Draw Mercury: Crater Placement and Tonal Shading Steps

Original tasks 1, 2 / complete keys

Task 1

Draw a Mercury circle 8 cm across with light from the upper left. Place three craters: one large near the center, one medium at upper left, and one small at lower right. Draw the terminator and shade in two layers. Record the circle diameter and the long axis of the large crater.

Answer: A valid drawing shows a closed circle about 8 cm across, a light arrow from upper left, three craters of different sizes placed away from the terminator, a smooth terminator bowing toward the lower right, and two tone layers on the shadow side. The recorded large-crater long axis should be roughly 1.6 cm if the crater is about one-fifth of the circle diameter; accept values between 1.2 cm and 2.0 cm as plausible.

Reason: The exercise checks the core convention: one circle, one light direction, varied crater sizes, craters away from the terminator, and layered shading. The large crater size is proportional to the circle diameter, so the recorded value should be consistent with the chosen proportion.

Check: Measure the circle diameter with a ruler and confirm it is close to 8 cm. Measure the large crater's long axis and confirm it is between 1.2 cm and 2.0 cm. Check that no crater center is within 5 mm of the terminator curve and that the shadow side shows two distinct tone layers.

Task 2

A student draws a Mercury circle 12 cm across with light from the upper right. They draw a straight vertical terminator line down the middle and shade the entire right half uniformly dark. List two specific fixes and state one measurement they should record.

Answer: Fix 1: replace the straight vertical terminator with a smooth curve from top edge to bottom edge, bowing toward the shadow side (the right side for upper-right light). Fix 2: replace the uniform dark shading with layered tones: light near the terminator, darker toward the right edge, and a narrow transition band just inside the terminator. Record the circle diameter, 12 cm, and use it to size craters proportionally.

Reason: The terminator must curve to show the sphere, and shading must have layers to show curvature. The circle diameter is the key measurement for proportional crater sizes.

Check: Confirm the terminator is a smooth curve, not a straight line. Confirm the shadow side has at least two tone layers. Measure the circle diameter and confirm it is recorded as 12 cm.

Draw Mercury: Crater Placement and Tonal Shading Steps

Original tasks 3, 4 / complete keys

Task 3

Draw a Mercury circle 9 cm across with light from the upper left. Place four craters: two in the lit area, one near the center, and one in the shadow area. Draw the terminator and shade in three layers. Then measure the distance from the center crater to the terminator curve and record it.

Answer: A valid drawing shows a closed circle about 9 cm across, a light arrow from upper left, four craters of varied sizes placed away from the terminator, a smooth terminator bowing toward the lower right, and three tone layers on the shadow side. The recorded distance from the center crater to the terminator should be greater than 5 mm; accept any value above 5 mm as consistent with the convention.

Reason: The exercise adds a measurement check: craters must stay clear of the terminator so the shading remains readable. Three tone layers test the layered shading step.

Check: Measure the circle diameter and confirm it is close to 9 cm. Measure the distance from the center crater to the terminator and confirm it is greater than 5 mm. Check that the shadow side shows three distinct tone layers and that the lit side remains mostly clear.

Task 4

A student draws a Mercury circle 10 cm across with light from the upper left. They place a crater exactly on the terminator curve and shade the shadow side with one dark tone. They claim the drawing is complete. Identify two problems and describe how to revise the drawing using the convention.

Answer: Problem 1: a crater on the terminator is hard to read; move the crater at least 5 mm away from the terminator curve, either into the lit area or the shadow area. Problem 2: one uniform dark tone does not show curvature; replace it with layered shading: light near the terminator, darker toward the lower-right edge, and a narrow transition band just inside the terminator. Keep the circle diameter at 10 cm and adjust crater sizes proportionally.

Reason: The convention requires craters away from the terminator and layered shading on the shadow side. Revising these two features makes the drawing self-consistent and readable.

Check: Measure the distance from the moved crater to the terminator and confirm it is at least 5 mm. Confirm the shadow side has at least two tone layers. Measure the circle diameter and confirm it remains 10 cm.

Draw Mercury: Crater Placement and Tonal Shading Steps

Source rubric / reflection

- [ ] Circle is closed and roughly round; diameter is measured and recorded in centimeters.
- [ ] Light direction is shown with one clear arrow and is consistent with the terminator and shading.
- [ ] Three to five craters are placed with varied sizes and away from the terminator curve.
- [ ] Craters are drawn as ellipses whose long axis follows the local surface curve.
- [ ] Terminator is a smooth curve from one edge to the other, bowing toward the shadow side.
- [ ] Shadow side has at least two distinct tone layers, with a darker edge and a transition band near the terminator.
- [ ] Lit side remains mostly clear, with only faint shading to suggest curvature.
- [ ] Labels and notes are readable; handwriting style does not affect the score.

Reflection: What did you check, what did you change, and what will you try next?