

Hand Generator

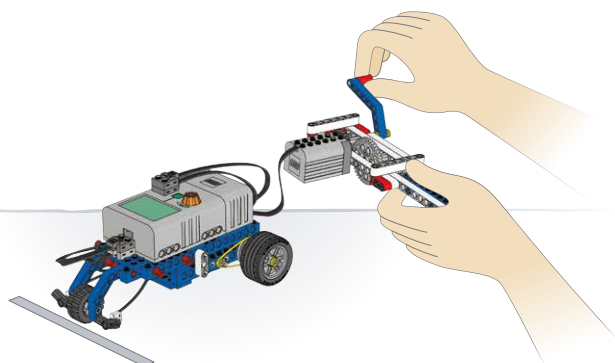
Name(s): _____

Date and subject: _____

Build the Hand Generator and the Joule Jeep

(building instructions booklets 1A and 1B, to page 15, step 16).

- Test the models functionality. Loosening bushings can reduce friction
- Connect the plugs properly by pressing them firmly together
- Make sure to return the joules (J) reading to zero before testing
- Mark a start line for your joule jeep



Turn and Go

First, predict how many generated joules (J) you will be able to accumulate by turning the handle of the hand generator after a time period of 60 seconds (sec.).

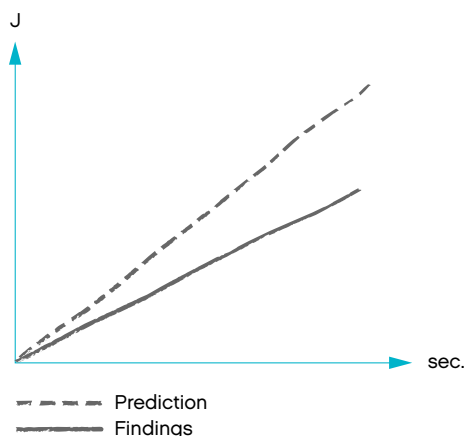
Graph your prediction in a system of coordinates as illustrated opposite.

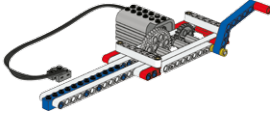
Then, investigate the amount of joules accumulated at 10 second intervals. Read and record your findings.

Graph your findings in the same system of coordinates as your prediction. Remember to reset the Energy Meter before each investigation.

Next, mark a starting line for your joule jeep and find out how far the Joule Jeep can run on the amount of accumulated joules.

My joule jeep traveled a distance of: _____

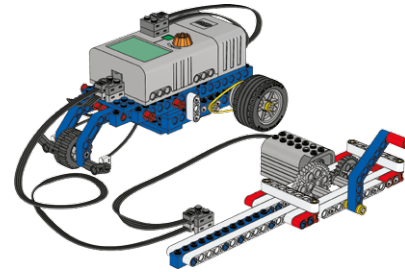


	10 sec.	20 sec.	30 sec.	40 sec.	50 sec.	60 sec.
My Prediction	(J)	(J)	(J)	(J)	(J)	(J)
My Findings	(J)	(J)	(J)	(J)	(J)	(J)

Gearing Up

(building instructions booklets 1A and 1B, to page 16, step 1)

First, rebuild the hand generator's gearing. Look carefully to see what difference the new gearing will make to the speed. Predict how many generated joules (J) you will be able to accumulate by turning the handle of the hand generator after a time period of 60 seconds (sec.).



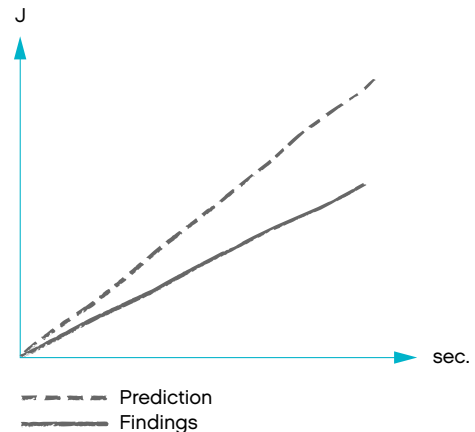
Graph your prediction in a system of coordinates as illustrated opposite.

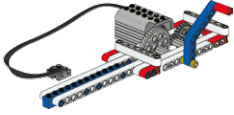
Then, investigate the amount of joules accumulated at 10 second intervals. Read and record your findings.

Graph your findings in the same system of coordinates as your prediction. Remember to reset the Energy Meter before each investigation.

Next, mark a starting line for your joule jeep and find out how far the joule jeep can run on the amount of accumulated joules.

My joule jeep traveled a distance of: _____



	10 sec.	20 sec.	30 sec.	40 sec.	50 sec.	60 sec.
My Prediction	(J)	(J)	(J)	(J)	(J)	(J)
My Findings	(J)	(J)	(J)	(J)	(J)	(J)





Identifying Variables

Identify and write down at least three variables, explaining clearly how these affect the efficiency of the hand generator and joule jeep.

Hand Generator

Name(s): _____

Date: _____

NGSS GOALS	 BRONZE	 SILVER	 GOLD	 PLATINUM
<p>1. Student work related to this Crosscutting Concept: In this project, we rebuilt our hand generator's gearing to see what difference the new gearing would make to the speed and efficiency of our hand generator.</p>				
<p>Stability and change: Students learn changes in one part of a system might cause large changes in another part of the system.</p>	<ul style="list-style-type: none"> We completed the first investigation on our student worksheets and then rebuilt the gears for the 2nd investigation. 	<ul style="list-style-type: none"> We met Bronze. We graphed a prediction of how many joules of energy we could generate with the new gearing system. We graphed our measurements. 	<ul style="list-style-type: none"> We met Silver. We used our graphs as evidence to explain how changing the gears affected our hand generator's efficiency. 	<ul style="list-style-type: none"> We met Gold. We proposed a new experiment to test how another design change to our hand generator would affect its speed and/or efficiency.
<p>2. Student work related to this Practice: In this project, we built and used a model electric car, a joule jeep, to help us test predictions about the energy we could generate with a hand crank and the distance the joule jeep would travel with that energy.</p>				
<p>Developing and using models: Develop and use a model to predict and describe phenomena.</p>	<ul style="list-style-type: none"> We built a hand generator model. We built a joule jeep model. We made sure our models moved smoothly. 	<ul style="list-style-type: none"> We met Bronze. We tested our wire connections. We zeroed our Energy Meter. We completed at least one practice energy measurement. 	<ul style="list-style-type: none"> We met Silver. We used our hand generator and joule jeep with care to complete all investigations. We zeroed our Energy Meter in between experiments. 	<ul style="list-style-type: none"> We met Gold. We used our models to help us explain how different variables affect our hand generator's performance.
<p>3. Student work related to this Practice: In this project, we planned and carried out an investigation on generating energy with a hand crank. We measured energy with an energy meter and organized our results in a data table.</p>				
<p>Planning and carrying out investigations: Plan an investigation, identify what tools are needed, how measurements are recorded, and how many data are needed to support a claim.</p>	<ul style="list-style-type: none"> We gathered the tools we needed in our investigation. 	<ul style="list-style-type: none"> We met Bronze. We tested our measurement procedure using the Energy Meter to make sure our results were accurate. 	<ul style="list-style-type: none"> We met Silver. We completed all measurements to the best of our ability, redoing measurements as needed. We completed all data tables. 	<ul style="list-style-type: none"> We met Gold. We proposed a new investigation with our hand generator, joule jeep, and Energy Meter. We outlined what measurements we would make and how much data we would collect.
<p>Notes:</p>				