

Teacher Information *(Continued)*

Activity 9 Graphing an Extra Dimension

Answer to Instructions: Part A

- When $a > 1$, the graph moves towards the y -axis.
When $-1 < a < 0$, the graph reflects over the x -axis and moves away from the y -axis.

Answers to Instructions: Part B

- In the yz plane, the trace is a parabola, opening upward. In the xy plane, the trace is a single point.
- The resulting trace is a circle for $z > 0$.
- The parabolic trace in the xz plane is moved towards the z -axis.
- In the xz plane, the trace is a parabola, opening upward. In the yz plane, the trace is a parabola opening upward, moved towards the z -axis. In the xy plane, the trace is a single point.
- The trace is a circle when $a = b$; otherwise, it is elliptical.
- The parabolic trace in the yz plane opens downward instead of upward.
- In the xz plane, the trace is a parabola, opening downward. In the yz plane, the trace is a parabola, opening upward. In the xy plane, the trace is a single point.
- Parabolic traces in the xz and yz planes both open downward.

Answers to Questions

- The trace in the xz and yz planes is parabolic and the trace in planes parallel to the xy plane is elliptical (circular if $a = b$).
- Answers will vary. The surface is called a *hyperbolic paraboloid* because the xz and yz plane traces are still parabolic, but the trace in planes parallel to the xy plane is a hyperbola.