Basic graphing techniques

1. General techniques

   (a) When one line passes behind another, break it to show it doesn't touch and that part of it is hidden.

   (b) make the angle between the positive x-axis and positive y-axis large enough.

   (c) Draw planes parallel to the coordinate planes as if they were rectangles with sides parallel to the coordinate axes.

   (d) Dash or omit hidden portions of lines. Don't let the line touch the boundary of the parallelogram that represents the plane, unless the line lies in the plane.

   (e) Spheres: Draw the sphere first (outline the equator); draw axes, if any, later. Use line breaks and dashed lines.

   (f) A general rule for perspective: Draw the object as if it lies some distance away, below, and to the left.

   (g) To draw a plane that crosses all three coordinate axes, follow the steps shown here:

      i. Sketch the axes and mark the intercepts.
      ii. Connect the intercepts to form two sides of a parallelogram.
      iii. Complete the parallelogram and enlarge it by drawing lines parallel to its sides.
      iv. Darken the exposed parts, break hidden lines, and, if desired, dash hidden portions of the axes. You may wish to erase the smaller parallelogram at this point.

2. Drawing cylinders parallel to the coordinate axes

   (a) Sketch all three coordinate axes very lightly.

   (b) Sketch *(very lightly)* the trace of the cylinder in the coordinate plane of the two variables that occur in the cylinder's equation.

   (c) Sketch traces in parallel planes on either side (again, lightly.)

   (d) Add parallel outer edges to give the shape definition.

   (e) If more definition is required, darken the parts of the lines that are exposed to view. Leave the hidden parts light. Use line breaks when you can.

Drawing Quadric Surfaces.

   1. Lightly sketch the three coordinate axes.

   2. Decide on a scale and mark the intercepts on the axes.

   3. Sketch cross sections in the coordinate planes and in a few parallel planes, but don't clutter the picture. **Use tangent lines as guides.**

   4. If more is required, darken the parts exposed to view. Leave the rest light. Use line breaks when you can.