

Key: Yellow highlight = required component

Achieve Amazing Amusement Games (maker challenge)

Maker Challenge Title Achieve Amazing Amusement Games

Grade level Target grade = 10 and *scalable* down to grade 6 and up to grade 12

Subject area(s) (Choose from [TE subject areas](#)) Measurement, Physics, Problem Solving

Estimated Time Required _____ minutes

Header image



ADA Description: Two skee ball machines
source: Creative Commons

Maker Challenge Recap

For this challenge, students will engineer an amusement park arcade game. Using the engineering design process, they will determine the rules, rewards, and functionality of the game. The game must be playable, have a reward system in place, and be able to be replicated by following the student group's design plans. Students will be allotted a budget to purchase materials for their game.

Maker Materials & Supplies

- budget worksheet with price listing for parts
- parts: cardboard, rubber bands, plastic spoons, duct tape, twine, marbles, rubber ball, balloons, craft sticks, glue cartridges
- freebies: glue gun, scissors, markers/crayons/colored pencils

Kickoff

Have you ever played an arcade game for prizes? What are some of the games you have played (skee ball, claw games, basketball hoop challenge, etc)? What motivated you to play these games (prizes, fun, etc)? Why do you think these games exist (to attract customers, make money for the business, entertain people, etc)? Why do you think engineering is important to the process of creating these games (design, physics, optimization). The purpose of these games is to entice customers to play them, and if they are not engineered correctly, players will become frustrated. The best designed games are fun to play, work as expected, and reward players, often while earning arcades money at the same time.

Engineers must take many factors into consideration when designing and building these games. The cost of the materials, how often players should be rewarded, and the expected age and abilities of the player are all important for the design of the game.

What are your ideas for a game? With your group (3 per group), you will use the engineering process to research, design, build, test, and improve/redesign (if needed) a game for the class to play. Record the process using the maker challenge design journal template. You have a budget of \$10 to build your design prototype.

Resources:

Maker Challenge Design Journal (https://www.teachengineering.org/content/documents/TE-design-journal-template_v4_tedl.pdf)

Pique student interest by showing this video on how to design a simple skee ball machine: <https://www.youtube.com/watch?v=rwCRG1RM-U4>

Access to a computer for research if needed (principles of physics, drag, etc)

Maker Time

Some prompts to ask students if needed:

What are the rules of the game?

Will your game have points? How do you win?

How many players at a time (single/multiplayer)?

What are the physics involved?

Is there a time limit?

What will make your game fun? What can make it more challenging (to prevent boredom)?

What can make it easier (to prevent frustration)?

Is there going to be a theme to your game?

What are some challenges you are experiencing right now? How can we address them?

What is the probability of success (winning)?

Insist students sketch a design before they begin “buying” materials from you. Remind them to leave money in the budget for redesign if needed.

Remind students failure is part of the design process and the best way to learn.

Wrap Up

As a class, have students share and play one another's games. Have students share out:

- Why they chose the design they did
- What was easiest about the process
- What was most challenging
- How many times did they have to revisit parts of the engineering design process
- What did they like most about other classmate's designs?

Attachments

Maker Challenge Design Journal (https://www.teachengineering.org/content/documents/TE-design-journal-template_v4_tedl.pdf)

Budget worksheet

(<https://docs.google.com/document/d/17EIO059vdo974gdRr5FDvTuRkhhaX3WLGU8VG2tMS8w/edit?usp=sharing>)

Tips

If you want this to be more challenging, here are some suggestions: Set limits on how many of each/certain items. Have students do statistical analysis of expected values (using cost per play and how often success is experienced). Change the cost of the items, or the given budget. Set a minimum amount of actions for the game (a la Rube Goldberg machine).

Other

none

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Maker Challenge Testing Info