

GAMERS STEM CHALLENGES



FOOSBALL TABLE • GAME CODING • PINBALL MACHINE

GAMERS

STEM Challenges



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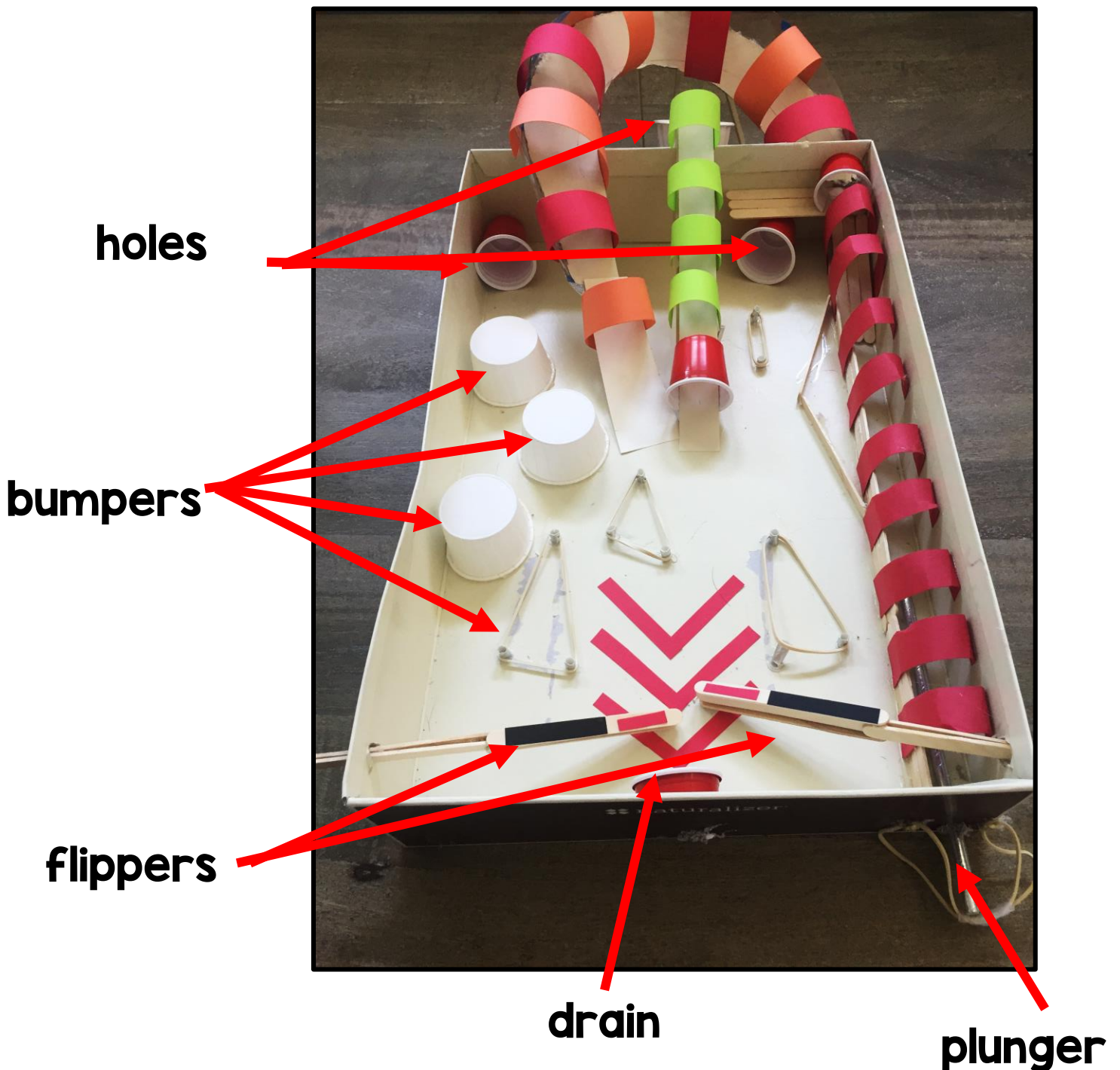
[Kevin & Amanda Fonts](#)
[KG Fonts](#)



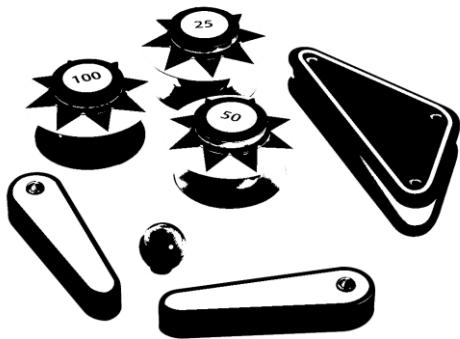
CHALLENGE #1:

Required
Functioning Parts
in the Challenge:

Create a Pinball Machine!



