



## Curiosity Guide #201

### Vision

Accompanies Curious Crew, Season 2, Episode 1 (#201)

### Benham's Top

Investigation #6

#### Description

Surprise your friends with an amazing spinning disc that fools the eyes.

#### Materials

- Round plastic lids from butter dishes
- Nail or pushpin
- Toothpick
- White glue or hot glue
- Benham disc patterns, printed off the Internet
- Scissors

#### Procedure

- 1) Search "Benham disc patterns" on the Internet. Print some of the black and white patterns on regular paper.
- 2) Cut out the round patterns.
- 3) Glue a pattern on a round butter dish lid.
- 4) Gently poke a small hole through the center of the pattern and lid.
- 5) Cut the toothpick in half. Insert it through the lid so that the point sticks out of the bottom. Leave a small part of the toothpick sticking out of the top to make a spinning handle.
- 6) Add a drop of white or hot glue in the top of the lid where the toothpick comes through to help hold it in place.
- 7) Spin the spinner at different speeds and observe the disc. Do you see colors?

- 8) Other things to try: Spin the disc in different lighting conditions. Reverse the spinning direction. Print and try other black and white or blue patterns. Make your own patterns. What do you see?

### **Adult Variation**

#### Materials

- CD
- Propane torch
- Penny
- White glue or hot glue
- Benham disc patterns, printed off the Internet
- Clamp vise

#### Procedure

- 1) Place a penny in a clamp vise so that the majority is above the vise.
- 2) Heat the penny with a propane torch until hot. Turn off the torch.
- 3) Carefully press the CD over the penny so the edge of the penny is lined up in the center of the CD opening.
- 4) The hot penny should melt the CD plastic and begin to slide through. Stop when the penny is halfway through. Let it cool and bond together.
- 5) Search "Benham disc patterns" on the Internet. Print some of the black and white patterns on regular paper.
- 6) Cut out the round patterns.
- 7) Cut a small slit in the center of the pattern to slide over the penny.
- 8) Glue the pattern on the CD.
- 9) Spin the spinner at different speeds and observe the disc. Do you see colors?
- 10) Other things to try: Spin the disc in different lighting conditions. Reverse the spinning direction. Print and try other black and white or blue patterns. Make your own patterns. What do you see?

## My Results

### Explanation

The Benham top is named after its toymaker inventor, Mr. C.E. Benham, who invented the toy in 1894. His toy has been a wonder for over 100 years because the viewer sees colors coming from the black and white disc. Spinning the disc at 3 to 5 rotations per second in a balanced fashion permits great results.

Scientists believe that the cones in the eye that detect red, green, and blue do it at different speeds. Red is fastest to see and refresh. Cones that see blue are the slowest to detect, but the image lasts longer.

The flashing black and white patterns trick the eye. When the white blur goes by, the cones in the eye do not see the color white because they respond to it at different times. This sends different messages to the brain from the red, green, and blue sensitive cones so that the brain interprets color that isn't there. Scientists aren't certain this is the explanation, but it is one theory. Perhaps you will solve this vision mystery when you get older.

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