Rainbow Scale Drawing: Overlapping Rows with a Hue Gradient

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

Task 1

A pattern has four rows, hue from 0 to 180 degrees, w = 16 mm, h = 10 mm, and d = 7 mm. Find the hue step, list row hues, and state the overlap per row.

Answer: Hue step = 180 divided by 3 = 60 degrees. Row hues: 0, 60, 120, 180 degrees. Overlap per row = 10 minus 7 = 3 mm.

Reason: Four rows have three gaps, so divide the range by 3. Overlap is h minus d.

Check: Verify that 0 plus 3 times 60 equals 180 and that d is less than h.

Task 2

After five rows with d = 6 mm, what is the cumulative distance from row 1 to row 5? If h = 9 mm, what is the overlap per row?

Answer: Cumulative distance = 4 times 6 = 24 mm. Overlap = 9 minus 6 = 3 mm.

Reason: Row 5 is four gaps below row 1. Overlap is the covered portion of each scale.

Check: Measure row 1 to row 5 on the plate; it should read 24 mm.

Task 3

A six-row pattern runs from hue 40 to 340 degrees. What is the hue step? If row 3 is at 160 degrees, does that fit the progression?

Answer: Hue step = 300 divided by 5 = 60 degrees. Row hues are 40, 100, 160, 220, 280, 340. Row 3 at 160 degrees fits.

Reason: Six rows have five gaps. Row 3 is two steps from row 1: 40 plus 2 times 60 equals 160.

Check: Confirm each adjacent pair differs by 60 degrees and the last row equals 340.

Task 4

With w = 22 mm and d = 10 mm, where should the second row's first scale start horizontally relative to the first row's first scale? If h = 15 mm, what is the overlap?

Answer: Offset = w/2 = 11 mm. Overlap = 15 minus 10 = 5 mm.

Reason: The half-width offset nests scales between the row above. Overlap is h minus d.

Check: Measure the horizontal shift between row starts; it should be 11 mm, and d must be less than h.

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Source rubric / reflection

- [ ] Row lines are horizontal and spaced by d within the stated tolerance.
- [ ] Each new row is offset horizontally by w/2.
- [ ] Scale top edges sit on row lines and bottom tips extend h below.
- [ ] Hue numbers increase monotonically from first to last row.
- [ ] Cumulative distance after k rows matches (k minus 1) times d.
- [ ] Valid alternatives are accepted when overlap, hue progression, and spacing checks pass.

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