students who are familiar with research concepts and developing research reports/presentations.

Increase difficulty by:
- *Requiring a team research paper in addition to a team presentation.*
- *Requiring an individual presentation/paper.*

LESSON
Transportation Trends and Technologies

GRADES 9-12: STUDENT INSTRUCTIONS

1. With your assigned team, choose one of the following transportation trends/technologies for your research project:
    a. Connected Vehicles: A connected car is a car that can communicate bidirectionally with other systems outside of the car (LAN). This allows the car to share internet access, and hence data, with other devices both inside and outside the vehicle.
    b. Autonomous Vehicle: A vehicle that is capable of sensing its environment and moving safely with little or no human input.
    c. Hyperloop: Hyperloop is a sealed tube or system of tubes with low air pressure through which a pod may travel substantially free of air resistance or friction.
    d. Positive Train Control: PTC is a system of functional requirements for monitoring and controlling train movements and is a type of train protection system.
    e. Technological innovations in transportation for people with disabilities
    f. "UBER" for trucking
    g. Alternative fuels/vehicles (innovations in diesel engines; hybrid technologies; etc.): Non-conventional and advanced fuels are any materials or substances that can be used as fuels, other than conventional fuels like; fossil fuels (petroleum (oil), coal, and natural gas); a motor vehicle that runs on alternative fuel, an energy other than traditional petroleum fuels (petrol or Diesel fuel); and also refers to any technology that powers an engine that does not involve solely petroleum (e.g. electric car, hybrid electric vehicles, solar powered).
    h. Innovations in E-commerce: The activity of electronically buying or selling of products on online services or over the Internet.
    i. Smart Cities: An urban area that uses different types of electronic Internet of things (IoT) sensors to collect data. Insights gained from that data are used to manage assets, resources and services efficiently. In return, that data is used improve the operations across the city.
    j. Amazon 'Beehive' (Prime Air): A drone delivery service currently in development by Amazon. The service uses delivery drones to autonomously fly individual packages to customers.
    k. Another topic of your choosing (must be approved by instructor)

2. Prepare a 5-7 minute presentation that provides the following information about your topic and 'sells' the trend to your audience. Be sure to address why they should be excited about this.
    a. A detailed description of the trend/technology so that someone completely unfamiliar with this topic will be able to understand what it is.
    b. Identify the advantages and disadvantages of this trend/technology from the following perspectives: 1. Safety 2. Efficiency. 3. Environmental impact 4. Cost v. Access/Connectivity
    c. Explain any policy or regulatory requirements or considerations related to this trend/technology.
    d. Identify career pathways for someone interested in working in this area (i.e., what kinds of jobs are available, what kinds of skills are required, what kinds of professionals are needed?)
    e. Conclude with key challenges or areas of research that are currently being pursued for your trend/technology and how solving these problems might impact our society in the future. (And why transportation professionals are so important!)

SEE AND BE SEEN

ENGINEERING Performance Expectations

Next Generation Science Standards Performance Expectations:

Grades K-4
Students who demonstrate understanding can define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. Source: https://www.nextgenscience.org/dci-arrangement/3-5-ets1-engineering-design

Grades 5-8
Students who demonstrate understanding can analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. Source: https://www.nextgenscience.org/dci-arrangement/ms-ets1-engineering-design

Grades 9-12
Students who demonstrate understanding can design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Source: https://www.nextgenscience.org/pe/hs-ets1-2-engineering-design

LESSON
Build Your Ideal Street

OBJECTIVE

Students will be able to recognize engineering design choices by identifying simple cause and effects that lead to real world design choices.

MATERIALS

- Blocks, Legos (if building)
- Paper and pens, pencils, markers, etc. (if drawing)

ACTIVITY

Students will draw or build (using blocks, Legos, etc.) an ideal street. The design should include at least a side walk and one other real world aspect (crosswalks, signs, signals, lights, lanes, etc.) used on streets. Have students share their creation and explain some of their design choices, such as:

- Does it have bike lanes and crosswalks?
- Is it in a neighborhood lined with houses, near a park, or near places you like to go?
- What do people use your street for?

LESSON
Build Your Ideal Street

GRADES K-4: STUDENT INSTRUCTION

1. Gather your materials.
2. Draw or build your ideal street. The design must include at least a sidewalk and one other real-world aspect (crosswalks, signs, signals, lights, lanes, etc.) used on streets. While you draw or build your street, consider the following:

    a. Does it have bike lanes and crosswalks?
    b. Is it in a neighborhood lined with houses, near a park, or near places you like to go?
    c. What do people use your street for?

3. Show your teacher your creation and explain the choices you made.

MATERIALS

- Blocks, Legos (if building)
- Paper and pens, pencils, markers, etc. (if drawing)

LESSON
The Importance and Implementation of Transportation Master Plans

OBJECTIVE

Students will be able to recognize engineering design choices by identifying simple cause and effects that lead to real world design choices.

MATERIALS

- Computer or laptop
- Master Plan Video: https://youtu.be/hnLC2loVmDQ
- Master Plan of Complete Streets: https://www.cityoflancasterca.org/about-us/departments-services/development-services/planning/master-plan-of-complete-streets
- Safe Routes to School Master Plan: https://www.cityoflancasterca.org/srts
- Master Plan of Trails and Bikeways: https://www.cityoflancasterca.org/about-us/departments-services/development-services/planning/advanced-planning/master-plan-for-trails-and-bikeways
- Safer Streets Action Plan: https://www.cityoflancasterca.org/about-us/departments-services/development-services/lancaster-safer-streets-action-plan

ACTIVITY

From the Safe Routes to School Master Plan webpage, students will find the section of the plan that relates to their school. In the document, there is a collision map, a suggested route map, and a proposed improvement map along with a narrative of those improvements. Instruct students to write a short essay about how these improvements will improve their ability to get to school safely, highlighting which route they would take, and whether or not they would suggest any additional improvements.

HELPFUL VIDEOS

- Complete Streets Design Demo: https://youtu.be/mPGmZuCL-sY
- What is Engineering?: https://youtu.be/btGYcizV0iI
- Civil Engineering: https://youtu.be/-xbtnz4wdaA
- Why Moving People is Complicated: https://youtu.be/erYf6NNw8Ec

LESSON
The Importance and Implementation of Transportation Master Plans

GRADES 5-8: STUDENT INSTRUCTIONS

1. From the Safe Routes to School Master Plan webpage, find the section of the plan that relates to your school.
2. In the document, there is a collision map, a suggested route map, and a proposed improvement map along with a narrative of those improvements.
3. Write a short essay about how these improvements will improve your ability to get to school safely, highlighting which route you would take, and whether or not you would suggest any additional improvements.

MATERIALS

- Computer or laptop
- Safe Routes to School Master Plan: https://www.cityoflancasterca.org/srts

HELPFUL VIDEOS

- Complete Streets Design Demo: https://youtu.be/mPGmZuCL-sY
- What is Engineering?: https://youtu.be/btGYcizV0iI
- Civil Engineering: https://youtu.be/-xbtnz4wdaA
- Why Moving People is Complicated: https://youtu.be/erYf6NNw8Ec

Grades 9-12

LESSON
The Importance and Implementation of Transportation Master Plans

OBJECTIVE

Students will be able to recognize engineering design choices by identifying simple cause and effects that lead to real world design choices.

MATERIALS

- Computer or laptop
- Master Plan Video: https://youtu.be/hnLC2loVmDQ
- Master Plan of Complete Streets: https://www.cityoflancasterca.org/about-us/departments-services/development-services/planning/master-plan-of-complete-streets
- Safe Routes to School Master Plan: https://www.cityoflancasterca.org/srts
- Master Plan of Trails and Bikeways: https://www.cityoflancasterca.org/about-us/departments-services/development-services/planning/advanced-planning/master-plan-for-trails-and-bikeways
- Safer Streets Action Plan: https://www.cityoflancasterca.org/about-us/departments-services/development-services/lancaster-safer-streets-action-plan

ACTIVITY

Students will review the Safe Routes to School Master Plan section relevant to their school or home neighborhood as well as the Safer Streets Action Plan, particularly “Appendix B: Countermeasure Toolbox.” Instruct them to write responses to the following:

- Based on what you learn from Appendix B, do you agree with the proposed improvements relevant to your school or home neighborhood? Why or why not?
- What additional improvements would you suggest be applied to this neighborhood, specifically where, what, and why?

HELPFUL VIDEOS

- Complete Streets Design Demo: https://youtu.be/mPGmZuCL-sY
- What is Engineering?: https://youtu.be/btGYcizV0iI
- Civil Engineering: https://youtu.be/-xbtnz4wdaA
- Why Moving People is Complicated: https://youtu.be/erYf6NNw8Ec

LESSON
The Importance and Implementation of Transportation Master Plans

GRADES 9-12: STUDENT INSTRUCTIONS

Review the Safe Routes to School Master Plan section relevant to your school or home neighborhood as well as the Safer Streets Action Plan, particularly "Appendix B: Countermeasure Toolbox."

- Based on what you learn from Appendix B, write a short essay addressing the following:
  - Do you agree with the proposed improvements relevant to your school or home neighborhood? Why or why not?
  - What additional improvements would you suggest be applied to this neighborhood, specifically where, what, and why?

