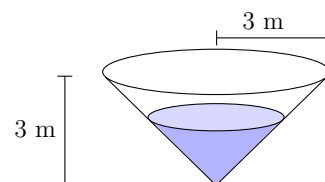


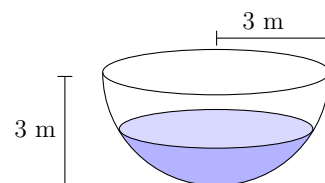
1. A force of $F = 20x - x^3$ Newtons is needed to stretch a nonlinear spring by x meters. How much work is required to stretch it from $x = 0$ to $x = 2$ meters?

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2. A twenty foot chain that weighs 3 lbs. per foot is hanging from a winch 20 feet above ground level. How much work is needed to wind the chain up?

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3. A conical pool has a radius of 3 meters and a depth of 3 meters. Initially the water in the pool is 2 meters deep. How much work is needed to pump all of the water in the tank up to the surface? (Recall that the weight density of water is 9800 Newtons per meter cubed).



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4. What if the pool is a hemisphere with radius 3 meters? If the water is initially two meters deep, then how much work would it take to pump the water out of the pool? *For this problem it is enough to write down the definite integral. You do not need to evaluate it.*



5. Write $0.\overline{54} = 0.545454\dots$ as a geometric series and as a reduced fraction.

6. Calculate the following sums.

(a) $\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \dots$

(b) $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \dots$

7. Calculate the following sums.

(a) $5 + 0.5 + 0.05 + 0.005 + 0.0005 - \dots$

(b) $0.1 - 0.01 + 0.001 - 0.0001 + \dots$

8. Find the sum of each geometric series below.

(a) $\sum_{k=0}^{\infty} \frac{2^{k+2}}{3^k}$.

(b) $\sum_{k=1}^{\infty} \frac{(-1)^k}{5^k}$.

9. Find the sum of each geometric series below.

(a) $1 - 2x + 4x^2 - 8x^3 + 16x^4 - \dots$

(b) $1 + \sin x + \sin^2 x + \sin^3 x + \sin^4 x + \dots$
