



MILKY WAY SPACE STATION 111

CADET ACADEMY

ALBA 310: THE LAGRANGE L4 EXPEDITION

Observe • Question • Explain

ROUGH DRAFT • SCIENCE FIELD WORKBOOK



ALBA 310 READY

MISSION BRIEFING

Vanguard-6 deploys the ALBA 310 robotic probe from the Lagrange L4 staging region. The probe must cross a dense debris field, enter Earth orbit, investigate an unexpected ocean disturbance, and transmit everything it observes.

CADET OBJECTIVE

Follow the evidence. Separate what the instruments measure from what the crew infers.

1. What is the probe's first destination?
2. Name two kinds of data the crew must protect during the mission.



A BALANCED PLACE IN SPACE

SCIENCE FILE 1: LAGRANGE POINTS

A Lagrange point is a region where the gravity of two large bodies and the motion of a smaller object can work together. Near L4, an object can remain about 60 degrees ahead of the smaller orbiting body. Real spacecraft still need careful navigation and occasional corrections.

QUICK CHECK

L4 is not a place with no gravity. It is a useful gravitational arrangement.

1. Why might L4 be useful as a staging region?
2. True or false: An object at L4 experiences no gravity. Explain.



MAP THE MOTION, NOT JUST THE OBJECTS

SCIENCE FILE 2: NAVIGATING A DENSE FIELD

In a moving debris field, a safe route changes with time. Navigation must track each object's position, direction, and speed. GMTO adds a fictional topology solution for the story, but the underlying challenge is real: predict where hazards will be when the probe reaches them.

CADET CALCULATION

If debris crosses the route in 12 seconds and ALBA arrives in 20 seconds, the original crossing point may already be clear.

1. Which three measurements help predict a moving object?
2. Why can a route that looks blocked now become safe later?



OUR NEIGHBORHOOD IN THE MILKY WAY

SCIENCE FILE 3: THE ORION SPUR

The Solar System lies in the Orion Spur, a smaller spiral feature between the Sagittarius and Perseus arms of the Milky Way. Calling it a “spur” describes our galactic neighborhood; it is not a solid structure or a boundary a spacecraft crosses like a wall.

EXPLAIN IT TO A YOUNGER CADET

The Orion Spur is like a neighborhood on a much larger spiral-shaped map of stars.

1. Is the Orion Spur a solid object?
2. What two major spiral arms border our galactic neighborhood?



FALLING AROUND EARTH

SCIENCE FILE 4: ORBITAL INSERTION

To enter orbit, a probe needs the right direction and sideways speed. Too slow, and it may descend; too fast, and it may escape. An insertion burn changes the probe's velocity so gravity bends its path around Earth instead of pulling it directly down.

DRAW THE VECTOR

On a blank sheet, draw Earth, ALBA 310, a velocity arrow, and a curved orbital path.

1. What does an insertion burn change?
2. Why does an orbiting probe keep missing the ground?



THE RISING MASS

SCIENCE FILE 5: EVIDENCE OR INTERPRETATION?

The instruments report an ocean distortion, a gravitational spike, and an energy mass leaving the atmosphere. Those are observations inside the story. Calling the mass alive, intelligent, or dangerous would be an interpretation until more evidence is collected.

SORT THE STATEMENTS

Observation: "The field strength increased." Interpretation: "The entity is trying to escape."

1. Write one observation from this scene.
2. Write one possible interpretation—and label it as an inference.

LRS VANGUARD-6

Milky Way Space Station 111

MISSION: OBSERVE / INTERCEPT

TARGET: UNKNOWN

DESTINATION: UY SCUTI

DISTANCE TO TARGET

~ 2.39 LIGHT YEARS

VELOCITY (EST)

> 28,000 km/s

TRACKING: ACTIVE

TARGET: UY SCUTI

TYPE: RED SUPERGIANT

RADIUS: ~ 1,708 R_⊙

DISTANCE: 2.39 LIGHT YEARS

LUMINOSITY: ~ 340,000 L_⊙

SURFACE TEMP: ~ 3,500 K



"SOME PHENOMENA ARE NOT MEANT
TO BE EXPLAINED. ONLY OBSERVED."

A RED SUPERGIANT

SCIENCE FILE 6: UY SCUTI

UY Scuti is an enormous red supergiant in the constellation Scutum. Its exact size is difficult to determine because distance, atmosphere, pulsation, and surrounding material complicate the measurements. In this mission, the plasma mass approaches its environment—but the fictional encounter is not a claim about the real star.

REAL SCIENCE / STORY SCIENCE

Real: UY Scuti is a red supergiant. Story: a sentient plasma phenomenon meets Vanguard-6 there.

1. Why can the size of a distant supergiant be difficult to measure?
2. Identify one real element and one fictional element on this page.



