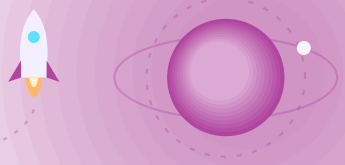
LESSON T3-03 · TIER 3 · ATMOSPHERE & ASCENT

Gravity Turn Ghost

HIGH SCHOOL (9–12)



Name _____ Date _____ Class / Period _____

Let gravity bend the path

A rocket does not fly straight up to orbit. It starts vertical, tips over a little, and then lets gravity do the turning while the engine pushes along the path. The curved path that follows is called a gravity turn, and it wastes very little fuel.

Mission goal: fly a gravity turn with the first stage and keep the climb angle inside the corridor on the screen.

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Fly the turn

- A gravity turn starts straight up, tips over by about _____° at _____ km, then follows the way the rocket is moving.
- The corridor on the screen shows the climb angle we want at each height, plus or minus _____°. A flight with no air reaches _____ m/s and a coast height of _____ km when the first stage runs out.

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. Why does the flight path bend during a gravity turn?

Hint: The path is the line the rocket traces through the sky. The velocity is the speed and direction of the rocket at one moment.

□ The engine pushes the rocket sideways

□ Gravity keeps pulling the velocity direction downward while thrust follows it

□ Air pushes the rocket over

Because...

3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Press **[Space]** to light the engine and **[Z]** for full throttle. Climb straight up until the Height reads about _____ kilometre. Hold **[W]** for about one second to tip the nose toward the horizon, then click PROGRADE in the Flight Computer so the nose follows the way you are moving. Keep burning until the first tank runs dry.

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*