

FEATHERING GRIP AID

Reduced grip strength affects certain adaptive rower's ability to:

- ✱ maintain contact to the oar
- ✱ feather or rotate the oar
- ✱ the rower's overall comfort during extended periods of rowing

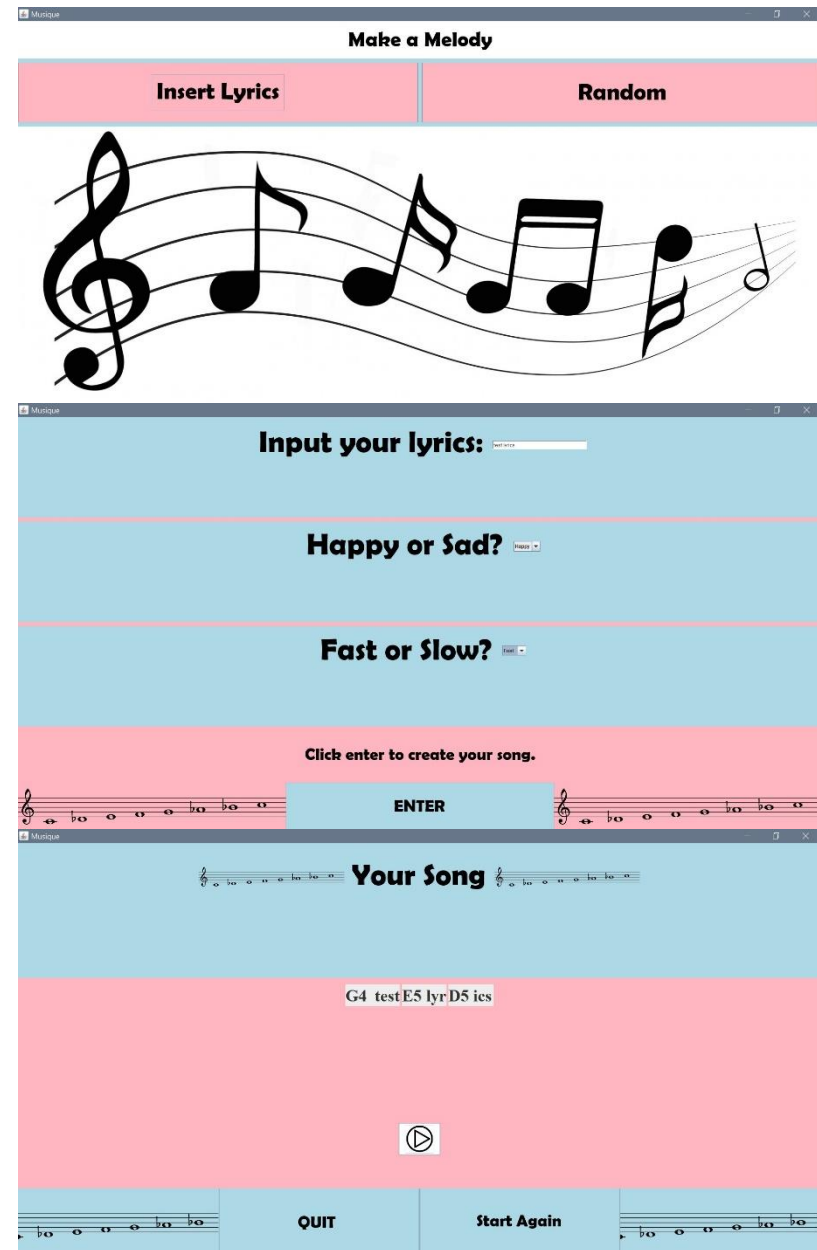
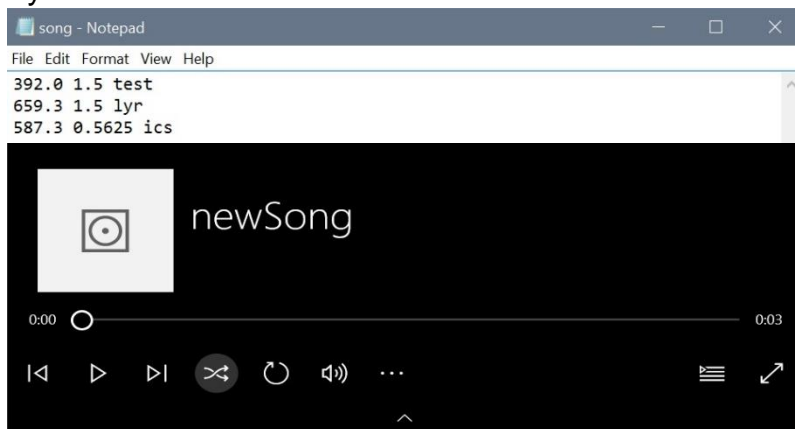
Companies have grip aids that help these adaptive rower's, but also compromise the rower's safety by being too restrictive and lack quick releases in the incident of a capsized. In our project, we worked with the adaptive rowers of Community Rowing Inc. (CRI). With our CRI partner, we created for him gloves that allow a solid connection to the oar, with optimal comfort and safety. Above is the final product, designed with bright orange

