

Name:

# Super Spinners!

## What's Torque?

Torque is the effort it takes to make something spin! Can you describe the torque seen in the following images?



a)

b)

c)

## Terrific Torque

### Materials:

- CD
- Pencils
- Cardboard
- Scissors
- Rubber band
- String



### Instructions:

1. Trace the CD on cardboard and cut it out.

2. Poke a pencil through the cardboard centre, and hold in place by winding the rubber bands around the pencil above and below the cardboard.

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## Talk About It!

1. What purpose do you think the handle has in getting the top to spin?
2. Can you list some other situations where torque is useful?
3. Describe how a teeter-totter is an example of torque.

## Did You Know?

A **torque (torc)** is also a piece of jewellery made from metals strands that have been intertwined. This torc was found in Scotland, along with three others. It has 8 gold wires twisted together with decorated ends and a safety chain. They were discovered in 2010 by a David Booth with a metal detector, who was rewarded \$740,000 as a reward! These torcs were likely buried within a religious building, dating back to 300-100 BC.



## Test Your Top!

1. Give your top a long handle and short tip by pushing just a little of the pencil through the hole. How well does it spin?
2. Now push most of the pencil through a cardboard circle to make a long-tipped spinner with a short handle. Does the spin change?
3. Try spinning a triangle or square-shaped disk instead. Does it work any better?



## Pay for a Better Spin

Tape six pennies on the rim of a cardboard disk, and tape 6 close to the centre of another. Compare their spins.



A property called **rotational inertia** keeps things spinning long after we set them down. More mass near the outer edge of a spinning object increases this inertia and gives us an even better spin.



Let's use this property to improve our tops!

3. Space 8 pennies around the edge of the cardboard. Glue them in place. Put a dab of glue on top as well, and add another cardboard disk. Put this double-disk under a book overnight.

5. Punch holes into a section of a cardboard tube, and drop it over the pencil (it should be able to turn freely). Hold the cardboard as you wind 60cm of cord around the pencil handle.

4. Poke a pencil through your disk, giving it the right amount of tip/handle to make it spin for a long time.

## Winner Spinner

- A disk with weight spread around it evenly.
- A long handle and short tip.
- Weight spread evenly along the outer edge.
- The greater the torque, the longer the spin.