Related Rate Worksheet

1. $A = \pi r^2$ $\quad \frac{dA}{dt} = 6 \text{ mi}^2/\text{hr}$

Find $\frac{dr}{dt}$ when $A = 9 \text{ mi}^2$

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$9 = \pi r^2$

$r = \frac{3}{\sqrt{\pi}}$

$A = \pi r^2$

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$

$\frac{dr}{dt} = \frac{1}{2\pi r} \frac{dA}{dt}$ when $r = \frac{3}{\sqrt{\pi}} \text{ mi}$, $\frac{dA}{dt} =$

$\frac{dr}{dt} = \frac{1}{2\pi \frac{3}{\sqrt{\pi}} \text{mi}} \cdot \frac{6 \text{ mi}^2}{\text{h}} = \boxed{\frac{\sqrt{\pi}}{\pi} \frac{\text{mi}}{\text{hr}}}$

2. $V = \frac{4}{3}\pi r^3$ $\quad \frac{dV}{dt} = 3 \frac{\text{ft}^3}{\text{min}}$

$D = 2r$

Find $\frac{dD}{dt}$ when $r = 1 \text{ ft}$, $D = 2 \text{ ft}$

$V = \frac{4}{3}\pi \frac{D^3}{8} = \frac{\pi}{6} D^3$

$\frac{dV}{dt} = \frac{\pi}{2} D^2 \frac{dD}{dt}$

$\frac{dD}{d}$