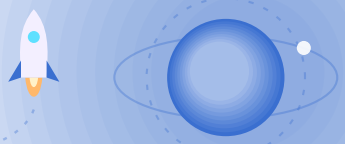
LESSON T4-01 · TIER 4 · FALLING AROUND THE WORLD

Miss the Ground

GRADES 6–12



Name _____ Date _____ Class / Period _____

Falling around the world

Throw a ball sideways and it curves down and lands. Throw it faster and it lands farther away. Throw it fast enough and the ground curves away underneath it as fast as it falls, so it never lands. That is an orbit.

Mission goal: watch the craft fall all the way around the world once without ever touching the ground.

Standards practiced: MS-ESS1-2, HS-ESS1-4 · Words to know: orbital-velocity, free-fall, escape, bound-orbit

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Fall around the world

- Our craft is _____ km up, above the _____ km of air. Gravity here still pulls with _____ m/s², which is _____% of its pull at the ground.
- The craft moves sideways at about _____ m/s. In one second it falls _____ m toward Terra, and in that second the ground curves away by the same _____ m.

Write the numbers shown in the sim in the blanks above, then record what you notice:

2 PREDICT

COMMIT TO A HYPOTHESIS FIRST

Prediction 1. At this height a craft can hit the ground, circle the world, or escape into space, depending on its sideways speed. Which list puts the three results in order from the SLOWEST speed to the FASTEST?

Hint: Think of throwing a ball: too gently and it lands near you, hard enough and it keeps missing the ground, and even harder and it never comes back.

□ Escapes into space, circles the world, hits the ground

□ Hits the ground, circles the world, escapes into space

□ Circles the world, hits the ground, escapes into space

Because...

3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Press **[.]** to speed up time and watch the Height number: it stays near _____ kilometres as the craft goes all the way around. Press **[,]** to slow time down again if you need to. Do not fire the engine.

Trial	What I changed	What I measured / saw	Matched my prediction?
1			Yes · No · Partly
2			Yes · No · Partly
3			Yes · No · Partly

4 EXPLAIN

CLAIM · EVIDENCE · REASONING

Claim — What did you find out? (answer the mission goal in one sentence)

Evidence — Which numbers or observations from the sim support your claim?

Reasoning — Which science idea connects your evidence to your claim?

Self-check: □ I made a prediction before experimenting □ I used numbers from the sim □ I explained *why*, not just *what*