**The Meteor Rocket Activity**

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| **Subject Areas** | Physics, Chemistry, and Physical Science |
| **Grade Level(s)** | 7th to 12th grade |
| **Learning Objective(s)** | 1. Apply Newton’s second law to real life examples 2. Analyze factors affecting the rate of reaction 3. Calculate vertical displacement knowing the falling time |

1. **Vocabulary Activity. Go to dictionary.com and look for the definition of the following words. Then, write a sentence with the word.**

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| **Vocabulary word** | **Definition** |
| **Newton’s second law** |  |
| **Newton’s third law** |  |
| **Vector** |  |
| **Force** |  |
| **Acceleration** |  |
| **Reactants** |  |
| **Products** |  |
| **Chemical reaction** |  |
| **Displacement** |  |
| **Combustion reaction** |  |
| **Thrust** |  |

1. **Reflection Questions. After learning how rockets work, answer the following questions.**
2. If you increase the amount of baking soda, what would happen to the thrust? Why?

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1. If the amount of reactants is increased, what would happen to the mass of the rocket?

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1. What is the relationship between the mass of the rocket and the thrust needed to lift it?

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**3. Applying the scientific method. The amount of vinegar will be changed and the flying time will be recorded to find the height. Discuss with students how the scientific method is used by engineers to generate knowledge and help them identify the variables for the experiment and write the hypothesis.**

**Materials**

1. **Rocket kit**
2. **Stopwatch**
3. **Digital balance**
4. **Worksheet to record the observations**

**Mathematical expression needed to calculate the height**

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**Variables**

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| **Independent Variable** |  |
| **Dependent Variable** |  |
| **Control Group** |  |
| **Constant(s)** |  |

**Hypothesis**

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| If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_then, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Quantitative Observations**

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| **Amount of vinegar (mL)** | **Mass of the rocket (g)** | **Flying time (s)** | **Height (m)** |
| **400** |  |  |  |
| **600** |  |  |  |
| **800** |  |  |  |

**4. Conclusion Questions**

1. According to the evidence gathered, what is the relationship between the amount of vinegar and the flying time? How can that pattern be explained?

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1. Was your hypothesis accepted? How is the data collected supporting your hypothesis?

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1. What can you do to maximize the flying time without increasing the mass of the rocket?

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