Spiral Shell Drawing: Coiling Curve and Ridge Construction

Original tasks 1, 2, 3, 4 / complete keys

Task 1

Starting radius 0.4 units, increment 0.3 units per quarter turn. Calculate the radius after five quarter turns.

Answer: 0.4 + 5 × 0.3 = 0.4 + 1.5 = 1.9 units.

Reason: Use radius = starting radius + (quarter turns × increment). Substitute 0.4, 5, and 0.3, then add.

Check: Recalculate with the same formula and confirm the multiplication and addition are correct.

Task 2

A coil has a starting radius of 0.5 units and reaches 2.1 units after eight quarter turns. What increment was used?

Answer: Increment = (2.1 − 0.5) ÷ 8 = 1.6 ÷ 8 = 0.2 units per quarter turn.

Reason: Rearrange the formula: increment = (final radius − starting radius) ÷ quarter turns.

Check: Substitute back: 0.5 + 8 × 0.2 = 2.1 units.

Task 3

You plan one ridge per quarter turn for twelve quarter turns. If the first ridge is at the first quarter turn, how many ridges are placed in total?

Answer: Twelve ridges.

Reason: One ridge per quarter turn for twelve quarter turns gives 12 × 1 = 12 ridges.

Check: Count the quarter turns and multiply by the ridge interval; confirm the count matches the planned total.

Task 4

A drawn coil measures 1.4 units at the fourth quarter turn. The starting radius was 0.6 units and the increment was 0.2 units. Is the drawing consistent with the plan?

Answer: Yes. Expected radius = 0.6 + 4 × 0.2 = 1.4 units, which matches the measured value.

Reason: Calculate the expected radius with the formula and compare it with the measurement.

Check: Repeat the calculation and measure again at the same checkpoint to confirm the match.

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Source rubric / reflection

- [ ] Center is marked and the unit, starting radius, and increment are labeled.
- [ ] Coiling curve joins smoothly at each quarter turn without sharp corners.
- [ ] Ridge steps are placed at a recorded interval and do not cross the center or each other.
- [ ] At least two radii are calculated with the formula and compared with measured values.
- [ ] Valid alternatives are accepted when construction logic and arithmetic checks are documented.

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