neoprene to increase visibility and a Velcro wrap around the wrist for quick release. Both features are geared towards safety but also added comfort. The wrap around the wrist creates support and the neoprene material is water resistant to ensure warmth. Additionally, our partner explained gloves can be difficult to use when his fingers curl, therefore we used less material on the top of the hand.



MUSIQUE

Musique is a simple random melody generator implemented on a Java GUI. The user must choose between creating a completely random song, which will choose from a collection of three poems, or inserting personal lyrics. The user can input their own lyrics, which will be digested by a Syllable class and determine where to break the words. Then the user chooses a mood of their melody, which randomly decides the scale of the song (i.e. a happy song will randomly choose one of the major scales we have provided in the program). Then the user chooses a tempo, which dictates the duration of each note (i.e. a sad song will have longer notes). Then if the user surpasses 500 characters or forgets to answer any of the three questions, they will not be able to press the enter button and be prompted to fix whichever mistake was made. The final song is displayed and the user can play their song, quit, or start again. Their song is also saved into a .wav file and the song's frequencies (Hz), durations(seconds), and syllables are saved into a .txt file.



MATH PUZZLE SERIES

Math is commonly seen as a hard and dreaded subject to people of all ages. Through math puzzles, our goal is to present math in a fun and visual way. These puzzles pose a new perspective on math, and strive to break down previous misconceptions of math. As well, each puzzle has a complementing worksheet with instructions and challenges to complete, like the one on the right.



The L - Puzzle



Challenge 1: 4 x 4

Have a partner place the black challenge square anywhere on the 4 x 4 grid.

