**WORK (PUMPING PROBLEMS)**

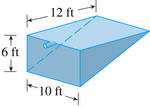
General

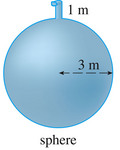
* Always slice horizontally
* Start with the origin of the axis system at the bottom of the tank
* Build up work formula from density paying close attention to units (see table below)

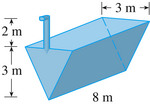
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| **Metric Units** | **US Units** |
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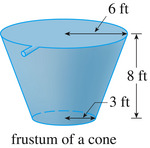
Example 1. A tank has the shape of an inverted circular cone with height 10 feet and base 4 feet. It is filled with water to a height of 8 feet. Set up the integral to find the work required to empty the tank by pumping all of the water out of a spout 2 feet above the top of the tank.

Example 3. The tanks below are full of water. Set up the integral to find the work required to pump the water out of the spout at the top of the tank.

[](file:///C:/Users/ralph.boedigheimer/Desktop/SolidWorks%20Downloads/Media/Image_Library/chapter6/06p450d.html)

[](file:///C:/Users/ralph.boedigheimer/Desktop/SolidWorks%20Downloads/Media/Image_Library/chapter6/06p450b.html)

[](file:///C:/Users/ralph.boedigheimer/Desktop/SolidWorks%20Downloads/Media/Image_Library/chapter6/06p450a.html)

[](file:///C:/Users/ralph.boedigheimer/Desktop/SolidWorks%20Downloads/Media/Image_Library/chapter6/06p450c.html)