Star Tattoo Drawing: Point Geometry and Outline Design

Original tasks 1, 2, 3 / complete keys

Task 1

A five-point star has center C and radius 20 mm. P1 is at the top. What is the straight-line distance from C to P3 if P3 is placed correctly on the circle?

Answer: 20 mm.

Reason: Every outer point of the star lies on the circle, so the distance from the center to any outer point equals the radius.

Check: Measure C to P3 with a ruler; it should match the 20 mm radius within 1 mm.

Task 2

You place five points on a circle at equal spacing. What is the angle between adjacent points in degrees?

Answer: 72 degrees.

Reason: A full circle is 360 degrees; dividing by five equal gaps gives 360 divided by 5 equals 72.

Check: Measure two adjacent central angles with a protractor; each should be 72 degrees within 2 degrees.

Task 3

A star design must fit inside a 50 mm by 50 mm bounding box. The center is at the box center and the radius is 22 mm. Does the star fit if one point is at the top and the design is not rotated?

Answer: No, it does not fit safely.

Reason: The top point reaches 22 mm above the center. The box half-height is 25 mm, leaving only 3 mm margin. The side points also reach 22 mm from center, leaving 3 mm margins. This is too tight for a clean outline and even margins.

Check: Measure from the center to the box edge (25 mm) and subtract the radius (22 mm); the remaining margin is 3 mm, which is less than the planned 5 mm minimum.

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Original tasks 4 / complete keys

Task 4

You draw a pentagram guide and then trace the outer silhouette. How many inner intersection points do you mark before tracing the silhouette?

Answer: Five inner intersection points.

Reason: The pentagram connection order creates five crossing points inside the star. Each outer point connects to two adjacent inner intersections when tracing the silhouette.

Check: Count the crossings where guide lines intersect inside the star; there should be five distinct points.

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Source rubric / reflection

- [ ] All five outer points lie on the circle within 1 mm of the chosen radius.
- [ ] Angular spacing between adjacent points is equal within 2 degrees.
- [ ] The connection order matches the stated star type.
- [ ] The outline is continuous and has consistent measured line weight.
- [ ] The design fits inside the bounding box with even margins.
- [ ] Valid alternatives such as rotation or a different radius are accepted if geometry and outline quality are preserved.

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