

Unleashed

## **Lesson Plan 1**

| LESSON OBJECTIVE |
| --- |
| Students will be able to:   * Define motion * Understand what is motion in everyday life * Explain why motion is important in everyday life |

| ASSESSMENT |
| --- |
| * Exit Questions * Classwork |

| KEY POINTS |
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| * Teacher will introduce students to motion in order for students to be able to define motion and be able to explain its use in everyday life * Students will participate in an experiment to learn about motion * Class will engage in a short discussion about what they have learned |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Ask the question:  What is motion? | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students to the initiative and provide the note to students handout.  Introduce students to what motion is and how it is used in everyday life. | Slidedeck  [Note to Students](https://docs.google.com/document/d/1J2mREfsxbY7WRBGnESlvxQIFCCaIT7J5CwScL8piy9g/edit?usp=sharing) |
| **Independent Activity [10 min]** | Engage in the experiment and the think-pair-share activity. | Slidedeck  Cups, index cards, pennies |
| **Class Discussion [20 min]** | Engage in the think-pair-share activity. | Slidedeck |
| **Closing [5 min]** | Ask the questions: Look at the image below, what is the reference point? Who is not moving, moving closer to, or farther away from the reference point?  Remind students to complete daily learning log. | Slidedeck  Paper and pencil (or discuss out loud as a class)  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core**   * [**CCSS.ELA-LITERACY.SL.9-10.2**](http://www.corestandards.org/ELA-Literacy/SL/9-10/2/) Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. * **CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*. |

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## **Lesson Plan 2**

| LESSON OBJECTIVE |
| --- |
| Students will be able to:   * Define speed & velocity * Understand how to determine the speed of an object * Understand how to read a graph to determine the speed of an object |

| ASSESSMENT |
| --- |
| * Exit Questions * Classwork |

| KEY POINTS |
| --- |
| * Teacher will introduce students to speed and velocity in order for students to be able to define both speed and velocity * Students will learn how to read a graph * Class will engage in a short discussion about what they have learned |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Ask the question:  How do you determine the speed of an object? | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students to both speed and velocity | Slidedeck |
| **Independent Activity [10 min]** | Engage students in the reading graph activity | Slidedeck |
| **Group Activity [20 min]** | Engage in the drawing graph activity. | Slidedeck |
| **Closing [5 min]** | Ask the questions: What is the average speed for a runner who covers 400 meters in 2 minutes?  Remind students to complete the daily learning log. | Slidedeck  Paper and pencil (or discuss out loud as a class)  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core ELA**   * [**CCSS.ELA-LITERACY.SL.9-10.2**](http://www.corestandards.org/ELA-Literacy/SL/9-10/2/) Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. * **CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*.   **Common Core Math**   * **CCSS.MATH.CONTENT.HSA.CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. * **CCSS.MATH.CONTENT.8.EE.B.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. |

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## **Lesson Plan 3**

| LESSON OBJECTIVE |
| --- |
| Students will be able to:   * Define force * Understand balanced and unbalanced forces * Understand the relationship between the pull of two objects |

| ASSESSMENT |
| --- |
| * Exit Questions * Classwork |

| KEY POINTS |
| --- |
| * Teacher will introduce students to force & inertia * Students will learn and understand balanced and unbalanced forces * The concept of tug of war is used to demonstrate balanced and unbalanced forces. * Class will engage in a short discussion about what they have learned |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Ask the question:  What makes the wheels on a bike turn? | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students to force, inertia, balanced & unbalanced forces | Slidedeck |
| **Independent Activity [10 min]** | Can you define the vocabulary? | Slidedeck |
| **Group Activity [20 min]** | Tug of War | Slidedeck, whiteboard and/or rope |
| **Closing [5 min]** | Ask the questions: When you jump, why do you move but the Earth doesn’t?  Remind students to complete the daily learning log. | Slidedeck  Paper and pencil (or discuss out loud as a class)  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core**   * **CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*. |

## **Lesson Plan 4**

| LESSON OBJECTIVE |
| --- |
| Students will be able to:   * Define friction * Understand all types of friction * Label the types of friction |

