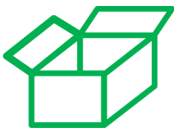


## CHALLENGE #5: MINI GOLF COURSE (EXPLORATORY)

### YOUTH WILL BUILD A MINI GOLF COURSE THAT INCLUDES OBSTACLES



#### MATERIALS:

Gift wrap tube, meter stick, cardboard, masking tape, ball, plastic cups, toys and other materials found around your home.



#### VOCABULARY:

**LAW OF REFLECTION:** The angle at which light moves toward a smooth surface is the same as the angle at which the light leaves the smooth surface. In other words, the incoming angle (angle of incidence) is the same as the outgoing angle (angle of reflection). This principle is the same for objects bouncing off of a flat surface. When banking a ball off of a wall, the angle at which it leaves the wall will be the same as the angle at which it came toward the wall. We use this in playing pool, indoor soccer, hockey, and basketball.

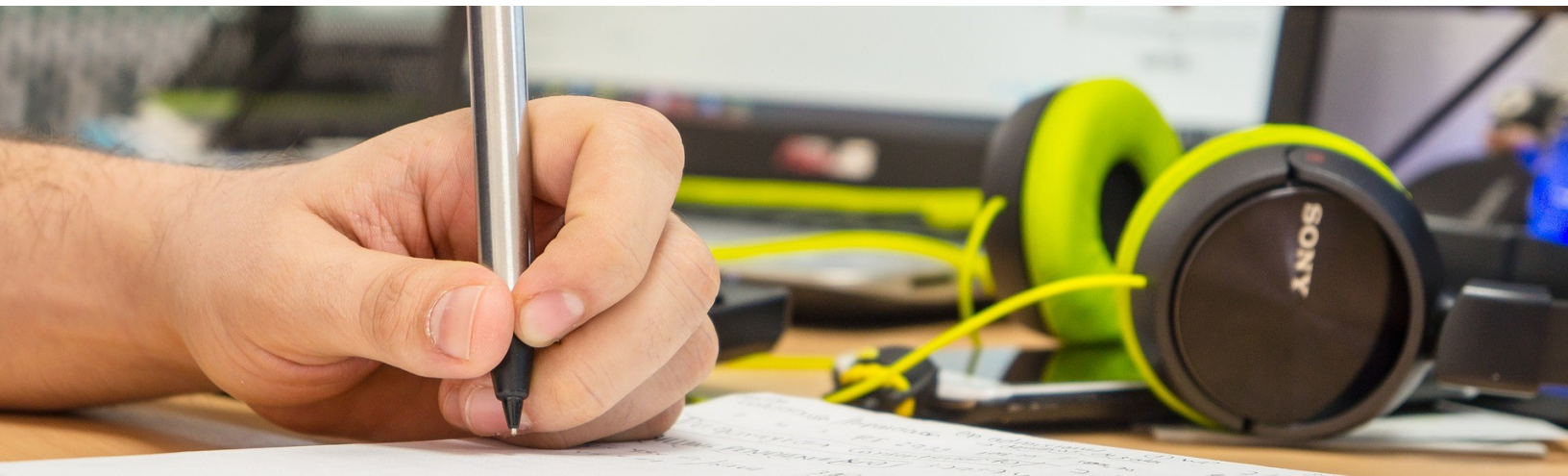


#### 4-H LIFE SKILL:

**PLANNING:** A mini golf course is designed to present a bit of a challenge. When you **PLAN** your holes, try to include at least one obstacle per hole that blocks the path of the ball from start to finish. It could be placing a book in between the start and the finish, or it could be designing a hole that curves around a wall.

