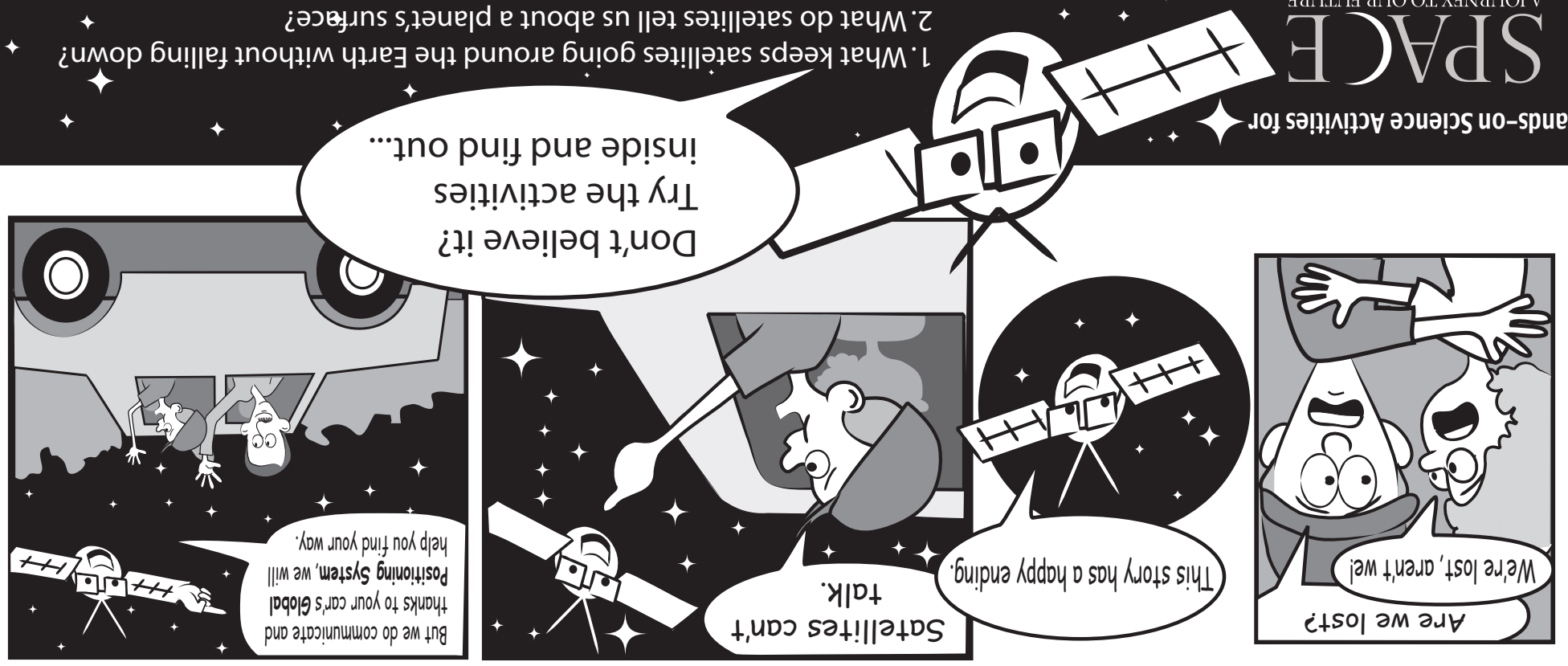

Hands-on Science Activities for

SPACE
A JOURNEY TO OUR FUTURE

1. What keeps satellites going around the Earth without falling down?
2. What do satellites tell us about a planet's surface?
3. How many satellites does it take to find you when you're lost?
4. How do satellites talk to us?

What's Happening?

1. **Around She Goes.** The ball represents a satellite, the weight on the string represents the pull of gravity and your hand is the Earth. When the force of gravity and the forward motion of the ball are equal, it stays in orbit. Your energy, swinging the ball, represents the forward motion supplied by the rocket that launches a satellite. The satellite keeps on going due to inertia. Without gravity (if you removed the weight) the ball would fly off in one direction.

2. **Over Hill, Over Dale.** Satellite radar works by sending a signal to the ground and measuring the time it takes to return to the satellite. In your model, the straw is the signal and, instead of measuring time, you measured distance in inches. This information can be used to figure out the altitude at different locations on a planet, even places you can't see. The signals are used to produce topographic maps and study a planet's surface.

3. **Finders Keepers.** The landmarks you created represent satellites used by GPS (Global Positioning System) as reference points for finding people. Their satellite receivers on Earth communicate regularly with 24 orbiting satellites. Triangulation, using data from three of those satellites, works for GPS in the same way it did many years ago when sailors used a sextant and stars as their guide. Today's technology uses four satellites for even greater accuracy.

4. **Pick a Pixel.** The squares on your graph paper represent pixels, meaning picture elements or the tiny squares that make up a picture. The more squares per inch on your graph paper, (your version of pixels) the better the quality of your image. The images we get from space come from radio signals made of thousands of pixels. When the radio signal gets to Earth, it is changed back to an image again.

Explore Some More: Try these websites for more adventures with satellites, technology and space.
http://www.fourmilab.ch/earthview/satellite.html
http://imagers.gsfc.nasa.gov/index.html
http://www.gmability.com/education
http://solarsystem.nasa.gov

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