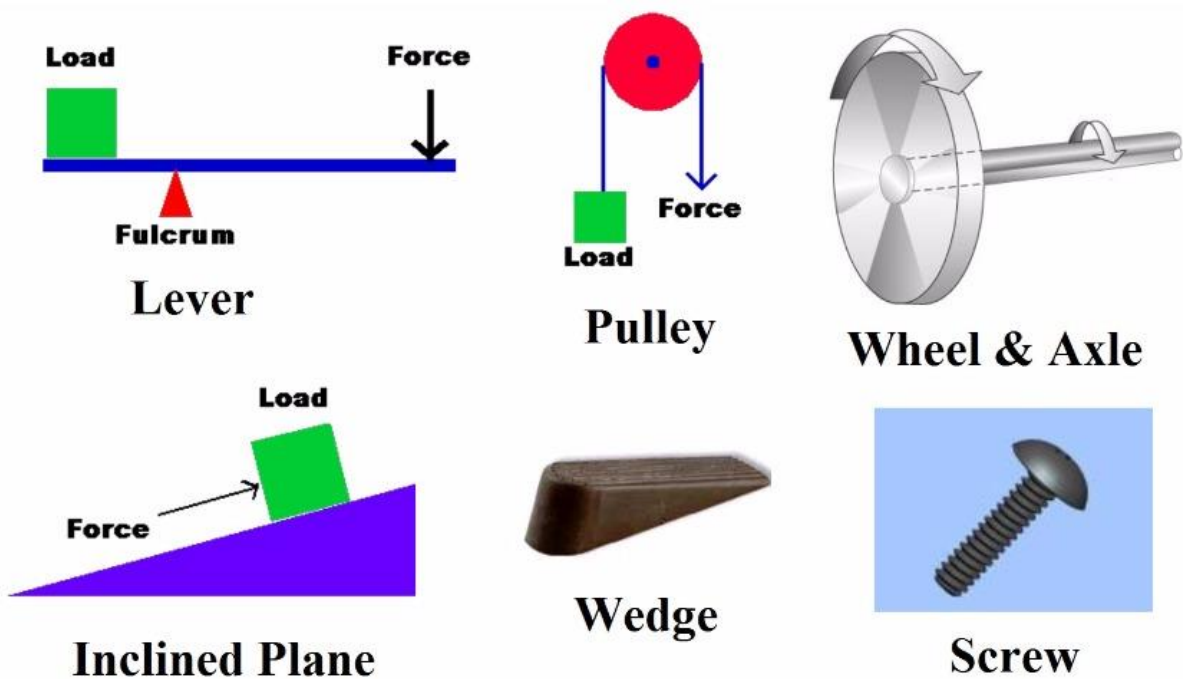


KINETIC CARS

FAST FACTS

Simple Machines



Newton's Laws of Motion

1st Law: Inertia: A body at rest stays at rest unless acted upon by an outside force. A body in motion stays in motion unless acted upon by an outside force.

2nd Law: Unbalanced Forces: Force = Mass Multiplied by Acceleration.

$F=M*A$ -It takes force to move an object. The bigger the mass the more force it takes to move it or stop it once it is moving.

3rd Law: Equal/Opposite: For every action, there is an equal and opposite reaction.

Science vocabulary:

Newton's First Law of Motion: Inertia: A body at rest stays at rest unless acted upon by an outside force. A body in motion stays in motion unless acted upon by an outside force.

Newton's Second Law of Motion: Unbalanced Forces: Force = Mass Multiplied by Acceleration.

$F=M*A$ -It takes force to move an object. The bigger the mass the more force it takes to move it or stop it once it is moving.

Newton's Third Law of Motion: Equal/Opposite: For every action, there is an equal and opposite reaction.

Simple machines: Simple machines are used to apply force to make work easier. There are 6 examples of simple machines: lever, pulley, wheel and axle, wedge, screw, inclined plane,

Friction: resistance to movement.

