LESSON T5-05 · TIER 5 · TRANSFERS & RENDEZVOUS

Satellite Rescue and Dock

GRADES 6–12

Name _____ Date _____ Class / Period _____

Rescue the satellite

Docking is a slow, careful dance. The two docking ports must be lined up, close together, and barely moving toward each other, or they will bounce apart. The RCS thrusters push the craft gently in any direction.

Mission goal: close the {sepM} metres to the satellite and dock, staying under {budgetKg} kg of RCS fuel.

Standards practiced: HS-PS2-2, MS-PS2-1 · Words to know: docking, capture-envelope, closing-rate, rcs

1 LOOK

OBSERVE BEFORE YOU TOUCH A CONTROL

Step 1 · Line up and close in

- The satellite is _____ m ahead of us on our orbit, nose pointing back at us. It is already selected as your target.
- Each tug has a docking port on its nose. We have _____ kg of RCS fuel; the whole approach needs about _____ kg.

Step 2 · Dock

- To latch, the ports must be closer than _____ m and lined up to within _____°, and they must close gently.
- Stay on the line between the two ports. Tap **[K]** to slow down if you are closing too fast.

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. Which way does the satellite's docking port face, compared with the way you are approaching?

Hint: Each tug has a docking port on its nose. Look at which way the satellite's nose points: it is the way its port faces.

□ Away from my approach path

□ Across my approach path

□ Toward my approach path

Because…

Prediction 2. How fast can the two ports be closing and still latch?
Hint: The unit m/s means "metres every second". A walk is about 1.5 m/s.

□ Up to 5 m/s

□ Up to 0.75 m/s

□ Any speed: they are magnets

Because...

3 EXPERIMENT

CHANGE ONE VARIABLE AT A TIME

Step 1. Press **[R]** to turn the RCS thrusters on. In the Flight Computer open the DOCKING tab and press ALIGN PORT so your port lines up with the satellite's. Tap **[I]** to push forward for about _____ seconds to start closing at about _____ m/s. If you drift sideways, press NULL REL VEL and start again. Close in until the Port distance is under 20 m.

Step 2. Keep closing slowly with **[I]**, and tap **[K]** to slow down: stay under _____ m/s when the ports are close. Use HOLD CORRIDOR in the Flight Computer to stay on the line. When the ports touch they latch.

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*