1 Which unit can be expressed in base units as $\mathrm{kg\,m^2\,s^{-2}}$?

A joule

B newton

C pascal

D watt

2 The luminosity L of a star is given by

$$L = 4\pi r^2 \sigma T^4$$

where

r is the radius of the star,

T is the temperature of the star and

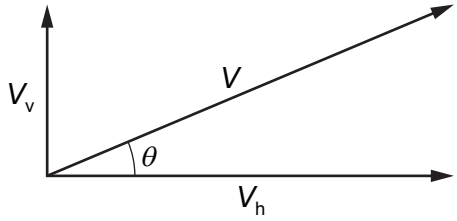
σ is a constant with units $\mathrm{W\,m^{-2}\,K^{-4}}$.

What are the SI base units of L?

A $\mathrm{kg\,m^2\,s^{-1}}$ **B** $\mathrm{kg\,m^2\,s^{-2}}$ **C** $\mathrm{kg\,m^2\,s^{-3}}$ **D** $\mathrm{kg\,m^2\,s^{-4}}$

3 A particle has velocity V at an angle θ to the horizontal.

The components of the particle's velocity are V_v upwards in the vertical direction and V_h to the right in the horizontal direction, as shown.



What are expressions for the magnitude of V and for the angle θ?

	magnitude of V	θ
A	$\sqrt{(V_\mathrm{v}^2 + V_\mathrm{h}^2)}$	$\tan^{-1}\left(\frac{V_\mathrm{h}}{V_\mathrm{v}}\right)$
B	$\sqrt{(V_\mathrm{v}^2 + V_\mathrm{h}^2)}$	$\tan^{-1}\left(\frac{V_\mathrm{v}}{V_\mathrm{h}}\right)$
C	$\sqrt{(V_\mathrm{v}^2 - V_\mathrm{h}^2)}$	$\tan^{-1}\left(\frac{V_\mathrm{h}}{V_\mathrm{v}}\right)$
D	$\sqrt{(V_\mathrm{v}^2 - V_\mathrm{h}^2)}$	$\tan^{-1}\left(\frac{V_\mathrm{v}}{V_\mathrm{h}}\right)$