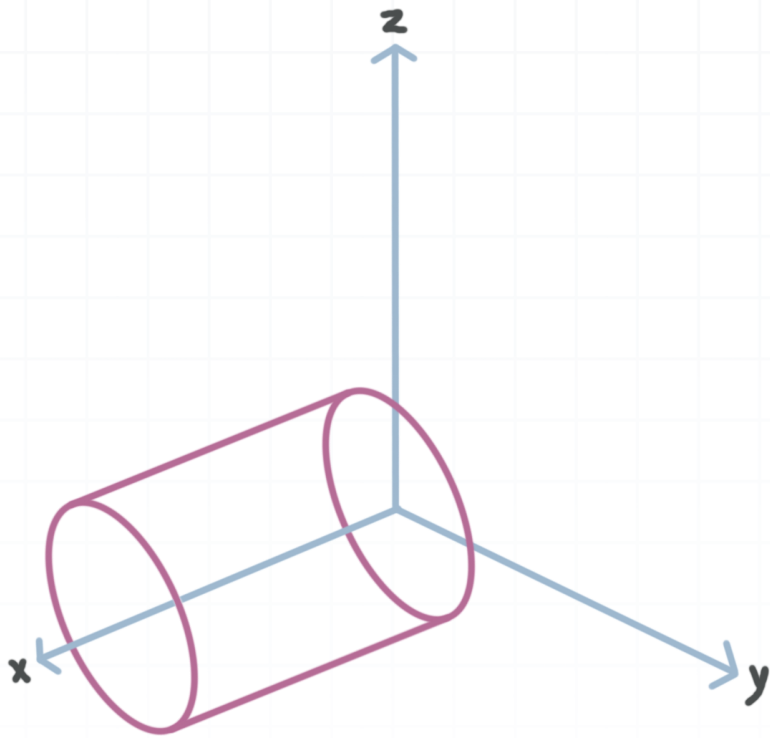**Topic**: Sketching the surface

Question: Which equation represents this quadric surface?

Answer choices:

A $\quad x^2 + z^2 = 1$

B $\quad x^2 + y^2 = 1$

C $\quad y^2 + z^2 = 1$

D $\quad x^2 + y^2 + z^2 = 1$

Solution: C

The first thing we can see in this surface is that it's a cylindrical shape. The standard form of a cylinder is

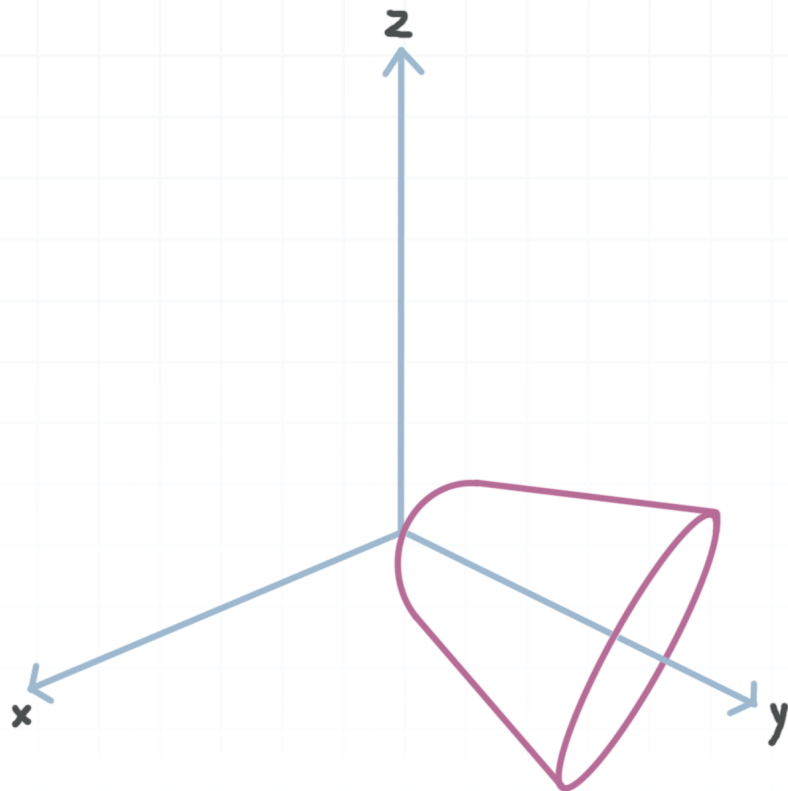$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

for a cylinder with a center at $(0,0,0)$. The cylinder we have does have a center at $(0,0,0)$ but revolves around the x-axis, not the z-axis.

