Basketball Cross-Contour Drawing: Wrapping Lines Around a Sphere

Original tasks 1, 2 / complete keys

Task 1

On a 12 cm circle, state the convention: even spacing of 1.5 cm everywhere, with curvature increasing only near the outer edge. Draw four cross-contour lines across the upper half, each crossing the vertical seam at an angle. Describe where curvature should be strongest.

Answer: Curvature should be strongest near the outer edge of the circle and flattest near the center, while spacing remains 1.5 cm throughout. Each line should cross the vertical seam at an angle, not run parallel to it.

Reason: The stated convention fixes spacing as even and places curvature change only at the edge. Crossing the vertical seam at an angle ensures the lines are cross-contour rather than seam-following.

Check: Measure spacing between adjacent lines at three points; each should be about 1.5 cm. Check that each line crosses the vertical seam at a visible angle and that the bow is strongest near the edge.

Task 2

A drawing shows five cross-contour lines on a sphere. At the center, spacing is 1 cm; at mid-radius, 1.5 cm; near the edge, 2 cm. The stated convention is wider spacing near the center and closer spacing near the edge. Identify the mismatch and state one correction.

Answer: The spacing pattern is reversed: it is closest at the center and widest at the edge, which contradicts the stated convention. Correction: redraw the lines so spacing is about 2 cm at the center, 1.5 cm at mid-radius, and 1 cm near the edge, or revise the stated convention to match the drawing and apply it consistently.

Reason: The convention requires wider center spacing and closer edge spacing. The measured values show the opposite pattern, so either the drawing or the convention must change.

Check: Compare measured spacing at center, mid-radius, and edge to the convention. If the order is reversed, the mismatch is confirmed.

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Original tasks 3, 4 / complete keys

Task 3

Draw a sphere with one vertical seam and one horizontal seam. Add three cross-contour lines that wrap around the right side, crossing the vertical seam. State whether your lines use the example convention or an alternative, and give one reason your choice supports spherical volume.

Answer: A valid response states either the example convention (wider center spacing, closer edge spacing) or an alternative such as even spacing with stronger edge curvature. The lines cross the vertical seam at an angle and curve around the right side. The reason should connect the convention to volume, for example: closer spacing near the edge makes the surface appear to turn away from the viewer.

Reason: Cross-contour lines that wrap around the side and cross the vertical seam describe the sphere's turning surface. A stated convention makes the volume cue checkable.

Check: Confirm that three lines cross the vertical seam at an angle and curve around the right side. Check that the stated convention is written down and that the line spacing and curvature match it.

Task 4

A student draws cross-contour lines that are all straight and parallel to the horizontal seam. They claim the lines show volume because they are evenly spaced. Evaluate the claim and give two specific fixes.

Answer: The claim is not supported: straight lines parallel to a seam do not describe surface curvature and read as flat. Fix 1: angle each line so it crosses the horizontal seam and bows with the sphere's curvature. Fix 2: state a spacing convention and apply it, for example wider spacing at the center and closer spacing near the edge, or an alternative stated convention.

Reason: Cross-contour lines must cross the form and change direction to show turning. Parallel straight lines fail both conditions, so volume is not communicated.

Check: Check that each line crosses the horizontal seam at an angle and shows visible curvature. Check that a stated convention is present and that spacing matches it at center, mid-radius, and edge.

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Source rubric / reflection

- [ ] Sphere boundary is clear and approximately circular; construction lines are light or removed.
- [ ] Seam map includes at least one vertical and one horizontal seam curve plus two arcing seams.
- [ ] At least six cross-contour lines are present and each crosses at least one seam at an angle.
- [ ] A spacing and curvature convention is stated in the margin or notes.
- [ ] Line spacing and curvature are consistent with the stated convention across the drawing.
- [ ] No shading is used; volume is communicated by line curvature and spacing alone.
- [ ] Valid alternatives (dashed lines, different line counts, stronger seam emphasis) are accepted if the convention is stated and applied consistently.

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