

Primer on Solving Quantitative Style Word Problems in Physical Science and Geology

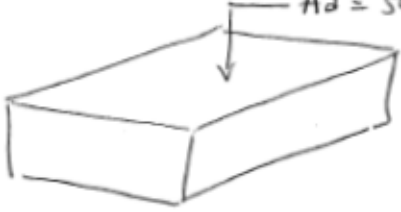
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- (1) Carefully read the word problem
- (2) Identify all the variables
 - a. ID Knowns
 - b. ID Unknowns
- (3) Draw and sketch the problem, labeling all the variables with magnitudes and units
- (4) Convert all units to consistent dimensions; use unit algebra techniques, cancel units
- (5) List all equations that apply to the problem, refer to class notes and text book
- (6) Rearrange equations, substitute variables, algebraically solve for the unknown(s)
- (7) Check your work, review your math, review your unit algebra, does the value of your answer make logical sense? For example, if you calculate the volume of the Earth as 6 gallons, something is not right, and you need to go back to the drawing board.

Example Problem 1.2 Assume you are dealing with a vertical-walled reservoir having a surface area of $500,000 \text{ m}^2$ and that an inflow of $1.0 \text{ m}^3/\text{sec}$ occurs. How many hours will it take to raise the reservoir level by 30 cm ?

Stepwise solution to problem 1.2

1.2



$Ad = 500,000 \text{ m}^2$

$\text{Inflow} = \left(\frac{1 \text{ m}^3}{\text{sec}} \right) \left(\frac{60 \text{ sec}}{\text{min}} \right) \left(\frac{60 \text{ min}}{\text{hr}} \right) =$

$Q_{\text{inflow}} = 3600 \frac{\text{m}^3}{\text{hr}} = \frac{\text{Inflow}}{\text{rate}}$

$d = 30 \text{ cm} \frac{1 \text{ m}}{100 \text{ cm}} = 0.3 \text{ m}$

$V_{\text{ol}} = A \cdot d$

$V_{\text{ol}} = (500,000 \text{ m}^2)(0.3 \text{ m}) = 150,000 \text{ m}^3$

$t / (Q_{\text{inflow}}) = \frac{V_{\text{ol}}}{Q}$

$t = \frac{V_{\text{ol}}}{Q} = \frac{150,000 \text{ m}^3}{3600 \text{ m}^3/\text{hr}} = 41.7 \text{ hr}$