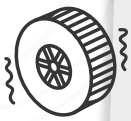
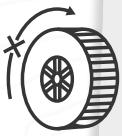
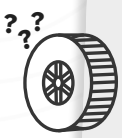
Diagnosing Water Wheel Challenges *Troubleshooting Guide*

How to Use this Guide

1. **Observe & Record:** Note exactly what's happening during each test (e.g., wheel slows, tilts, squeaks).
2. **Identify Concept:** Match the symptom to the underlying scientific principle.
3. **Answer Diagnostics:** Ask the guiding questions to pinpoint the root cause.
4. **Implement Fixes:** Apply one or two targeted solutions, then retest.
5. **Reflect & Iterate:** Document changes, note improvements, and refine further.

Problems	Symptoms	Scientific Concept	Diagnostic Questions	Possible Solutions
 Noticeable wobble or vibration	Irregular rotation, wobble	Balance, Center of Mass, Alignment	Is mass distributed evenly around the axle? Are paddles identical? Are parts too loose or too tight?	• Redistribute paddles symmetrically • Re-measure and recut misaligned parts
 Wheel resists or seizes up	Sticky movement, slow spin despite bead flow	Friction	Where are parts rubbing?	• Reposition pieces to reduce contact and rubbing • Smooth rough edges
 Very low lift or no lift	Input energy (beads) doesn't translate to work	Conservation of Energy	Where is energy escaping? Are the beads bouncing off the paddles?	• Narrow paddle gaps to catch more water • Seal leaks in buckets • Streamline paddle shape to maximize bead collection
 Inconsistent test results	Lift heights vary widely between trials	Tolerance + Precision	Is the string getting caught or twisted?	• Test the winding on the pulley