WHEN CURIOSITY MUST PAUSE

COMMAND DECISION: THE NO-GO ORDER

Captain Larry orders Vanguard-6 to remain outside the quarantine boundary. Good exploration is not reckless. When the crew encounters an unknown phenomenon, protecting people, preserving data, and avoiding contamination can be more important than getting closer.

CADET ETHICS

A scientist can say “we do not know yet” and still make a strong safety decision.

1. Give two reasons to obey the no-go order.
2. What additional evidence would you want before approving a closer approach?



BRING THE DATA HOME

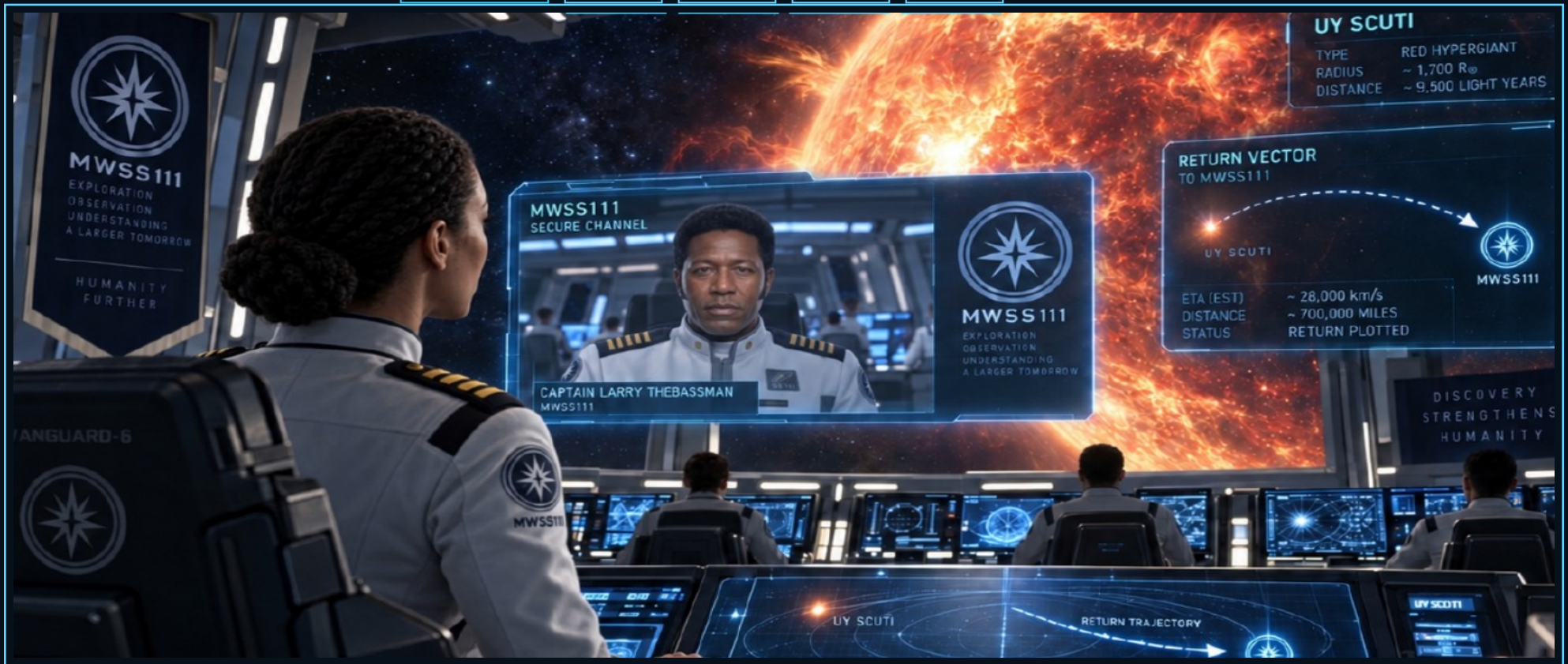
MISSION DEBRIEF

ALBA 310 completed orbital insertion, detected an anomaly, and helped Vanguard-6 trace its wake. The crew then followed a lawful safety order, secured the telemetry package, and returned to MWSS111.

FINAL REVIEW

Answer in complete sentences. There may be more than one defensible answer when you support it with evidence.

1. Describe the mission in four events.
2. Which science concept was most important to the mission—and why?
3. Design one new instrument for ALBA 310. What would it measure?
4. What question should the next expedition investigate?



CREATE A FIELD REPORT

CAPTAIN'S LOG: YOUR TURN

Write a short report from the viewpoint of a cadet reviewing the ALBA 310 telemetry. Keep observations separate from interpretations, recommend one safety action, and end with one unanswered question.

REPORT CHECKLIST

☐ Mission event ☐ Two observations ☐ One inference ☐ Safety recommendation ☐ New question

1. My report title:
2. Evidence I would cite:
3. Decision I recommend: