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|  | **Balloon Racers Investigation**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| **Engage** |
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| Did you know that the Saturn V rocket was made up of about 3 million parts? Each of these parts had to work together in order to transport astronauts to the moon. It took an astounding amount of time, money, and resources just to launch one of these rockets. Even simple items we use daily such as a toaster, baseball, or pencil sharpener are made of multiple parts that have been designed, tested, and improved over time. |  |
|  | Engineers are the people who design and develop all these things, from the simple to the complex. Many of the things you use every day have been engineered to help you. The process of engineering involves the work of designing and creating new products or systems by using scientific methods. Engineering is a branch of science that applies physics and chemistry in the manufacture of these products.  |

Problem-solving ability is one of the most important characteristics of a good engineer. Let’s test your ability to solve a problem! |
| **Explore** |
| Imagine you and your partner are engineers who just graduated from college. A company is looking to hire two new engineers. Engineers have to be accurate in their measurements and to observe carefully as they test their designs. In addition, you have to be able to quantify your observations so that you can demonstrate the effectiveness of your designs with convincing data. After interviewing, the company narrowed the candidates down to the people in this class. To figure out whom to hire they have one final test: Your team’s balloon racer must travel the 2 to 5-meter zipline in the fastest time.**Materials:**

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| 6 meters of string4 Balloons4 Strawsmeasuring tool | 3 pieces of construction papermasking tapescissorsstopwatch |

1. In the box below sketch and label your balloon racer design.
2. Get your design approved by your teacher.
3. Build and test your balloon racer design.

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| **Sketch and label your balloon racer design here.** |

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| **Explain** |
| 1. What was your Balloon Racer’s fastest time completing the 2 to 5-meter track (or the furthest distance it could get to)?
2. How might you calculate your Balloon Racer’s speed? Speed is measured in units of “distance” per “time”, for example, “miles per hour”. For our purposes let’s use “meters per second”. Calculate your Balloon Racer’s speed below.
3. Your balloon racer was influenced by a lot of forces during its trip across the zipline. In the picture below label each of these forces and draw an arrow showing the direction of the force.

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| **Sketch and label your balloon racer design here.** |

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| **Elaborate** |
| 1. What is one thing you could change about your Balloon Racer to make it travel faster down the zipline?
2. Change one thing about your Balloon Racer (the one thing you change is the independent variable). Draw and label the design in the box below.

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| **Sketch and label your balloon racer design here.** |

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| **Evaluate** |
| Did your Balloon Racer perform better this time? Explain why you think it did/did not have a faster time during this test. |