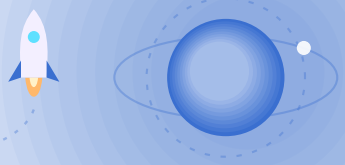
LESSON T4-02 · TIER 4 · FALLING AROUND THE WORLD

Circularize or Burn

HIGH SCHOOL (9–12)



Name _____ Date _____ Class / Period _____

Make an oval into a circle

An engine burn changes the orbit on the opposite side of where you burn. To lift the low point of an oval orbit, you burn at the high point, going forward, until both ends are the same height.

Mission goal: burn once at the high point so the orbit becomes a circle about {apKm} kilometres up.

Standards practiced: HS-ESS1-4 · Words to know: circularization, apoapsis-burn, eccentricity, delta-v

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Burn at the high point

- The craft goes _____ m/s at its high point. A circular orbit _____ km up needs _____ m/s, so the burn must add about _____ m/s.
- The target is a circle _____ km up, plus or minus _____ km. A burn between _____ and _____ m/s counts.

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. Our orbit is an oval. To turn it into a circle as high as its highest point, where on the orbit should the engine burn?

Hint: The lowest point of an orbit is called periapsis and the highest point apoapsis. A burn raises the opposite side of the orbit.

□ At periapsis (the low point)

□ At apoapsis (the high point)

□ Anywhere on the orbit

Because...

3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Click PROGRADE in the Flight Computer so the nose follows the way you are moving. Press **[M]** to see the orbit, and **[.]** to speed up time until the Height stops rising: that is the high point. Slow time down with **[,]**. Then press **[Space]** to light the engine and **[C]** for half throttle. Watch the Orbit low point climb, and when it reads _____ km or more press **[X]** to cut 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*