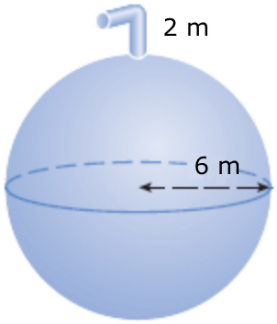
Work & Average Value of a Function

1. How much work is done (in J) when a weightlifter lifts 210 kg from 1.5 m to 2.0 m above the ground?

2. A variable force of $6x^{-2}$ pounds moves an object along a straight line when it is x feet from the origin. Find the work done (in ft-lb) in moving the object from x=1 ft to x=13 ft.

3. A force of 18 lb is required to hold a spring stretched 8 in beyond its natural length. How much work W is done in stretching it from its natural length to 10 in beyond?

4. A tank is full of water. Find the work (in J) required to pump the water out of the spout. Use $9.8\ m/s^2$ for g and $1000\ kg/m^3$ for density of water.



5. Find the average value of $f(x) = 3x^2 + 4x$, $[-1,3]$.

6. Find all numbers b so the average value of $f(x) = 2 + 10x - 9x^2$ on the interval $[0, b]$ is equal to 3.

7. The graph of the velocity of a car that is accelerating is shown below.
    a. Use the midpoint rule with n=3 to estimate the velocity during the first 18 seconds.
    b. At what time was the instantaneous velocity equal to the average velocity?