iTeams Lesson Plan

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| Name of Lesson/Grade Level: Bike Gears/ 7th grade math |
| Big Idea/Focus of Lesson: Gear Ratios/Ratio and Proportion |
| Lesson of Overview: Students will work with bike gears to look at the ratio between, teeth number, crank turns, wheel turns, and distance traveled. |
| Materials: Bikes! |
| Core Content:  Science and/or Math Practices:   * Constructing viable arguments and critiquing the work of others.   Cross-Cutting Concept(s): |
| Assessment: Gears! Performance Assessment  How many speeds on a 21-speed bike? |

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|  | **Teacher will...** | **Students will...** |
| Introduction: | Show gear animation  Cardboard or 3D gears | Students will observe and generate questions |
| Student Exploration: | How many turns of the pedal would it take to turn the wheel a whole number of turns?  Can you set it up so that when you turn a whole number of turns of the pedal you turn a whole number of turns of the wheel?  Which gear gives you the farthest distance with the least number of pedal rotations? | Students will test different gear ratios to look at the relationship between gears and…  effort for pedaling  distance traveled  crank turns  wheel turns |
| Closure/Summary: | Show video clip on how gears work on a bike? | How many turns of the pedal would it take to turn the wheel a whole number of turns?  Can you set it up so that when you turn a whole number of turns of the pedal you turn a whole number of turns of the wheel? |

Resources:

<http://www.glencoe.com/sites/common_assets/mathematics/teacher/middle_school_resources/scimath_lab13.pdf>

<http://www.science-animations.com/support-files/m01gears.swf>

Gear Animations:

<http://apps.engr.utexas.edu/aim/curriculum/gears.htm>

<http://puzzling.caret.cam.ac.uk/game.php?game=25&>

<http://illuminations.nctm.org/Activity.aspx?id=3549>

Gear Template Generator

<https://woodgears.ca/gear_cutting/template.html>

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**GEAR EXPLORATION--JULIA**

I began by showing an animation of three interlocking gears.

<https://www.youtube.com/watch?v=kUPjcKF3hA8>

We talked as a class about…

* What kinds of objects have gears? (bikes, clocks, cars, toys, things that move)
* What do you notice about gears in the animation? (they are different sizes, the smaller one turns faster, some have more teeth)

I handed students a gear set and an observation sheet. The directions were to look for relationships between teeth and turns. They recorded their observations, reported out, added to their observations based on classmates’ responses, and then wrote a summary paragraph about the relationship between gears and teeth.





