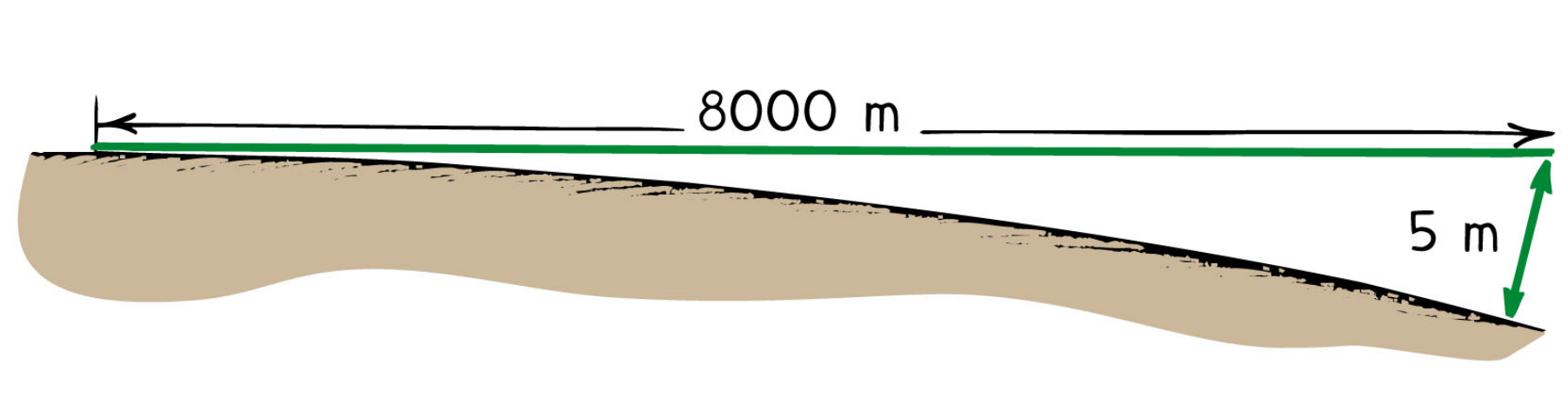
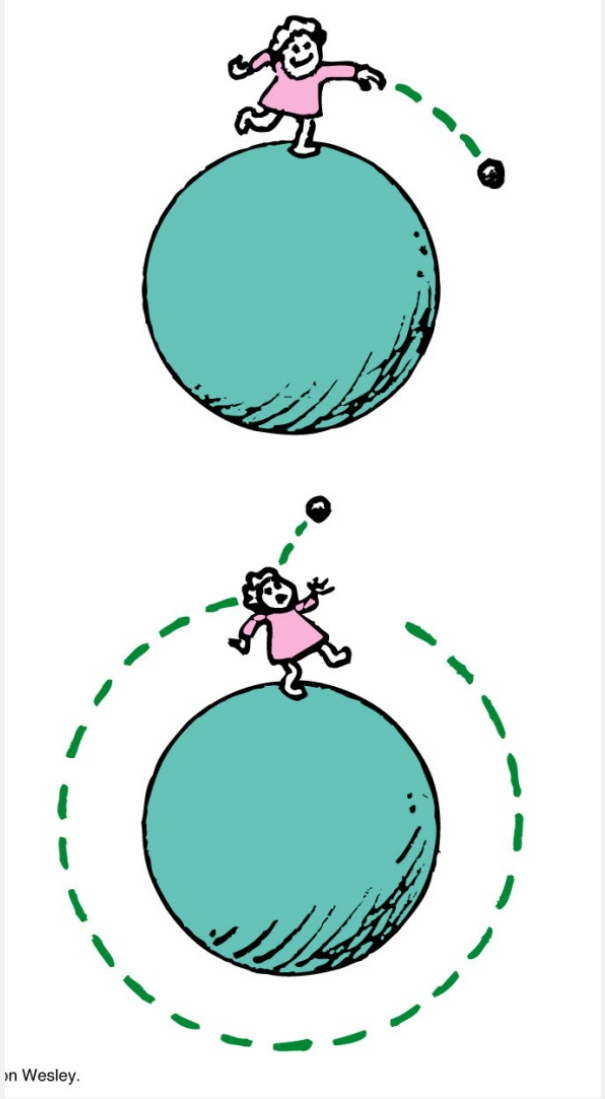
What could happen to a baseball if you threw it horizontally so fast (~8000 m/s, about 18,000 mph) that the curvature of the Earth factored into your calculations? (i.e. even as the baseball is falling, the ground seems to "fall away" too)



