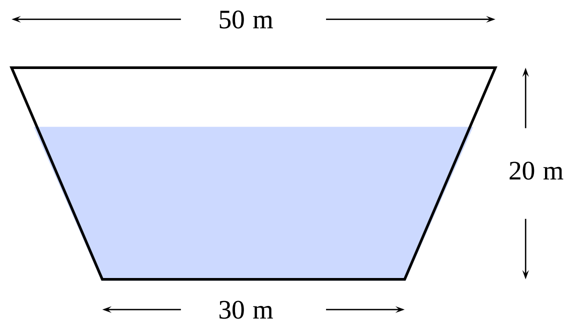
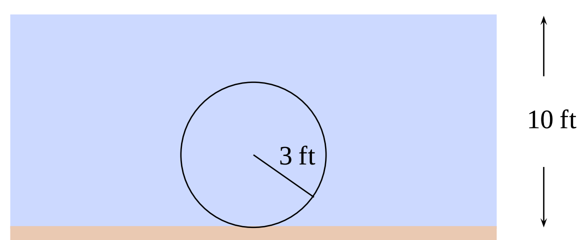
1. A cone with height 12 ft and radius 4 ft, pointing downward, is filled with water to a depth of 9 ft. Find the work required to pump all the water out over the top. (Water weighs 62.4 lb / ft^3).

2. A leaky 10-kg bucket is lifted from the ground to a height of 12 m at a constant speed with a rope that weighs 0.8 kg / m. Initially the bucket contains 36 kg of water, but the water leaks at a constant rate and finishes draining just as the bucket reaches the 12 m level. How much work is done?

3. A dam has the shape of the trapezoid shown in the figure below. Find the force on the dam due to hydrostatic pressure if the water level is 4 m from the top of the dam.



4. Find the hydrostatic force on one end of a cylindrical drum with radius 3 ft if the drum is submerged in water 10 ft deep.



5. Test the series for convergence or divergence.

(i) $\displaystyle\sum_{n=1}^{\infty} \frac{5^n}{1+7^n}$ (ii) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{(7+n^2)^3}$ (iii) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^2+2n+1}$ (iv) $\displaystyle\sum_{n=1}^{\infty} \frac{(2n)!}{n!(n+1)!}$

(v) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{5n^2+4}$ (vi) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{ne^n}$ (vii) $\displaystyle\sum_{n=1}^{\infty} \frac{n\sin n}{n^3+1}$ (viii) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(\ln n)^2}$

6. Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[4]{n}}$ is absolutely convergent, conditionally convergent, or divergent.

7. Find the radius of convergence and the interval of convergence for the power series $\sum_{n=1}^{\infty} \frac{5^n (x-2)^n}{8n^7}$.