Draw a Pile of Coins: Overlapping Ellipses and Edge Shading

Original tasks 1, 2, 3 / complete keys

Task 1

Two coins overlap. Coin 1 is behind, coin 2 is in front. Coin 1's top ellipse has width 60 mm and height 20 mm. Coin 2's top ellipse has the same dimensions and is shifted 15 mm right and 10 mm down. Describe which part of coin 1's outline is visible.

Answer: Only the part of coin 1's outline outside coin 2's top ellipse is visible. The lower right arc of coin 1 is hidden where coin 2's ellipse covers it.

Reason: The front coin's top ellipse defines the hidden region. Any back-coin line inside that ellipse must be erased. The shift of 15 mm right and 10 mm down places coin 2 over the lower right of coin 1.

Check: Trace coin 2's top ellipse. Confirm that no coin 1 line remains inside it. The visible coin 1 outline should stop exactly at coin 2's boundary.

Task 2

A coin's side edge is visible along its lower curve. The coin diameter is 40 mm. Using the hypothetical band width of one-tenth of the diameter, state the band width and describe where it should be darkest.

Answer: The band width is 4 mm. It should be darkest at the lowest point of the lower curve and fade toward the left and right ends.

Reason: One-tenth of 40 mm is 4 mm. The lower curve is closest to the coin below, so the shadow is strongest there. Fading toward the sides suggests curvature.

Check: Measure the band at its widest point; it should be about 4 mm. Check that the darkest area is at the bottom center, not evenly spread.

Task 3

You are drawing a pile of four coins in two layers: back layer coins A and B, front layer coins C and D. In what order should you draw the outlines, and why?

Answer: Draw A and B first, then C and D. Within each layer, order does not matter much, but all back-layer coins must be drawn before front-layer coins.

Reason: Drawing back to front ensures that front coins can cleanly hide back coins. If you draw a front coin first, you may later draw back-coin lines that incorrectly cross inside the front coin.

Check: After drawing, confirm that every visible back-coin edge stops at a front-coin boundary. No back-coin line should cross inside a front coin's top ellipse.

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Original tasks 4 / complete keys

Task 4

A student shades the entire side edge of a coin evenly dark. The top face is also dark. Explain the problem and give one fix using the lesson convention.

Answer: Even shading makes the side edge look flat, and a dark top face removes the separation between face and edge. Fix: keep the top face light and shade only a narrow band along the lower curve, darkest at the bottom center.

Reason: The convention uses contrast between a light top face and a narrow dark edge band to show curvature. Uniform darkness destroys that contrast.

Check: Check that the top face is mostly light and that the dark band is narrow and concentrated at the lower curve. The coin should read as a curved edge, not a flat disc.

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Source rubric / reflection

- [ ] Each coin is drawn as an ellipse with a distinct top face and side edge.
- [ ] Overlaps are correct: nearer coins hide farther coins, and hidden arcs are erased.
- [ ] Edge shading is a narrow band along the lower curve, darkest at the bottom center.
- [ ] Top faces remain mostly light, with clear separation from side edges.
- [ ] Ellipse proportions are consistent across the pile unless a deliberate perspective change is explained.
- [ ] The pile reads as stacked coins, not as flat circles.
- [ ] Alternative consistent edge-shading styles are accepted if they meet the separation and overlap criteria.

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