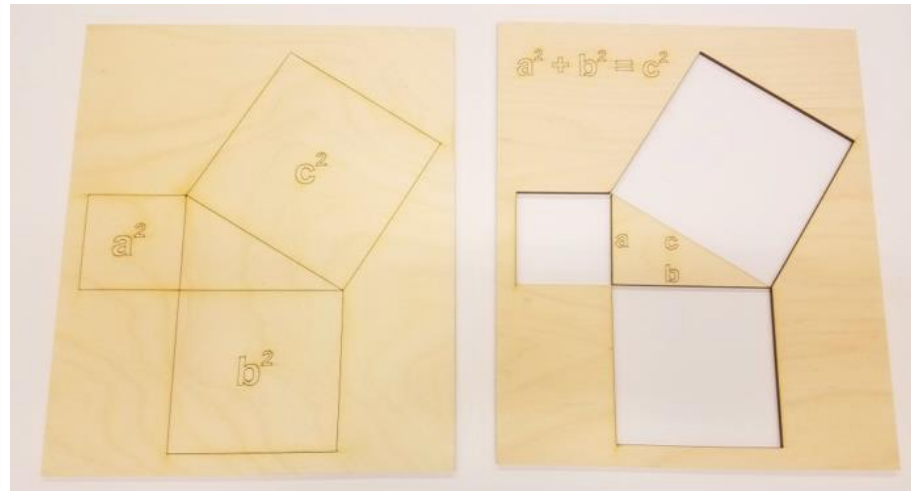
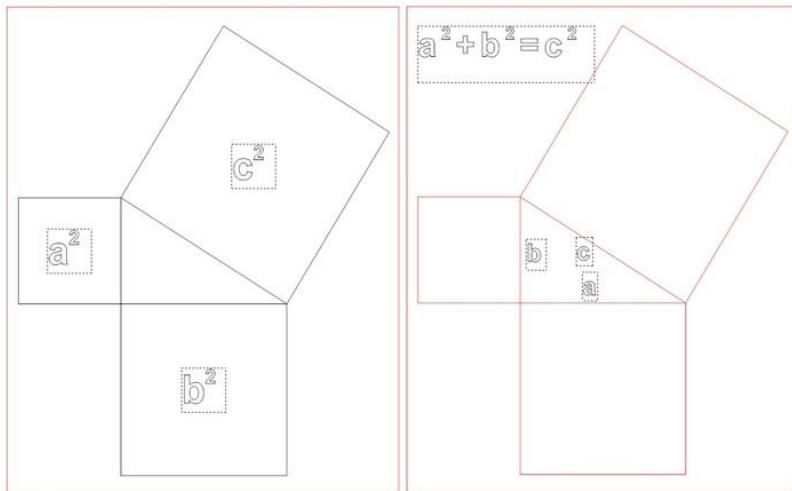
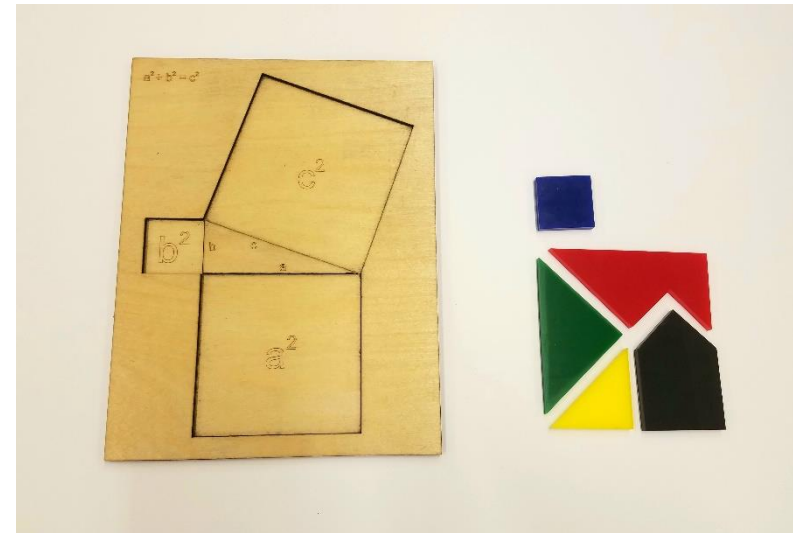
Can you tile the rest of the 4 x 4 grid with colored L-shaped tiles?

Challenge 2: 8 x 8

Can you tile the rest of the 8 x 8 grid with L-shaped tiles?

PYTHAGOREAN PUZZLER

The Pythagorean Puzzler is designed to introduce the Pythagorean Theorem and Pythagorean triples. The puzzle is designed with three squares, which the **a** and **b** squares have areas that add up to the **c** square's area. On a fundamental level, the puzzle demonstrates the Pythagorean Theorem, but also poses a fun challenge of trying to fit all the plastic pieces into the **c** square or all into the **a** and **b** square. Using files drawn on Corel Draw, the wood and plastic puzzle pieces are engraved and cut on a laser engraver. The puzzles are made with a sturdy Baltic birch wood and double layered to ensure the puzzles can withstand all age groups. As well, the pieces are made from a thick durable acrylic, but caution is advised for smaller children since smaller pieces can be placed in the mouth.

