**11** A cylinder, open at both ends, has base radius $r$ cm and height $4r$ cm. Its curved surface area is $S$ cm$^2$.

Given that $r$ varies with time $t$, find $S$ at the instant when $\frac{\mathrm{d}S}{\mathrm{d}t} = 6\frac{\mathrm{d}r}{\mathrm{d}t}$. [5]

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