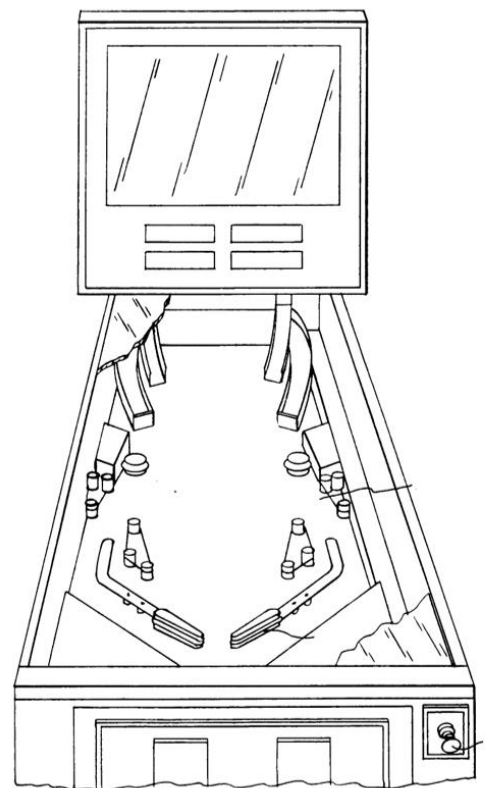
The Mechanics & How to Play Pinball



In Pinball, the player uses the **Flippers** to direct the ball through different parts of the machine. Students can create different types of **obstacles**, **bumpers**, and holes to earn points in their game. Pinball machines typically use three balls (marbles). The ball is launched by using the **plunger**, which propels the ball forward. The player wants to avoid the ball reaching the **drain**, which is the hole in between the two flippers. Students will need to create a stand so that their Pinball machine is tilted forward towards the player.

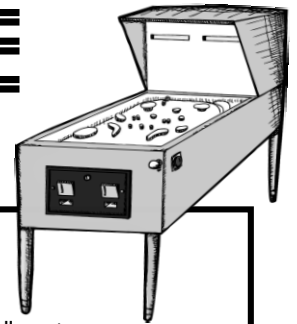
Tips:

- The most important mechanism in your design is the **plunger**. Focus on that part of the machine first. What are tools you can use to launch the ball?
- Have fun with your design creating loops and slides, but do not forget that they still have to function properly!
- Test the machine with your marble while you are building. Don't assume everything will function properly without testing it as you go.
- Your Flippers need to be able to move independently of each other and not only up and down at the same time.



PINBALL MACHINE

STEM CHALLENGE



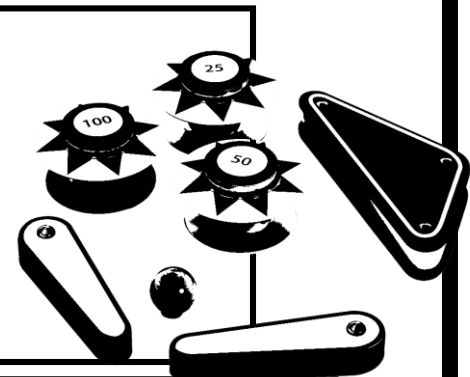
The STEM Challenge:

Using the supplies below, students must design a Pinball machine that contains the following properly-functioning parts: **Flippers, drain, holes, bumpers, and plunger**. For extending learning, students can decide to incorporate a spring in the design of their plunger. Students must be able to successfully launch the ball using the plunger. They must have at least 5 obstacles such as bumpers and 3 holes that award points to the player. The Flippers must be able to function in preventing the ball from reaching the drain. Students have a week to create their design. They do not have to use all the materials listed below but cannot add any to the list.

Materials:

- Cardboard box
- Duct tape
- Construction paper
- Glue
- 3 Marbles
- Spring (extended learning - not required)

- Rubber bands
- Mini cups
- Straws
- Plastic bottles
- Scissors
- Popsicle sticks
- Cardboard
- Ruler



OUR STEM GROUP

Student Names:

Predict:

Predict how difficult this challenge might be. What are some difficulties you might run into while trying to complete this challenge?

