Cambridge International AS & A Level

Mathematics 9709

Paper 1 Pure Mathematics 1

Topic 7-Differentiation

Question No (12)

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The length, x metres, of a Green Anaconda snake which is t years old is given approximately by the formula

$$x = 0.7\sqrt{(2t - 1)},$$

where $1 \leqslant t \leqslant 10$. Using this formula, find

(i) $\dfrac{dx}{dt}$,

(ii) the rate of growth of a Green Anaconda snake which is 5 years old.

Solution

On Next page

$$x = 0.7\sqrt{(2t-1)} \quad \rightarrow (1)$$

(i)

$$x = 0.7\,(2t-1)^{1/2}$$

Differentiate w.r.t t

$$\frac{dx}{dt} = 0.7\left[\frac{1}{2}(2t-1)^{1/2-1}(2-0)\right]$$

$$= 0.7\,(2t-1)^{-1/2}$$

$$\frac{dx}{dt} = \frac{0.7}{\sqrt{2t-1}}$$

(ii) rate for 5 years.

$$\frac{dx}{dt} = \frac{0.7}{\sqrt{2t-1}}$$

at $t=5$

$$\frac{dx}{dt} = \frac{0.7}{\sqrt{2(5)-1}}$$

$$= \frac{0.7}{\sqrt{10-1}}$$

$$= \frac{0.7}{\sqrt{9}}$$

$$\frac{dx}{dt} = 0.233$$

$\therefore$ rate of growth $= 0.233$ m/year.