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| **Lesson Title : Forces**  | **Unit #:1** | **Lesson #:1** | **Activity #:1** |
| **Activity Title: The Hook** |

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| **Estimated Lesson Duration:** | **3 days** |
| **Estimated Activity Duration:** | **1 day** |

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| **Setting:** | **Day one of lesson, classroom** |

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| **Activity Objectives:**  |

**5 PS 4 The amount of change in movement of an object is based on the mass of the object and the amount of force exerted.**

* **Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t).**
* **Earth pulls on all objects with a gravitational force. Weight is a measure of the gravitational force between an object and the Earth.**
* **Any change in speed or direction of an requires a force and is affected by the mass of the object and the amount of force applied.**

 **I can determine the forces that can move an object that is at rest.**

**I can generate questions about movement of objects after watching a video of NASCAR crashes.**

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| **Activity Guiding Questions:**  |

1. What makes some cars go faster than others?

2. Why are some of the cars more damaged than others?

3. What makes the cars move?

4. Do all the cars move the same way?

5. What causes crashes?

6. How do cars go with force?

7. Can a force hurt someone?

8. How does a force work?

9. Do forces help you go faster?

10. Why do cars “ball up” after they crash?

11. What causes crashes?

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| **Next Generation Science Standards (NGSS)**  |
| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| X Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☐ Developing and using models | X Cause and effect |
| ☐ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☐ Analyzing and interpreting data | ☐ Systems and system models |
| ☐ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function.  |
| ☐ Engaging in argument from evidence | ☐ Stability and change.  |
| ☐ Obtaining, evaluating, and communicating information  |  |

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| **Ohio’s New Learning Standards for Science (ONLS)** |
| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| X Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

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| **Common Core State Standards -- Mathematics (CCSS)** |
| **Standards for Mathematical Practice (Check all that apply)** |
| ☐ Make sense of problems and persevere in solving them | ☐ Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ☐ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, ONLS and/or CCSS):** |

**OHIO 5 PS 4 The amount of change in movement of an object is based on the mass of the object and the amount of force related.**

**NGSS 3-5 PS2 A Force and Motion**

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| **Material:**  |

<https://docs.google.com/viewer?a=v&pid=sites&srcid=c2FzZWFzLm9yZ3xtZWxpc3NhLWEtZG9sbC0yMDE1fGd4OjM4ODU2MzdjNmJiMmY5YTM>

Lesson PowerPoint

Link to NASCAR crashes

2 large posters for brainstorming and question generating

Pre/post test

Students notebooks

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| **Teacher Advance Preparation:**  |

Set up PowerPoint to run on smart board

Set up NASCAR video to run on smart board

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| **Activity Procedures:** |

The Hook: The students will be presented with a 3 minute video on NASCAR races with pictures of traffic jams and demolition derby as the hook. The unit will start with a brainstorm on what they know about forces, the information will be gathered onto a large poster board to hang in classroom. Then the students will be presented with a slide and ask to identify what pictures they think represent forces, with a discussion on why they identified them as forces. The students will then be shown the video. After the video the students will be asked to identify the essential questions that they now have about forces. Their questions will be written on poster board and hung up next to the brainstorm. The questions will be looked at later in the unit to arrive at the essential question to determine the challenge. The essential question will be determined after the students have learned the different forces. The list of generated questions will be revisited added and subtracted from until we have the question- how do forces move objects? The essential question then will be used to guide the rest of the lessons and the challenge.

Students need to share at their table, group of 4.

The prepared PowerPoint will be the guide for the lesson.

Link to PowerPoint <https://docs.google.com/viewer?a=v&pid=sites&srcid=c2FzZWFzLm9yZ3xtZWxpc3NhLWEtZG9sbC0yMDE1fGd4OjM4ODU2MzdjNmJiMmY5YTM>

**The Challenge-**students will be working on lesson and labs in the next activities to lead up to the challenge. The challenge will be to create a car that moves 5 meters using a force. The car must be made of material that is at home. The students will follow the engineering design model using a worksheet and working in a group of three.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

Exit question posted in PowerPoint – written in notebook by students-

 What is a force? How do forces move objects?

Give an example of a force and how it moves the object.

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.Refer to Activity Template for details. |

All the learning styles in the classroom where engaged in watching the NASCAR crashes and formulating questions. The pictures in the slide and video assisted the English Language Learners.

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson. |

The students enjoyed the Hook- the NASCAR crashes. The student though when formulating the questions where more focused on crashes then that a force was involved in the movement on the cars and the degree of the crash damage. The slide with the forces on it had to be referred to stimulate questions on force. A better hook might have been to show many moving objects and ask what make them move. After watching objects from things falling out of the sky, cars moving, sling shots, wind up toys etc then the students might not be so focused on the crash.