Finger Basketball

Category: Physics

Type: Make & Take

Rough Parts List:

1	Large piece of thick cardboard
1	Small piece of wood
10”	Dowel, ¼” diameter works well
1	Measuring spoon
1	Small piece of cardstock
1	Brass fastener
1	Length of string
1	Piece of foil
1	Small piece of soft plastic tubing
1	Sharpie, pencil or markers
1	Roll of tape
	Balls of foil, pom-poms, erasers, beans, marbles, pebbles

Tools List:

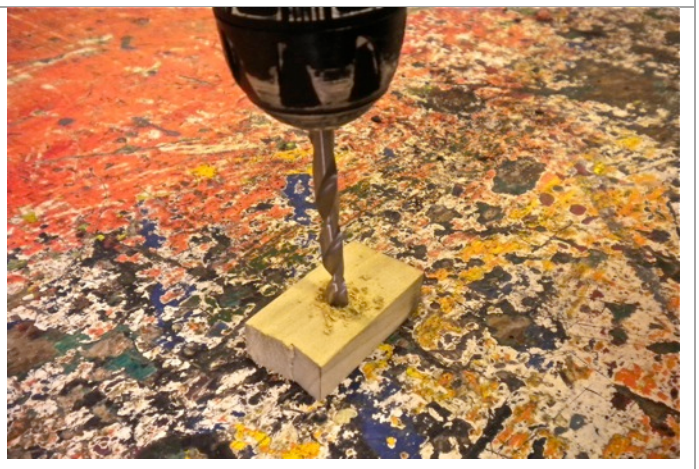
Scissors
Hot glue gun
Drill
Drill bit, same size as the dowel
Saw

Video: http://youtu.be/CqCqr3RZ2xQ

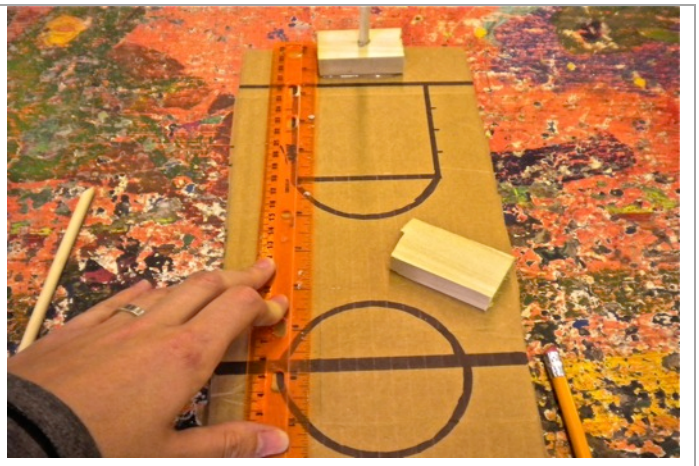
How To:

Measure a piece of cardboard approximately 6”x12”.

Cut it out with scissors.

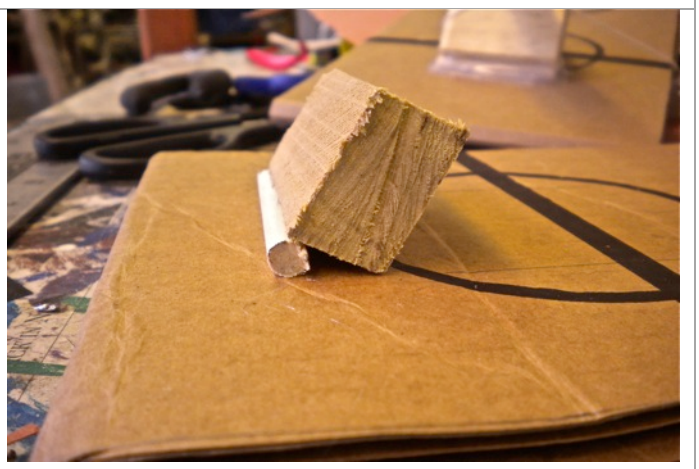
	→	
Fold the piece of cardboard in half.		Glue it together and press down.
	→	
Mark the lines of a basketball court using markers or a pencil.		Use a jar to help draw the circles.
	→	
The markings should look like the picture above.		Drill a hole the same size as your dowel into one of the small blocks of wood.

