# Tower Crane

**Name(s):**  
**Date:**

<table>
<thead>
<tr>
<th>NGSS GOALS</th>
<th>BRONZE</th>
<th>SILVER</th>
<th>GOLD</th>
<th>PLATINUM</th>
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</table>

## 1. Student work related to this Crosscutting Concept:
In this project, we explored the cause and effect relationship between the pulley arrangement in our tower crane and the weight and speed of the load we lift.

**Cause and Effect:**
Students use cause and effect relationships to explain and predict behaviors in design systems.

- We observed our tower crane lift an object with pulley setup A.
- We predicted what would happen with pulley setup B.
- We met Bronze.
- We noted how pulley setup B caused a change in our lifting length and lifting time.
- We predicted what would happen with pulley setup C.
- We met Silver.
- We noted how pulley setup C caused a change in our lifting length and lifting time.
- We observed what was different about each pulley setup.
- We met Gold.
- We explained the functions and possible additional improvements of the new tower crane.

## 2. Student work related to this Practice:
In this project, we built a working model of a tower crane to test different types of pulley systems.

**Developing and Using Models:**
Develop and use a model to generate data to test ideas about phenomena in designed systems, including those representing inputs and outputs.

- We built the tower crane with pulley setup A.
- We completed our measurements and calculations for pulley setup A.
- We met Bronze.
- We built pulley setup B.
- We completed our measurements and calculations for pulley setup B.
- We completed our tests of A and B at least twice.
- We met Silver.
- We built pulley setup C.
- We completed our measurements and calculations for pulley setup C.
- We completed all of our tests at least three times.
- We met Gold.
- We made changes to the two pulleys found near the motor.
- We used our observations of this experiment to help us answer our redesign questions.

## 3. Student work related to this Practice:
In this project, we redesigned our tower crane. We developed an investigation to explore how the new design functions.

**Planning and Carrying Out Investigations:**
Collect data about the performance of a proposed object.

- We picked a redesign question.
- We created a data table to organize our measurements and observations.
- We met Bronze.
- We identified our independent and dependent variables.
- We completed at least two tests.
- We met Silver.
- We identified our experimental controls (what we kept constant for each experiment).
- We completed at least three tests.
- Our data helped us evaluate our redesign.
- We met Gold.
- We completed multiple trials for all of our tests.
- We created a new data table to clearly compare our redesign test results with the data from our first experiments.

**Notes:**