Brainstorm:

How are you going to tackle this challenge? How do you plan on designing the plunger?

PINBALL MACHINE

STEM CHALLENGE



TRIAL 1:

Notes:

Drawing:

TRIAL 2:

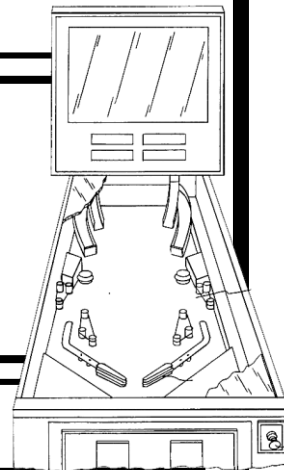
Notes:

Drawing:

TRIAL 3:

Notes:

Drawing:



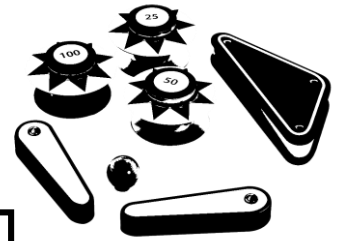
END RESULT:

Drawing:

PINBALL MACHINE

STEM CHALLENGE

Reflection



Did you complete the challenge? Yes or No? _____

Additional features in your design: (such as loops and slides)

If you did NOT complete the challenge, what would you do differently next time?

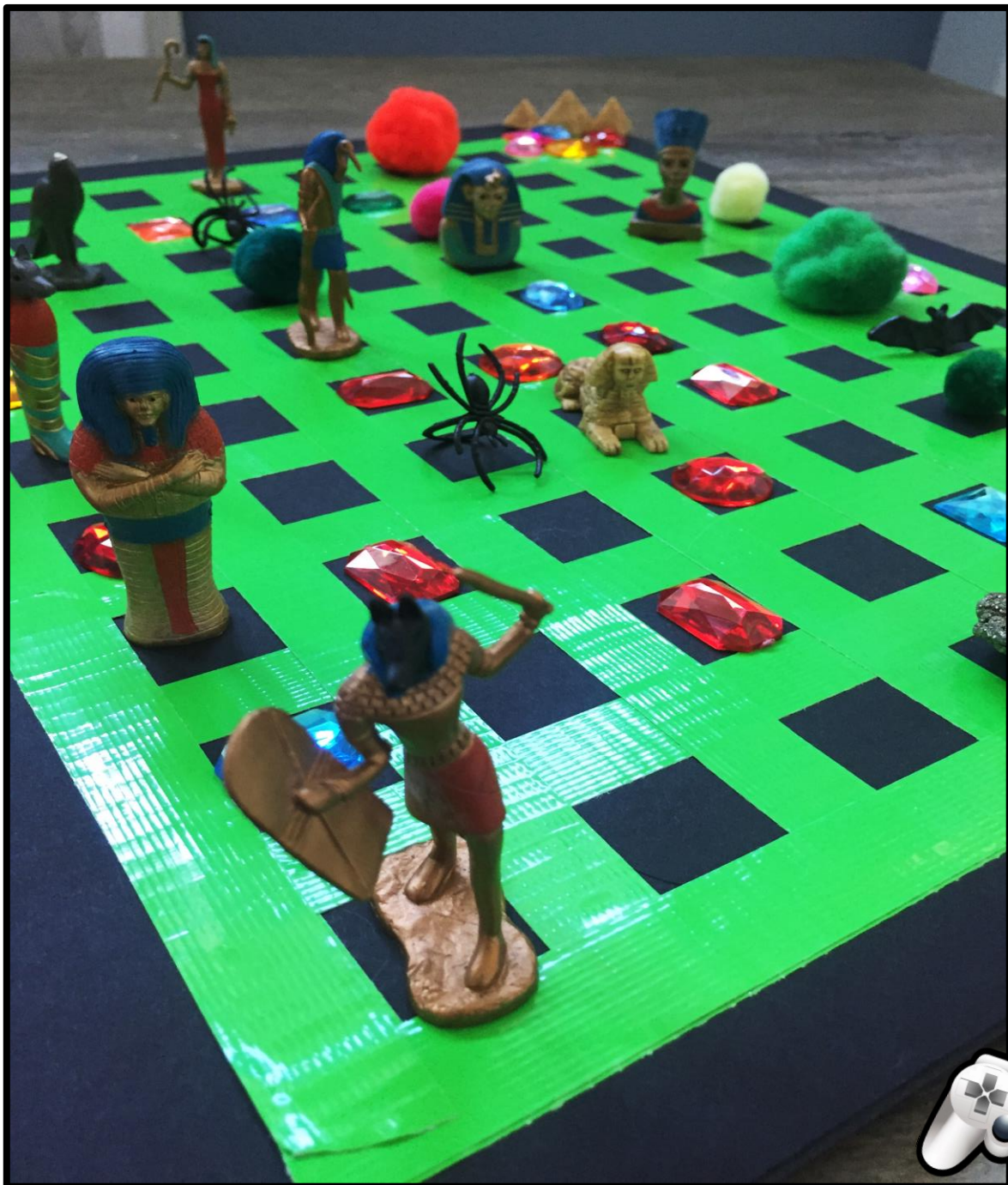
Were your predictions correct? How so? If not, what occurred instead?

