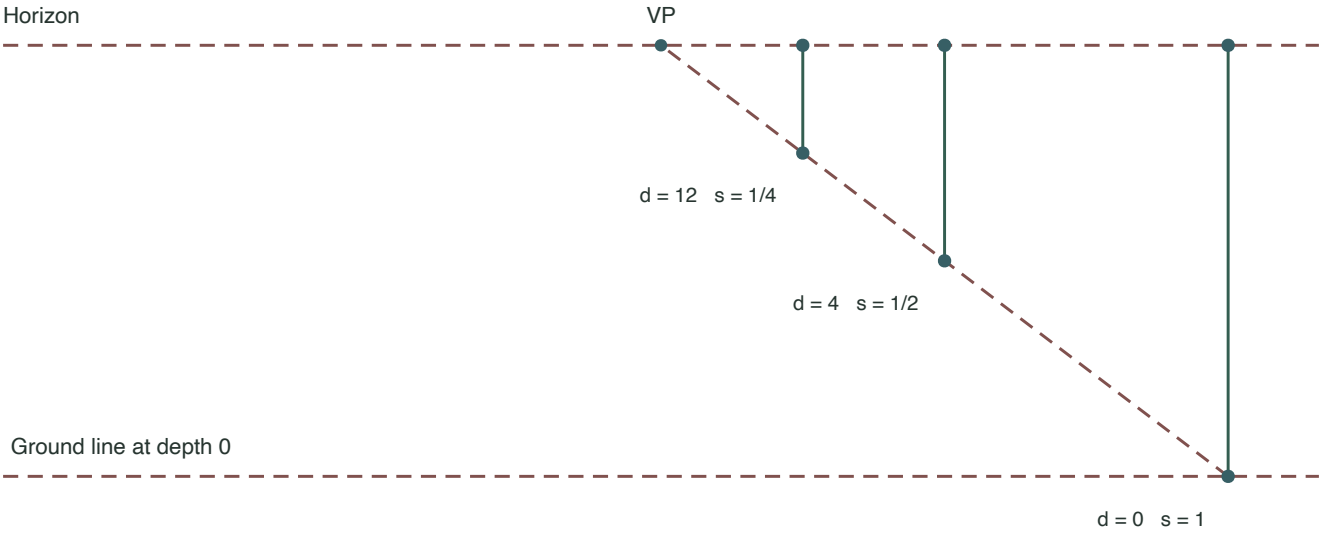
Perspective Drawing Formulas

Original prompt

Draw a one-point perspective reference with a horizon line, a vanishing point, a ground line, and three receding vertical posts at depths 0, 4, and 12 units, using eye height h = 4. Label the scale factor at each post.

For this construction, eye height h and eye-to-picture-plane distance f are both 4 units.



Drawn heights: 4, 2 and 1 units. All tops share the horizon.

Answer

At d = 0, s = 1, drawn height 4. At d = 4, s = 0.5, drawn height 2. At d = 12, s = 0.25, drawn height 1. The post tops converge to the vanishing point.

Reasoning

Use the chosen picture-plane distance f = h = 4 to calculate s at each depth. Each post top is at eye height, so the top positions align along the horizon toward the vanishing point.

Check

Check that each scale factor matches the formula and that the three post tops lie on a straight line toward the vanishing point.

