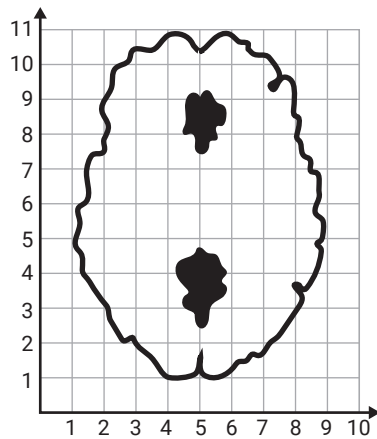


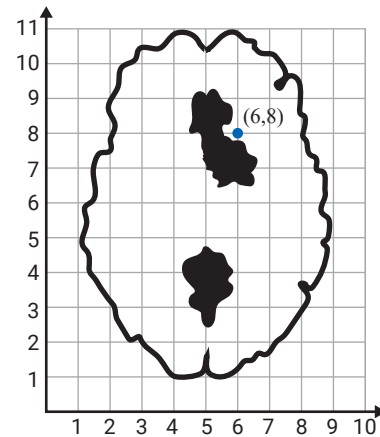


The following image shows a rough sketch of the cross-section of a human brain with a grid overlaid. The shape is roughly elliptical, with the major axis being vertical.



1.
  - a. Sketch a line segment on the vertical grid lines so that the segment going through the cross-section is as long as it can be and the portions to the left and right of the line segment are roughly symmetric.
  - b. Sketch a horizontal line segment on the horizontal grid lines so that the segment going through the cross-section is as long as it can be and the portions above and below the line segment are roughly symmetric.
2. Let the intersection of the two segments be the center of the ellipse. State the coordinates of the following as  $(x, y)$  ordered pairs.
  - a. The center
  - b. The vertices on the major axis
  - c. The vertices on the minor axis
3. State the lengths of the major and minor axes.
4. Write the equation of the ellipse.
5. Sketch the ellipse over the grid with the brain cross-section. (As a check, the point  $(8, 9)$  should be very close to the ellipse, but not on the ellipse.)

6. Given  $x = 8$ , use your equation of the ellipse to solve for the larger of the two values of  $y$ . Write this point in  $(x, y)$  form with the  $y$ -value as a simplified square root and rounded to the nearest tenth.
7. Suppose there is a tumor indicated in the scan and the closest part of the tumor to the point determined in Problem 6 is at  $(6, 8)$ .



- a. Calculate the distance from the point found in Problem 6 to the point  $(6, 8)$  and round the answer to the nearest tenth.
- b. Suppose after chemotherapy that the closest part of the tumor to the point determined in Problem 6 is  $(5, 7.5)$ . Calculate the distance from this point to the point found in Problem 6.
- c. Compare the distances from parts a. and b., and provide a probable reason for the differing values.