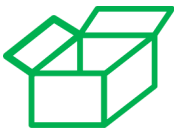
### DO: YOUTH COMPLETE THE ACTIVITY

Watch the challenge: <https://go.umd.edu/mgchallenge>



## CHALLENGE # 5: MINI GOLF COURSE (GUIDED)

### YOUTH WILL BUILD A MINI GOLF COURSE THAT INCLUDES OBSTACLES



#### MATERIALS:

Paper towel or other cardboard tube such as a gift wrap tube, cardboard, masking tape, ball, plastic cups, other materials found around your home



#### VOCABULARY:

**LAW OF REFLECTION:** The angle at which light moves toward a smooth surface is the same as the angle at which the light leaves the smooth surface. In other words, the incoming angle (angle of incidence) is the same as the outgoing angle (angle of reflection). This principle is the same for objects bouncing off of a flat surface. When banking a ball off of a wall, the angle at which it leaves the wall will be the same as the angle at which it came toward the wall. We use this in playing pool, indoor soccer, hockey, and basketball.

#### LIFE



#### SKILLS

#### 4-H LIFE SKILL:

**PLANNING:** A mini golf course is designed to present a bit of a challenge. When you **PLAN** your holes, try to include at least one obstacle per hole that blocks the path of the ball from start to finish. It could be placing a book in between the start and the finish, or it could be designing a hole that curves around a wall.



#### DO: YOUTH COMPLETE THE ACTIVITY

Watch the challenge: <https://go.umd.edu/mgchallenge>  
then follow steps 1-5 on the following page.

## CHALLENGE #5: MINI GOLF COURSE (GUIDED STEPS ONE THROUGH FIVE)

### STEP 1. IDENTIFY THE PROBLEM

Design and build a mini golf course using items you have around your home. Plan at least one hole that uses a “bank shot” to get to the cup.

### STEP 2. IMAGINE SOLUTIONS

Think about all of the possible ways you can make your golf club and course. Here are some ideas to get you started. You can use a paper towel or gift wrap tube for the shaft of the golf club, and tape cardboard from a cereal box or a folded paper plate to one end as the head of the club.

The most fun mini golf courses have obstacles. What creative things can you use as obstacles in your golf course? Toys, books, and furniture legs make good obstacles. Remember to try to bank the ball off of a wall or book to use the **LAW OF REFLECTION**.

### STEP 3. PLAN POSSIBLE SOLUTIONS

Plan how you want to make the golf club. Plan how and where you are going to set up your golf course. Decide where each hole starts, where the ending cup will be placed, and what obstacles will be placed in between.

### STEP 4. CREATE YOUR MINI GOLF COURSE

1. Fold a paper plate or cardboard around one end of the tube and tape the ends together to make the head of the golf club. Tape the head to the tube so that it will hold together.
2. Set up your golf course so that each hole has a beginning, obstacles, and a cup. Try to bank the ball off of something to see the law of reflection in action.
3. Challenge your family to try to get the ball to the end cup at each hole in as few hits as possible.

### STEP 5. IMPROVE YOUR DESIGN

Do you need to change anything to make your golf club or golf course better or more challenging? You can go back to Step 1, and start the process again to make the changes to improve your golf course.

## CHALLENGE #5: MINI GOLF COURSE

### REFLECT: GUIDE YOUTH THROUGH THE REFLECTION PROCESS

See a solution here: <https://go.umd.edu/mgsolution>

Did your final mini golf course look exactly like the **PLAN** you created? Why or why not?

How did understanding the **LAW OF REFLECTION** help you design and play your game?

What effect did challenging your family members to play your mini golf course have on how you felt about it?

### APPLY: CHALLENGE THE YOUTH TO APPLY WHAT THEY'VE LEARNED TO OTHER PARTS OF THEIR LIVES

If you have played mini golf before, how was your game similar or different to it?

Now that you have successfully created a mini golf course, what other games could you recreate with household materials? Could you develop a new game to challenge your family members?

### REFERENCES:

D'Augustino, T. D. (2016, March 16). *4-H family engineering night engages youth in science*. Michigan State University. [https://www.canr.msu.edu/news/4\\_h\\_family\\_engineering\\_night\\_engages\\_youth\\_in\\_science](https://www.canr.msu.edu/news/4_h_family_engineering_night_engages_youth_in_science)

Finio, B. (n.d.). *Mini golf physics*. Science buddies. <https://www.sciencebuddies.org/stem-activities/mini-golf-physics>