MATERIALS

- Safe Routes to School Master Plan: https://www.cityoflancasterca.org/srts
- Safer Streets Action Plan: https://www.cityoflancasterca.org/about-us/departments-services/development-services/lancaster-safer-streets-action-plan

HELPFUL VIDEOS

- Complete Streets Design Demo: https://youtu.be/mPGmZuCL-sY
- What is Engineering?: https://youtu.be/btGYcizV0iI
- Civil Engineering: https://youtu.be/-xbtnz4wdaA
- Why Moving People is Complicated: https://youtu.be/erYf6NNw8Ec
- Master Plan Video: https://youtu.be/hnLC2loVmDQ

SEE AND BE SEEN

ART Performance Expectations

National Core Arts Anchor Standards:

Grades K-2
Students who demonstrate understanding will be able to engage in exploration and imaginative play with various arts materials, engage collaboratively in exploration and imaginative play with various arts materials, and brainstorm to generate multiple approaches to an art or design problem. Source: https://www.nationalartsstandards.org/sites/default/files/Visual%20Arts%20at%20a%20Glance%20-%20new%20copyright%20info.pdf

Grades 3-5
Students who demonstrate understanding can elaborate on an imaginative idea, brainstorm individual and collaborative approaches to a creative art or design problem, and combine ideas to generate an innovative idea for art-making. Source: https://www.nationalartsstandards.org/sites/default/files/Visual%20Arts%20at%20a%20Glance%20-%20new%20copyright%20info.pdf

Grades 6-8
Students who demonstrate understanding will be able to combine concepts collaboratively to generate innovative ideas for creating art, apply methods to overcome creative blocks, and document early stages of the creative process visually and/or verbally in traditional or contemporary media. Source: https://www.nationalartsstandards.org/sites/default/files/Visual%20Arts%20at%20a%20Glance%20-%20new%20copyright%20info.pdf

Grades 9-12
Students who demonstrate understanding can use multiple approaches to begin creative endeavors, individually or collaboratively formulate new creative problems based on students' existing artwork, and visualize and hypothesize to generate plans for ideas and directions for creating art and design that can affect social change. Source: https://www.nationalartsstandards.org/sites/default/files/Visual%20Arts%20at%20a%20Glance%20-%20new%20copyright%20info.pdf

LESSON 2A

"Watch Me Go!" Collage Self-Portrait (inspired by Sara Fanelli)

sarafanelli.com

BACKGROUND

Sara Fanelli is an Italian illustrator and designer who lives in London, England. Her artwork can be found in magazines, children's books, and art venues around the world. Students will draw inspiration from Fanelli's playful style, creativity, imagination, and bold color palette.

THE CHALLENGE

For this project, students will use mixed-media collage techniques to create an artwork that features themselves and their favorite way to get around. Students are encouraged to think about safety when illustrating their self-portrait (for example: should they be wearing a helmet? Knee and elbow pads? Bright colors? Should their bike have a light? etc.).

MATERIALS

- Blank sheet of paper or cardstock (8.5" x 11")
- Pencil and eraser
- Coloring utensils (markers, crayons, and/or colored pencils)
- Old magazines or newspapers
- Child-safe scissors*
- Glue stick or liquid glue*

**The use of scissors and glue may require adult supervision and/or assistance.*

LESSON 2A
"Watch Me Go!" Collage Self-Portrait

GRADES K-4: STUDENT INSTRUCTIONS

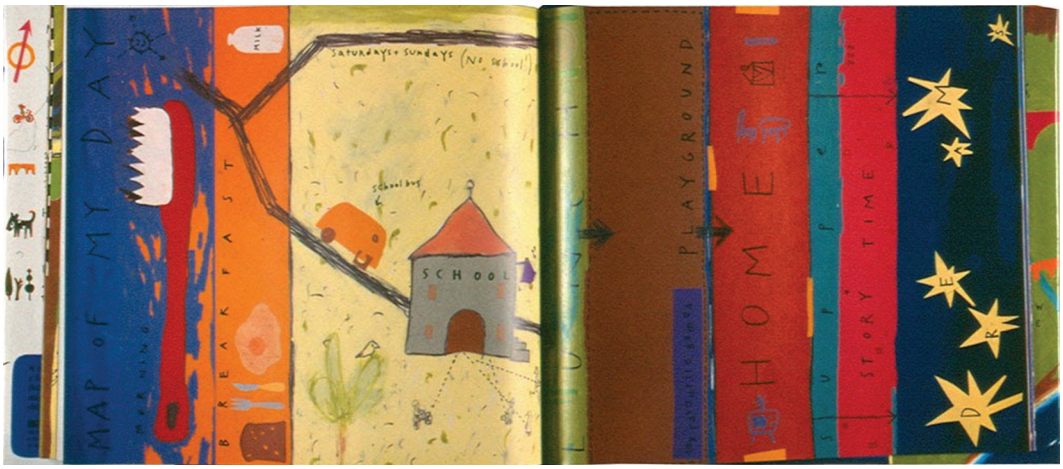
1. Gather your materials.
2. What is your favorite way to get around (other than riding in a car)? Draw yourself doing this thing — whether it be walking, running or riding a bike/scooter/skateboard. Don't forget to draw yourself wearing a helmet if you're riding something!
3. Color in your artwork with your favorite colors. Remember that wearing bright colors makes it easier for drivers to see you when you're getting around town.
4. Look through old magazines and/or newspapers and cut out images to add to your artwork. You can add to the background, your clothes, and more!
5. Use glue to paste the cut pieces of paper to your self-portrait.
6. **Optional:** Submit your artwork to the MOAH:CEDAR Art Exhibition here: https://forms.gle/Kn9mSawQv9u8X8Bv8

MATERIALS

- Blank sheet of paper or cardstock (8.5" x 11")
- Pencil and eraser
- Coloring utensils (markers, crayons, and/or colored pencils)
- Old magazines or newspapers
- Child-safe scissors*
- Glue stick or liquid glue*

**The use of scissors and glue may require adult supervision and/or assistance.*

LESSON 2B
"My Memory Map" (inspired by Sara Fanelli)



sarafanelli.com

BACKGROUND

Sara Fanelli is an Italian illustrator and designer who lives in London, England. Her artwork can be found in magazines, children's books, and art venues around the world. Students will draw inspiration from Fanelli's playful style, creativity, imagination, and bold color palette.

THE CHALLENGE

For this project, students will use colored pencils or markers to create an artwork inspired by Sara Fanelli's 'My Map Book' that visually describes how they get from one place to another. Students are encouraged to include the different sights, sounds, and smells they experience while traveling. Encourage students to submit their creations to the exclusive SEE AND BE SEEN art exhibition at MOAH:CEDAR.

MATERIALS

- Blank sheet of paper or cardstock (8.5" x 11")
- Pencil and eraser
- Coloring utensils (markers, crayons, and/or colored pencils)

LESSON 2B
"My Memory Map"

GRADES K-5: STUDENT INSTRUCTIONS

1. Gather your materials.
2. Watch this read-aloud by Zoe Asha-Williams of Sara Fanelli's 'My Map Book' for inspiration. Notice how Fanelli labels the things she draws, and how her artwork describes different places
3. Think about a place where you like to go, like a friend's house, the park, or school (before quarantine). How do you get there? Do you walk, ride the bus, ride in a car, ride your bike? Write down from start to finish all the ways you travel and the things you see. *Optional: take notes next time you travel somewhere and use these notes for your Memory Map.*
   Example: 1) leave my home, 2) walk to the bus stop, 3) ride the bus and pass the donut shop, 4) get off the bus, 5) walk to the park
4. Flip over the paper. On the left-hand side, draw your home in pencil. Label with the word "home". On the right-hand side, draw where you like to travel, and label it.
5. In between your home and where you like to travel, draw the various ways you get there. Label as you draw.
6. Color in.
7. Optional: Submit your artwork to the MOAH:CEDAR Art Exhibition here: https://forms.gle/Kn9mSawQv9u8X8Bv8

MATERIALS

- Blank sheet of paper or cardstock (8.5" x 11")
- Pencil and eraser
- Coloring utensils (markers, crayons, and/or colored pencils)

Grades 6-8

LESSON

"Creative Crosswalk" (inspired by the contemporary crosswalks of Carlos Cruz-Diez, Robyn Sparrow, and The Art of Chase)

dailyhive.com

BACKGROUND

Creative crosswalks enhance the beauty of an area while making streets safer for pedestrians to cross. Bright, artistic designs make crosswalks easier for drivers to see, and more enticing for pedestrians to use. Students will use a ruler to creatively design an eye-catching, geometrically-patterned crosswalk inspired by Carlos Cruz-Diez, Robyn Sparrow, and The Art of Chase. Encourage students to submit their creations to the exclusive SEE AND BE SEEN art exhibition at MOAH:CEDAR.

- Carlos Cruz-Diez transformed the **Wynwood crosswalk** to transform the Miami intersection into a more pedestrian-friendly place.
- Robyn Sparrow is a First Nation Musqueam artist who designed crosswalks in celebration of National Indigenous People Day. The colors and designs in **Sparrow's Vancouver crosswalk** celebrate the vitality and history of the Musqueam community and its artistic traditions.
- The Art of Chase used the City of Lancaster's existing road-marking stencils to create **unique crosswalk murals on Lancaster Blvd**.

MATERIALS

- Blank sheet of paper
- Pencil and eraser
- Ruler or protractor
- Coloring utensils (markers, colored pencils, crayons, pastels, etc.)

