Answer on Question #54278 – Math – Calculus

Question

Each side of a square is increasing at a rate of 7 cm/s. At what rate is the area of the square increasing when the area of the square is 64 cm^2?

Solution

Let A = Area; a = side of the square.

It is known that $A = a^2$. If the area of the square is $A = 64\ cm^2$, then the side of the square is a = 8 cm.

Since A is also a function of time:

$A(t) = a^2(t)$,

so the rate of change in A(t) with respect to time t is the following:

$\frac{dA}{dt} = \frac{dA}{da} \cdot \frac{da}{dt}$ due to the chain rule.

Differentiating,

$\frac{dA}{dt} = \frac{dA}{da} \cdot 7 = 2a\ cm \cdot 7\ cm/s = 14a\ \mathrm{cm}^2/s$.

Therefore, the rate at what the area is increasing, when a = 8, is

$\left.\frac{dA}{dt}\right|_{a=8\ cm}$ = (14 cm/s) (8 cm) = **112 cm^2/s** .

Answer: $14a \frac{\mathrm{cm}^2}{s} = 112 \frac{\mathrm{cm}^2}{s}$**.**