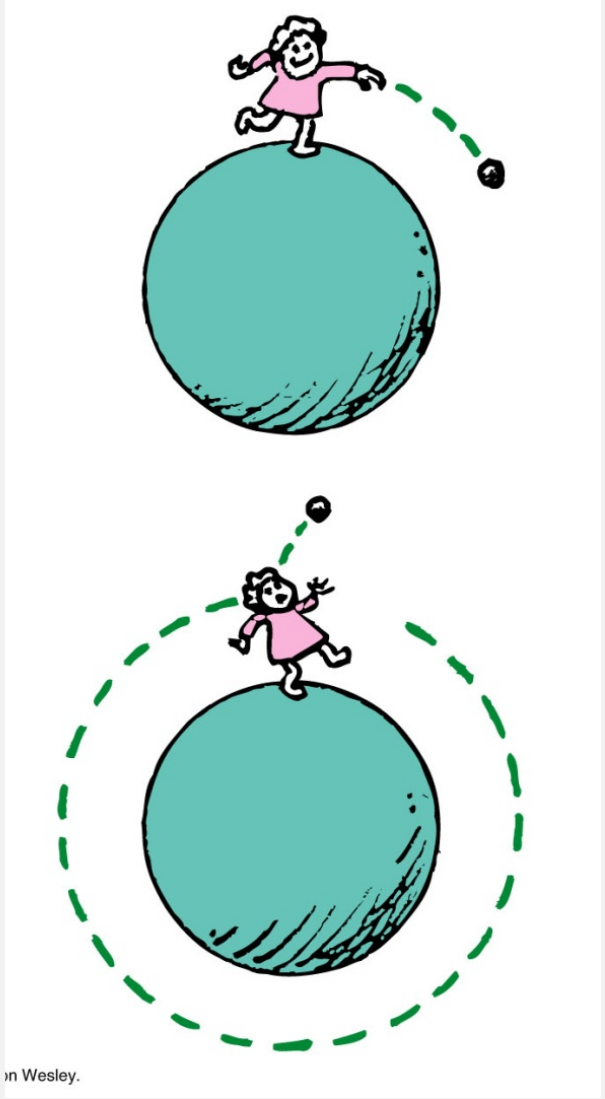


This is how satellites work!

Load it up on a rocket to get out of the densest part of Earth's atmosphere

Turn the rocket and "throw" at 8000 m/sec (18,000 mph)

Earth circumference is 25,000 miles, takes 25000mi/18000mph = 1.4 hours = 84 minutes



- Satellites are essentially **in constant free fall**
- Acceleration due to gravity is always **perpendicular** to the horizontal motion
  - Gravity doesn't change magnitude of horizontal velocity – only constantly changes the direction of the velocity
  - What would cause the satellite to slow down and fall back to Earth?

THINGS TO BE CAREFUL OF

- In the playing catch lab: time you measured is the total time in the air, but you can't divide it by 2 to get max height because the height tossed isn't the same as the height caught
- Don't use $v = \frac{\Delta x}{\Delta t}$ or $x_f = x_i + v\Delta t$ in the y (vertical) direction!
  - This equation assumes no change in velocity
- Likewise, don't use an equation that uses acceleration for the horizontal unless the problem specifies
  - I.e. cars speeding up or braking have a horizontal acceleration

CONCEPTS TO KNOW FOR THE EXAM

- Vector addition and using trig to break vectors up into their components
- Make calculations for an object thrown with an initial horizontal velocity
  - An object thrown horizontally and an object dropped take the same amount of time to hit the ground *if* height and gravity are the same
- Make calculations for an object thrown with an initial velocity at an angle
- Keep your horizontal and vertical calculations separate!

I WILL COLLECT HW PACKETS ON WEDS/THURS

- Staple the **Vectors In-Class Activity 8/29 (guinea pig), Boat Race Vectors,** and **Conceptual Worksheet from Friday** to your HW Packet