LESSON
"Creative Crosswalk"

GRADES 6-8: STUDENT INSTRUCTIONS

1. Place the piece of paper horizontally in front of you.
2. Start at the top left corner and measure 2 inches down the left edge of the page. Mark with a pencil. Measure 2 inches from the bottom left corner and mark with a pencil. Repeat on the right edge of the paper.
3. Connect the pencil marks from left to right, creating a long rectangle in the middle of the page. This is the "crosswalk".
4. Use a ruler or protractor to create a repeated pattern of lines, triangles, squares, and other geometric shapes.
5. Color in your crosswalk using bright, eye-catching colors that would be easy for drivers and pedestrians to see.
6. Optional: Submit your artwork to the MOAH:CEDAR Art Exhibition here: **https://forms.gle/Kn9mSawQv9u8X8Bv8**

MATERIALS

- Blank sheet of paper
- Pencil and eraser
- Ruler or protractor
- Coloring utensils (markers, colored pencils, crayons, pastels, etc.)

ADDITIONAL RESEARCH LINKS

- About Carlos Cruz-Diez: **http://www.cruz-diez.com**
- About Robyn Sparrow: **https://bit.ly/3iCL6wQ**
- About The Art of Chase: **http://www.theartofchase.com**

Grades 9-12

LESSON

"Word On the Street" (inspired by artist Scott Froschauer)

scottfroschauer.com

BACKGROUND

Scott Froschauer is an experimental artist who lives and works in Los Angeles. He uses the materials and visual language of street signs to replace restricting and negative signage (such as "WRONG WAY", "STOP" and "DO NOT ENTER") with positive affirmations. Over two dozen of Froschauer's signs are on display throughout Los Angeles. Froschauer said about one of his works:

> "I ran into a city worker who was maintaining the landscaping around one of my street signs. He asked what the sign was supposed to mean. Of course I asked him what he thought it meant. After several minutes of explaining his search for the official meaning of this, very unofficial, sign, he finally said that he was really sure what it was supposed to mean but it made him feel something, something he wasn't quite sure of... Something that felt like hope."

Students will brainstorm their own positive affirmations and create their own traffic or roadway sign. Encourage students to submit their creations to the exclusive SEE AND BE SEEN art exhibition at MOAH:CEDAR.

Scott Froschauer's "The Word on the Street" series for inspiration (33 examples)

MATERIALS

- Blank piece of paper
- Pencil and eraser
- Ruler
- Colored pencils or pastels

LESSON
"Word On the Street"

GRADES 9-12: STUDENT INSTRUCTIONS

1. On the back of your piece of paper, spend a few minutes brainstorming and writing down ideas for a sign design. Think about positive affirmations (positive thinking, self-empowerment) that matter to you.
2. Using a ruler and a pencil, draw the shape of your sign on the front side of your paper. Make the sign large, so it fills up most of the page. The shape can resemble a street sign, stop sign, yield sign, etc.
3. Using a pencil, lightly add text to your sign, using block letters that would be easy for a driver and/or pedestrian/bicyclist to see. Using a ruler will be handy here.
4. Add color and erase your pencil lines.
5. Optional: Submit your artwork to the MOAH:CEDAR Art Exhibition here: https://forms.gle/Kn9mSawQv9u8X8Bv8

MATERIALS

- Blank piece of paper
- Pencil and eraser
- Ruler
- Colored pencils or pastels

ADDITIONAL RESEARCH LINKS

- About Scott Froschauer: http://scottfroschauer.com

SEE AND BE SEEN

MATH Performance Expectations

Grades K-2
Students who demonstrate understand will be able to measure lengths indirectly and by iterating length units, and represent and interpret data. Source: http://www.corestandards.org/Math/Content/1/MD/

Grades 3-5
Students who demonstrate understanding will be able to solve problems involving measurement, estimation, and conversion of measurements, solve word problems involving distances and intervals of time and convert like measurement units within a given measurement system. Source: http://www.corestandards.org/Math/Practice/

Grades 6-8
Students who demonstrate understanding can solve real-world and mathematical problems involving area, surface area, and volume. Source: http://www.corestandards.org/Math/Content/6/G/

Grades 9-12
Students who demonstrate understanding can model with mathematics, interpret expressions for functions in terms of the situation they model, and analyze empirical situations. Source: https://www.cde.ca.gov/be/st/Ss/documents/ccssmathstandardaug2013.pdf

LESSON
Transportation Length Line Up

OBJECTIVE

Students will be able to apply spatial reasoning by attempting by utilizing a pre-defined space and filling it with objects.

MATERIALS

- Different cars, airplanes, trains, motorcycle (any transportation-related toys/models)
- Masking tape
- Measuring tools (yard stick, measuring tape, and ruler, at least one with both English and metric units)

ACTIVITY

Students will use the objects and toys to measure different distances. Have them start by taping a straight line about 2' to 3' long across a table or floor. Tell them to arrange the toys they selected end-to-end along the tape line. After the toys are lined up, have students measure the line of toys in both inches and centimeters. On a piece of paper, have them answer the following:

a. How many toys did you use in your line?
b. Turn the vehicles to face a different direction. Can you fit more or less vehicles in the line? By how much?
c. Which is longer, an inch or a centimeter?

Add additional questions as applicable to grade level

LESSON
Transportation Length Line Up

GRADES K-2: STUDENT INSTRUCTION

1. Gather your materials.
2. Tape a straight line about 2’ to 3’ long to the table or floor.
3. Arrange the vehicles end-to-end along the tape line.
4. After the toys are lined up, measure the line of vehicles in both inches and centimeters.
5. On a piece of paper, answer these questions:
    a. How many toys did you use in your line?
    b. Turn the vehicles to face a different direction. Can you fit more or less vehicles in the line? By how much?
    c. Which is longer, an inch or a centimeter?

MATERIALS

- Different cars, airplanes, trains, motorcycle, bikes, scooters, etc. (any transportation-related toys/models)
- Tape
- Measuring tools (yard stick, measuring tape, and ruler, at least one with both English and metric units)

LESSON
To School and Back: Analyzing Transportation Data

OBJECTIVE

Students will be able to explain the difference between passive and active transportation and be able to identify one benefit of active transportation, calculate the average and individual distances traveled to and from school on a daily, weekly, and yearly basis, and use the data collected to make an assessment to if there is a way to make their route more active transportation involved or not.

MATERIALS

- Research method (laptop, phone, or dictionary)

ACTIVITY

Students will research the definitions for “Active Transportation” and “Passive Transportation”, write them down, explain the differences in their own words, and write down one benefit they think they both have. Next, tell students to map out your route from your house to your school. They can use apps like Google Maps, Waze, or they can simply go for a ride or walk with a family member and measure it that way. They should write down:

- How far is your route to school?
- How far is it from your school to home? Round the distance up to the nearest whole number.

Now that they have their distances, tell them to write down how they got there.
- Do they use a car?
- Did they use other ways of transportation?
- Did they use active or passive transportation?

Next, have them use the distance they came up with for their whole route from home to school and back home, and figure out how far they travel in a day? Week? Year? How far do they travel for each increment of time?

Teachers, option to advance the lesson to Part 2 by following the prompts below:

Using the answer they got for how far they go in a year, have students find the weekly average for distance traveled. Now that they have their distances for the total distance traveled for a day, week, year, ask them to find places that are the same distances away from their house.

Using a map, tell students to find a location that is the same total distance away from their house. Students should report back with the locations they picked and what is there. Now using the same map, have them take the distance they got for total travel in a week and find a location that is the same distance away from their house. Where did they pick? What is there? Lastly, students should take the distance they got for travel in a year and find a location that is the same distance away from their house. Now where are they? What is there?

...continued on next page

LESSON: To School and Back: Analyzing Transportation Data

To finish the assignment, have students consider if any of the places they ended up on the map somewhere they would like to go? How would they get there? Would they use active or passive transportation to get to those locations? Using all of the data that they have collected through the whole exercise, tell students to take another look at their route to school. Is there any part of their daily route to school that they could change in order to include active transportation? If not why?

Students should write a response using the information they have gathered to support their reasoning for this prompt.

HELPFUL VIDEOS

- "Walk This Way" Pedestrian Safety for Young Children: https://youtu.be/-t2oX6zQEyU
- Top 10 Bike Safety Rules for Kids: https://youtu.be/PT1-mDlVyaI

LESSON
To School and Back: Analyzing Transportation Data

GRADES 3-5: STUDENT INSTRUCTIONS

PART 1:

1. Research the definitions for “Active Transportation” and “Passive Transportation”. Now write down the definitions and explain the differences in your own words. Also write down one benefit you think they both have.

2. Using your laptop or phone, map out your route from your house to your school. You can use apps like Google Maps, Waze, or you can simply go for a ride or walk with a parent or your family and measure it that way. Write down the following distances:

   a. How far is your route to school?
   b. How far is it from your school to home? Round the distance up to the nearest whole number.

3. Now that you have your distances, write down how you get there.

   a. Do you use a car?
   b. Do you use other ways of transportation?
   c. Do you use active or passive transportation?

4. Use the distance you came up with for your whole route from home to school and back home, and figure out how far you travel in a day? Week? Year? How far do you travel for each increment of time? *Hint: you should multiply your total distance by the unit of time to get your answer.*
   Unless instructed to continue to Part 2, stop here and share your results with your teacher.

PART 2:

5. Using the answers from above, find the weekly average for distance traveled. What did you get? *Hint: you should divide your total distance traveled in a year by the number of weeks in a year.*

6. Use your results for the total distance traveled for a day, week, year for the following. You know the distance for traveling in a day from your home to school and back. Research places are the same distance away from your house. Using a map, find a location that is the same total distance away from your house.

   a. Where did you pick? What is there?

7. Now using the same map, take the distance you got for total travel in a week and find a location that is the same distance away from your house.

   a. Where did you pick? What is there?

