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| Lesson Plan Title: |
| **Hand Dynamometers – Biomechanics** |
| Primary Subject Area: |
| Engineering, Biomedical, Life Sciences |
| Grade Level: |
| 5th- 12th grade |
| **Overview:** |
| This activity will introduce students to the anatomy of the body, bones and muscles in the hand and arms, and biomechanics and bioengineering studies that will explain how prosthetics work. |
| Approximate Duration: |
| 90 minutes |
| Common Core Standards June 2012 Draft |
| This lesson aligns with the following Common Core Standards:  * LS1.A.: Structure and Function * LS1.D: Information Procesing |
| Interdisciplinary Connections: |
| Biology/Life Sciences |
| **Objectives:** |
| * Get students to understand the bone structure and muscles that exist in their hands and arms * Give students an opportunity to explore how their muscles and bones function to complete every-day tasks * Understand what makes some individuals stronger than others * Analyze data sets from the students trials with the hand dynamometers to look for patterns or interpretations |
| Lesson Materials and Resources: |
| Hand dynamometer handout, introductory powerpoint/prezi |
| Technology Tools and Materials: |
| Hand dynamometer |
| Background Information: |
| A diagram of the hand, picture showing anatomy of the body and the bone structure of your hands |
| Lesson Procedures: |
| This activity works well with the following timing:   * 20 mins- explain background, introduce dynamometers, explain data collection process * 40 mins- students test their grip strength, record measurements in data sheets * 30 mins- data analysis, discussion around questions from handout |
| Assessment Procedures: |
| 1. Draw a picture of your hand (by feeling it for bones, muscles) 2. Examine the picture of your bone and hand structure 3. Test personal grip strength using the hand dynamometers, record results 4. Compile data from class, enter into spreadsheet, analyze results and look for similarities and comparisons 5. Discuss questions on handout, get students to think of further applications |
| Accommodations/Modifications: |
| \* Works best if each students work in teams of 5 to test and record – independently for the drawings in beginning |
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| Explorations and Extensions: |
| Biomechanics – artificial biceps, prosthetics, etc. |
| Reflections: |
| Please see attached handout for student questions. |
| Contact Information: |
| Center for STEM Education [www.stem.neu.edu](http://www.stem.neu.edu) or [stem@neu.edu](mailto:stem@neu.edu) |