Distance: how far an object can be moved

Printable Handouts

1. A pre-assessment or post assessment quiz for 4th grade and up: Online or printable
https://www.quia.com/pop/36483.html?AP_rand=1020393551
2. Cartoon Laws versus Newton's Laws
3. Kinetic Cars: Test Drive
4. Stem To-Go: Simple Machines in My Life

Kid-Tech Spot: Supplemental interactive websites and games

1. Rube Goldberg's Machine Short video: <https://www.youtube.com/watch?v=2yp3nXVCLSO>
2. Simple Machine Webquest:
<https://mt15000322.schoolwires.net/cms/lib/MT15000322/Centricity/Domain/190/Simple%20Machines%20Webquest.pdf>
3. An app to compare/contrast different fuel efficiencies of cars: <https://www.fueleconomy.gov/feg/findacar.shtml>

Tech for Teachers

1. For Physics Stations, use pages 7 and 8 of this Rube Goldberg Unit to set up and explore stations independently.
<https://media.rubegoldberg.com/site/wp-content/uploads/2017/10/Rube-Goldberg-Lesson-Plans.pdf>

More resources, just in case

- <https://www.youtube.com/watch?v=SC7Nbn1W6sY>
- <https://4-h.org/parents/stem-agriculture/youth-stem-activities/rubber-band-cars/>
- <https://www.youtube.com/watch?v=hjXYVpAYYG0>
- <https://www.scientificamerican.com/article/build-a-rubber-band-powered-car/>
- <https://4-h.org/parents/stem-agriculture/youth-stem-activities/rubber-band-cars/>
- <https://media.rubegoldberg.com/site/wp-content/uploads/2017/10/Rube-Goldberg-Lesson-Plans.pdf>
- <https://www.youtube.com/watch?v=JVUaU-NXLSA>
- https://www.youtube.com/watch?v=JVUaU-NXLSAhttps://www.quia.com/pop/36483.html?AP_rand=1020393551
- <https://www.youtube.com/watch?v=9xhEXDrMMLg>
- <https://www.grc.nasa.gov/www/k-12/airplane/newton.html>
- <http://www.rahul.net/figmo/Archives/toon-physics.html>
- <http://www.dgp.toronto.edu/~karan/courses/csc2529/cartoonlaw.htmrk>
- <http://www.justscience.in/wp-content/uploads/2017/05/pjimage-1-2.jpg>
- http://www.troup.org/userfiles/929/My%20Files/Science/MS%20Science/8th%20Science/Force_Motion/simple_machines/bicycle_compound_machine.pdf?id=11340
- <https://musclecars.howstuffworks.com/muscle-car-information/how-muscle-cars-work7.htm>
- <https://www.bloomberg.com/opinion/articles/2018-05-17/american-appetites-for-suvs-pickups-might-not-doom-fuel-economy>
- <https://www.businessinsider.com/the-muscle-car-is-over-2015-5>
- <https://godurhamtransit.org/trip-planner>

