# Starfish Symmetry Drawing: Radial Axis and Arm Completion

Original tasks 1, 2, 3 / complete keys

Task 1

A starfish drawing uses a center O and five arms. The first arm is drawn along a vertical axis. At what angle from the vertical axis should the second arm be drawn if the arms are equally spaced?

Answer: 72 degrees.

Reason: A full turn is 360 degrees. Five equal arms divide 360 by 5, giving 72 degrees between neighboring arms.

Check: Multiply 72 by 5 to get 360, confirming the five intervals complete one full turn.

Task 2

A reference arm is 8 cm long and 3 cm wide at its midpoint. A student draws a second arm 7 cm long and 3 cm wide at its midpoint. Describe one adjustment that would improve radial symmetry.

Answer: Lengthen the second arm to 8 cm so its length matches the reference arm.

Reason: Radial symmetry requires matching proportions at equal angles. The midpoint width already matches, but the length differs by 1 cm.

Check: Measure both arms from the center to the tip; the difference should be 0 cm after adjustment.

Task 3

On a paper circle centered at O, a student marks five arm tips. The straight-line distance between neighboring tips is 4 cm for four pairs but 5 cm for one pair. What does this suggest about the angular spacing?

Answer: The pair with a 5 cm separation is spaced more widely than the others, so the arms are not equally spaced.

Reason: On a circle centered at O, equal angles produce equal chord lengths between neighboring tips. A larger chord indicates a larger angle.

Check: Measure all five chord lengths; they should be equal if the angles are equal.

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Original tasks 4 / complete keys

Task 4

A starfish drawing has a central disk of radius 1.5 cm centered at O. One arm outline starts 2 cm from O instead of at the disk edge. Is this a symmetry problem, and what is a simple fix?

Answer: Yes, the arm base is disconnected from the central disk. Move the arm base inward so it meets the disk edge at 1.5 cm from O.

Reason: In a radial starfish drawing, each arm should connect to the central disk at the same radius. A 2 cm start leaves a gap of 0.5 cm.

Check: Measure the distance from O to each arm base; all should be about 1.5 cm.

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Source rubric / reflection

- [ ] Center O is clearly marked and the central disk is centered on it.
- [ ] Five arm directions are marked at equal angles of about 72 degrees.
- [ ] Each arm tip lies on its ray and all arm lengths match the reference length within the chosen tolerance.
- [ ] Midpoint widths match the reference width at the same relative position on each arm.
- [ ] Construction lines are light or erased, and the final outline reads as a starfish with radial symmetry.
- [ ] Valid alternatives: line style, tip shape, and surface texture may vary, provided spacing and proportions remain consistent.

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