8. Lastly, take the distance you got for travel in a year and find a location that is the same distance away from your house.
    a. Now where are you? What is there?
    b. Are any of the places you ended up on the map somewhere you would like to go?
    c. How would you get there? Would you use active or passive transportation to get to those locations?

9. Using all the data that you have collected through the entire exercise, take another look at your route to school. Is there any part of your daily route to school that you could change in order to include active transportation? If not, why? Write a response using the information you have gathered to support your reasoning for this prompt.

HELPFUL VIDEOS

- "Walk This Way" Pedestrian Safety for Young Children: **https://youtu.be/-t2oX6zQEyU**
- Top 10 Bike Safety Rules for Kids: **https://youtu.be/PT1-mDlVyaI**

LESSON
Building Better Buses: Transportation Design Challenges

OBJECTIVE

- Challenge 1: Students will use Common Core math and computational skills, including mathematical modeling, to design the most efficient bus route for a fictitious town.
- Challenges 2 and 3: Students will use Common Core math and computational skills, including mathematical modeling, to decide how to power a bus fleet in a fictitious town using gasoline, E85 ethanol, and/or electricity using 50% coal and 50% carbon-free renewables.
- Challenges 1, 2, and 3: Students will be able to describe how technology can reduce human impacts on Earth's systems and human consumption of nonrenewable natural resources. Students will weigh the benefits and drawbacks of various transportation energy sources in terms of cost, carbon emissions, energy production, as well as social and environmental impacts.

THE CHALLENGE

This lesson is composed of three challenges, each addressing a different aspect of how to design an efficient public bus system for a fictitious town while taking into account the benefits and drawbacks of various fuel options. All challenges involve mathematical and computational thinking and modeling that is connected not only to the NGSS, but also to the middle school Common Core math standards. Depending on the time you have and your curriculum goals, you can employ one, two, or all three of the challenges in your classroom, although we recommend progressing in order from #1 to #3 as each challenge builds on the previous one(s).

In attempting these challenges, students will find that there is often more than one way to solve a problem. The purpose of these challenges is for students to reason out their own logical methods for solving a problem using math and computational skills with little initial guidance.

MATERIALS

- Computer or laptop
- Rulers
- Calculator
- Scratch paper
- Building Better Buses worksheets

ACTIVITY

Teachers should review the Building Better Buses worksheets and determine which of the assignments they want to use for their class:

- Challenge #1 (suggested time: 45-60 min): Design an 'efficient' public bus system
- Challenge #2 (suggested time: 45-60 min): Compare fuels: Biofuel vs. regular gasoline
- Challenge #3 (suggested time: 45-60 min): Grid or no grid?

...continued on next page

LESSON: Building Better Buses: Transportation Design Challenges

Students will be using extensive mathematical and computational thinking to solve various problems presented by each challenge. Make sure to leave enough time at the end of each challenge for students to present their methods to their classmates.

Check for understanding by either having a class discussion or asking students to write a reflection of their experience for homework. Examples of questions that can be addressed in discussions or reflections include:

- How would you define 'efficiency'? Is there more than one kind of 'efficiency'? Why do you think we would want to make a public bus system efficient?
- How do different energy sources used for powering buses compare? What are the benefits and drawbacks of each? What factors did you take into account in deciding how to power your public bus system?
- Why do you think we might care how much carbon a particular fuel might produce when used? Why do we care about cost?

You can extend this learning experience by having your students explore the public transportation system that exists in your community. How energy or time efficient is it? What impacts does it have on the environment or community, if any? Challenge your students to write a letter to your local government officials with recommendations for improvements.

HELPFUL VIDEOS

- What's the Deal With Fossil Fuels?: http://www.calacademy.org/educators/whats-the-deal-with-fossil-fuels
- Buses and Biofuels: Sustainable Transportation: http://www.calacademy.org/educators/buses-and-biofuels-sustainable-transportation

LESSON
Building Better Buses: Transportation Design Challenges

GRADES 6-10: STUDENT INSTRUCTIONS

Imagine a fictitious town called Solutionville. The citizens of Solutionville want to make sure their community is a healthy and safe place. They decide to start improving their town by giving people more access to public transportation that is both time and energy efficient. Imagine you are a citizen of Solutionville who has been tasked with helping to design a public bus system that would service the downtown area.

Questions to consider:

- What conditions should a public bus system have to be 'time efficient?
- What about 'energy-efficient'?
- What reasons might a person have for driving their own car from place to place instead of taking public transportation?
- Why do you think a person might try to find a shortcut to get from one place to another?
- What might be some benefits of public transportation?
- What does being 'energy-efficient' mean, and what do you think are the benefits of something that is 'energy-efficient' versus something that is not?
- What other factors do you think you should consider when designing your public transportation system? (E.g., environmental impacts)

Complete the challenges one, two, or all of the challenges in your worksheets based on what your teacher assigns.

Building Better Buses: Transportation Design Challenges

Challenge #1: Design an 'efficient' public bus system

Name: _____ Date: _____

Introduction: The citizens of Solutionville want to make sure their community is a healthy and safe place for families to live. They decided to start by giving people more access to efficient and convenient public transportation. Imagine you are a citizen of Solutionville who has been tasked with helping to design a public bus system that would service the downtown area.

Your Challenge: Design a bus route system for downtown Solutionville. Your teacher will tell you your time limit for this Challenge.

1. **On your own,** draw your bus routes on the Map of Downtown Solutionville using arrows to indicate the direction of the buses.
2. Try to **minimize** both the **distance traveled** by the buses and the **amount of time** people have to wait at any one bus stop.
3. Make sure your routes obey the Rules listed on the map.
4. **Calculate the total distance** driven by all buses after all bus stops have been serviced once.
5. **Indicate how long** the longest complete bus circuit takes. Assume buses drive at an average of 30 mph (equal to 0.5 miles per minute) and spend one minute at each stop.
6. **Compare** your route to your partner's. If you have time, work together to try another system of routes.

What You Will Need

* Partner
* Ruler
* Calculator
* Pencil/eraser
* Scratch paper

Tips and Hints

- *Although all roads in Solutionville are two-way, to simplify your measurements, you can assume buses drive down the exact middle of the street.*
- *If you make mistakes or find your map is getting too messy, ask your teacher for a second copy.*


Map of Downtown Solutionville
Park
School
University of Solutionville
MOAH
Library
Doctor's Office
LPAC
Bus depot
Park
Rules
1. Bus(es) must start from AND end at the bus depot.
2. You can have as many buses running as you like, but all bus stops must be serviced.
2. Bus(es) can only pick up passengers on the right side of the road. Pay attention to the side of the street that the bus stop is on!
= Bus stop
= Bus depot entrance/exit
0.25 mi
N
W
E
S

Name: _____ Date: _____

Notes, measurements, and calculations

Total Distance of All Routes: _____

Time of Longest Complete Bus Circuit: _____

Building Better Buses: Transportation Design Challenges

Challenge #2: Compare fuels: Biofuel vs. Regular Gasoline

Name: _____ Date: _____

Introduction: There are several different kinds of fuels used to power things like cars, trucks, and buses. Regular gasoline and diesel fuel made from petroleum have long been used to run many of our vehicles. Biofuels made from vegetable oils aren't new, but their popularity has grown in recent years. E85 is one type of biofuel made from 85% corn ethanol and 15% regular gasoline. When deciding which fuel to use to power a vehicle, it's important to think about how much energy the fuel can produce, how much it costs, and its impacts on the environment.

Your Challenge: Present to your fellow citizens of Solutionville an analysis of how E85 biofuel compares to regular gasoline as options for fueling the community's buses.

1. With your partner, read about the **Bus Test Drive Experiment** on the next page, and use the information in it to figure out which fuel is more efficient: E85 biofuel or regular gasoline.

2. With your partner, use the Transportation Fuel Cards and any other information you know to calculate:

   - How the **carbon dioxide produced** by a bus burning regular gasoline **compares** to the carbon dioxide produced by a bus running on E85 biofuel for the same distance driven.

   - How the **cost** of running buses on E85 biofuel **compares** to running buses on regular gasoline for the same distance driven.

3. With your partner, **write** a short article for the local paper, *The Solutionville Inquirer,* comparing E85 biofuels vs. regular gasoline in terms of cost, energy-efficiency, and impacts on the environment and the community.

What You Will Need

* Partner
* Calculator
* Pencil/eraser
* Scratch paper
* Bus Test Drive Experiment
* Transportation Fuel Cards: E85 Biofuel and Regular Gasoline

Tips and Hints

- *It can be helpful to organize the information you need to solve a problem in a way that is easy for you to visualize and keep track of. Examples of organizational structures include: tables, lists, maps, pictures, flow charts. You can also cut out the transportation fuel cards so that you can easily arrange them or move them around.*

Name: _____ Date: _____

Bus Test Drive Experiment

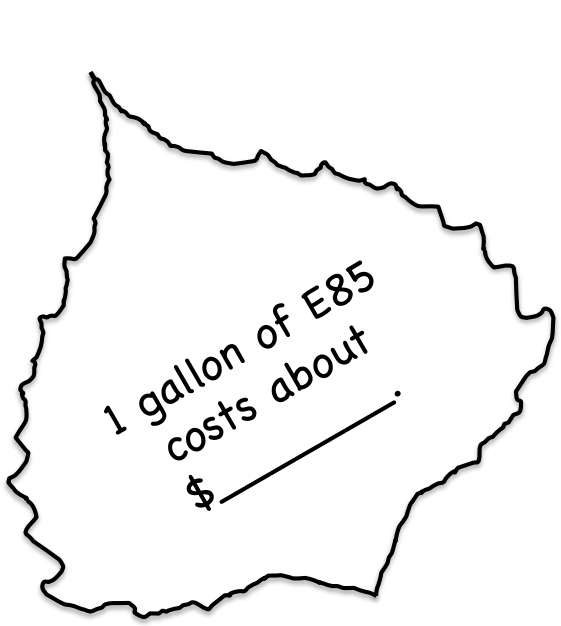
You want to compare how the fuel efficiency of a bus running on E85 biofuel compares to the fuel efficiency of a bus running on regular gasoline. You obtain two buses that are identical except that one is powered by E85 and one is powered by regular gasoline. You drive the bus running on E85 until the 36-gallon gas tank is half empty and your odometer says you drove 108 miles. You then drive the bus running on regular gasoline until the gas tank is ¾ empty (¼ full) and your odometer says you drove 243 miles.

