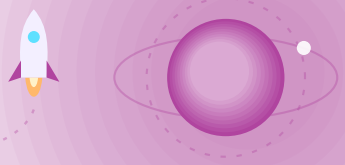
LESSON T3-01 · TIER 3 · ATMOSPHERE & ASCENT

Falling Speed Lab

GRADES 6-12



Name _____ Date _____ Class / Period _____

The speed where falling stops speeding up

A falling object speeds up until the air pushes back as hard as gravity pulls it down. Then the two forces balance, the speed stops changing, and it falls at a steady speed. That speed is called the terminal speed.

Mission goal: fly the rocket up, bring it down under its parachute, and measure the steady speed where drag balances weight.

Standards practiced: MS-PS2-2, HS-PS2-1 · Words to know: drag, terminal-speed, force-balance, quasi-steady

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Step 1 · The steady fall

- Once its fuel is burned our rocket weighs _____ kg, so gravity pulls it down with _____ N.
- Near the ground the air has a density of _____ kg/m³ and the open parachute catches it over a drag area of _____ m². Without the parachute the rocket would fall at about _____ m/s.

Step 2 · A heavier rocket

- Twice the mass means twice the weight: _____ N instead of _____ N.
- The parachute catches the same air, so at any given speed the drag is the same as before. The drag has to climb until it matches the bigger weight.

Step 3 · A wider parachute

- A parachute twice as wide catches twice as much air, so it drags twice as hard at the same speed.
- The weight stays _____ N, so the drag still has to reach that number to balance it.

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. The rocket will fall back under its parachute. How fast will it be dropping just before it lands? Mark the range you expect.

Hint: The unit m/s means "metres per second". A falling object speeds up until the air pushes back as hard as gravity pulls. After that its speed stays the same: that is the terminal speed. Aim for a band about 2 m/s wide.

My prediction (circle or fill in): _____ to _____

Because...

Prediction 2. Now picture the same rocket loaded until it is twice as heavy, falling under the same parachute. Will its steady fall speed be faster, slower or the same?

Hint: Heavier means gravity pulls harder, so the air has to push back harder before the speed stops growing.

□ Slower

□ Faster

□ The same

Because...

Prediction 3. Back to the normal rocket, but the parachute is twice as wide. Will its steady fall speed be faster, slower or the same?

Hint: A wider parachute catches more air, so it pushes back harder at the same speed.

□ Faster

□ The same

□ Slower

Because...

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3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Press **[Space]** to light the engine and **[Z]** for full throttle. When the fuel runs out press **[Space]** again to open the parachute, then keep falling until you land. Watch the Speed number.

Step 2. Read the numbers, then press Got it.

Step 3. Read the numbers, then press Got it.

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*