Answer choices A, B and D are all incorrect because the cylinder revolves around the x-axis and never contacts it. Therefore x cannot appear in the correct equation. Answer choice C is correct because the equation represents a cylinder, and there's no x variable in it.

Topic: Sketching the surface

Question: Which equation represents this quadric surface?

Answer choices:

A $\quad x^2 + z^2 = y^2$

B $\quad x^2 + z^2 = y$

C $\quad y^2 + z^2 = x$

D $\quad x^2 + y^2 = z$

Solution: B

The first thing we can see in this surface is that it's an elliptic paraboloid. The standard form of an elliptic paraboloid is

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z}{c}$$

for an elliptic paraboloid with a center at $(0,0,0)$. The elliptic paraboloid we have does have a center at $(0,0,0)$ but revolves around the y-axis not the z-axis.
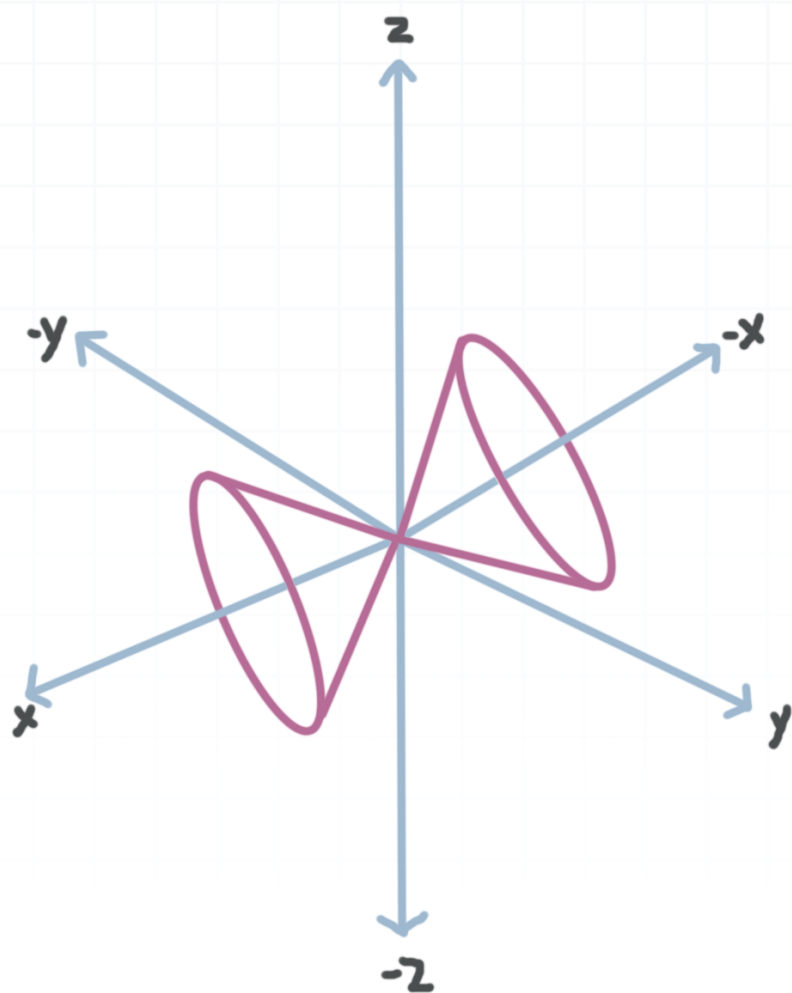
Answer choice A is incorrect because this is not the equation of an elliptic paraboloid. Answer choices C and D are incorrect because these are equation of elliptic paraboloids that revolve around the x-axis and z-axis instead of the y-axis.

Answer choice B is correct because this is the equation of an elliptic paraboloid, and the y variable is not squared, which corresponds to the shape revolving around the y-axis.

Topic: Sketching the surface

Question: Which equation and description represents this quadric surface?

Answer choices:

A $x^2 + y^2 = z^2$

B $x + y = z$

C $x^2 + z^2 = y^2$

D $y^2 + z^2 = x^2$

Solution: D

The first thing we can see in this surface is that it's an elliptic cone. The standard form of a cone is

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z^2}{c^2}$$

for an elliptic cone with a center at $(0,0,0)$. The elliptic cone we have does have a center at $(0,0,0)$ but revolves around the x-axis not the z-axis.

Answer choices A and C are incorrect because these are the equations of elliptic cones that revolve around the z-axis and y-axis instead of the x-axis. Answer choice B is incorrect because this isn't the equation of an elliptic cone.

Option D is correct because this is the equation of an elliptic cone that revolves around the x-axis.