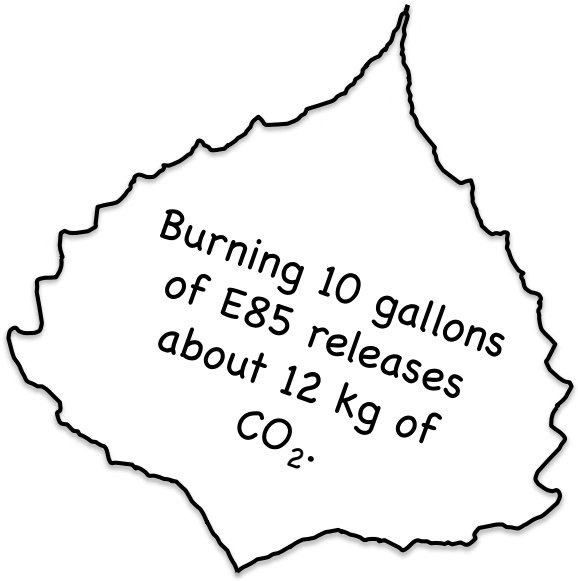
Using this information, which bus is more fuel-efficient: the bus running on E85 biofuel, or the bus running on regular gasoline?

Notes and calculations:

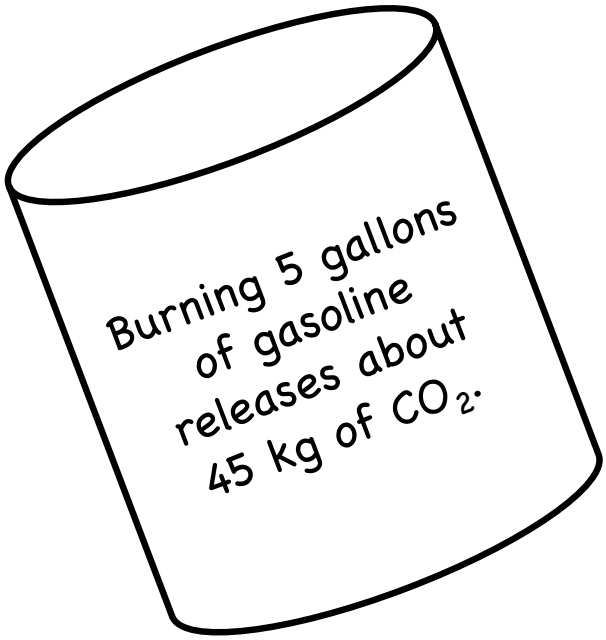
Transportation Fuel Cards: E85 Biofuel and Regular Gasoline

E85 is a biofuel made out of 85% ethanol and 15% gasoline that can be used to power cars, trucks, and buses. Ethanol biofuel can be made from a variety of crops, such as corn or sugarcane. Below you'll find more information about E85 that you might find useful for your calculations:





Gasoline, or 'octane,' is a kind of fossil fuel that is commonly used to power cars, trucks, and other kinds of vehicles. Fossil fuels formed over millions of years from the decaying remains of ancient plants and animals. Below you'll find more information about gasoline that might be useful for your calculations:



Name: _____ Date: _____

Notes and calculations

Building Better Buses: Transportation Design Challenges

Challenge #3: Grid or No Grid?

Name: _____ Date: _____

Introduction: In some cities, public buses are not powered by gasoline or any other type of fuel that must be pumped into the bus to make it run. Instead, these buses run on electricity! This electricity can either be produced by coal, renewable energy sources like wind power, or some combination of both.

Your Challenge: As a knowledgeable and well-informed citizen of Solutionville, you have been put in charge of deciding how to power your new public bus fleet. You can use any combination of regular gasoline, E85 ethanol, and electricity produced from 50% coal and 50% wind power.

1. You can use the routes you designed in Challenge #1.
2. You should try and **minimize CO_2 emissions** produced by your bus system.
3. You should try and **minimize the cost** of your plan.
4. With your partner, **prepare a short presentation** of your final plan to present to your fellow residents of Solutionville at the next Town Hall meeting.

What You Will Need

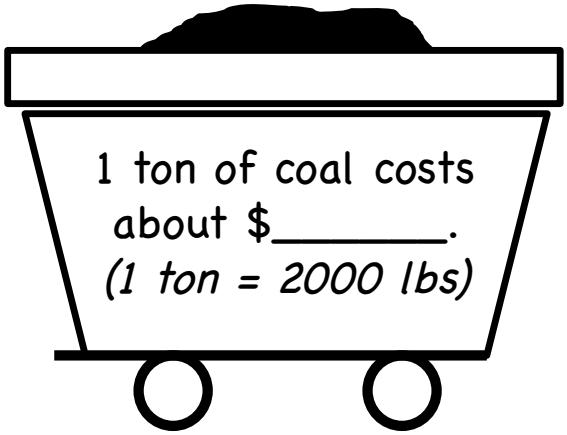
* Partner
* Ruler
* Calculator
* Pencil/eraser
* Scratch paper
* Transportation Fuel Cards: E85 biofuel, regular gasoline, and 50/50 electricity

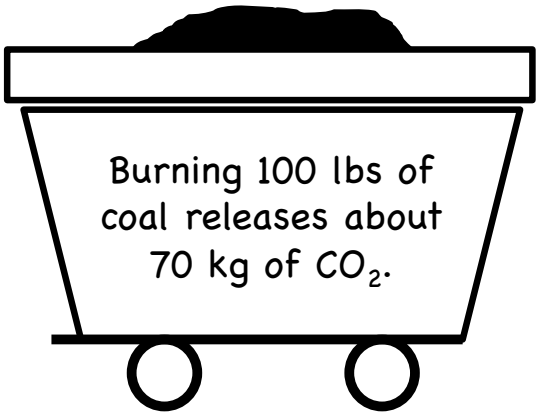
Tips and Hints

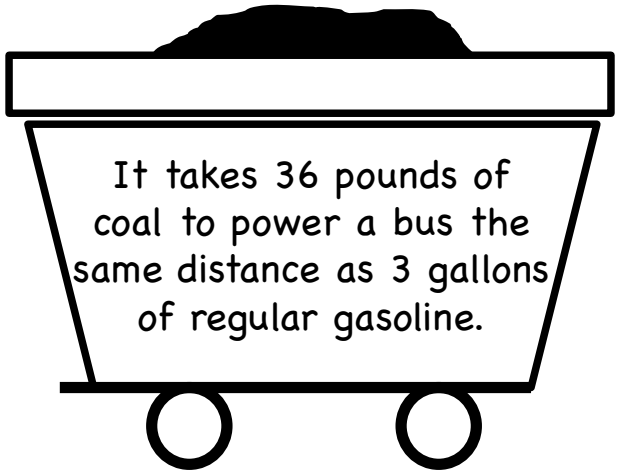
- *It can be helpful to organize the information you need to solve a problem in a way that is easy for you to visualize and keep track of. Examples of organizational structures include: tables, lists, maps, pictures, flow charts. You can also cut out the transportation fuel cards so that you can easily arrange them or move them around.*

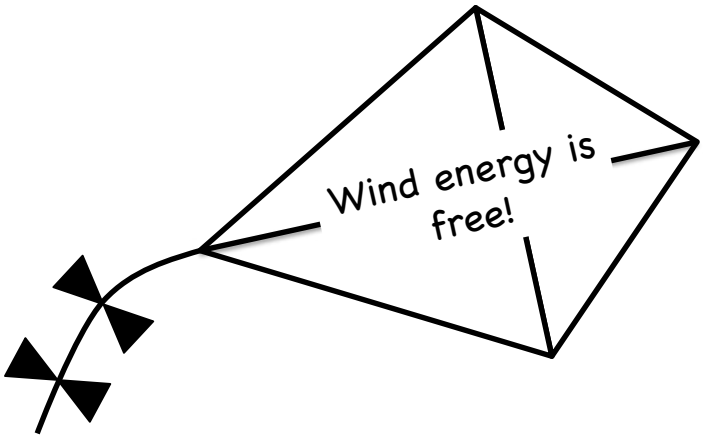
Transportation Fuel Cards: 50/50 Electricity

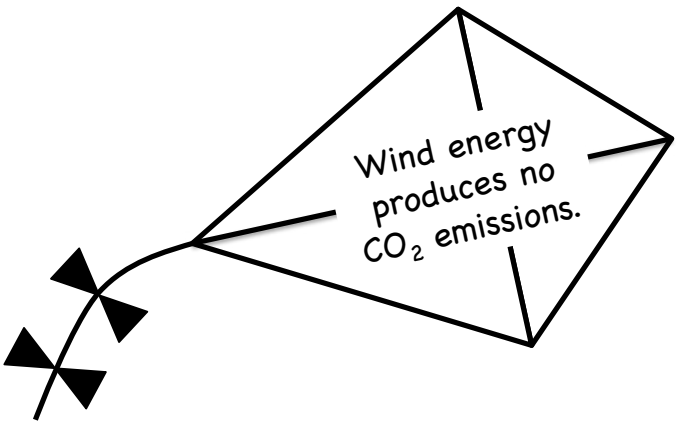
Electricity can be produced in a variety of ways, such as burning coal, utilizing renewable energy sources like the wind or sun, or through a combination of these ways. Below you'll find more information about coal and wind energy that you might find useful for your calculations:











Name: _____ Date: _____

Notes and calculations

Grades 9-12

LESSON
Active Transportation Crash Data Analysis

OBJECTIVE

Students will research and apply data to create an analysis of crash data to better understand street safety.

