

Solutions relying entirely on calculator technology are not acceptable.

FINEVIEW

(a) Express as an integral

$$\lim_{\delta x \rightarrow 0} \sum_{x=4}^{12} (1+2x)^{\frac{1}{2}} \delta x$$

(1)

(b) Using your answer to part (a) show that

$$\lim_{\delta x \rightarrow 0} \sum_{x=4}^{12} (1+2x)^{\frac{1}{2}} \delta x = \frac{98}{3}$$

(3)

(a) $\int_4^{12} (1+2x)^{\frac{1}{2}} dx$ (1 mark)

(b) try $y = (1+2x)^{\frac{1}{2}+1} = (1+2x)^{\frac{3}{2}}$

then $\frac{dy}{dx} = \frac{3}{2}(1+2x)^{\frac{3}{2}-1} \times \frac{d(1+2x)}{dx}$ (1 mark)

by Chain Rule

$$= \frac{3}{2}(1+2x)^{\frac{1}{2}} \times 2$$

$$= 3(1+2x)^{\frac{1}{2}}$$

we want $\frac{dy}{dx} = 1(1+2x)^{\frac{1}{2}}$, which is 3 times smaller,

so Integral is $y = \frac{1}{3}(1+2x)^{\frac{3}{2}} + c$ (1 mark)

$$\left[\frac{1}{3}(1+2x)^{\frac{3}{2}} \right]_4^{12} = \left(\frac{1}{3}(1+2(12))^{\frac{3}{2}} - \frac{1}{3}(1+2(4))^{\frac{3}{2}} \right)$$

$$= \frac{1}{3}(25)^{\frac{3}{2}} - \frac{1}{3}(9)^{\frac{3}{2}}$$

$$= \frac{1}{3}(125) - \frac{1}{3}(27)$$

$$= \frac{98}{3}$$

(1 mark)