

1. Water is being pumped into a vertical standing cylinder of radius $5m$ and height $20m$ at a rate of $3\frac{m^3}{min}$. How fast is the water level inside the cylinder rising when the cylinder is $\frac{1}{2}$ full?
2. A Ferris wheel has a diameter of $135m$ and is always moving around in a circle. One revolution of the ride takes 27 minutes. One minute into the ride a passenger is rising upward at a rate of $0.06\frac{m}{s}$. How fast is the passenger going in the horizontal direction at that time?
3. A rectangular block with a square base is being squished in such a way that its height is decreasing at a rate of $2\frac{cm}{min}$ while its volume remains constant. At what rate is the edge of its base, x , increasing when $x = 30cm$ and $y = 20cm$?

IMPORTANT STEPS:

1. Draw a picture.
 2. Write down an equation for the given information. This should be information about a rate of change that is given.
 3. Write down an equation that will answer the problem. This should be something you are trying to find the rate of change of.
 4. Put the two equations together. This should result in taking a derivative using the chain rule and an equation that relates the rates.
 5. Plug in the information you have and solve for the rate that you want.
 6. Answer the full question. Sometimes this means plugging back in to previous equations.
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