

# KEEP ON TRUCKING

## PBL: PROJECT BASED LEARNING

### **Focus Standards:**

SC.3.N.1.1 Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations and generate appropriate explanations based on those explorations.

SC.3.N.1.2 Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

SC.3.N.1.6 Infer based on observations

MAFS.3.MD.2.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.

MAFS.3.MD.2.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

### **Embedded Standards:**

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.

SC.3.N.3.2 Recognize that scientists use models to help understand and explain how things work

SC.3.N.3.3 Recognize that all models are approximations of natural phenomena as such, they do not perfect account for all observations

SC.3.N.1.3 Keep records as appropriate, such as pictorial, written or simple charts and groups, of investigations conducted.

SC.3.N.1.4 Recognize the importance of communication among scientists.

SC.3.N.1.5 Recognize that scientists question discuss and check each other's evidence and explanations.

**Design Challenge: The 2017 Trucking Competitions** are being held in Miami, FL at McNair Stadium!!! This is the championship event for truck designers and drivers, consisting of racing and weight loads. The winner is considered the **WORLD CHAMPION!** You are now all members of the “Pit Crew” and you need to design a truck for your driver to take to the finals.

- 1. Your truck must be made out of recycled materials.**
- 2. Start collecting possible materials that you can use to build your truck and bring them in. (You could use soda lids as wheels, a peanut butter jar as the body of the truck. Be creative!) Mrs. McNair will provide some things for you, but most of the materials will need to be brought in by YOU!**
- 3. You can start discussing with your team how the materials can be used.**
- 4. You will race your truck over three surfaces: tile, carpet, and asphalt.**
- 5. You will need to determine which surface your truck will travel the best on (travels the farthest distance) and explain why.**

Remember the following:

A **question** is what we want to find the answer to and need to investigate and research.

On which surface will your truck travel the farthest?

The **hypothesis** is your best guess, based on your research, as to the answer to the question. We use the “If, then because” statement for a hypothesis. (IF we do something, THEN this will be the result BECAUSE of this information we learned while researching.)

Next, we **experiment!** We do the actual investigation, or test, to see if our hypothesis is correct and we answer our question. However, we must keep good records of our data. This means we are specific in our measurements.

The fourth step is to **analyze** our data. We look at our records, make charts or graphs that display our data in a very neat, organized and easy to read way and are able to explain it to anyone who may ask about our experiment.

The last step is a **conclusion**. This is where we write a few paragraphs that explain what we did in our experiment. This is one of the most important things we, as scientist, do! It allows other scientists to read about our experiment, look at our data, provides them a way to repeat the experiment if they want, and lets them see how great we are at science!

**Task 1 (Day 1):** Choose a Trucker Team Name that you would like to design a truck for to use in the World Finals. Design a new logo for your team! (Display examples of company logos i.e. UPS, FEDEX, Florida Trucking Association...)

Trucker Team Names:

Hot Wheels	Savage	Truck Kings
Truck Queens	Oil Crusader	Road Kill
Bounty Hunter	Wrecking Crew	Get-R-Done
El Toro Loco	Monster Mutt	Blue Thunder
Beast Mode	Jurassic Attack	Heavy Pedal
Soldier Fortune	Terminator	Mohawk Warrior
Northern Nightmare	Dark Knight	RoadRunner

**Task 2 (Day 2) :** To design a truck that will travel the farthest on various surfaces, you will need to understand potential and kinetic energy. How does potential and kinetic energy create change in motion? Research and investigate this question using the Science Fusion book, Britannica.com, Brainpopjr.com, Ducksters.com search potential energy, kinetic energy)

**Task 3 (Day 3):** Based on your research from the previous day; create a Tree Map to explain what is potential energy and kinetic energy. See sample for set up of Tree Map. Then create a demonstration that explains potential and kinetic energy.

**Task 4 (Day 4):** Each team will rotate by using a coin to slide across three different surfaces; carpet, tile, and asphalt. Slide a coin across the tile. Slide a coin across the carpet. Once all teams have completed carpet and tile, as a class we will go outside to test the asphalt. You need to have three trials on each surface. After each trial, measure the distance your coin traveled. You need to measure in feet and inches (to the nearest ¼ inch) and in centimeters (Scientists always use the metric system!) Record your data.

**Task 5 (Day 5):** You will be given a chart to graph your results from the coin sliding done the previous day. Your chart will need to include a Title, what distance/measurement, three surfaces used. Display your data in a table on chart paper. Discuss with your group on which surface did your coin travel the farthest? Explain why in 4-6 sentences. Please include your reasoning on the chart (bottom or back page)

Once all groups have completed their data table you will do a gallery walk. You will compare the observations made by different groups to the observations made by your group. Be ready to explain the differences you noticed across the groups. We will have a class discussion about this, if time allows!

Video: <https://www.youtube.com/watch?v=C7NPD9W0kro>

**Task 6 (Day 6-7):** Gather all you materials you have brought in and now it's time to Start building your truck! You only have **TWO DAYS** to build, so you need to use your time wisely and stay on task. If you finish early continue to research on the computer about different types of energy and how we use energy every day.

**Task 7 (Day 8) :** Practice run! You will have a chance to practice with your truck. Then you will use the rest of your time to make any changes needed to help your truck run better. Today you will need to share all the responsibilities to be successful. One person will push the truck, the other two will measure the distance the truck traveled. Then you will need to rotate jobs.

**Task 8 (Day 9):** Today is the day! Race day at McNair Stadium! You are going to race your trucks down the ramp on different surfaces (tile, carpet, asphalt) to determine which the best surface to race is. You will have three attempts on each surface.

You are responsible for a few things during the race:

1. You need to time how long it takes your truck to travel 5 feet past the ramp. Record your times on the chart provided.
2. You will also need to measure in feet and inches (to the nearest  $\frac{1}{4}$  of an inch) the total distance your truck travels. Record your distance on the chart.

**Task 9 (Day 10):** Analyze your data and come to a conclusion. Write a 2-3 paragraphs in your PBL notebook that explains what we did in our experiment. You will need to explain this step-by-step someone that has never done this will be able to easily repeat the experiment. Then you will need to explain your results. What surface did your truck travel the farthest? Why?

\*Be prepared to share all your hard work with other Trucking Teams\*

**Team Name:** \_\_\_\_\_

**Team Members:** \_\_\_\_\_

**Time to Travel 5 Feet Past the Ramp**

<b>Surface</b>	<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>
Tile			
Carpet			
Asphalt			

**Total Distance Traveled (in feet and inches to the nearest ¼)**

<b>Surface</b>	<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>
Tile			
Carpet			
Asphalt			