Orthographic Drawing of Stairs

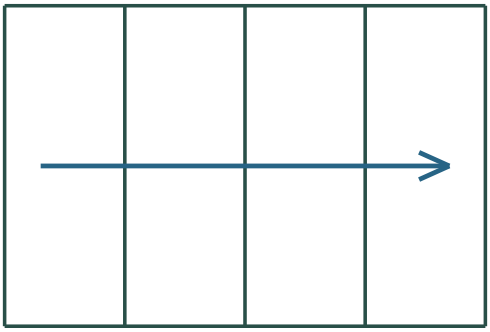
Answer | Task 1 of 4 | LETTER

Original prompt

Task 1: Draw the plan of the straight four-tread stair, showing each tread as a rectangle and the travel arrow.

Given

Classroom model: four treads are each 80 units across and 30 along the run. Each rise is 20 units. Include the final rise to the landing.



Straight plan: 4 treads, each 80 × 30 units

Answer

Four equal 80-by-30 tread rectangles in a straight row with a travel arrow pointing up the run.

Reasoning

The chosen straight stair has four equal plan footprints, each 80 units wide and 30 units deep, so its plan is a row of four matching rectangles.

Check

Count four rectangles, verify each is 80 by 30 units, and check that the arrow follows the straight run.

Orthographic Drawing of Stairs

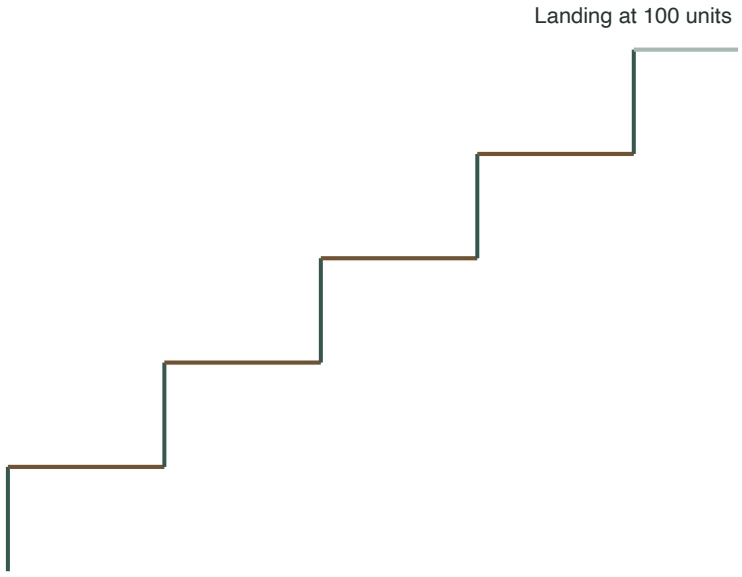
Answer | Task 2 of 4 | LETTER

Original prompt

Task 2: Draw the elevation of the straight four-tread stair, showing risers and treads as a stepped profile.

Given

Classroom model: four treads are each 80 units across and 30 along the run. Each rise is 20 units. Include the final rise to the landing.



4 tread surfaces · 5 rises of 20 units

Straight side elevation

Answer

A stepped profile with four horizontal tread surfaces and five vertical risers, each 20 units high; the fifth rise reaches the landing for a total rise of 100 units.

Reasoning

This chosen straight example has four tread surfaces and includes the final landing rise. Each rise is 20 units in the classroom model.

Check

Count four tread surfaces and five risers. Measure each rise as 20 units and confirm the total is 100 units.

Orthographic Drawing of Stairs

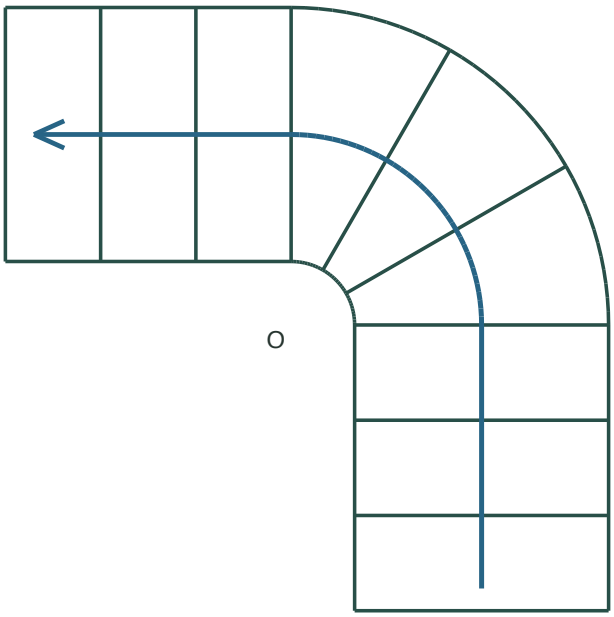
Answer | Task 3 of 4 | LETTER

Original prompt

Task 3: Draw the plan of a stair with a winder turn, fanning the winder treads around the corner.

