Create a STEM Board Game

Our final STEM unit

Overview

- During the remaining days of the school year, you will be designing your own board game.

- Remember all those great games you have played in your life?

- Well, now you can make your own; your own rules, your own design, your own questions!

- One thing though…. you must relate it to some of the concepts we learned in STEM this year!

Brainstorm

- First, before you start thinking about your "new" design, you'll need to brainstorm a list of board games that you like to play, or ones that you have played before.

- Let's do that now....

Criteria

- If you would like, you can use the board games we talked about in class as a way to get you started on your own idea.

- Otherwise, you can create your own, unique idea for a board game!

Criteria

- Something you need to keep in mind is that board games are fun, interactive, structured and are NOT TRIVIA GAMES.

- DO NOT make your game based on Jeopardy or Trivial Pursuit!

- Use your creative minds to think of ways to relate STEM to your board game.

Game Requirements

- You will work in teams of 3 to 4 students.

- Each board game made must have the following items included in the project:

- <u>Playing board</u>: including game pieces and any necessary devices to complete your designed game

  - <u>Board must be an original</u>, not one taken from a previously owned board game

Game Requirements

- <u>STEM Theme</u>: Game theme, questions, statements, layout, design must be related to STEM topics and concepts

- <u>Rules</u>: The rules must be written out, understandable, and applicable to the game you created

Game Requirements

- <u>Directions</u>: how to play the game
- <u>Organized</u>: Everything about your board must be neat and organized

Game Requirements

- <u>Creativity</u>: Creative, colorful and pretty! Who wants to play a game with no character!

- <u>Playable</u>: Your board game must be playable-you will play each other's games at the end of the project!

Grading

- Your games will be <u>graded</u> on the following criteria
- Related to STEM, using key terms, themes and concepts from the year
- Creativity, uniqueness of the game

Grading

- Neatness, and organization of the game
- Directions of the game MUST be either typed up or written VERY neatly
- Rules and directions of the game MUST described very well, so people know what they can and cannot do!

Grading

- Use CORRECT grammar, spelling, and punctuation in all directions, rules, and on game board—*your game needs to be understandable!*

- Playability—if you make it, you are going to want to play it!

- On your handout, I have given you a Rubric to help you get the grade you want!

How to Build a Board Game

- A homemade board game is just the thing to impress everybody on your next game night.
- But before you unveil your masterwork, you'll have to design the basics, like goals and rules.
- Once that's taken care of, you're ready to mock up a prototype so you can test your design.
- After the kinks get worked out in testing, all you need to do is create a polished finished product and you'll be all set for game night.
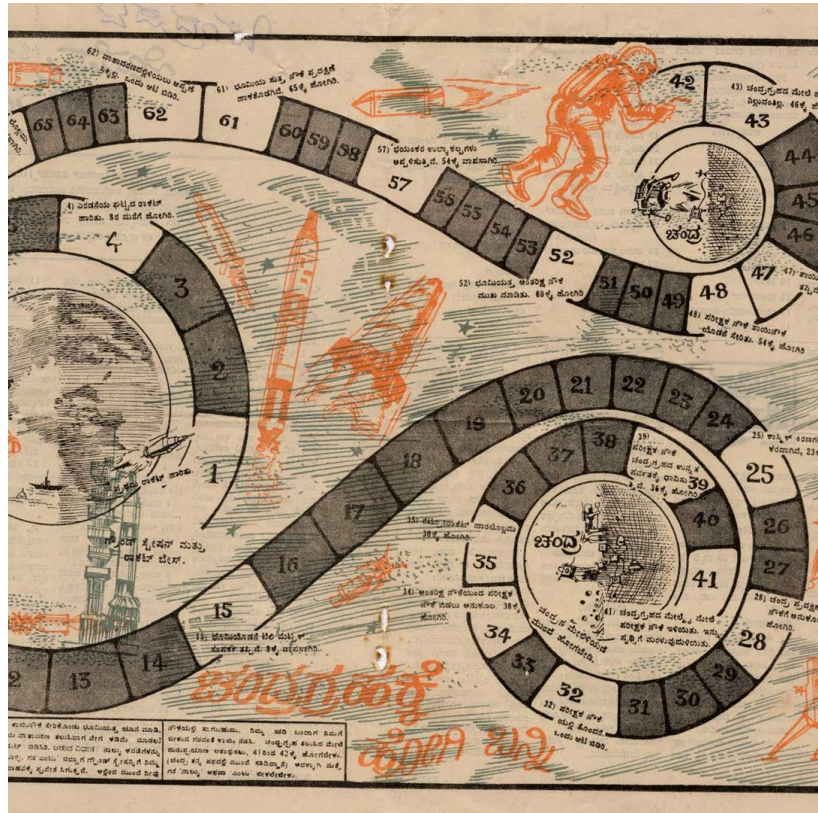
Write Down Your Ideas

- You never know when the perfect inspiration is going to hit.

