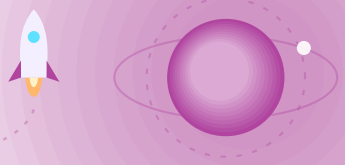
LESSON T3-05 · TIER 3 · ATMOSPHERE & ASCENT

Weathercocking and Active Control

HIGH SCHOOL (9–12)



Name _____ Date _____ Class / Period _____

Weathercocking: the air steers for you

A weather vane turns to face the wind. A rocket with fins at the back does the same: when the air hits it at an angle, the fins push the tail away and the nose swings back into the airflow. Real rockets meet this with gusts of wind. This simulator has no wind yet, so you give the nose a push yourself. To the air it looks just like a gust, because what matters is the angle between the nose and the airflow.

Mission goal: knock the nose off course twice, once with the steering assist on and once with it off, and watch the air swing it back.

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Step 1 · Kick the nose

- This rocket has a margin of _____ calibres: its balance point is ahead of its pressure point, so it is stable.
- The Nose off course number shows the angle between the nose and the way the rocket is moving.

Step 2 · Steering assist off

- The steering assist (SAS) fights any spinning of the rocket. Without it, only the air can straighten the nose.
- Press **[T]** once to turn the steering assist off, then kick the nose again.

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. A stable rocket is flying nose-first. Something turns its nose a few degrees to one side, so the air meets it at an angle, like a gust from the side. Which way will the air turn the nose?

Hint: Think of a weather vane. The fins at the back catch the air and push the tail around.

□ Further away from the airflow

□ Back toward the way the rocket is moving

□ It will not turn at all

Because...

Prediction 2. With the steering assist (SAS) turned off, does a stable rocket still straighten itself out?
Hint: The steering assist is a helper that fights any spinning of the rocket. A stable rocket might not need it.

□ No, only the steering assist can straighten it

□ Yes, the air pushes the nose back by itself

Because...

3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Press **[Space]** to light the engine and **[Z]** for full throttle. When the Speed passes 150 m/s, tap **[A]** for about one second to swing the nose to the side, then let go. Watch the Nose off course number.

Step 2. Press **[T]** once to turn the steering assist off. Then tap **[A]** for about one second to kick the nose again, let go, and watch the Nose off course number.

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*