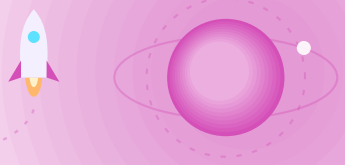
TEACHER ANSWER KEY

Capstone Missions

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Predictions below have fixed answers. Questions marked **Measured live** are graded against what the simulation actually produces, so the exact value depends on the student's run; use the tolerance shown in-game.

C-01 · Observatory Builder (High School (9–12))

P1. During the eclipse, when the craft is in Terra's shadow, what powers the station?
Answer: Batteries charged in sunlight

P2. In the last 20 metres before the ports touch, what is the safest way to close in?
Answer: Slow and steady, lined up with the port

P3. The station module has a battery of its own. After you dock with it, what happens to the power margin?
Answer: It goes up: there are more batteries

Capstone integrating earlier lessons; no new standard code is claimed. Design justification is recorded evidence: in the guided version each of the three checked experiments (power, rendezvous, docking) is one logged controlled attempt. Teacher note: the Modular Orbital Tug starts in a circle 100 km up with a station module 120 m ahead; the station draws 600 W, the eclipse of one lap lasts 10.7 minutes (385 kJ), one tug battery holds 320 kJ and two hold 640 kJ, so the panels must be out and the docking brings the second battery. The thermal limit is the weakest part of the craft (1,200 K) and the structural limit ratio is 1.

C-02 · Interplanetary Mail (High School (9–12))

P1. How far must Ares be AHEAD of Terra, seen from the Sun, when you leave? Mark the range you expect.
Answer: Measured live in the sim: compare the student's answer with the result shown after the flight (tolerance applies).

P2. To reach a planet that is farther from the Sun, which way should the escape burn push, compared with the way Terra moves round the Sun?
Answer: The way Terra moves

P3. How many days will the trip to Ares take? Mark the range you expect.
Answer: Measured live in the sim: compare the student's answer with the result shown after the flight (tolerance applies).

Extension: starts with pinned circular-coplanar ideal worlds, then discloses real-ephemeris and finite-burn approximation limits. Teacher note: the Ares Nuclear Cruiser starts in a circle 100 km up; Ares must lead Terra by 44.1° (graded within 5°), the escape burn is about 1,059 m/s and the trip about 75 days. Success is arriving inside the target body's sphere of influence, never touching a drawn conic. No standard code is claimed.
