Simple Probability
Using Contraption Maker

Common Core 7.SP Statistics and Probability
Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of discrepancy.

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Goals (Performance Objectives)	**Procedures** (Activities)	**Materials**
1. <u>Understand</u> that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. 2. <u>Record</u> a simple probability activity. 3. <u>Predict</u> probability outcomes given a controlled situation. 4. <u>Explain</u> the difference between theoretical and experimental probability.	I. **Anticipatory Set** (Computer Lab) ⇒ Have students go through the tutorial of Contraption Maker. Whole class activity with discussion. (*You could also use this time to review Cause and Effect standard.*) II. **Lesson Body** *(Or use lesson in your Math textbook)* • **Probability** is a number between 0 and 1 that expresses the likelihood that something will occur. Probability = <u>favorable</u> possible • Near 0-**unlikely**, near 1-**likely**, ½-neither unlikely or likely. • Small groups: Give each group a coin. Have one student toss the coin (so tosses are as consistent as possible) and one student record tosses-100 tosses. **Theoretical probability**-half of the tosses heads/half of the tosses tails. Have students share results how many times heads was tossed-**experimental probability.** Were the results of both types close? • Computer Lab-Contraption Maker: Bowling Blender (example: see *Software Notes*) <u>Individual Computer Time</u>: There are 4 puzzle parts you can choose from to complete this contraption. Based on the students' knowledge of Contraption Maker, decide which tools will be or will not be used to solve the contraption. Record decisions. <u>Whole Class Activity</u>: Students share which tools they thought would successfully complete the contraption. Example: There are 25 students in the class, 5 thought the *Teeter Totter* would help solve the contraption. Probability = 5 out 25 or 1 out 5. Calculate theoretical probability for all 4 tools. III. **Conclusion** Discussion or assignment: After viewing the given solution, calculate experimental probabilities. Why might the theoretical and experimental probabilities differ?	Teacher Materials: ♦ Access to computer lab ♦ <u>Contraption Maker</u> ♦ Coin for each student Student Materials: ♦ Pencil ♦ Paper

Evaluation:

Each student will pick a contraption to solve. Before beginning the solution label each tool as near 0-unlikely, ½-neither likely or unlikely, or near 1-likely to solve the contraption. A comparison will be made to the given solution and a short paragraph written to compare theoretical and experimental probability and explain problem solving reasoning.

Software Notes:

The Bowling Blender puzzle example used in this lesson plan is an official puzzle of *Contraption Maker*. From the main menu of the game, click the orange "Play" button, then click the purple "Official Puzzles" button at the top of the screen. Select the "Easy" difficulty level, then click the green right arrow once to the 2nd page of Easy Puzzles. Bowling Blender will appear in the upper right hand corner (shown below).
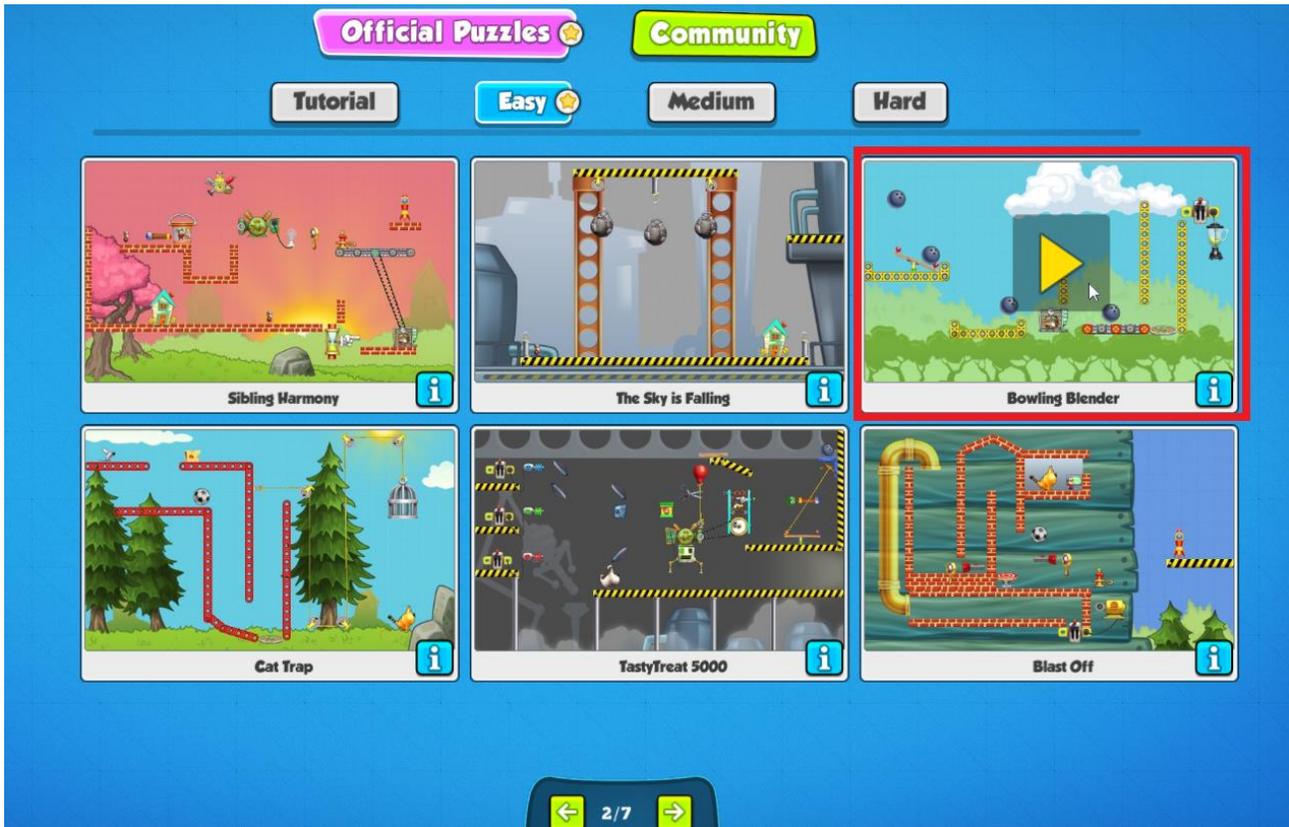
The Bowling Blender puzzle has four different types of parts that can be used to solve the puzzle's goal:

Teeter Totter: Drop an object on one end to lift up the opposite side.	**Belt**: Use to transfer rotational energy from one object to another.	**Corner Pipe**: Use pipes to rotate objects around your contraption.	**Mechanical Trampoline**: Make an object bounce and continually gain height.

Sources:

California Common Core State Standards: Mathematics, January 2013
Contraption Maker, Spotkin, LLC (Contact: deborah@spotkin.com)
Mrs. Ruby Marshall, former elementary math teacher at Idaho Hagerman Joint School District #233