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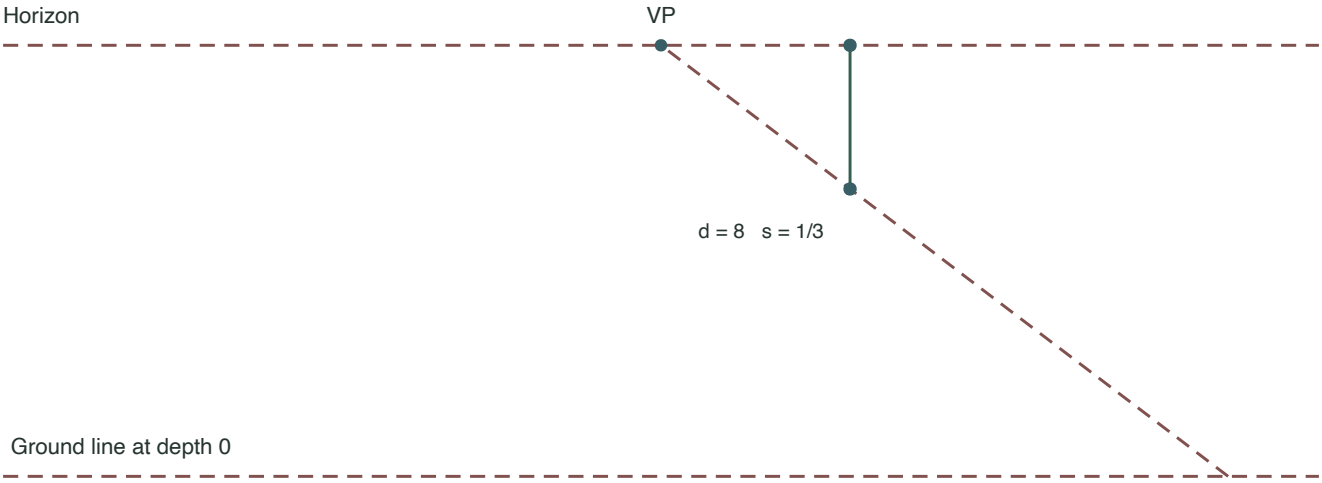
Original prompt

Compute the scale factor for a post at depth d = 8 with eye height h = 4, and state the drawn height if the true height is 4 units. Show the formula substitution and the result as a fraction and a decimal.

For this construction, eye height h and eye-to-picture-plane distance f are both 4 units.



s = 4/(4 + 8) = 1/3 | drawn height = 4/3 ≈ 1.333 units

Answer

s = 4/(4+8) = 4/12 = 1/3 ≈ 0.333. Drawn height = 4 × 1/3 = 4/3 ≈ 1.333 units.

Reasoning

Substitute the chosen distance f = h = 4 and depth d = 8 into the scale formula, then multiply the result by the true height 4.

Check

Confirm that 1/3 is less than the scale factor at d = 4 (0.5), which is expected because greater depth means more foreshortening.

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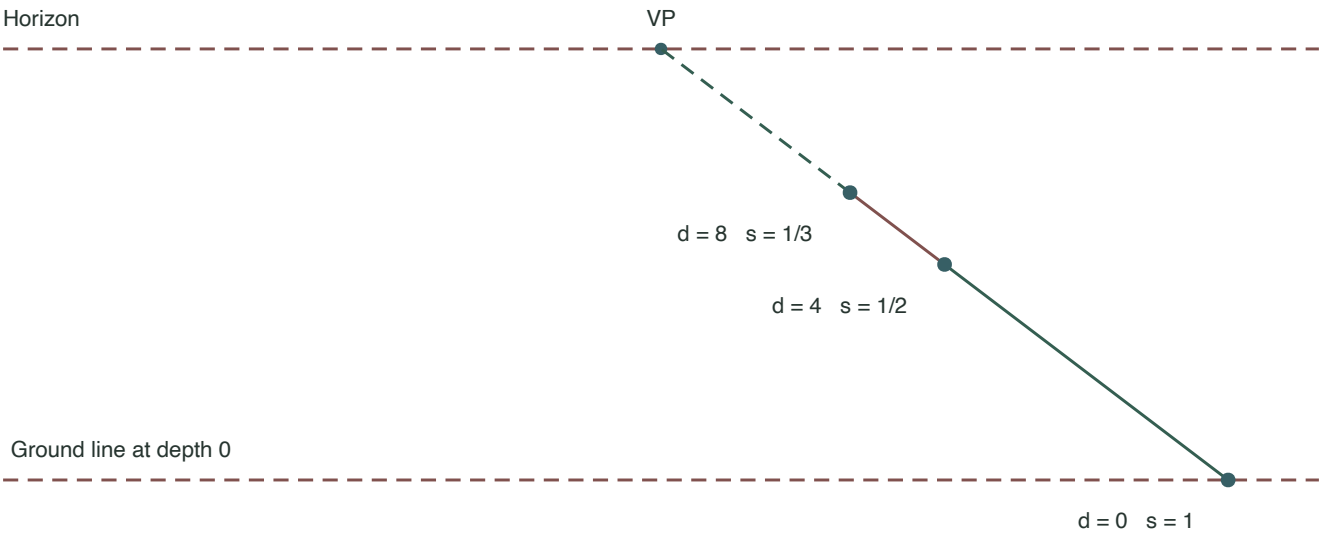
Original prompt

A receding interval from depth 0 to depth 4 has a scale factor of 0.5 at its far end. A second interval from depth 4 to depth 8 has a scale factor of 0.333... at its far end. Compare the two intervals and explain which appears more foreshortened and why, using the formula.

