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| **Second Grade NASCAR Challenge!****C:\Users\sse11532\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\OVQZIEL9\MC900439797[1].png** |
| **Background Information**  |
| You have been learning all about how pushing and pulling can affect the motion of an object. You even have learned about how speeds can change from object to object. Today you will be presented a design challenge that will require you to use all of this knowledge that you have learned. * This lesson was designed based on the PBS Kids Design Squad lesson “2-Wheel Balloon Car and 4 Wheel Balloon Car”
* <http://pbskids.org/designsquad/pdf/parentseducators/2wheelcar-english.pdf>
* <http://pbskids.org/designsquad/pdf/parentseducators/4wheelcar-english.pdf>
* <http://inspirationlaboratories.com/challenge-and-discover-make-a-vehicle/>
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| **Design Challenge** |
| NASCAR has been looking for a new race car prototype. They would like you to inspire their new race car design. They have hired you to become part of their racing design team. With gas prices these days, NASCAR is looking for alternative fuel choices. You will need to design a car that you can race by using the force of pushing or pulling. Your job is to create a car that can be moved by the force of a balloon or rubber band. You will need to use various materials to create a successful car design. Be sure your car is creative and of course looks like a car you want to drive! Have fun racing!  |
| **Criteria** |
| The car must include: * 4 wheels
* 2 axles
* A balloon that can be filled with air OR a rubber band(s) that will affect the speed of your car

The design must:* Have 2 to 3 colors
* Picture and parts labeled
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| **Materials/Tools:** |
| * scissors
* popsicle sticks (large)
* straws
* paper towel roll
* ice cream container (pint or quart)
* juice can
* candy mints (hole in the middle)
* bamboo skewers
* foam
* clay
 | * rubber band
* masking tape or duct tape
* string
* glue
* water bottles
* sponge
* marshmallows
* bottle caps
* balloons
* paper clips
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| **Standards** |
| **Science**S2P3. Students will demonstrate changes in speed and direction using pushes and pulls.* a. Demonstrate how pushing and pulling an object affects the motion of the object.
* b. Demonstrate the effects of changes of speed on an object.

**Math**MCC2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. MCC2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. MCC2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters. MCC2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. |
| **Assessments/Rubrics** |
| * Student Journal
* Teacher Observation
* Student Checklist
* Rubric
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**Instructional Steps:**

1. Tell the students about the challenge. Let them know they will be building a simple car that moves by the force of a balloon or rubber band pushing or pulling it.
2. Investigate the available materials. Discuss what part of the car each material might be good for. Body? Wheels? Axles? Which materials can be used to push the car? Pull it? After they decide which materials will make good wheels, you may have to demonstrate how to use the straw and skewer as an axle and how to use the marshmallows, sponge, or clay to fill a bottle cap so the skewer will stay in place (see video links at the beginning of the lesson).
3. Allow each student time to draw a picture of his/her plan for the car. Make sure the picture shows them using only the available materials.
4. Build the car.
5. As they finish building, allow for some “test runs”. The students can show you and each other how the balloon or rubber band moves their car. If the car falls apart during test runs, allow the student the time to fix it.
6. For their “official run”, have each student set their car at a designated starting line. Measure how far each car travelled and record this information. Create a class graph of this information.
7. Allow students to spend some time discussing improvements. How would they do it differently next time? Do they see another car with a good idea that they might like to try?
8. If time and materials allow, give the students the opportunity to make some of the improvements they discussed.

\*For this lesson, you may decide to go ahead and provide each student with a set of basic materials (4 “wheels”, axles, “body”) and then have the supplemental materials available for the students to choose from. You could also let them choose everything themselves.

\*Working as individuals, pairs, or groups is entirely up to you.

\*While the goal is for the students to build their car independently, if you see a student struggling it is always a good idea to help guide their thinking. What’s going wrong? What are you trying to do? What might help fix this problem? Once they verbalize these things, you can offer a few suggestions for what might help.

\*The improvement step is very important to the STEM process. It is the step that teaches students to stick with it, “if at first you don’t succeed…” and all that. If their car worked great the first time, this step pushes them into a higher level of thinking about their invention. If their car failed the first time, this step teaches them to continue thinking, evaluate their own work, and possibly change strategies. This is what we are trying to get to transfer over to their academics.

\*Student journal pages are attached to this lesson. Feel free to alter them to suit your needs.

\*Your team may decide on another “hook” or “wrap up”. Video clips, introductory activities, closing activities, etc. Totally up to you and your team. Study the lesson to decide how to break up your day.

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

NASCAR Challenge

 2nd Grade

**Challenge**:

NASCAR has been looking for a new race car prototype. They would like you to inspire their new race car design. They have hired you to become part of their racing design team. With gas prices these days, NASCAR is looking for alternative fuel choices. You will need to design a car that you can race by using the force of pushing or pulling. Your job is to create a car that can be moved by the force of a balloon or rubber band. You will need to use various materials to create a successful car design. Be sure your car is creative and of course looks like a car you want to drive! Have fun racing!

**Criteria/Constraints:**

The car must include:

• 4 wheels

• 2 axles

• A balloon that can be filled with air OR a rubber band(s) that will affect the speed of your car

The design must:

• Have 2 to 3 colors

• Picture and parts labeled

**Materials:**

Scissors, popsicle sticks (large), straws, paper towel roll, ice cream container (pint or quart), juice can, candy mints (hole in the middle), bamboo skewers , foam, clay, rubber band , masking tape or duct tape, string, glue, water bottles, sponge, marshmallows , bottle caps , balloons, paper clips

1. **ASK / ENGAGE:** What is the problem you are being asked to solve?

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1. **IMAGINE/BRAINSTORM:** What are some possible solutions to the problem that you are trying to solve? After you brainstorm, draw and label your ideas below.

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| **Idea #1** | **Idea #2** |

1. **PLAN/DESIGN:** Share your ideas with your group and collaborate to decide on a final design plan. Draw your team’s design below and make a list of the materials that you will need to complete your design.

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| **Team Design Plan** | **Materials List** |

1. **CREATE/TEST**: Use your Final Design Plan to create and build your solution. Test your design. Did it work? Why or Why not?

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1. **EVAULATE/IMPROVE:**  How well did your design work? Did your solution solve the problem within the given constraints?

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How can you improve your design? How can you make it better? Draw and label your improved design below.

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| **Improved Design Plan** |