- Playing games might spark the perfect idea for your own game.

- When using store-bought games for inspiration, ask yourself, "What would I do to improve this game?"

- This question can often lead you to interesting innovations.

Develop Your Game with a Theme

- Themes are the "feel" of a game and can also be referred to as the game's "genre."

- Games like Sorry! have a simple "race to the end" theme.

- Complex wargames have conflicts, player politics, and game piece placement strategy.

Develop Your Game with a Theme

- You might find inspiration for the theme of your game in your favorite novel, comic book, or TV series.

- Mythology and legends are often used when developing themes.

- Detective games or even Escape Room games are popular!
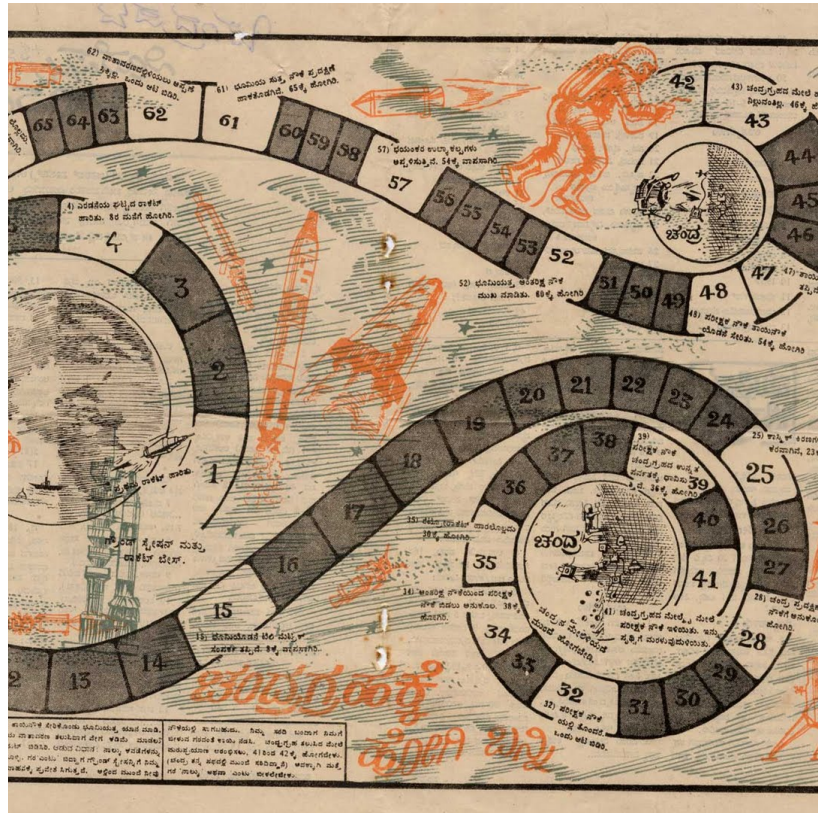
Use Mechanics to Develop Your Game

- Mechanics are the ways players interact with the game and each other.
- In Monopoly, the mechanics are centered around dice-rolling, buying/selling property, and making money.
- The mechanics of Axis & Allies involve moving pieces across a large board and resolving player conflicts with dice rolls.

Use Mechanics to Develop Your Game

- Common mechanics you might be interested in using include turns, dice rolling, movement, card drawing, and more.

Set Player, Time, & Size Limits

- Set player, time, and size limits for your game.
- Some games are limited by the size of the board, the number of player tokens, or the number of cards.
- Game board size and the number of cards will also influence how long it takes for players to complete your game.