THE CHALLENGE

Utilizing the Active Transportation Map Tool in Transportation Injury Mapping System (University of California, Berkeley), students will learn, research, and analyze the crash data relative to their school or home neighborhood.

MATERIALS

- Computer or laptop
- Printer

ACTIVITY

Students have been given detailed instructions to how view local crash data on the University of Berkeley, California website (next page). Students will then write a report based on their findings to address traffic concerns in the area.

HELPFUL VIDEOS

- Pedestrians Don't Have Armor – Quiet Armor: https://youtu.be/haZU9GyebXo
- Bicycle Safer Journey: https://youtu.be/ebA_J0gO11w
- Vision Zero 101: Growing the Vision for Safe Mobility: https://vimeo.com/220887450
- Not Just Big Cities: Vision Zero in Mid-sized & Suburban Communities: https://vimeo.com/388139767
- TIMS ATP Tool Overview: https://youtu.be/LpnGc8VFXPs

ADDITIONAL RESEARCH LINKS

- Office of Traffic Safety, Pedestrian Safety: https://www.ots.ca.gov/media-and-research/campaigns/pedestrian-safety/
- Safe Routes to School: https://www.saferoutespartnership.org/safe-routes-school
- California is one of the most dangerous states for pedestrians: https://www.sacbee.com/news/traffic/article240620167.html

LESSON
Active Transportation Crash Data Analysis

GRADES 9-12: STUDENT INSTRUCTIONS

Watch the suggested videos.

- Go to: https://tims.berkeley.edu/
- Sign-In using these credentials:
  - Username: **seeandbeseen@cityoflancasterca.org**
  - Password: **SeeAndBeSeen2020**
- Scroll down and click on the "ATP Maps & Summary Data" Link

STEP 1:

- County Field: Select "Los Angeles"
- City Field: Select "Lancaster"
- Check all of the following boxes for these field:
  - Include State Highway Related Collisions
  - Involved With
  - Collision Severity
- Set the Start and End of years to 2014 and 2018 respectively.

STEP 2:

- Leave the drop down menu selection as "Less than 3 miles across".
- Leave the map toggle as "Heat Map".
- Zoom in to find either your school or home neighborhood.
- Click on either your school or house location.
- Click the "Show Community Heat Map" button.

STEP 3:

- Zoom to find either your school or home neighborhood.
- Click on the circle icon in the top right-hand corner of the map.
- Click on your school or home, and while continuing to hold down the mouse button pull out to create a circle that is roughly 2,640 feet (half-mile radius). There will be a measurement pop-up to show you how large the circle is. Then, release the mouse button.
- Click the "Show Project Area Collision Map"

STEP 4:

- Evaluate the map, then scroll down to "Step 5"

STEP 5:

- Click on the down arrow of "Summary Results" and evaluate those results.
- If you are interested in reviewing the "Collision List", click the down arrow.
- Click the "Open in-depth collision summary" button. A new window will appear. Review all of the relative data offered on this webpage.
- Scroll down to "Step 6".

STEP 6:

- Click the "Print" button and save the report as a pdf – this will serve as back-up to your analysis report.

- Write a 2-3 page (or word min/max) report that utilizes the data that the ATP Tool provided you to:
  - Analyze the collision data, e.g. trends and anomalies.
  - Describe your greatest concerns for traffic safety in your report area.
  - Identify a singular "collision hot spot" within your report area and provide a suggested solution or countermeasure that might improve safety at that location. See Safer Streets Action Plan, "Appendix B: Countermeasure Toolbox" for common countermeasures: https://www.cityoflancasterca.org/about-us/departments-services/development-services/lancaster-safer-streets-action-plan
- Submit your report with the ATP Tool report pdf.

MATERIALS

- Computer or laptop
- Safer Streets Action Plan: https://www.cityoflancasterca.org/about-us/departments-services/development-services/lancaster-safer-streets-action-plan
- Active Transportation Map Tool: https://tims.berkeley.edu/

HELPFUL VIDEOS

- Pedestrians Don't Have Armor: https://youtu.be/haZU9GyebXo
- Bicycle Safer Journey: https://youtu.be/ebA_J0gO11w
- Vision Zero 101: Growing the Vision for Safe Mobility: https://vimeo.com/220887450
- Not Just Big Cities: Vision Zero in Mid-sized & Suburban Communities: https://vimeo.com/388139767
- TIMS ATP Tool Overview: https://youtu.be/LpnGc8VFXPs

SEE AND BE SEEN

LESSON 1A
Heart Rate and Active, Healthy Living

OBJECTIVE

Students will be able to perform exercises and measure and log heart rate along with understand how stress on the body effects changes in heart rate.

THE CHALLENGE

Create an exercise log by using a stopwatch or clock. Students will complete different exercises and find their heart rate before and after completing each exercise.

MATERIALS

- Watch or stopwatch
- Paper and pencil

ACTIVITY

Students will work with a partner (family member or friend) to help them check and record their heart rate. Students will engage in a series of different exercises and record their heart rate using the Heart Rate Monitor Sheet and turn it in.

HELPFUL VIDEOS

- How to Feel Your Heart Beat: https://www.youtube.com/watch?v=tF9-jLZNM10
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

LESSON 1A
Heart Rate and Active, Healthy Living

GRADES K-5: STUDENT INSTRUCTIONS

1. Have a partner (family member) start by checking your heart rate for one minute and record it.
2. Now try doing an exercise like running, jumping, or actively moving around for one minute and record your heart rate.
3. Try different activities and compare your heart rate based on those activities (riding a bike, jump roping, sporting activities, etc.).
4. Remember to record what your heart rate is and label what you were doing. Go over what you found out with your partner and turn in your log to your teacher.

MATERIALS

- Watch or stopwatch
- Heart Rate Monitor Chart

HELPFUL VIDEOS

- How to Feel Your Heart Beat: https://www.youtube.com/watch?v=tF9-jLZNM10
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

Worksheet

HEART RATE MONITOR CHART

Starting heart rate (measure heart rate before you begin)	**Activity** (what are you doing?)	**Time** (how long did you perform the activity for?	**Ending heart rate**	**How long did you rest before the next activity?**

NOTES

LESSON 1A
Heart Rate and Active, Healthy Living

OBJECTIVE

Students will be able to perform exercises and measure and log heart rate along with understand how stress on the body effects changes in heart rate.

THE CHALLENGE

Create an exercise log by using a stopwatch or clock. Students will complete different exercises and find their heart rate before and after completing each exercise. Students will then go over the data collected and write short responses on why the heart rate reacted the way it did in those exercises.

MATERIALS

- Watch or stopwatch
- Paper and pencil
- Heart Rate Monitor Chart

ACTIVITY

Students will work with a partner (family member or friend) to help them check and record their heart rate. Students will engage in a series of different exercises and record their heart rate using the Heart Rate Monitor Sheet. After filling out their chart, have students go over their recorded information and write short responses on why their heart rate reacted the way it did in those situations. Students should turn in writing prompts and heart rate monitor chart.

HELPFUL VIDEOS

- How to Feel Your Heart Beat: https://www.youtube.com/watch?v=tF9-jLZNM10
- How to Check Your Heart Rate: https://www.youtube.com/watch?v=eAmcHizIbL4
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

LESSON 1A
Heart Rate and Active, Healthy Living

GRADES 6-8: STUDENT INSTRUCTIONS

1. Have a partner (family member) start by checking your heart rate for one minute and record it.
2. Now try doing an exercise like running, jumping, or actively moving around for one minute and record your heart rate.
3. Try different activities and compare your heart rate based on those activities (riding a bike, jump roping, sporting activities, etc.).
4. Remember to record what your heart rate is and label what you were doing. Before you turn in your log, go over the information that was found and write short responses to why your heart rate reacted the way it did in those situations.
5. Turn in your writing prompts and heart rate log.

MATERIALS

- Watch or stopwatch
- Heart Rate Monitor Chart

HELPFUL VIDEOS

- How to Feel Your Heart Beat: https://www.youtube.com/watch?v=tF9-jLZNM10
- How to Check Your Heart Rate: https://www.youtube.com/watch?v=eAmcHizlbL4
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

Worksheet

HEART RATE MONITOR CHART

Starting heart rate (measure heart rate before you begin)	**Activity** (what are you doing?)	**Time** (how long did you perform the activity for?	**Ending heart rate**	**How long did you rest before the next activity?**

NOTES

Grades 9-12

LESSON 1A
Heart Rate and Active, Healthy Living

OBJECTIVE

Students will be able to perform exercises and measure and log heart rate along with understand how stress on the body effects changes in heart rate.