Did you enjoy completing this challenge? If you could change it in any way (ex: materials, time restrictions), what would you change and why?

CHALLENGE #2:



Code a Video Game Challenge!



Directions: Coding a VIDEO GAME

Designing an entire video game is a large undertaking, but students can learn about the process during this STEM activity! They first must decide on their concept and the purpose of the game. What is the player of the game trying to achieve while playing? Who are the characters (heroes and villains), what are the obstacles, and what are the commands that the player uses to win the game?

Examples of commands are: moving up, down, across, or a type of battle move. Students need to be very clear on the commands they come up with and how they serve a purpose. If their game board has an obstacle made of ice, do they have a specific command to melt it? Is there a boss at the end of the game that takes multiple commands to take down? **Get creative with the commands!**

Using poster board and duct tape (or drawing lines) students must create a grid of their 3-D game. Inside the boxes of the grid, obstacles, rewards, and characters can be placed. There must be a starting point and a finishing point of their game. There must be a possible way for the player to win the game.

**** In their groups, students will first work together to plan and design the board, obstacles, characters, villains, commands, etc. **Once the board is put together, students will split into two groups, the players and the programmers.** The programmers will be in charge of developing the game - placing the obstacles, characters, and **writing down the commands in the exact order (the code) that will allow the players to win the game.** It is up to the programmers how difficult they want their game to be. The players will try to beat the game that the programmers created. After they are successful, the players and programmers will switch roles so they each have a turn playing the game.





GAME CODING

STEM CHALLENGE



The STEM Challenge:

(Please read directions page first) Students will work together to plan and design a game with characters, obstacles, and commands. The game must have an **objective** with a **starting point** and a **finishing point**. It is up to the group how detailed they would like their game to be. Once the board is put together, students will split into their two groups - the **players** and the **programmers**. The programmers will be in charge of **developing the game** - placing the obstacles, characters, and **writing down the commands** in the exact order that will allow the players to win the game. It is up to the programmers how difficult they want their game to be. The players will try to beat the game that the programmers created. Players must document the list of commands they tried during each attempt of beating the game. After they are successful, the players and programmers will switch roles so they each have a turn playing the game. The new programmers can now move the obstacles. Students have 3 days to complete this challenge.

Materials:

- Colored duct tape / washi tape
- Poster board
- Students choice of figurines for obstacles, characters, rewards, etc.
- Paper (or flashcards) for list of commands
- Markers (optional)
- Paint (optional)

OUR STEM GROUP

Student Names:

Predict:

Predict how difficult this challenge might be. What are some difficulties you might run into while trying to complete this challenge?

Brainstorm:

How are you going to tackle this challenge? What materials do you plan on using for characters and obstacles? What are some ideas you have for the design?

GAME CODING

STEM CHALLENGE



TRIAL 1:

Notes:

Drawing:

A large empty rectangular box intended for drawing, located to the right of the notes for Trial 1.

TRIAL 2:

Notes:

Drawing:

A large empty rectangular box intended for drawing, located to the right of the notes for Trial 2.

TRIAL 3:

Notes:

Drawing:

A large empty rectangular box intended for drawing, located to the right of the notes for Trial 3.

