Draw Tree Roots: Spreading Lines and Soil Line

Original tasks 1, 2 / complete keys

Task 1

On a 15 cm wide paper, place a soil line 5 cm from the bottom. Draw a trunk base at the center. Choose a total spread width of 10 cm. Draw four main roots. Check that at least two main roots extend beyond 5 cm from center. Describe your root tip distances.

Answer: A valid drawing has a horizontal soil line 5 cm from the bottom, a centered trunk base, and four main roots spreading outward and downward. Example tip distances from center: 4 cm left, 6 cm right, 3 cm left, 7 cm right. Two roots reach 6 cm and 7 cm, which are beyond 5 cm, so the check passes.

Reason: The spread width is 10 cm, so half is 5 cm. At least two main roots must extend beyond 5 cm from center. The example distances satisfy this with simple arithmetic.

Check: Measure each main root tip distance from the center point with a ruler. Count how many are greater than 5 cm. The drawing passes if the count is at least two.

Task 2

Draw a soil line and trunk base on paper 18 cm wide. Use a total spread width of 14 cm. Draw three main roots with tip distances 6 cm left, 7 cm right, and 4 cm left. Draw two secondary roots. Does the drawing meet the spread check? Explain.

Answer: Half of 14 cm is 7 cm. The tip distances are 6 cm, 7 cm, and 4 cm. The 7 cm root is equal to 7 cm, not beyond it; the 6 cm and 4 cm roots are also not beyond 7 cm. So zero roots are beyond half the spread width. The drawing does not meet the check. To fix it, extend one root to 8 cm or reduce the spread width to 10 cm (half = 5 cm) so both the 6 cm and 7 cm roots qualify.

Reason: The check requires at least two main roots beyond half the spread width. With half equal to 7 cm, the distances 6, 7, and 4 do not produce two values greater than 7.

Check: Compute half the spread width: 14 divided by 2 equals 7 cm. Compare each tip distance to 7 cm using greater than. Count qualifying roots. The count must be at least two.

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Original tasks 3, 4 / complete keys

Task 3

On paper 22 cm wide, draw a soil line 8 cm from the bottom. Draw a trunk base slightly left of center. Choose a total spread width of 16 cm. Draw five main roots. At least two main roots must extend beyond 8 cm from center. Propose tip distances that pass the check and label all parts.

Answer: A valid proposal: tip distances 9 cm left, 7 cm right, 8 cm left, 10 cm right, and 5 cm left. Half of 16 cm is 8 cm. The roots at 9 cm and 10 cm are beyond 8 cm, so the check passes. Labels are placed outside the root area for soil line, trunk base, main roots, and secondary roots.

Reason: The spread width is 16 cm, so half is 8 cm. At least two tip distances must be greater than 8 cm. The proposed distances include 9 cm and 10 cm, which satisfy the requirement.

Check: Measure each tip distance from the center point. Count distances greater than 8 cm. The drawing passes if the count is at least two. Also check that labels are readable and do not cover root lines.

Task 4

Draw a root system on paper 12 cm wide. Place the soil line 4 cm from the bottom. Choose a total spread width of 8 cm. Draw three main roots and one secondary root. Check that at least two main roots extend beyond 4 cm from center. If your drawing fails, state one adjustment and redraw the check.

Answer: A valid drawing has a horizontal soil line 4 cm from the bottom, a trunk base at center, and three main roots. Example tip distances: 3 cm left, 5 cm right, and 4 cm left. Half of 8 cm is 4 cm. The 5 cm root is beyond 4 cm, but the 4 cm root is equal, not beyond. Only one root qualifies, so the drawing fails. Adjustment: extend the 4 cm root to 5 cm. Then two roots (5 cm and 5 cm) are beyond 4 cm, and the check passes.

Reason: The check requires at least two main roots beyond half the spread width. With half equal to 4 cm, the distances 3, 5, and 4 produce only one value greater than 4. Extending one root fixes the count.

Check: Compute half the spread width: 8 divided by 2 equals 4 cm. Compare each tip distance to 4 cm using greater than. Count qualifying roots. After adjustment, recount to confirm at least two roots qualify.

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Source rubric / reflection

- [ ] Soil line is present, horizontal, and clearly separates air from soil.
- [ ] Trunk base meets the soil line and is narrower at the top than at the soil line.
- [ ] Three to five main roots spread outward and downward from the trunk base.
- [ ] Main roots taper from thicker near the trunk to thinner at the tips.
- [ ] At least two secondary roots branch from main roots.
- [ ] At least two main roots extend beyond half the chosen spread width.
- [ ] Labels for soil line, trunk base, main roots, and secondary roots are readable and do not cover root lines.
- [ ] Valid alternative styles are accepted if the structural checks above are met.

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