| ASSESSMENT |
| --- |
| * Exit Questions * Classwork |

| KEY POINTS |
| --- |
| * Teacher will introduce students to friction * Students will learn and understand all types of friction * Students will watch the Ok Go Rube Goldberg video and label the types of friction * Class will engage in a short discussion about what they have learned |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Ask the question:  If you kick a soccer ball down a field, why does it stop rolling? | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students to friction | Slidedeck |
| **Independent Activity [10 min]** | Watch the Ok Go Rube Goldberg machine video and label types of Friction used | Slidedeck |
| **Group Activity [20 min]** | Complete a think-pair-share activity based on the types of friction found in the video - use the handout provided | Slidedeck & handout ([access a pdf copy](https://drive.google.com/file/d/1RZXIu6ItdJ8PP6GCq_xhauYphCKyxPNV/view?usp=sharing) or make a copy of the [digital version](https://docs.google.com/presentation/d/1YF9TGQapDC1BJXBeWJ0s6-HJmSqWUlYg48ro7TPiSvo/edit?usp=sharing)). |
| **Closing [5 min]** | Ask the questions: What force causes objects to have circular motion?  Remind students to complete the daily learning log. | Slidedeck  Paper and pencil (or discuss out loud as a class)  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core**   * **CCSS.ELA-LITERACY.SL.6-12.1** * Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. * [**CCSS.ELA-LITERACY.SL.9-10.2**](http://www.corestandards.org/ELA-Literacy/SL/9-10/2/) Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. * **CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*. |

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## **Lesson Plan 5**

| LESSON OBJECTIVE |
| --- |
| Students will be able to:   * Understand diversity in racing * Explore notable race car drivers * Apply knowledge gained to create a plan for a race car |

| ASSESSMENT |
| --- |
| * Exit Questions * Classwork * Completed Race Track (built by class) |

| KEY POINTS |
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| * Teacher will introduce students to Formula 1, NASCAR, and notable drivers * Students will collaborate to build a race track |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Ask the question:  What would you invent to improve something that already exists? | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students Formula 1, NASCAR, diversity in racing, and notable drivers (watch videos and share information on slides) | Slidedeck |
| **Group Activity [30 min]** | Design a race track as a class | Slidedeck |
| **Closing [5 min]** | Complete the creation of the race track!  Remind students to complete the daily learning log. | Slidedeck  Paper and pencil (or discuss out loud as a class)  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core**   * [**CCSS.ELA-LITERACY.SL.9-10.2**](http://www.corestandards.org/ELA-Literacy/SL/9-10/2/) Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. * **CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*. |

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## **Lesson Plan 6**

| LESSON OBJECTIVE |
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| Students will be able to:   * Apply knowledge gained to build a balloon powered race car |

| ASSESSMENT |
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| * Exit Questions * Classwork * Completed Race Car |

| KEY POINTS |
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| * Students will plan, build, test, and improve their designs until they compete in the Qualifier round - the top cars will compete in the Grand Prix! All students can submit their race cars to the BreakFree contest. |

| COMPONENT | TEACHER & STUDENT ACTIONS | MATERIALS |
| --- | --- | --- |
| **Do Now [5 min]** | Design and build a balloon powered race car! | Slidedeck  Paper and pencil (or discuss out loud as a class) |
| **Mini-Lesson [15 min]** | Introduce students to the race car contest | Slidedeck  Instructions available in the slide deck  More instructions are available at [this PDF](https://drive.google.com/file/d/1safKJtxBreL5x_R6Gx-Ut42BESCW_mI1/view?usp=sharing) or [this PDF](https://drive.google.com/file/d/1Zpr9Y9p4aT7KR53WH1vmnMy-Sq23xFhf/view?usp=sharing). |
| **Independent Activity [10 min]** | Students will design and build the race car and complete the build sheet | Slidedeck  Print the build sheet ([linked here](https://drive.google.com/file/d/1rpMogrNb-zbv3yWeOvKwe20D0qewCYCa/view?usp=sharing) as a pdf; [linked here](https://docs.google.com/presentation/d/1a_iln94oJaf3q5ubGFKqbc9i4b3U_SgHbSX7VhuqezM/edit?usp=sharing) as a google doc) |
| **Group Activity [20 min]** | Students will work alone or in groups to build a balloon powered race car | Slidedeck |
| **Closing [5 min]** | Submission: Submit race car to the BreakFree contest  Remind students to complete the daily learning log. | Slidedeck  Paper and pencil  [Daily Learning Log](https://drive.google.com/file/d/1IC7E96ZvcNCAd77fVoPkGlblDGjOeDff/view?usp=sharing) |
| **DIFFERENTIATION CONSIDERATIONS:** | | |
| * Choose either paper/pen/pencil or digital tools (Google Slides, Google Draw, etc) * Students can work individually or in groups * Students can have more teacher support where needed | | |

| STANDARDS |
| --- |
| **NGSS**   * **MS-PS3-2**. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. * **MS-PS3-5**. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. * **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.   **Common Core**   * [**CCSS.ELA-LITERACY.SL.9-10.2**](http://www.corestandards.org/ELA-Literacy/SL/9-10/2/) Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. * **​​CCSS.ELA-LITERACY.RST.6-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-12 texts and topics*. |



\*lessons adapted from “Everything you need to know about Science” by Micheal Geisen and other websites ([source](http://www.westerville.k12.oh.us/userfiles/4170/Classes/5610/Measuring%20Motion%20HW%202013.pdf))