END RESULT:

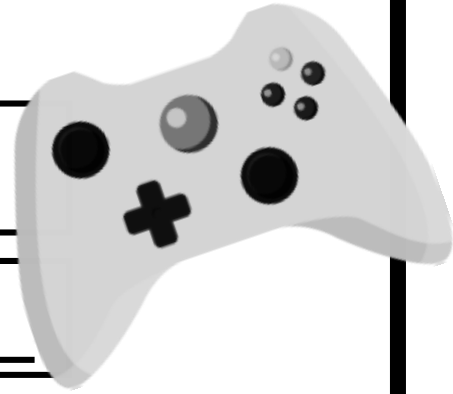
Drawing:

A large empty rectangular box intended for drawing, located to the right of the notes for the End Result section.

GAME CODING

STEM CHALLENGE

Reflection



Did you complete the challenge? Yes or No? _____

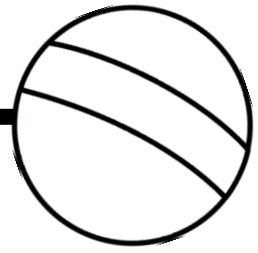
While you were the programmer, on a scale of 1 - 10, how difficult was it to beat your game? _____

If you did NOT complete the challenge, what would you do differently next time? _____

Were your predictions correct? How so? If not, what occurred instead? _____

Did you enjoy completing this challenge? If you could change it in any way (ex: obstacles, characters, time restrictions), what would you change and why? _____

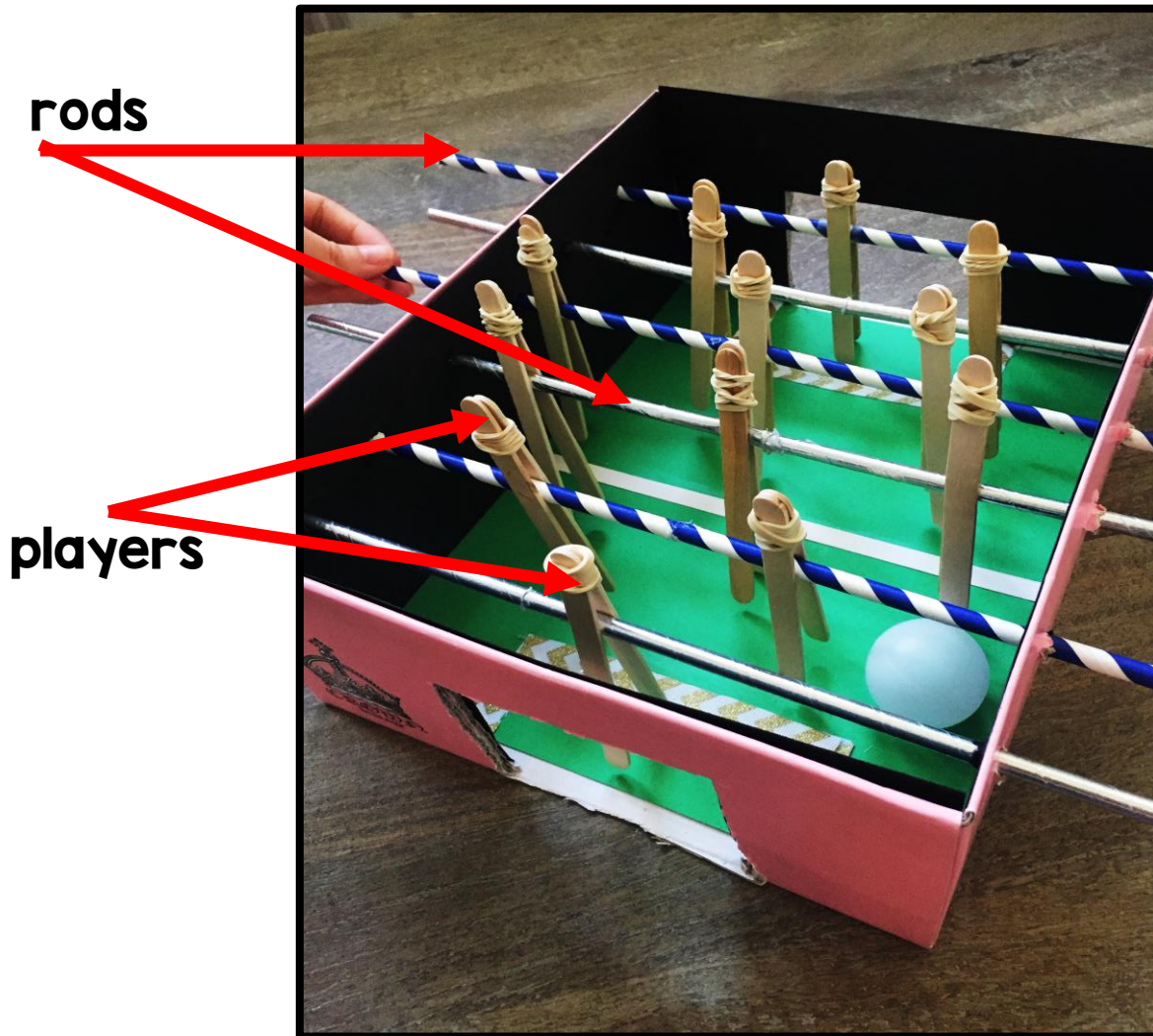
CHALLENGE #3:



Design a Foosball Table!



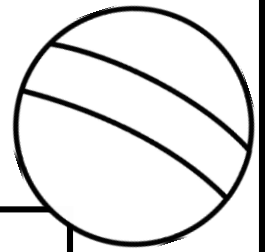
The Mechanics & How to Play Foosball



Foosball is also known as table soccer! Push, pull, and turn the rods in order to get your players to kick the ball into the opponent's goal. The rods are staggered with the home team and the opposing team players. There is one goalie player protecting your home goal. The object of the game is to get the ball in your opponent's goal.

FOOSBALL TABLE

STEM CHALLENGE



The STEM Challenge:

Students must construct a functioning foosball table that has at least 12 players (6 per player) and 6 rods. (3 per player) Students must be able to push, pull, and turn the rods properly to move the players. The players must be secure enough to not fall off and hit the ball properly. There must be two opposing goals that the ball can be knocked into by the players. Not all of the materials have to be used but students cannot add materials to the list. Students have 2 days to complete this challenge

Materials:

- Shoebox
- Ruler
- Straws (or skewers)
- Glue
- Popsicle Sticks
- Rubber bands
- Ping pong ball
- Construction paper
- Paint or markers
- Scissors

OUR STEM GROUP

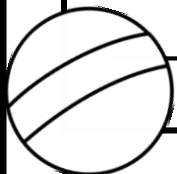
Student Names:

Predict:

Predict how difficult this challenge might be. What are some difficulties you might run into while trying to complete this challenge?

Brainstorm:

How are you going to tackle this challenge? What are some ideas you have?



FOOSBALL TABLE

STEM CHALLENGE

TRIAL 1:

Notes:

Drawing:

TRIAL 2:

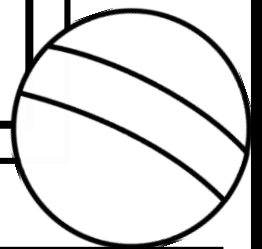
Notes:

Drawing:

TRIAL 3:

Notes:

Drawing:



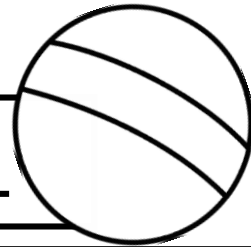
END RESULT:

Drawing:

FOOSBALL TABLE

STEM CHALLENGE

Reflection



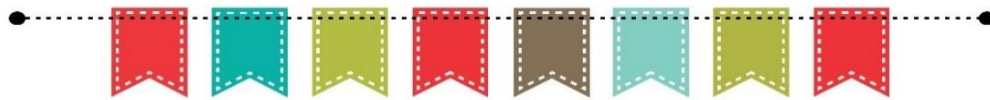
Did you complete the challenge? Yes or No? _____

How long did it take your group to complete the challenge? _____

If you did NOT complete the challenge, what would you do differently next time? _____

Were your predictions correct? How so? If not, what occurred instead? _____

Did you enjoy completing this challenge? If you could change it in any way (ex: materials, time restrictions), what would you change and why? _____



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ANSWER KEY INCLUDED!
STEM ACTIVITY • NGSS ALIGNED

VOLCANOES
Interactive Notebook
ANSWER KEY INCLUDED!
STEM ACTIVITY INCLUDED

sick?
worry-free
NO PREP!
sub plans

Trading Cards
Animals • Biomes • Adaptations

music exploration
in the classroom!
music genres
HISTORY • SOUND CLIPS • activities • art • creative fun

classical jazz rock country hip hop pop

"I'm done!"
"What do I do now?!"
Write a sensory poem. What do you see, hear, smell, feel, taste at this moment? Make a poem about it.

The Best Bored Busters!



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