THE CHALLENGE

Create an exercise log by using a stopwatch or clock. Students will complete different exercises and find their heart rate before and after completing each exercise. Students will then go over the data collected and write short responses on why the heart rate reacted the way it did in those exercises. Then they will use a different measure of time, create a log using the same exercises, and compare and contrast the data by writing and prompt.

MATERIALS

- Watch or stopwatch
- Paper and pencil
- Heart Rate Monitor Chart

ACTIVITY

Students will work with a partner (family member or friend) to help them check and record their heart rate. Students will engage in a series of different exercises and record their heart rate using the Heart Rate Monitor Sheet. After filling out their chart, have students go over their recorded information and write short responses on why their heart rate reacted the way it did in those situations. Students should turn in writing prompts and heart rate monitor chart. Next, have students try a different duration of time for the same exercises they used at the one-minute time frame and see where their heart rate is at after more time exercising. Students should take both logs and write a short prompt explaining the differences in the data that they collected and turn everything in.

HELPFUL VIDEOS

- How to Check Your Heart Rate: https://www.youtube.com/watch?v=eAmcHizlbL4
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

LESSON 1A
Heart Rate and Active, Healthy Living

GRADES 9-12: STUDENT INSTRUCTIONS

1. Have a partner (family member) start by checking your heart rate for one minute and record it.
2. Now try doing an exercise like running, jumping, or moving around for one minute and record your heart rate.
3. Try different activities and compare your heart rate based on those activities (riding a bike, jump roping, sporting activities, etc.).
4. Remember to record what your heart rate is and label what you were doing. Go over the information and write short responses to why your heart rate reacted the way it did in those situations.
5. Next, try a different duration of time for the same exercises you used at the 1-minute time frame and see where your heart rate is at after more time exercising.
6. Now take both logs and write a short prompt explaining the differences in the data that you collected and turn everything into your teacher.

MATERIALS

- Watch or stopwatch
- Heart Rate Monitor Chart

HELPFUL VIDEOS

- How to Check Your Heart Rate: https://www.youtube.com/watch?v=eAmcHizIbL4
- Exercise Ideas - 10 Minute Family Fun Cardio: https://www.youtube.com/watch?v=t7nrOBBfcYI
- Top 5 Easy Exercises for Kids to Get Stronger: https://www.youtube.com/watch?v=vO9DJ91PZ4E
- Science for Kids - Measuring Heart Rate: https://www.youtube.com/watch?v=RiWr69OzfPo

Worksheet

HEART RATE MONITOR CHART

Starting heart rate (measure heart rate before you begin)	**Activity** (what are you doing?)	**Time** (how long did you perform the activity for?	**Ending heart rate**	**How long did you rest before the next activity?**

NOTES

LESSON 2A
Active Transportation Activities

OBJECTIVE

Get the students outside to walk, bike, skate, etc., to be physically active and learn to be more aware of their surroundings and safety.

THE CHALLENGE

While out for a walk or bike ride, students will complete a scavenger hunt by identifying items along their route. Students should also be able to identify safety measures like sidewalks, crosswalks, etc., as well as any hazards along their route.

MATERIALS

- Bike Safety: https://youtu.be/dkoVxBnnGko
- Pedestrian Safety: https://youtu.be/PzghGxEqBMQ
- Neighborhood Scavenger Hunt Worksheets

ACTIVITY

Instruct students to watch the Bike Safety and Pedestrian Safety videos. Each video contains versions for the appropriate age range, so be sure to point out the right videos for their grade level. With a parent or guardian, tell students to take a walk or bike ride around their neighborhood and to take their Neighborhood Scavenger Hunt Worksheets with them. Students should fill out the worksheets based on observations from their walk and turn it in.

LESSON 2A
Active Transportation Activities

GRADES K-4: STUDENT INSTRUCTIONS

1. Watch the videos relevant to your grade level on Pedestrian Safety and Bike Safety.
2. Go on a walk or bike ride with a parent/guardian.
3. Utilize the Neighborhood Scavenger Hunt Worksheets during your walk/ride.
4. Turn in your completed worksheets.

MATERIALS

- Bike Safety: **https://youtu.be/dkoVxBnnGko**
- Pedestrian Safety: **https://youtu.be/PzghGxEqBMQ**
- Neighborhood Scavenger Hunt Worksheets

NEIGHBORHOOD SCAVENGER HUNT

Print this activity sheet for a family scavenger hunt in your neighborhood. Work together as a team or complete on your own.

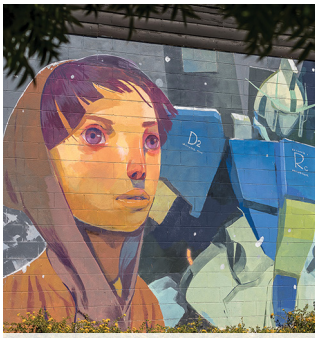
☐ Bird House

☐ Crosswalk

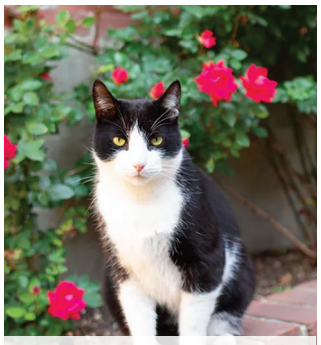
Wildcard! Draw something you see.

☐ _____

☐ Park



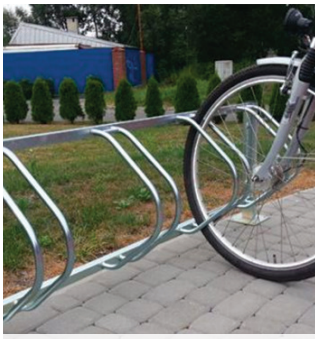
☐ Street Art



☐ Cat

☐ Pedestrian Signal

☐ Joshua Tree



☐ Bike or Scooter Parking

☐ Roundabout

☐ Garden Gnome

☐ Dog

☐ Flowers in Bloom

☐ Bicyclist

☐ Regional Transit

☐ Sidewalk Art

ALPHABET SCAVENGER HUNT

Print this sheet out. As you go on a walk, write down objects you see starting with each letter of the alphabet. How many can you find?

- ☐ A _____
- ☐ B _____
- ☐ C _____
- ☐ D _____
- ☐ E _____
- ☐ F _____
- ☐ G _____
- ☐ H _____
- ☐ I _____
- ☐ J _____
- ☐ K _____
- ☐ L _____
- ☐ M _____
- ☐ N _____
- ☐ O _____
- ☐ P _____
- ☐ Q _____
- ☐ R _____
- ☐ S _____
- ☐ T _____
- ☐ U _____
- ☐ V _____
- ☐ W _____
- ☐ X _____
- ☐ Y _____
- ☐ Z _____

NEIGHBORHOOD SOUND WALK
What do you hear?

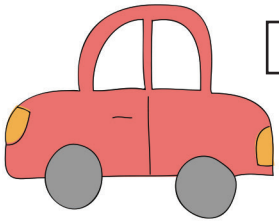
You can hear many sounds on your walk in your neighborhood. Can you identify the sounds below? Print this sheet out to take with you on your next walk.

☐ Bird

☐ Bicycle

☐ Dog

☐ Music



☐ Car

☐ Family Walking

What else did you hear? Draw a picture of what you heard on your walk!

LESSON 2A
Active Transportation Activities

OBJECTIVE

Get the students outside to walk, bike, skate, etc., to be physically active and learn to be more aware of their surroundings and safety.

THE CHALLENGE

While out for a walk or bike ride, students will complete a scavenger hunt by identifying items along their route. Students should also be able to identify safety measures like sidewalks, crosswalks, etc., as well as any hazards along their route.

MATERIALS

- Bike Safety: https://youtu.be/dkoVxBnnGko
- Pedestrian Safety: https://youtu.be/PzghGxEqBMQ

ACTIVITY

Instruct students to watch the Bike Safety and Pedestrian Safety videos. Each video contains versions for the appropriate age range, so be sure to point out the right videos for their grade level. With a parent or guardian, tell students to take a walk or bike ride around their neighborhood and to think about these questions:

- What do you see?
- How do you feel?
- Are there things you would change?
- How has your neighborhood changed since COVID-19?

Encourage students to take a few photos and notes on their walk and tag **@seeandbeseen_** on Facebook and Instagram with their photos and answers.

If they have recommendations for transportation improvements, have students add them to the Street Stories map here: https://streetstory.berkeley.edu/

Students will complete the assignment by writing 1-page report describing their experience and any recommendations that they made to Street Stories and turning it in along with their photos.

LESSON 2A
Active Transportation Activities

GRADES 5-8: STUDENT INSTRUCTIONS

1. Watch the videos relevant to your grade level on Pedestrian Safety and Bike Safety.
2. With a parent/guardian, walk around your neighborhood and think about these questions:
   - What do you see?
   - How do you feel?
   - Are there things you would change?
   - How has your neighborhood changed since COVID-19?
3. Take a few photos and notes on your walk and tag **@seeandbeseen_** on Facebook and Instagram with your photos and your answers.
4. If you have recommendations for transportation improvements – make sure to add them to the Street Stories map here: **https://streetstory.berkeley.edu/**
5. Write a 1-page report describing your experience and any recommendations that you made to Street Stories.
6. Turn in your report and photos.

LESSON 2A
Active Transportation Activities

OBJECTIVE

Get the students outside to walk, bike, skate, etc., to be physically active and learn to be more aware of their surroundings and safety.

