

# Penguin Rotary Switch

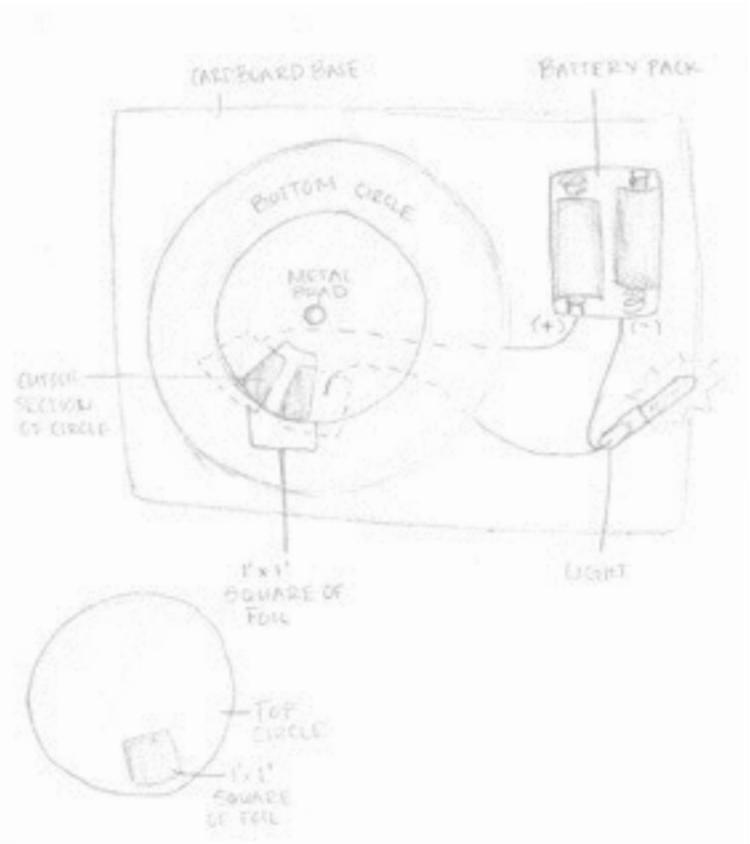
## How to Build It:

### Materials:

- |   |  |   |   |
|---|--|---|---|
| <input type="checkbox"/> Cardstock                          | <input type="checkbox"/> Tinfoil or tinfoil tape | <input type="checkbox"/> Thumbtacks                                   | <input type="checkbox"/> AA battery holder          |
| <input type="checkbox"/> Paperboard, matboard, or cardboard | <input type="checkbox"/> Glue stick              | <input type="checkbox"/> Telephone wire or other thin, insulated wire | <input type="checkbox"/> Christmas light            |
| <input type="checkbox"/> Brass fasteners                    | <input type="checkbox"/> Scissors                | <input type="checkbox"/> AA battery                                   | <input type="checkbox"/> Solder and soldering irons |
| <input type="checkbox"/> X-acto knife                       |  |   |   |

### Procedure:

1. Print the Penguin Puzzle on cardstock
2. Cut out the circles on the dotted lines.
3. Cut out one of the Blue sections labeled 1 through 8 using an X-acto knife or scissors.
4. Using a thumbtack, poke holes through the center of both the large and small circles.
5. Place the larger circle on the left side of the cardboard rectangle.
6. Use a pencil to trace the cut out section of the circle onto the cardboard.
7. Remove the paper circle from the cardboard.
8. Cut 3 squares of tinfoil that are 1 inch long and 1 inch wide.
9. On the piece of cardboard, glue two squares of tinfoil on the marked spot. There should be a small space between the two pieces of tinfoil in the middle of the box.
10. Use a small piece of tinfoil tape to attach a piece of wire to each tinfoil square. The wires should lead to the right side of the piece of cardboard.
11. Glue the last tinfoil square to the back of the small circle, making sure to put it behind the penguin with the matching number to the cut out section.
12. Glue the large circle to the cardboard making sure to place the hole over the tin foil squares.
13. Connect the two circles using a brass fastener.
14. Complete the circuit! Attach the red wire from the battery pack to one of the wires coming from underneath the circles.
15. Attach the black wire from the battery pack to one side of the Christmas light.
16. Attach the other side of the Christmas light to the second wire coming from underneath the circles.
17. Put in the batteries and test it out! Match up the right penguin to get the light to turn on!