Set Player, Time, & Size Limits

- When setting these limits, think about:
- The number of players your game will support.
- Will the game be fun with just two players?
- How about with the max number?
- Will there be enough cards/tokens?
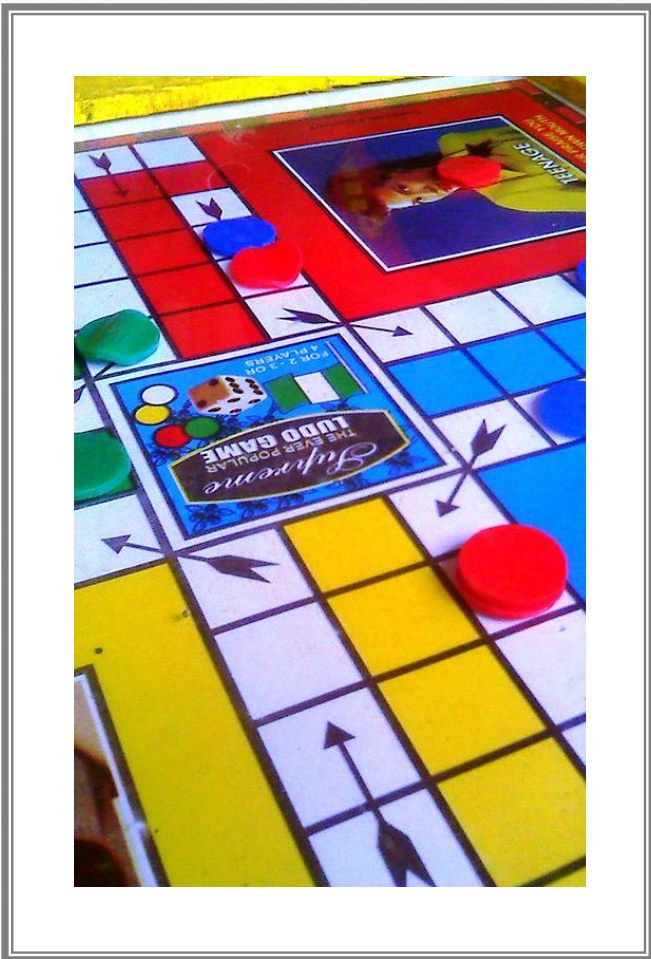
The Average Time to Complete a Game

- How long should the game be?
- Should there be a time limit?
- Remember that the first playthrough of a game generally takes longest.
- Also, players will need time to learn the rules.

The Size of Your Game

- Large game boards and decks will usually add complexity and lengthen the game time, but this will also make your game less portable.

Decide How Players will Win

- Once you have the basic ideas behind your game written down, ask yourself, "How can players win the game?"

- Consider the different ways that the player could win, and keep these in mind as you work on the game.

Ways Players Can Win

- <u>Race games</u> have players hurry to the end of the board. In these games, the first player to reach the final square wins.

- <u>Point-gain games</u> require players to accumulate awards, like victory points or special cards. At the end of the game, the player with the most points or awards wins.

Ways Players Can Win

- Cooperative games involve players working together toward a common goal, like repairing a submarine, stopping a virus outbreak, or escaping from a fictious locked room.

- Deck-building games rely on cards to move gameplay along. Players earn, steal, or trade cards to strengthen their hand to accomplish the game's goals.

Write Out the Basic Rules

- These rules will undoubtedly change as you continue to develop your game, but a basic set of rules will allow you to begin testing quickly.

The Starting Player

- When writing your rules, keep the following in mind: *The starting player.*

- Many games choose the first player by having players roll dice or draw cards. The highest roll or card goes first.

The Player Phase

- What do players do during their turn?
- To balance turn time, most games only allow one or two player actions per turn.

Player Interaction

- How will players influence each other?
- For example, players on the same square might "duel" by rolling for the highest number.
- Or they might have to go back to the beginning.
- Think about ways your game rules would handle this.

The Non-Player Phase

- If there are enemies or board effects (like fires or floods), you'll need to establish when these occur during gameplay.

Outcome Resolution

- Outcomes might be decided with a simple roll of the dice.

- Special events might require specific cards or rolls (like doubles).

Use Prototypes to Test Your Game

- Before you begin work on the finished product, create a rough prototype (test game) so that you can play around with it.

- It doesn't have to be pretty, but a hands-on experience will help you to see if the basics work the way you planned.

- A prototype is a vital part of the game creation process, as it gets ideas out of your head and into the real world where you can evaluate them with other players.

Use Prototypes to Test Your Game

- Hold off on adding artistic details until you begin assembling the final product.

- Simple, pencil-drawn game boards and cards will allow you to erase and make adjustments as necessary.

- Sketch a rough draft of your board design. This will give you a sense of whether your board is too large or small.

Game Board Design

- Depending on the theme and mechanics of your game, your board may or may not include the following elements:
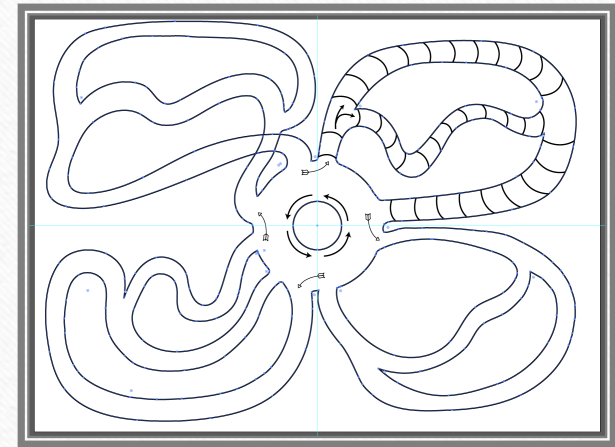
Game Board Design: A Path

- Simple games may have a single path that leads to a finish line, more complex path games may have splits or loops in the path.

