Wheel and Axle Cup Racer
Teacher's Guide

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The Initial View (Introducing the Activity)

Machines are sometimes complicated to watch work, but not in this case! The kids will probably predict which one will win, but they will be surprised by the margin of victory!!!

Take a Deeper View! (More Science)

Machines make our life so much simpler and easier, yet sometimes they are almost "invisible" to us! The **Wheel and Axle** changed history yet we certainly take it for granted. A flat tire reminds us all too well of the importance of this simple machine, doesn't it? The **Torque** or twisting force you put in at one end of the straw was **Converted** to a straight **Pull**. This pull was enough to defeat **Gravity** and bring the buckets racing to the straw. The same kind of **Conversion** or change is done by your car's wheels when they turn and send you moving! Machines change the **Direction** of our force or act like "**Force-Multipliers**" to help us move something. Look at how a small car jack lets you lift your entire car off the ground! Machines are expensive, use **Energy**, and must be fixed, but nobody wants to be without them!

More and Bigger Views! (Additional Classroom Ideas)

1. Try different sized spools on the straw "axle".
2. Put only one "bucket" at a time on the straw. Put some weight in the buckets and compare how much force it takes to lift them.
3. Make a list of places where the wheel and axle is used in different machines. Make a bulletin board of pictures of a wheel and axle in use.
4. Read and research back into history about the wheel and axle. Try to find out when the first ones were used. On what kind of machines were they used?
5. Write a story of what your life would be like if there were NO wheels and axles around. Write a story of how your life would be without any machines. Imagine an improved machine. Write about how you design it and what it would do for people.
6. Use different diameters of axles. Try different wooden dowels or even a piece of old broomstick. Compare how these different diameters affect "winding" time.
9. A pulley is a type of wheel and axle. Find some examples of pulleys pulling things!
10. Look in history for what is called the *Machine Age*, a time when machines were starting to replace people and animal power.
11. What was the *Industrial Revolution*? How did this beginning of manufacturing change people's lives for the better and for the worse? List good and bad things that happened.
12. Compare our life with machines with a native people who use few or no machines. Would you want to trade place with them? Any disadvantages or advantages?
13. Pick a machine, like the sewing machine for example. Trace its invention, development, and what modern ones are like today. Do this for any machine you choose. Report to the class on what you've learned. Write about life without some or all machines!
14. Visit a local museum and find examples of some old types of machines which were used. How are they different from the ones we use today? Are there any machines there which we don't use today? Why don't we use these machines? Write about what you've learned.

Answers

1. (faster, each turn would wind even more string up)