## **How it Works:**

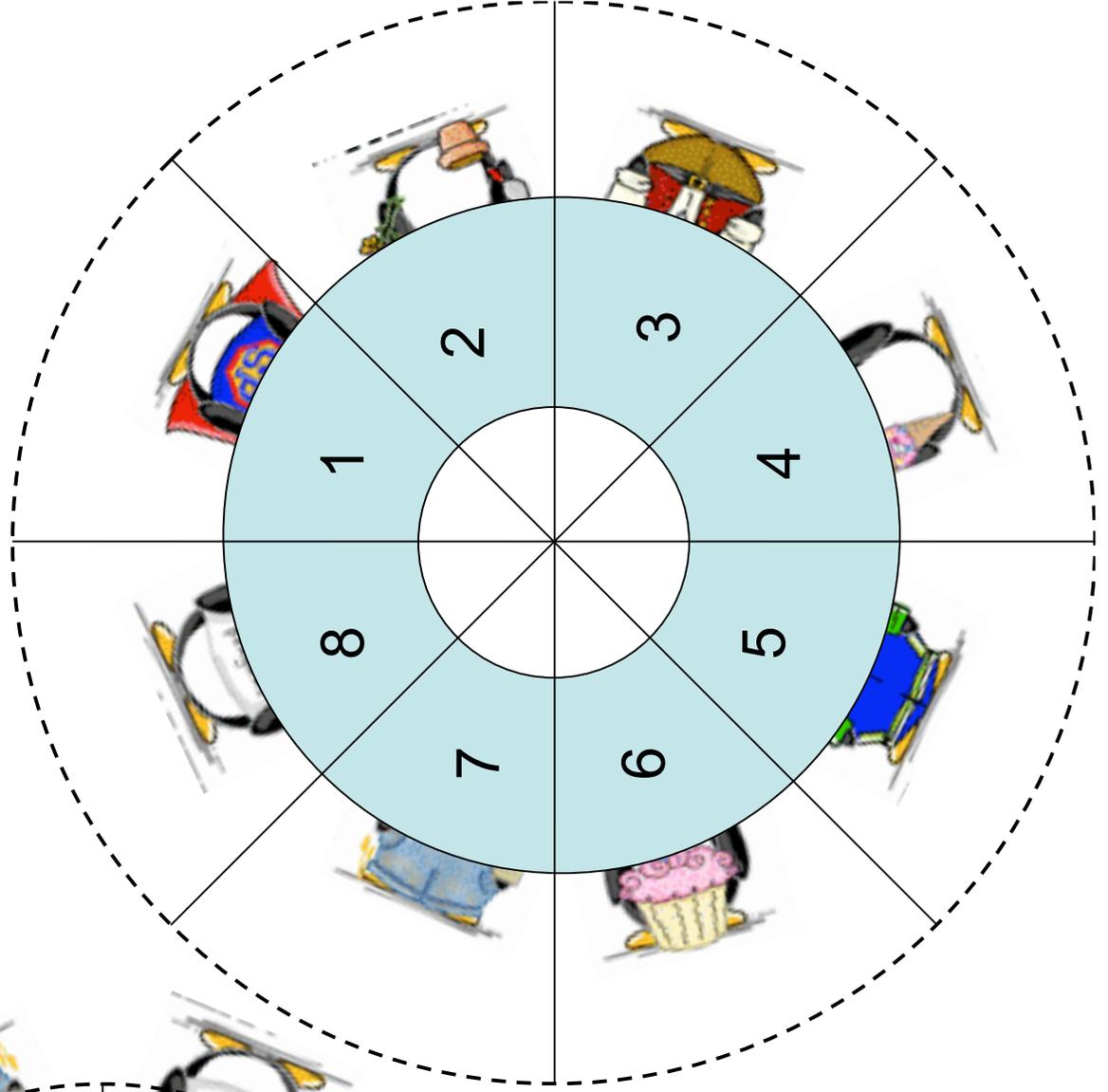
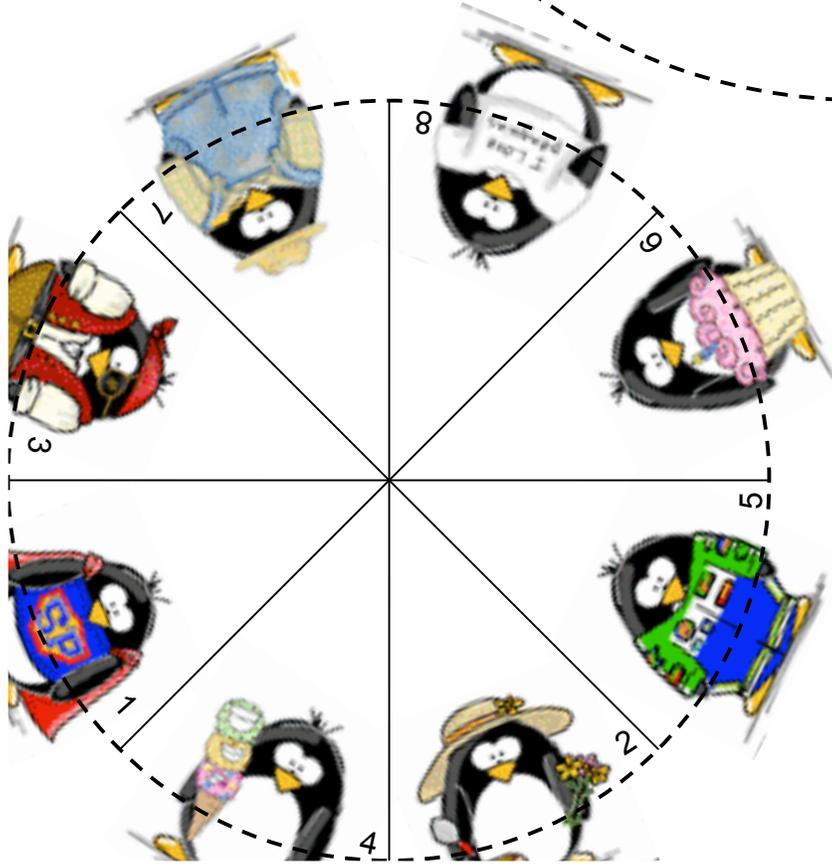
The Penguin Puzzle mimics a rotary switch, like an old fashioned telephone, in which part of the switch is spun to complete the circuit. When the right penguin is matched up, the circuit is complete and the electricity runs from one piece of tinfoil to another to turn on the light!

## **Experiment!**

Can you hook up two penguins to turn on the same light?

Can you make two penguins turn on different lights?

# Penguin Puzzle



## Directions

1. Cut the circles out on the dotted lines.
2. Cut out the blue part in one of the sections of the large circle.
3. Use a pin to poke holes in the middle of each circle.