Glue the dowel into the wood and glue the wood to the cardboard at the very edge of the court.



Measure where the second small piece of wood will sit at the opposite end of the court.

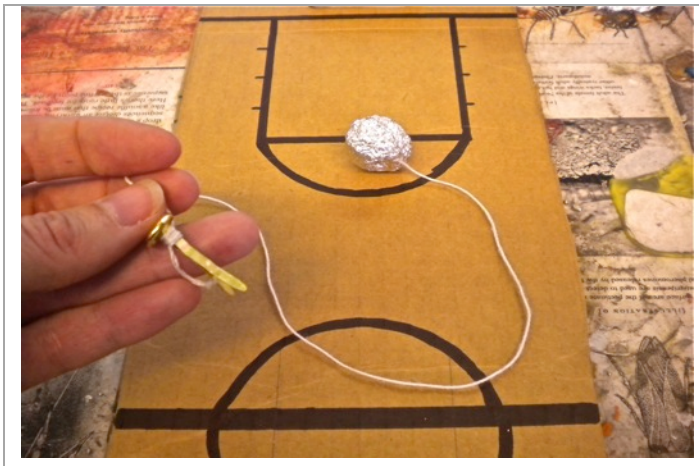
Glue a dowel near the edge of the circle.



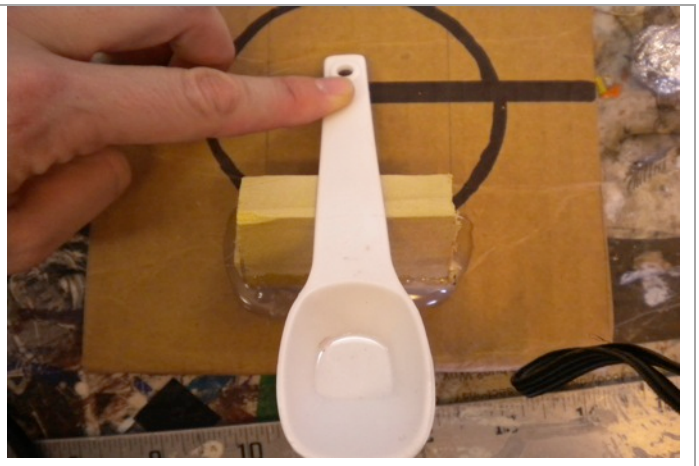
Angle the block on the dowel and glue in place.

Tie one end of string to a brass fastener.

Place the other end of the string into the tinfoil and make a ball.



It should look like the picture above.



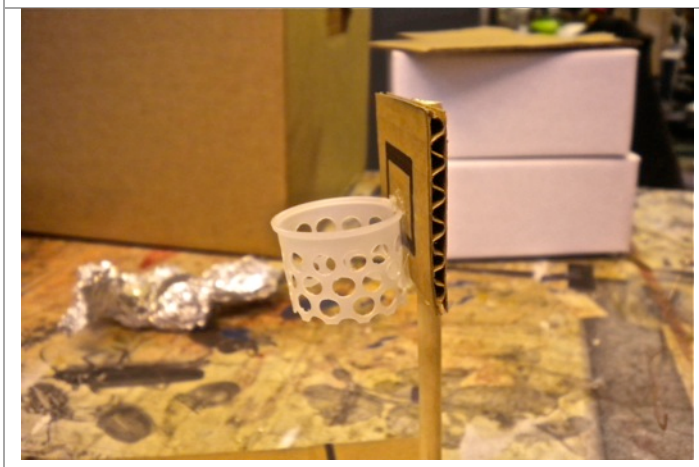
Angle a measuring spoon on the block of wood and mark where the spoon touches the cardboard.

