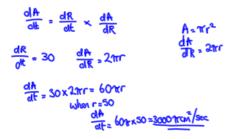
AH Related Rates of Change.notebook

Related Rates of Change

This topic is another application of the chain rule. We can solve problems in context with more than two variables. Given that y is a function of x and that x and y are both functions of u, the chain rule states that $dy \quad dy \quad du$

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

1. The radius of a circular ripple is increasing at a rate of 30cm per second. How fast is the area increasing when the radius is 50cm?



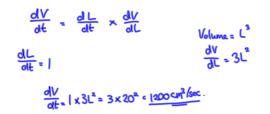


2. The volume of a spherical balloon is increasing at a rate of $0.05m^3/s$. How fast is the surface area increasing when the radius is 0.04m?

Volume sphere = = = = = = Surface Area = 4772 $\frac{dA}{dt} = \frac{dV}{dt} \times \frac{dA}{dr} \times \frac{dr}{dv}$ $\frac{dV}{dt} = 0.05 \qquad \frac{dA}{dr} = 8\pi r$ $dA = 0.05 \times 8^{3} r \times 4^{3} r^{2}$ $= \frac{0.1}{r} = 4 r = 0.00$ 014 0.1 = Z.S.M2/second

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3. A cube has edge of length x cm and is expanding as time passes. If the length of the edge is increasing at 1cm/sec, how fast is the volume changing when the edge length is 20cm?



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4. A spherical balloon is being inflated. When the radius is 10cm the surface area is increasing at a rate of 120π cm² s⁻¹. Find the rate at which the volume is increasing at this moment.

(Volume of sphere = $\frac{4}{2}\pi r^3$, surface area = $4\pi r^2$)

 $\frac{dV}{dt} = \frac{dV}{dr} \times \frac{dr}{dA} \times \frac{dA}{dt}$

dA ∂E = 1208r V= ⁴/3π²

dV 47112 × 871 × 1201 dt 6071 cm3/sec r=10 => 6007003/s-1

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5.

The height of a cube is increasing at the rate of $5\,\mathrm{cm\,s^{-1}}$.

Find the rate of increase of the volume when the height of the cube is 3 cm.