In the News

1. A bridge collapsed due to a design flaw: <https://www.newsobserver.com/news/local/counties/wake-county/article21075972.html>
2. Most Fuel-Efficient Cars: <https://www.consumerreports.org/fuel-economy-efficiency/the-most-fuel-efficient-cars-best-mpg/>
3. English/Language Arts Extension: For Middle to High School age participants, this article explains the demise of muscle cars. <https://musclecars.howstuffworks.com/muscle-car-information/how-muscle-cars-work7.htm>
 - a. Muscle Cars: What is a muscle car? What happens when to demand when fuel prices go up? Here is an opinion piece that is packed with graphs. How have SUV's fared in recent economic times. <https://www.bloomberg.com/opinion/articles/2018-05-17/american-appetites-for-suvs-pickups-might-not-doom-fuel-economy>
 - b. For Middle and High School participants: What is the difference between a muscle car and a sports car? Make a Venn Diagram to compare/contrast. How is the auto industry changing to meet its customers' preferences? Here's an opinion piece that would also give some participants a good opportunity to agree/disagree and cite reasons in a potentially lively debate. It is also a good article to point out bias and persuasive writing. <https://www.businessinsider.com/the-muscle-car-is-over-2015-5>
 - c. For teen participants: Many teens are already thinking about driving. Ask "What if...?", and "What about YOU?" questions. What do YOU think is going to happen to fuel prices? How do you think fuel economy and greenhouse gas emissions may impact car manufacturers? How do hybrids and electric cars factor into decision making? Finally, if money was no object for the purchase of a new car, what kind of car would you buy? Ask participants to post pictures of participants' "dream cars." Then allow participants an opportunity to vote for the one they would want to buy. *Consumer Reports Magazine* has an annual car review edition that is a good resource for their decision-making.
 - d. Public transportation and car ownership and using the web to plan a trip: How available is public transportation in your community? In some towns, like Chapel Hill, NC, there is a free bus system for anyone. Other cities and towns may have hard to navigate or, like many rural areas, have minimum public transportation available. Which is more cost-effective for your community - owning a car or using public transportation? Where is the closest public transportation available to your program site? Ask participants to plan a trip using trains or buses and calculate the cost of the trip. How does this compare with the cost of owning and using their own car? How much does an UBER cost versus a public bus for the same distance? Here is a link to Durham's public transportation app. <https://godurhamtransit.org/trip-planner>

On the Road

1. Field Trip Resource: <http://www.carolinafielddrivesmag.com/>
2. RTP/Triangle Area: STEM and Roller Skating Field Trip in Raleigh: <http://www.unitedskates.com/public/raleigh/parties-groups/school/field-trips/index.cfm> Flyer: <http://www.unitedskates.com/upload/raleigh/STEM-2018-2019-Elementary-flyer-58-FRONT.jpg>
3. Charlotte Area: <https://science.discoveryplace.org/explore/exhibitions/think-it-up>

Other lessons and reference materials used to develop this unit

- <https://www.scientificamerican.com/article/build-a-rubber-band-powered-car/>
- <https://4-h.org/parents/stem-agriculture/youth-stem-activities/rubber-band-cars/>
- <https://media.rubegoldberg.com/site/wp-content/uploads/2017/10/Rube-Goldberg-Lesson-Plans.pdf>
- <https://www.youtube.com/watch?v=JVUaU-NXLSA>
- https://www.youtube.com/watch?v=JVUaU-NXLSAhttps://www.quia.com/pop/36483.html?AP_rand=1020393551
- <https://www.youtube.com/watch?v=9xhEXDrMMLg>
- <https://www.grc.nasa.gov/www/k-12/airplane/newton.html>
- <http://www.rahul.net/figmo/Archives/toon-physics.html>

- <https://www.youtube.com/watch?v=SC7Nbn1W6sY>
- <https://4-h.org/parents/stem-agriculture/youth-stem-activities/rubber-band-cars/>
- <https://www.youtube.com/watch?v=hjXYVpAyYG0>
- <https://www.scientificamerican.com/article/build-a-rubber-band-powered-car/>
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- https://www.youtube.com/watch?v=JVUaU-NXLSAhttps://www.quia.com/pop/36483.html?AP_rand=1020393551
- <https://www.youtube.com/watch?v=9xhEXDrMMLg>
- <https://www.grc.nasa.gov/www/k-12/airplane/newton.html>
- <http://www.rahul.net/figmo/Archives/toon-physics.html>
- <http://www.dgp.toronto.edu/~karan/courses/csc2529/cartoonlaw.htmrk>
- <http://www.justscience.in/wp-content/uploads/2017/05/pjimage-1-2.jpg>
- http://www.troup.org/userfiles/929/My%20Files/Science/MS%20Science/8th%20Science/Force_Motion/simple_machines/bicycle_compound_machine.pdf?id=11340
- <https://musclecars.howstuffworks.com/muscle-car-information/how-muscle-cars-work7.htm>
- <https://www.bloomberg.com/opinion/articles/2018-05-17/american-appetites-for-suvs-pickups-might-not-doom-fuel-economy>
- <https://www.businessinsider.com/the-muscle-car-is-over-2015-5>
- <https://godurhamtransit.org/trip-planner>