Use a pencil to push a hole through the marked hole on the cardboard .

Push the fastener through the hole in the spoon and through the hole in the cardboard.

Cut a small piece of thin cardstock and glue it over the fasteer. Tape over the cardstock to hold it firmly in place.

Cut a piece of thick cardboard to use as the backboard. Draw a square in the middle.

	→	
Glue the cardboard onto the top of the dowel.		Cut a small piece of plastic tubing. Use a hole puncher to make holes in the plastic and make it look like a net.
	→	
Glue the tubing to the backboard.		Place the foil ball in the measuring spoon, hold back the spoon, aim, let go, and try to score a point!

Fine Points:

→ If you can't punch holes in the plastic tube, it can be left as is. Just make sure the tinfoil ball will fall through it.

→ It doesn't have to be a basketball court, you can use any setting you want.

Concepts Involved:

- A lever is a simple machine that magnifies force.
- A lever consists of a bar that rotates around a fixed point called a fulcrum.

Focus Questions:

1. What are the spoon and piece of wood together acting as?
2. What is their purpose?
3. Are there any examples of levers in your home or at school?
4. Gather lightweight objects such as Styrofoam and pom-poms, mid-weight items such as little paper balls and heavyweight objects including beans and pebbles. Compare the flight path of all items thrown at the same angle. Which items flew highest? Furthest? Which make it into the basketball hoop easiest?

Elaboration:

Levers are simple machines that allow us to increase force. Levers have two parts, the arm and the fulcrum. The arm is the part that you push or pull on, and the fulcrum is the part that the arm balances on. In the basketball game the spoon acts as the lever and block of wood it is resting on is the fulcrum. A lever works by amplifying an input force to provide a greater output force, and reduces the force needed to move weights. The input force is the force applied by you to the spoon. The output force is the force applied by the spoon to the ball. There are examples of levers all around us, and they occur in nature. In our bodies, arms and jaws are both examples of levers.

How a lever changes force or distance depends on the location of the input and output forces relative to the fulcrum. Levers are grouped into 3 classes based on the location of the input and output forces. They are called first class, second class and third class. An example of a first-class lever is a seesaw, where the fulcrum is located in between the input (in our game, the ball) and output load. Our game is an example of a second-class lever, where the load is between the fulcrum and the input force. In third-class levers, the input force is between the fulcrum and the load.

Links to k-12 CA Content Standards:

Grades k-8 Standard Set Investigation and Experimentation:
Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other strands, students should develop their own questions and perform investigations.

Grades k-12 Mathematical Reasoning:
1.0 Students make decisions about how to approach problems:
1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
1.2 Determine when and how to break a problem into simpler parts.

2.0 Students use strategies, skills, and concepts in finding solutions:
1.1 Use estimation to verify the reasonableness of calculated results.
1.2 2.2 Apply strategies and results from simpler problems to more complex problems.
1.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

3.0 Students move beyond a particular problem by generalizing to other situations:
3.1 Evaluate the reasonableness of the solution in the context of the original situation.
3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
3.3 Develop generalizations of the results obtained and apply them in other circumstances.

Grade 2 Standard Set 1. Physical Sciences.
The motion of objects can be observed and measured. As a basis for understanding this concept:
1.d. Students know tools and machines are used to apply pushes and pulls (forces) to make things move.

Grade 7 Standard Set 6. Physical Principles in Living Systems (Physical Sciences)

Physical principles underlie biological structures and functions. As a basis for understanding this concept:

6.i. Students know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.

Grade 8 Standard Set 2. Forces.

Unbalanced forces cause changes in velocity. As a basis for understanding this concept:

2.a. Students know a force has both direction and magnitude.

2.b. Students know when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.

2.d. Students know how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.