

Gears Table

21-Tech Bridging Document

Exhibit Content Focus:

This exhibit focuses on how gears can be grouped together into gear trains to accomplish work. There are three types of gears, the driver gear, idler gears, and follower gear. The **driver gear** is the one that is turned. The **follower gear** is the one that does the work, and the **idler gears** are in between the other gears. A gear's rotation is dependent on its place in the gear train. Odd numbered gears (first, third, fifth, etc.) rotate one direction and even numbered gears (second, fourth, etc.) rotate the opposite direction.

Different size gears allow trains to either gear up or gear down. **Gearing up** is when a larger gear turns a smaller gear, causing faster movement but less power. Bicycles are examples of gearing up. **Gearing down** is when a smaller gear turns a larger gear, causing slower movement but more power. A carousel motor is an example of gearing down. Additionally, gear trains can become more advanced by stacking gears, thereby making it more efficient to gear up or down.

The gears component also highlights gear ratios and how the work a gear train is doing can be calculated using the gear sizes. The **gear ratio** is the relationship between the number of teeth on two gears that are meshed together. If the first gear has 24 teeth and the second gear has 12 teeth, their gear ratio is 24:12 or 2:1, which means the first gear doubles the speed of the second gear but half as much power. When the gear ratio is greater than 1 (ex. 2:1), the gear train is gearing up. When it is less than one, such as 1:2, the gear train is gearing down.

Related Apps:

- **Name: Groovy Gears**

- **Icon:**



- **Description:** Groovy Gears is a simple yet challenging puzzle game. Your task is to arrange gears of different size in order to make all output shafts rotate at the correct speed or gear ratio. Unlike other gear-based games, Groovy Gears allows you to stack multiple gears on top of each other, opening up a plethora of new possibilities.
- **Relation to Exhibit Content:** This app is a great way to give a challenge to a visitor on the gear table, and then be able to check their solution on the iPad to see if they come to a working conclusion.
- **Helpful Hints:** Be sure to highlight that the app has 3 sizes of gears, and our gear table also has 3 sizes of gears. This will make what is happening on the table look very much like what is happening on the app. Allow the kids to compare and contrast the gears on our table to the gears on the app.

- **Name:** Cogs HD

- **Icon:**



- **Description:** Cogs HD is a puzzle game where players build increasingly complex machines using sliding tiles in 2D and 3D environments. There are two different modes that can be played, Inventor and Challenge.
 - **Relation to Exhibit Content:** Application of the idea that gears can be arranged into to working gear trains to accomplish work.
 - **Helpful Hints:** Levels must be completed in the inventor mode before they can be attempted in the challenge mode.

Additional Information/Resources:

<http://www.dynamicscience.com.au/tester/solutions/hydraulicus/gears.htm>

http://www.youtube.com/watch?v=RSZvzVlyYk&feature=player_embedded#!