Draw a Small Cross: Proportion and Shading Steps

Original tasks 1, 2 / complete keys

Task 1

Draw a small cross with a total vertical height of 6 cm, a crossing point 2 cm from the top, arm lengths of 1.5 cm each, and a bar width of 0.8 cm. State the horizontal width and check the ratio.

Answer: The horizontal width is 3 cm because each arm is 1.5 cm. The horizontal width is half the vertical height, 3 cm to 6 cm. The crossing point is 2 cm from the top, which is above the midpoint at 3 cm.

Reason: Add the two equal arm lengths to get the full horizontal width. Compare that width with the vertical height to confirm the chosen ratio. Check that the crossing point is above the midpoint so the lower arm is longer.

Check: Measure the vertical height and horizontal width with a ruler. Confirm the left and right arms are equal and that the crossing point is above the midpoint. Check that the bar width is 0.8 cm at all four ends.

Task 2

A cross has a vertical height of 10 cm and a crossing point 4 cm from the top. Each arm is 2.5 cm. What is the horizontal width, and is the crossing point above the midpoint?

Answer: The horizontal width is 5 cm because 2.5 cm plus 2.5 cm equals 5 cm. The midpoint is at 5 cm from the top, and the crossing point is 4 cm from the top, so it is above the midpoint.

Reason: The full horizontal width is the sum of the two equal arms. The midpoint of a 10 cm vertical is 5 cm from the top. A crossing point at 4 cm is closer to the top than the midpoint, so the lower arm is longer.

Check: Measure the arms and add them. Mark the midpoint on the vertical guide and compare it with the crossing point. Confirm the crossing point is closer to the top.

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Original tasks 3, 4 / complete keys

Task 3

Draw a small cross with a vertical height of 7 cm and a horizontal width of 3.5 cm. Choose a crossing point above the midpoint and a constant bar width of 0.7 cm. Describe where the shading should be darkest if light comes from the upper right.

Answer: The arms are 1.75 cm each because half of 3.5 cm is 1.75 cm. A valid crossing point is 2.5 cm from the top, which is above the midpoint at 3.5 cm. With light from the upper right, the darkest shading should be on the lower left edges and the inner corners.

Reason: The horizontal width is split equally between the two arms. The crossing point must be above the midpoint, so any value less than 3.5 cm from the top is valid if the cross remains symmetrical. The darkest shading is opposite the light direction.

Check: Measure the arms to confirm they are equal. Check that the crossing point is above the midpoint. View the cross from a short distance and confirm the lower left edges and inner corners are darker than the upper right edges.

Task 4

A student draws a cross with a vertical height of 9 cm, a crossing point 4.5 cm from the top, arm lengths of 2 cm each, and a bar width that is 1 cm at the top but 0.6 cm at the bottom. Identify two proportion problems and state how to fix them.

Answer: The crossing point is at the midpoint, so the cross looks like a plus sign rather than a cross with a longer lower arm. The bar width changes from 1 cm at the top to 0.6 cm at the bottom, so the bars are not constant. Fix the crossing point by moving it above the midpoint, for example 3 cm from the top, and fix the bar width by marking half the chosen width on both sides of the vertical guide at the top and bottom.

Reason: A crossing point at the midpoint makes the upper and lower arms equal, which does not match the convention of a longer lower arm. A changing bar width makes the outline look tapered and inconsistent. Both problems are corrected by adjusting the construction marks before darkening the outline.

Check: Measure the distance from the top to the crossing point and compare it with the midpoint. Measure the bar width at the top and bottom and confirm they match. Check that the left and right arms remain equal after the correction.

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Source rubric / reflection

- [ ] Vertical height and horizontal width match the chosen ratio within a small tolerance.
- [ ] The horizontal bar crosses above the midpoint, keeping the lower arm longer.
- [ ] Left and right arm lengths are equal.
- [ ] Bar width is consistent at the top, bottom, left, and right ends.
- [ ] The outline is clean and construction guides are lightly erased.
- [ ] Shading uses one stated light direction and is darker on the side away from the light.
- [ ] Shading is built in light passes rather than one heavy pass.
- [ ] The cross is symmetrical and readable at a small size; valid alternative ratios are accepted if symmetry and consistency are maintained.

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