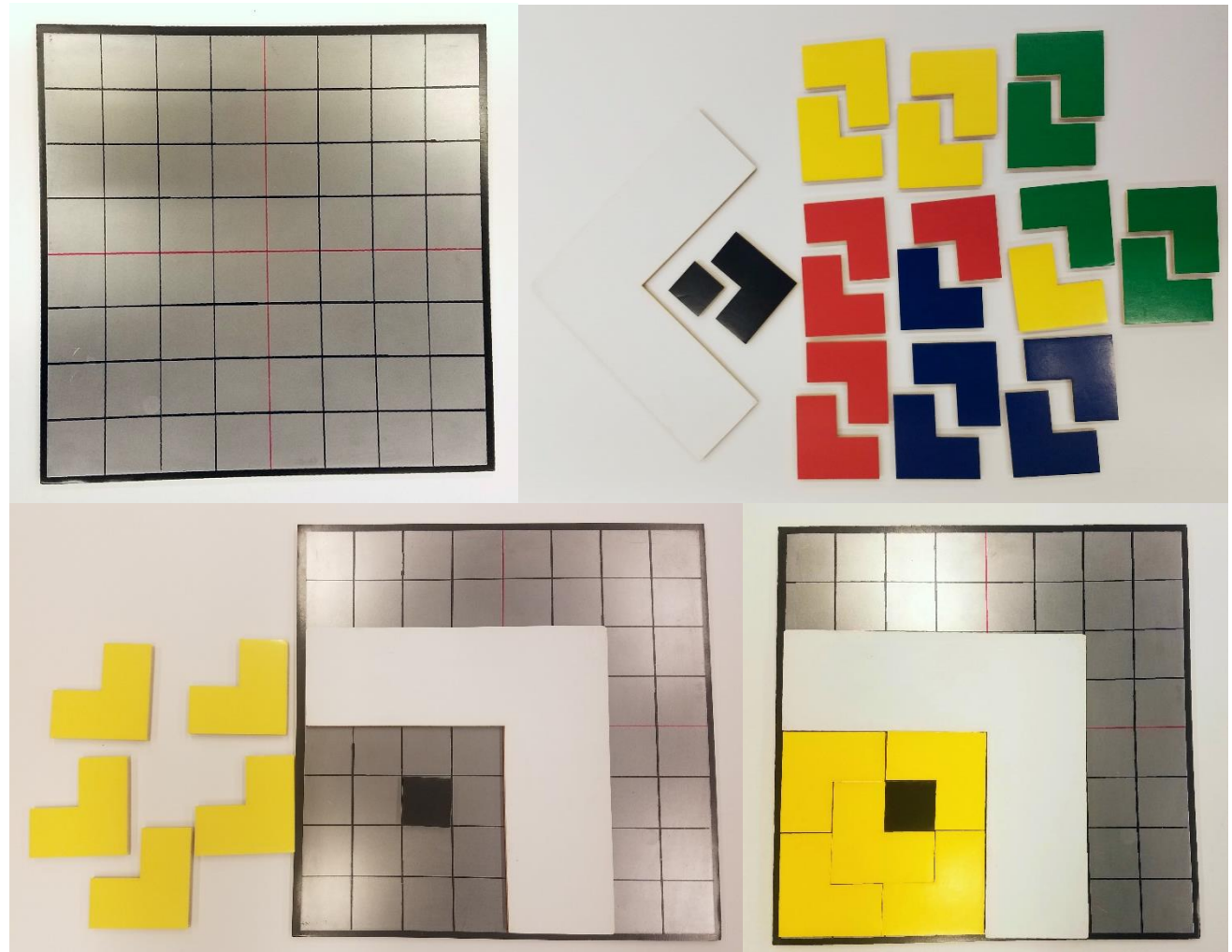


L PUZZLE

The L Puzzle introduces a Graph Theory about tiling. In graph theory, tiling is defined as when a surface can be covered by tiles without any extra surface being shown or any tiles overlapping. The puzzle pieces consist of trominoes (or the small L's), one square, and one big L.

The big L is to block off some of the main grid and start by working with a 4x4 grid. The user's first challenge is to tile the 4x4 grid with the one square and trominoes. Once the user solves this, the big L is removed and an 8x8 grid is the new challenge. The user will find out that the 8x8 can be tiled and this is due to the theorem:

Any $2^n \times 2^n$ grid can be tiled by one square and trominoes.



CARS AND BUSES

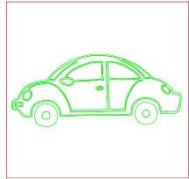
The goal of Cars and Buses is to show the Fibonacci numbers related by the recurrence relation:

$$F_n = F_{n-1} + F_{n-2}$$

with each
"bus"
representing
a 2-tile



and a "car" representing a
1-tile.



Then F_n equals the number of different ways you can "park" the cars and buses. The project is still in the beginning stages of prototyping and ideation, but these are some of the Corel Drawings and the first prototype. The first prototype was made on cardboard because our client, the Math Professor, was unsure of how big she wanted the puzzle. On the prototype, the added paper and sticky-notes are details she realized she wanted to add for the next prototype. Before the next prototype, I will experiment with vinyl stickers versus plotter paper as labels and their compatibility on wood and with varnish.

