The Grip Test

Read how a car design changes after a test.

4-PS3-4 "Design, test, and refine a device that converts energy from one form to another. (SEP: 6; DCI: PS3.B, PS3.D, ETS1.A; CCC: Energy/Matter) Alignment my include 3-5-ETS1-1"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where the passage names the energy stored in the band and the motion it produces, circle the part that slipped, and label the two distances 1 and 2 in test order.

Mina's Rubber-Band Car

1. Mina wanted to build a car that could move without being pushed. She made a light cardboard body and put two straw axles through it. Four cardboard wheels fit on the axles. She hooked one end of a rubber band to the body and the other end to the back axle. Turning the axle wound the band tightly. The stretched band stored energy that could make the wheels turn.

2. Mina tested her car on a smooth classroom floor. She marked a start line, wound the back axle five turns, and let go. The band unwound and turned the axle. The wheels turned, changing stored energy in the band into the car's motion. But the wheels slipped on the floor. The car traveled only 30 centimeters. Mina decided that the wheels needed a better grip.

3. She wrapped narrow rubber strips around each cardboard wheel. For a fair test, she used the same floor, start line, and five axle turns. This time, the wheels gripped the floor and the car went 70 centimeters. Mina kept the rubber strips because they helped the car travel farther. She also noticed that the car slowed and stopped. Some energy spread as heat and sound.

2 ANSWER WITH EVIDENCE

Use the passage

1. What energy change made Mina's car move when she let go?

2. What problem did Mina's first test reveal, and what did she change to fix it?

3. What did Mina keep the same in both tests? Why did that help her judge her change?

4. How do the distances show whether Mina's change worked?

3 YOUR TURN

Your own words

Design a device that uses moving air to make sound, without using car parts. In four sentences, name its parts, explain the energy change, describe a fair test, and tell what you would change and test again if the sound was too quiet.

ANSWER KEY

The Grip Test

GRADE 4 · 4-PS3-4

PART 1 · READ AND MARK

Underline where the passage names the energy stored in the band and the motion it produces, circle the part that slipped, and label the two distances 1 and 2 in test order. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What energy change made Mina's car move when she let go?	**Energy stored in the stretched rubber band changed into the car's motion.**
2	What problem did Mina's first test reveal, and what did she change to fix it?	**The wheels slipped on the floor, so Mina wrapped rubber strips around them for better grip.**
3	What did Mina keep the same in both tests? Why did that help her judge her change?	**She kept the floor, start line, and five axle turns the same. This helped her tell whether the new wheel grips made the difference.**
4	How do the distances show whether Mina's change worked?	**The car went 30 centimeters before the change and 70 centimeters after it, so the new grips helped it travel 40 centimeters farther.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would tape a loose paper flap over one end of a cardboard tube. Blowing through the tube would make the flap vibrate, turning the moving air's energy into sound. I would blow with about the same force each time while a partner listened from the same spot. If the sound was too quiet, I would loosen the flap and test it again.

Accept different workable air-powered sound devices. Look for a clear energy change, a test that keeps important conditions the same, and a change followed by another test.