

Chapter 6

Questions to Guide Your Review

1. How do you define and calculate the volumes of solids by the method of slicing? Give an example.
2. How are the disk and washer methods for calculating volumes derived from the method of slicing? Give examples of volume calculations by these methods.
3. Describe the method of cylindrical shells. Give an example.
4. How do you define the length of a smooth parametrized curve $x = f(t), y = g(t), a \leq t \leq b$? What does smoothness have to do with length? What else do you need to know about the parametrization to find the curve's length? Give examples.
5. How do you find the length of the graph of a smooth function over a closed interval? Give an example. What about functions that do not have continuous first derivatives?
6. What is a center of mass?
7. How do you locate the center of mass of a straight, narrow rod or strip of material? Give an example. If the density of the material is constant, you can tell right away where the center of mass is. Where is it?
8. How do you locate the center of mass of a thin flat plate of material? Give an example.
9. How do you define and calculate the area of the surface swept out by revolving the graph of a smooth function $y = f(x), a \leq x \leq b$, about the x -axis? Give an example.
10. Under what conditions can you find the area of the surface generated by revolving a curve $x = f(t), y = g(t), a \leq t \leq b$, about the x -axis? The y -axis? Give examples.
11. What do Pappus's two theorems say? Give examples of how they are used to calculate surface areas and volumes and to locate centroids.
12. How do you define and calculate the work done by a variable force directed along a portion of the x -axis? How do you calculate the work it takes to pump a liquid from a tank? Give examples.
13. How do you calculate the force exerted by a liquid against a portion of a vertical wall? Give an example.