THE CHALLENGE

While out for a walk or bike ride, students will complete a scavenger hunt by identifying items along their route. Students should also be able to identify safety measures like sidewalks, crosswalks, etc., as well as any hazards along their route.

MATERIALS

- Computer, laptop, or smartphone
- Bike Safety: https://youtu.be/dkoVxBnnGko
- Pedestrian Safety: https://youtu.be/PzghGxEqBMQ
- POW! WOW! Antelope Valley: www.lancastermoah.org/powwow
- Mural Map

ACTIVITY

Instruct students to watch the Bike Safety and Pedestrian Safety videos. Each video contains versions for the appropriate age range, so be sure to point out the right videos for their grade level. Students will begin by researching POW! WOW! Antelope Valley. POW! WOW! Antelope Valley returned for its third year September 5-12, 2020. International and area muralists adorned the walls of the city, adding to the 31 murals and installations created during the 2016 and 2018 editions of the festival.

With parent/guardian permission or support/participation, students should plan and complete an active transportation (walk, bike, etc. – no motorized vehicles other than one to get you to your starting point if necessary) tour of all of the murals. They can utilize the mural map to help them plan their tour.

Tell students to take a few photos and notes on their tour and tag **@seeandbeseen_** on Facebook and Instagram with their photos. Students will select one mural to research further and find out as much as they can about the piece and the artist.

To complete the assignment, students will write a 1-2 page report on their active transportation tour experience as well as the mural they selected, and turn it into along with their photos.

LESSON 2A
Active Transportation Activities

GRADES 9-12: STUDENT INSTRUCTIONS

POW! WOW! Antelope Valley returned for its third year September 5-12, 2020. International and area muralists adorned the walls of the city, adding to the 31 murals and installations created during the 2016 and 2018 editions of the festival.

1. Watch the videos relevant to your grade level on Pedestrian Safety and Bike Safety.
2. Research POW! WOW! Antelope Valley: www.lancastermoah.org/powwow
3. With parent/guardian permission or support/participation, plan and complete an active transportation (walk, bike, etc. – no motorized vehicles other than one to get you to your starting point if necessary) tour of all of the murals. Utilize the mural map to help you plan your tour.
4. Take a few photos and notes on your tour and tag **@seeandbeseen_** on Facebook and Instagram with your photos.
5. Select one mural to research further. Find out as much as you can about the piece and the artist.
6. Write a 1-2 page report on your active transportation tour experience as well as the mural you selected.
7. Submit your report and photos.

POW! WOW! ANTELOPE VALLEY

OFFICIAL MURAL MAP

1. Huntz Liu
2. Carlos Ramirez
3. Victoria Cassinova
4. Allison Bamcat
5. Manuel Zamudio
6. MJ Lindo-Lawyer
7. Carlos Mendoza
8. Casey Weldon
9. Chloe Becky
10. Gustavo Rimada
11. Spenser Little
12. Kim Sielbeck

MAP LEGEND

- STREET
- THE BLVD
- POW!WOW! AV MURALS

GENEROUSLY SPONSORED BY:

MOAH LANCASTER MUSEUM & PUBLIC ART FOUNDATION
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Lucky Luke Brewing
Lancaster Choice Energy
MONSTER ENERGY
HAWAIIAN AIRLINES
SprayPlanet
WM WASTE MANAGEMENT

SEE AND BE SEEN Art Contest!

lancaster ca

In partnership with the Museum of Art and History (MOAH), the SEE AND BE SEEN team at the City of Lancaster is holding an art contest! Winners of the contest will have their artwork adapted and prominently featured on a SEE AND BE SEEN signal cabinet, in addition to winning fun prizes!

The art contest is open to all Lancaster students in grades K-12.

To participate in the art contest, students must choose a SEE AND BE SEEN safety message as inspiration for their creation. Students can adapt their portrayal of the message as they like, but artwork must correlate to one of the four safety messages below:

- MAKE EYE CONTACT
- EYES UP, PHONE DOWN
- RIDE RIGHT IN THE BIKE LANE
- KEEP IN MIND, WALK BETWEEN THE LINES

Contest Guidelines

- Fill an entire vertical 9" x 12" piece of paper with artwork (don't leave a lot of white space!) Refer to page 97 for scale.
- If text or words are a part of your artwork, make sure they are clear and legible. It would be best to keep any text to a minimum.
- While crayons and colored pencils can be used, we suggest paint, markers, or more concentrated mediums. You can also use digital illustration!
- **Don't throw away your original artwork! We will need it later.**
- When completed, visit cityoflancasterca.org/sbsart to submit your contest entry.
- If you are mailing in or dropping off your submission to City Hall, put your artwork in a flat envelope. Do not fold, roll, or crease your artwork. Include your name, grade, school, and contact information. Write "SEE AND BE SEEN Art Contest" on the outside of the envelope.
- Read the entry instructions carefully and call MOAH at 661-723-6250 with any questions.

Mail/drop-off deadline: November 13

Lancaster City Hall, Development Services Counter
44933 Fern Avenue | Lancaster, CA 93534

Online deadline: November 15

Winners will be notified in early December.

Good luck, artists!

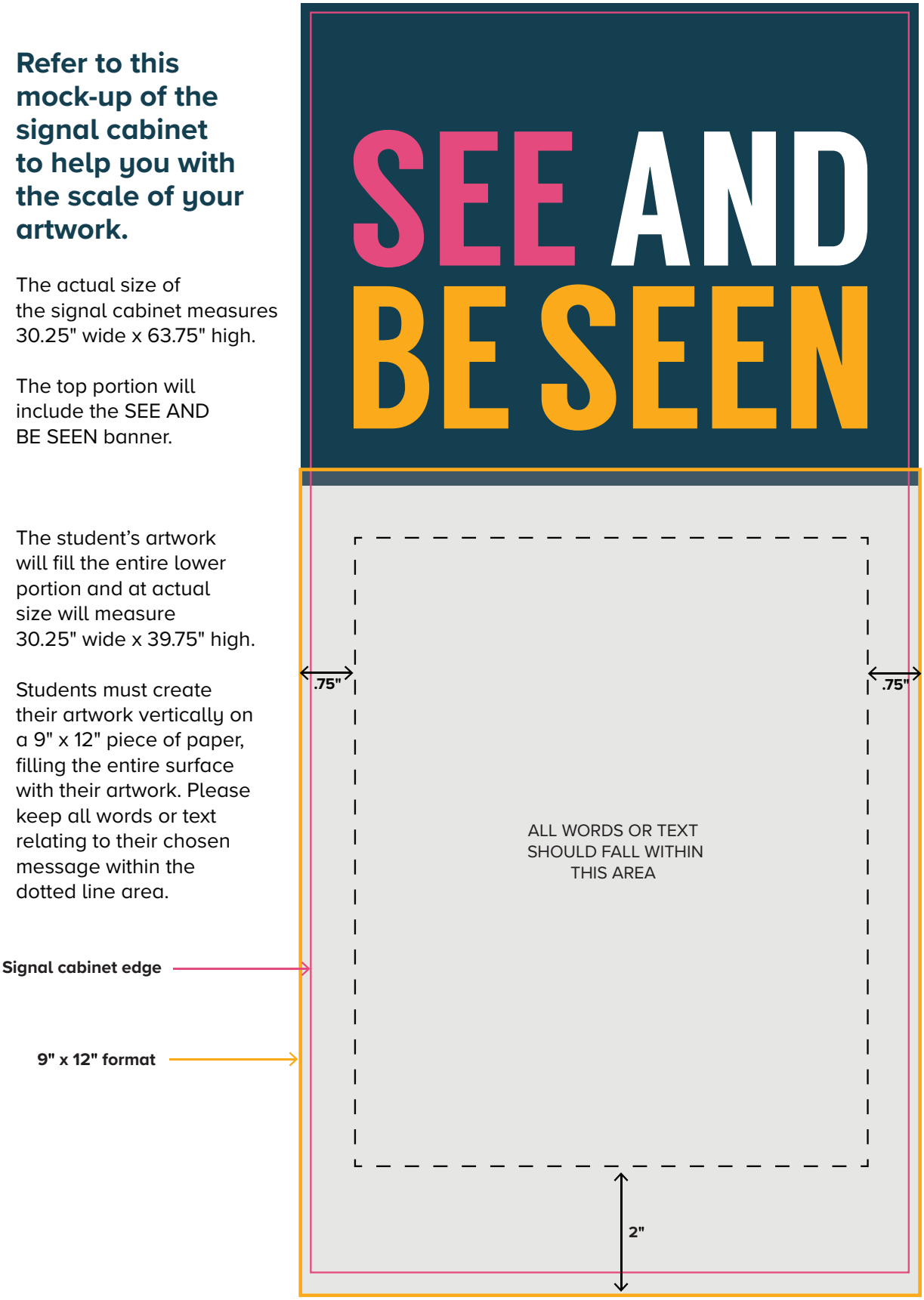
Refer to this mock-up of the signal cabinet to help you with the scale of your artwork.

The actual size of the signal cabinet measures 30.25" wide x 63.75" high.

The top portion will include the SEE AND BE SEEN banner.

The student's artwork will fill the entire lower portion and at actual size will measure 30.25" wide x 39.75" high.

Students must create their artwork vertically on a 9" x 12" piece of paper, filling the entire surface with their artwork. Please keep all words or text relating to their chosen message within the dotted line area.



ACKNOWLEDGMENTS

The City of Lancaster thanks its partners for their contribution to this guide and the entire SEE AND BE SEEN program.