Given

At corner O use x right and y up. Approach north from y = -90 to 0 across x = 20 to 100. Leave west from x = 0 to -90 across y = 20 to 100. Each tangent run has three 30-unit treads. Fill the turn with three equal sectors between radii 20 and 100. The walking line is at radius 60. Each rise is 20 units.



Quarter turn: 3 straight + 3 winder + 3 straight

Blue travel line: r = 60 through the turn

Answer

Draw three 80-by-30 lower-run rectangles, three annular-sector winders spanning 0°–30°, 30°–60° and 60°–90° counterclockwise between radii 20 and 100 about O, then three 80-by-30 upper-run rectangles. Add an arrow from the lower run through the turn to the upper run.

Reasoning

The specified plan has three straight treads before and after one 90° turn. Its three 30° sectors divide the turn evenly; at the radius-60 walking line, each winder going is $60\times\pi/6=10\pi$ units.

Check

Check three lower rectangles, three ordered sectors covering 90°, and three upper rectangles. Verify the inner and outer radii are 20 and 100, the width is 80, and the arrow follows the turn.

Orthographic Drawing of Stairs

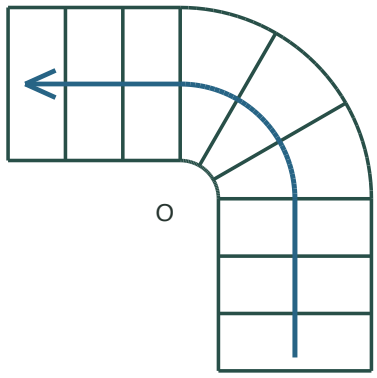
Answer | Task 4 of 4 | LETTER

Original prompt

Task 4: Draw the elevation matching the winder stair plan, then check the plan and elevation agree.

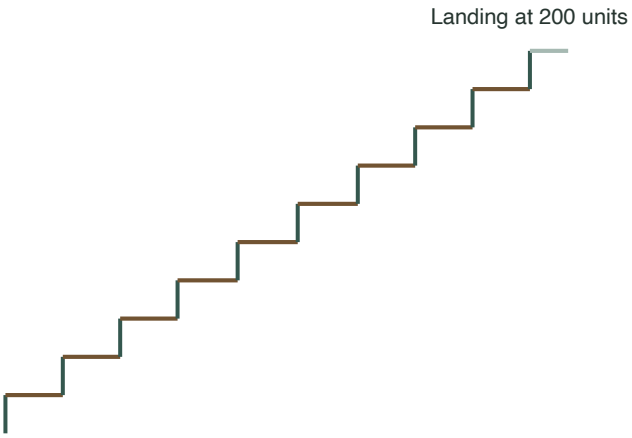
Given

At corner O use x right and y up. Approach north from y = -90 to 0 across x = 20 to 100. Leave west from x = 0 to -90 across y = 20 to 100. Each tangent run has three 30-unit treads. Fill the turn with three equal sectors between radii 20 and 100. The walking line is at radius 60. Each rise is 20 units.



Quarter turn: 3 straight + 3 winder + 3 straight

Blue travel line: r = 60 through the turn



9 tread surfaces · 10 rises of 20 units

Unfolded walking-line profile

Both diagrams use the same scale in model units.

Answer

Draw an unfolded profile along the walking line, not a conventional side elevation: nine tread surfaces with goings 30, 30, 30, 10π, 10π, 10π, 30, 30, 30 units, followed by the landing rise. Show ten 20-unit risers and a 200-unit total rise.

Reasoning

One ordinary side elevation does not show the plan direction change. The unfolded profile records the three straight treads, three winder goings at radius 60, three straight treads and landing rise in order.

Check

Compare nine profile tread goings with the nine plan treads, verify each winder going is 10π, and count ten 20-unit risers including the landing rise. The plan shows the turn; the unfolded profile does not.