Game Board Design:
A Playing Field

- Games that have a playing field do not have a set path.

- Instead, players move as they see fit.

- Sometimes these are through areas that are divided into squares or hexes.

Game Board Design: Landing Positions

- Landing positions can be depicted with shapes or images.

- They can have special effects, like allowing you to advance a square or draw a card.

Create Temporary Game Pieces

- Buttons, checkers, poker chips, chess pieces, Lego men, and knickknacks work well as temporary game pieces while you test your game.

- Avoid using game pieces that are too large for your prototype, since these can make it difficult to read information written on the board.

Create Temporary Game Pieces

Letters and Numbers Sorting Game
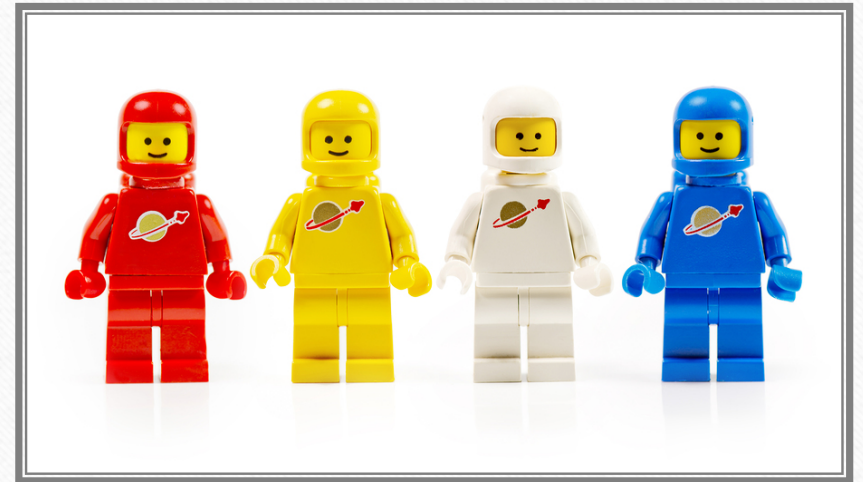
- Game pieces can change considerably over the course of your game's development.

- Keep game pieces simple so you don't invest a lot of time designing something that ends up getting changed afterwards.

Create Game Cards to Add Fun

- Randomly shuffled game cards will affect players in unexpected ways.

- A card often tells a quick story about an event that befalls a player and then changes their score/position/inventory accordingly.

- Decks have about 15 to 20 card types (like trap cards and tool cards).

- These types are limited to about 10 cards to a deck to create a balanced mix.

Test Your Prototype

- Once you have all of the basics assembled for your prototype, you can start testing the game to see how it plays.

- Before trying it out on a group, play it by yourself.

- Play through the game as each player and record any positives or negatives you notice as you play.

Test Your Prototype

- Adjust the number of "players" as you do to determine whether or not your game actually supports the minimum and maximum number of players.

- Find flaws in your game by trying to break it while solo testing.

- See if it's possible for players to always win with a specific strategy, or if there are loopholes in the rules that create an unfair advantage.

Test Your Prototype

- After you've solo played your game enough to work out most of the kinks, it's time to playtest with friends and family.

- Gather some friends or family and explain that you'd like them to test your game.

- Let them know that it's a work in progress and that you'd appreciate any feedback.

Test Your Prototype

- During playtesting, avoid adding any additional explanations.

- You won't always be able to clarify the rules.

- Take notes while the game is being played.

- Be alert for times people don't seem to be having fun or the rules get confusing.

- You'll likely need to improve these areas.

- Pay attention to players' ending position. If one player is consistently ahead of the other players, there's probably an unfair advantage.

Test Your Prototype

- Switch up the test players for a better perspective of your game.

- Everyone approaches games differently, and some might see things missing that you wouldn't have realized on your own.

- The more people you get to test your game, the more opportunities you'll have to find flaws or weak points and fix them.

Materials Needed

- Make a list of needed materials.
- Once testing is complete and you're happy with your game, you can get started on the final version.
- Each game will have unique needs, so your materials may vary.
- Make a list of all the parts your finished game will require so you don't forget anything.

