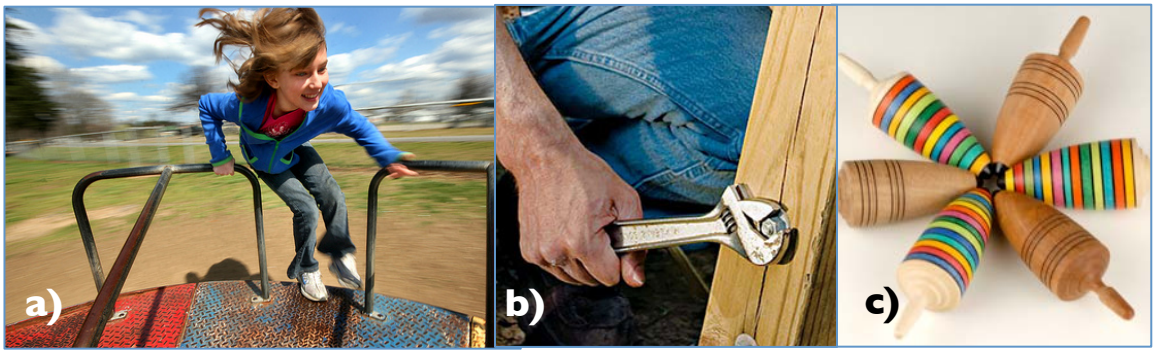
Name:

Super Spinners! (Teacher Version)

What's Torque?

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



a) *The force from pushing and the weight of the child makes the merry-go-round-ride spin*

b) *The force put on the end of the wrench allows the worker to tighten the bolt.*

c) *The force put on the handle of the top allows it to spin.*

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.

Source: Hauser, Jill. Gizmos & Gadgets. Charlotte: Williamson Publishing Co., 1999. Print.

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Talk About It!

1. What purpose do you think the handle has in getting the top to spin? *The handle gives something to hold so that a person could apply a force and spin it.*
2. Can you list some other situations where torque is useful? *Opening a jar, going around a merry go round.*
3. Describe how a teeter-totter is an example of torque. *If the ground wasn't in the way, the teeter-totter could spin the same way as the other objects we've described: around a centre point.*

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.

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

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.

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.

Source: Hauser, Jill. Gizmos & Gadgets. Charlotte: Williamson Publishing Co., 1999. Print.

Name:

Image Sources:

What's Torque?

1. Wooden Spinning Tops: http://www.woodenspinningtops.com/Home.html
2. This Old House: http://www.thisoldhouse.com/toh/article/0,,1222593,00.html
3. Hope Stands: http://samuelkee.com/2011/01/

Terrific Torque:

1. Wikipedia: http://en.wikipedia.org/wiki/File:Blank_cd.png
2. Once Upon A Teacher: http://onceuponateacher.blogspot.ca/2014/01/kindergarteners-use-their-magic-pencil.html
3. Esko: http://blog.esko.com/category/packaging-materials/cardboard-packaging-2/
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6. Second Law Media: http://www.secondlawmedia.com/how-much-time-does-it-take-to-manage-a-ppc-campaign/

Did You Know?

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Test Your Top!

1. Yoola: http://www.yooladesign.com/2013/12/spin-your-dreidel-your-spinning-top-your-kreisels-collecting-over-the-world/

Pay for a Better Spin:

1. Nerd Wallet: http://www.nerdwallet.com/blog/investing/2012/basics-trading-penny-stocks/pennies/
2. Etsy: https://www.etsy.com/market/spinning_top_toy