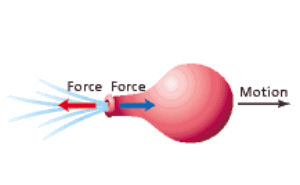
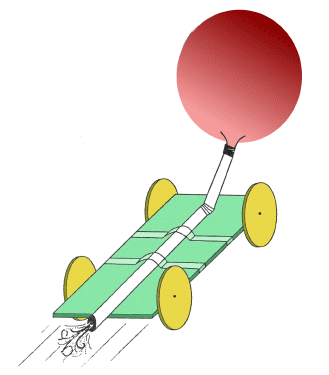
Balloon Car Investigation

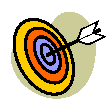
Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_





Motion & Forces Unit Assessment Project



Targets:

1- I can design and test a balloon car that will travel at least two meters.

(MS-ETS1-1) (MS-PS2-2)

2- I can apply my knowledge of Newton’s Laws of Motion to design and build my car.

(MS-ETS1-1) (MS-PS2-1) (MS-PS2-2) (MS-PS2-3.1)

3- I can apply my knowledge of forces (balanced, unbalanced, friction and gravity) to design and construct my car.

(MS-ETS1-1) (MS-PS2-2)

4- I can calculate speed for my car.

(CC.Math.6.RP.2)

5- I can graph and analyze my car’s data, and use my data to make changes to better my car’s performance.

(MS-PS2-2) (MS-ETS1-3) (MS-ETS1-4)

6- I can use my knowledge of Newton’s Laws as well as my knowledge of forces to make appropriate changes to my car to better its performance.

(MS-ETS1-3) (MS-ETS1-4) (MS-PS2-1) (MS-PS2-2) (MS-PS2-3.1)

Materials: You will be provided with balloons as needed, straws as needed, wooden sticks as needed, tape as needed, a basic set of wheels and a basic body.

**Day 1**

**Today’s Goals:**

**1- Form your design team & Identify your main goal for your car.**

**2- Gather materials & Plan out any materials needed to be brought from home.**

**3- Use Newton’s Laws to help you form a hypothesis for your car design.**

**4- Map out your design for your prototype balloon car. ☺**

**Step 1: Form Design Team & Identify your main goal for your car**:

Who are the members of your design team? (Up to 4)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_

What does your design team want your car to be able to do? \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 2- Gather materials & Plan out materials to be brought from home:**

What we have already:

What we need from home & who will be bringing it:

**Step 3- Use Newton’s Laws to help you form a hypothesis for your car design**

If we design our car \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

then it will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 4: Map out your design for your prototype balloon car. ☺**

Sketch your design for your car in the box below.

|  |
| --- |
|  |

**Day 2**

**Today’s Goals:**

**1- Complete construction of your prototype car by the end of this class period. (If your group is not ready by the end of class take it home and make sure it is ready for trial tomorrow.)**

**2- (Reflect on today’s progress) Make note of what went well for your design team today and what did not work so well, so that we may do a better job tomorrow.**

Reflection Box: In the box below please record your thoughts as to how today’s construction went. Make note of what went well for your design team today and what did not work so well, so that we may do a better job tomorrow.

|  |
| --- |
| My reflections: |

**Day 3**

**Today’s Goals:**

1. Begin testing your prototype car and collect data in the chart provided.
2. Graph your car’s data using Excel (Follow the steps on the graphing instruction sheet to create your graph.)

Test your car three times and record your data on the chart below. After recording your data, calculate your cars speed for each trial. **(Speed = Distance/Time)**

**Data for car 1 (Prototype)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Distance (Meters) | Time (seconds) | Speed (m/s) |
| Trial #1 |  |  |  |
| Trial #2 |  |  |  |
| Trial #3 |  |  |  |

Use your graphing instruction sheet and create a line graph to represent your data for car. Once your graph is complete, save it to your computer and use both your data table and your visual line graph to answer the analysis questions below.

**Analysis question 1:** After looking at your data which trial had the best data and why?

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**Analysis question 2:** If your car worked well, what was its best feature and why? If your car did not work so well, what do you think could help it next time?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Analysis question 3:** What does your design team plan to try next to improve your car’s performance? Why?

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**Day 4**

**Today’s Goals:**

1. Make one change to car 1 based on the data you collected. After the change has been made this is now going to be car 2.
2. After your change has been made to improve your car’s performance, test this new car three times.
3. Record car 2 data on the chart below and calculate your speed for each trial.
4. Use your graphing instruction sheet to create a line graph using Excel and save it to your computer.
5. Look at your data chart and your line graph to answer the analysis questions below.

Car 2 Data Chart

|  |  |  |  |
| --- | --- | --- | --- |
|  | Distance (Meters) | Time (Seconds) | Speed (m/s) |
| Trial #1 |  |  |  |
| Trial #2 |  |  |  |
| Trial #3 |  |  |  |

**Analysis question 1:** After looking at your data which trial had the best data and why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Analysis question 2:** If your car worked well, what was its best feature and why? If your car did not work so well, what do you think could help it next time?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Analysis question 3:** What does your design team plan to try next to improve your car’s performance? Why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Day 5**

**Today’s Goals:**

1. Make one change to car 1 based on the data you collected. After the change has been made this is now going to be car 3.
2. After your change has been made to improve your car’s performance, test this new car three times.
3. Record car 3 data on the chart below and calculate your speed for each trial.
4. Use your graphing instruction sheet to create a line graph using Excel and save it to your computer.
5. Look at your data chart and your line graph to answer the analysis/conclusion questions below.

**Car 3 Data Chart**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Distance (Meters) | Time (Seconds) | Speed (m/s) |
| Trial #1 |  |  |  |
| Trial #2 |  |  |  |
| Trial #3 |  |  |  |

**Analysis/conclusion question 1:** After looking at your data which trial had the best data and why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Analysis/conclusion question 2:** Look back at the data and graphs for all three of your cars. Which car had the best overall data and why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Analysis/conclusion question 3:** If you were or are going to continue developing your car what else might you try to change about your car to improve it? Remember to base changes on your data.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**\*\*\*Please copy and paste your three graphs to a single page and send it to the 6th grade printer. Staple your graphs to the back of this packet before you turn it in to be graded.**