Game Boards

- Game boards are traditionally mounted on chipboard or binder board.
- You can use an old game board as the base if you'd rather not purchase anything.
- Glue paper over it or paint it to hide the old game's layout.
- You can also use half of a sheet of poster board to give you the average sized board.

Using Cardstock

- Durable cardstock is useful both for covering game boards and making game cards.

- Simple tokens and counters can be made by cutting or punching circles out of cardstock.

Illustrate Your Game Board

- Your game board is the centerpiece of your board game, so feel free to get creative with the design.

- Make sure that the path or playing field is clearly marked and that all the instructions on the board are easy to read.

- Your imagination is the limit when decorating your board.

Illustrate Your Game Board

- Ready-made printouts, patterned paper, paint, markers, magazine cutouts, and more can be used to jazz up your board.

- A vibrant, colorful design will be more eye-catching to players.

- Color is also a great way of setting a mood.
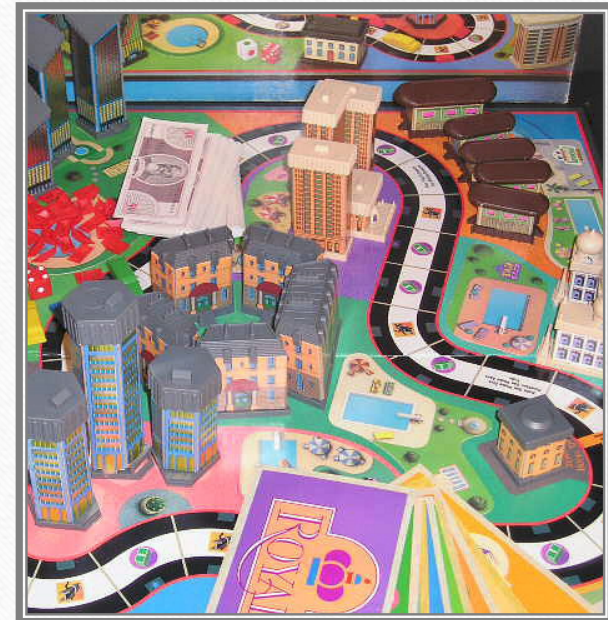
Create the Final Game Pieces

- The simplest way of doing this is by drawing or printing images on paper and then taping or gluing them to a sturdy backing, like cardstock.

- If you are making a game for family or friends, you can even use real photos of players.

- You can even try using homemade chess pieces, figurines sculpted from polymer clay, or origami animals for game pieces.

Dice or Spinners
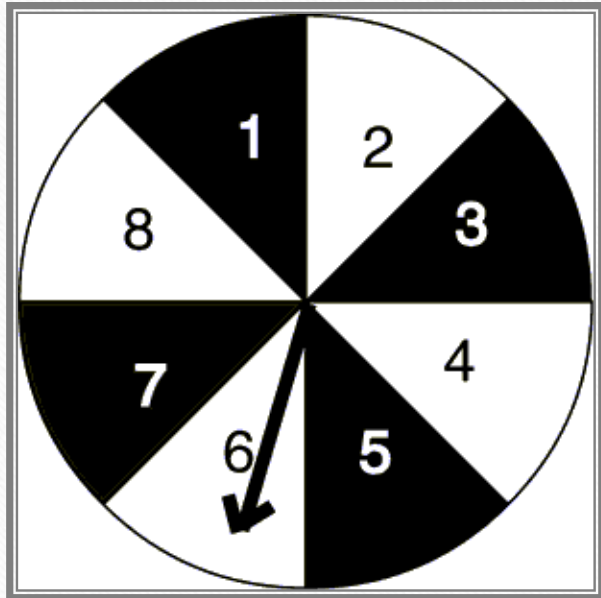
- If your game involves the use of dice or a spinner, you can use ones from old store-bought games.

- Create your own spinner with cardboard, a pushpin, and markers.

- Stick the pin through the base of a cardboard arrow and attach it to the center of a circular piece of cardboard, then draw the spinner options on the cardboard circle.

Dice or Spinners

- There are many different kinds of dice you can choose from.

- Dice with more sides are fun and will even decrease the odds of getting repeated numbers.

Game Cards

- Write out your game cards, when necessary.
- Homemade game cards can be made from cardstock.
- Use a normal playing card as a template when cutting so your cards are the same shape.

Game Cards

- Plain cards won't likely capture the interest of players, so use pictures, creative descriptions, and witty one-liners to make it fun!

- You can also create your game's cards using blank playing cards bought at a hobby shop to give your game a high-quality appearance.

Final Thoughts

- What you need to remember as you are thinking about this is to...
  - incorporate the information about STEM into your game while making the game educational, and
  - have fun with it!