Draw a Bass Drum: Shell, Hoops, and Tension Rods

Original tasks 1, 2, 3 / complete keys

Task 1

A bass drum has a head diameter of 50 units and a shell depth of 30 units. Using the two-thirds convention for the vertical axis, state the front ellipse dimensions and the shift for the back ellipse.

Answer: Front ellipse: 50 units wide, about 33 units tall (two-thirds of 50 is 33.3, rounded to 33). Back ellipse: same size, shifted 30 units diagonally.

Reason: The vertical axis is two-thirds of the horizontal axis, so 50 times 2/3 equals about 33. The back ellipse is shifted by the shell depth, 30 units.

Check: Multiply 50 by 2/3 and round to the nearest whole unit; confirm the shift equals 30 units.

Task 2

A front hoop is drawn with a 3-unit offset around a head ellipse that is 40 units wide and 28 units tall. What are the hoop ellipse dimensions?

Answer: The hoop ellipse is 46 units wide and 34 units tall.

Reason: A 3-unit offset on each side adds 6 units to each axis: 40 plus 6 equals 46, and 28 plus 6 equals 34.

Check: Add twice the offset to each axis and verify the band width is 3 units at four points.

Task 3

You want 6 evenly spaced tension rods on a front hoop. Describe how to find the spacing points using equal angular divisions rather than cardinal points plus bisection.

Answer: Divide the full ellipse into 6 equal angular increments of 60 degrees each, starting from the top point. Mark each point where the increment lands on the ellipse, giving 6 evenly spaced points around the hoop. Place rods at these points.

Reason: Cardinal points plus bisection only produces even spacing when the rod count is a multiple of 4, such as 8. For 6 rods, each point must be 1/6 of the full turn apart, so use 60-degree increments from the top.

Check: Count the 6 points and confirm that each adjacent pair is separated by the same angular increment (60 degrees) and by equal arc distance along the ellipse.

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Original tasks 4 / complete keys

Task 4

A drawing shows a front hoop band that measures 4 units at the top, 4 units at the bottom, 6 units on the left, and 2 units on the right. State the likely error and a fix.

Answer: The hoop ellipse is not centered on the head ellipse; the offset is uneven. Fix by re-drawing the hoop ellipse with a consistent 4-unit offset on all sides, then re-check the four measurements.

Reason: Uneven band widths indicate the hoop ellipse axes were not increased equally or the centers do not match.

Check: Measure the offset at four cardinal points after redrawing; all should be about 4 units.

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Source rubric / reflection

- [ ] Front head is an ellipse with horizontal axis longer than vertical axis.
- [ ] Back ellipse matches front ellipse in size and is shifted by the shell depth.
- [ ] Shell connecting lines are parallel and hidden edges are removed.
- [ ] Front and back hoops are narrow bands of consistent width.
- [ ] Tension rods are evenly spaced and lengths are consistent or consistently foreshortened.
- [ ] Construction lines are erased and final lines are clear.
- [ ] Valid alternatives are accepted if construction remains consistent and checkable.

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