

Designing and Building An Action Game: Grade 8

Understanding Structures and Mechanisms - Systems In Action

Understanding Matter and Energy - Fluids

Introduction: This project can be done individually or in groups of two. Students design and build their game after constructing the base structure seen in the diagram below. Maze games work well.

Prior Knowledge and Skills Students will need in order to complete this activity:

- How to use appropriate techniques and materials for building structures
- How to set up fluid power systems to achieve maximum mechanical advantage.

Materials:

- 1 piece of wooden dowel (supports the game board)
- Game board 30 cm x 30 cm. can be made from a thin piece of hardboard or from a thick piece of cardboard
- 4 syringes preferably 2 different sizes (provide the force to move the game board). The follower syringes are placed in diagonally opposite corners through holes drilled in the game board
- 1 piece of plastic tubing about 100 cm long
- 1 block of wood about 10 cm long (a piece of 2x4 would work well for the base for the game)
- Strips of wood to create the game surface ("jinx" wood or Popsicle sticks)
- Marble or game pieces



Scenario: The Internationally famous firm of "Games R Us" is looking to expand into the educational market. They would like to produce games that are educational but yet are entertaining and interesting, especially to teenagers. The "Games R Us" game designers, feel that a game involving pneumatics and hydraulics would be suitable but do not have the knowledge necessary to create a game of this type. They have therefore approached you to design and construct a prototype (model) of a game that meets the following design specifications (requirements). Final proposals, including prototypes, are due at the close of business on _____(date).

Design Specifications The game must:

- be operated using hydraulics or pneumatics (the syringes are used to control the rolling movement of the marble through the maze design on the base)
- be challenging enough to hold the interest of a teenager
- there must be a place provided for the storage of all loose parts
- be constructed out of the materials provided

Students will be required to submit:

- prior to the building stage - 3 rough sketches, final design choice, operations planning list.
- at the end of the design process - completed prototype, final design diagrams, self evaluation

Assessment and Evaluation:

Evidence of Student Learning: Design notes and drawings, working model, understanding of Mechanical Advantage, demonstration of knowledge of design process, presentation of design and model

Criteria: safe, appropriate, and effective use of materials and tools, design specification requirements are met, accurate Mechanical Advantage calculations, presentation shows understanding of key learnings, including use of design process.