For this construction, eye height h and eye-to-picture-plane distance f are both 4 units.



Along the ray: 0 to 4 is three times as long as 4 to 8.

Answer

The 4-to-8 interval appears shorter. Along the same receding ground line, its projected length is proportional to the difference of its two endpoint factors. The differences are 1 − 1/2 = 1/2 and 1/2 − 1/3 = 1/6. So the second interval appears one-third as long as the first.

Reasoning

Each endpoint lies its scale factor times the same front-to-vanishing-point distance from the point. For an interval along that line, subtract the endpoint factors to compare its drawn length.

Check

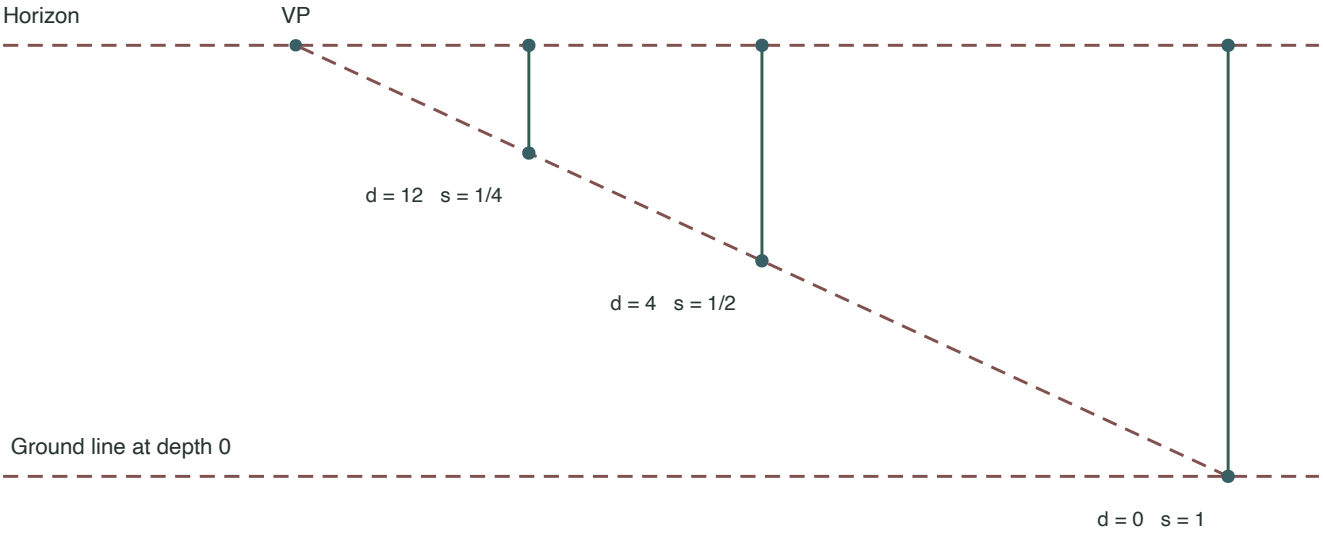
At depths 0, 4, and 8, check the factors 1, 1/2, and 1/3. Subtract consecutive factors and verify that (1/6) ÷ (1/2) = 1/3.

Perspective Drawing Formulas

Original prompt

Redraw the three-post construction from Task 1 but move the vanishing point to the left of center. Describe how the receding lines change and confirm that the scale factors at each depth remain the same.

For this construction, eye height h and eye-to-picture-plane distance f are both 4 units.



Drawn heights: 4, 2 and 1 units. All tops share the horizon.

Answer

The receding lines now angle toward a left-of-center vanishing point. The post heights still use 1, 0.5, and 0.25 at depths 0, 4, and 12, with the eye-to-plane distance fixed at f = h = 4.

Reasoning

In the diagram the vanishing point moves horizontally. The eye-to-plane distance and the three depths are held fixed, so the height scale factors stay the same.

Check

Confirm that the post tops still converge to the new vanishing point and that the drawn heights match the original scale factors.