

Intricacies of Design

Overview:

Da Vinci was constantly searching for more efficient ways to accomplish tasks through machinery. He was fixated on the use of simple machines to operate more complex, larger machines for various uses. His interest in the theoretical concept of force was his motivation behind many of his creations' unique designs or enhancements to current technology of the time. Many of his ideas were anticipations of the inventions during the industrial revolution.

What you need:

- Images of Leonardo da Vinci's machines (books, photographs, Internet searches, etc.)
- *Mouse Trap*© game by Milton Bradley (multiple to use for several small groups)
- Access to Internet
- Simple Machine Definitions handout
- Pre-made journals from "Leonardo's Journal" lesson, or other journal of choice

Teaching Strategy:

- Review simple machines: lever, wheel and axle, inclined plane, wedge, screw, and pulley.
- Discuss with learners how simple machines create

complex machines and give examples. Have learners locate examples in the classroom.

- Learners create a list of simple and complex machines they are familiar with or use on a daily basis.
- Set up all game boards prior to game play.

What to do:

- Create small groups of learners (no more than four per group) and allow time for each group to play *Mouse Trap*©. As learners play the game, they should record the various simple machines at work during play as well as the cause and effect relationships amongst the parts.
- Learners should then work together as a group to take apart the game board and record any further simple machines that were not previously recorded as well as their reasoning as to why they were unaware of them during play.
- Discuss as a group the simple and complex machines within the game.

- Distribute images of Leonardo's machines for learners to examine and locate simple machines used within. Learners should record their thoughts on the purpose of the machine, simple machines used, connection of simple machines, and materials used for each image in their journals.
- After completion of observations, discuss learner notes as a class and create a chart with pictures and coordinating information. Add detailed information for each picture after learners do further research.

Extensions:

- Learners explore www.rubgoldberg.com and explore the use of simple machines within his cartoons. Learners may create their own drawing and share with the class. Learners may

- then physically create the machine in their cartoon.
- Go on a scavenger hunt of the local community as a field trip to locate as many simple machines as possible. Graph the findings and discuss the reasons behind the simple machines used the most and least often.
 - Explore Newton's theory on force and motion as it correlates to machines.
 - Create centers for experiments involving each simple machine.
 - Learners invent a new use for a simple machine or a new tool that utilizes a simple machine. Have them make a detailed graphic of their design and a list of materials needed as well as construction needs. After solidifying the design plans, learners will construct their design using recyclable materials or materials from home stores, auto parts stores, hobby stores, etc.