Preamble: Figure (a) depicts Alberti’s floor in the $x$-$y$ plane (the unit of length is the foot). Figure (b) depicts the perspective image of the floor as drawn by an artist on a canvas in the $x$-$z$ plane (with the unit of length the inch). Alberti’s instruction to the artist, expressed within the framework of

the given coordinate systems, is this rule: A point $P$ with coordinates $P = (x_0, y_0)$ at any location in the $x$-$y$ plane (the unit of length here is the foot) with positive $y$-coordinate should be drawn at the point

$$Q = (x_1, z_1), \text{ where } x_1 = 12 \frac{2x_0}{2+y_0} \text{ and } z_1 = 12 \frac{8y_0}{2+y_0},$$

in the $x$-$z$ plane of the canvas (the unit of length here is the inch).

1. Let $c$ be a constant and consider the line $y = 22 + 8(x - c)$ in the $x$-$y$ plane. Take $c$ to be some random number between $-3$ and $3$ and sketch the line on the $x$-$y$ plane provided above. Check that the point $P = (\frac{t-22}{8} + c, t)$ is on the line for any positive $t$. Consider the perspective image $Q$ of $P$ in the $x$-$z$ plane and determine its coordinates by using Alberti’s instruction.
2. A small bug crawls on the floor along the line $y = 22 + 8(x - c)$ in the direction of the positive $y$-axis. Every minute or so, the artist draws the bug in perspective on his canvas. The artist notices that the points representing the bug are converging to a point on the canvas. What is this point? (Answer by first rewriting the coordinates of $Q$ appropriately).