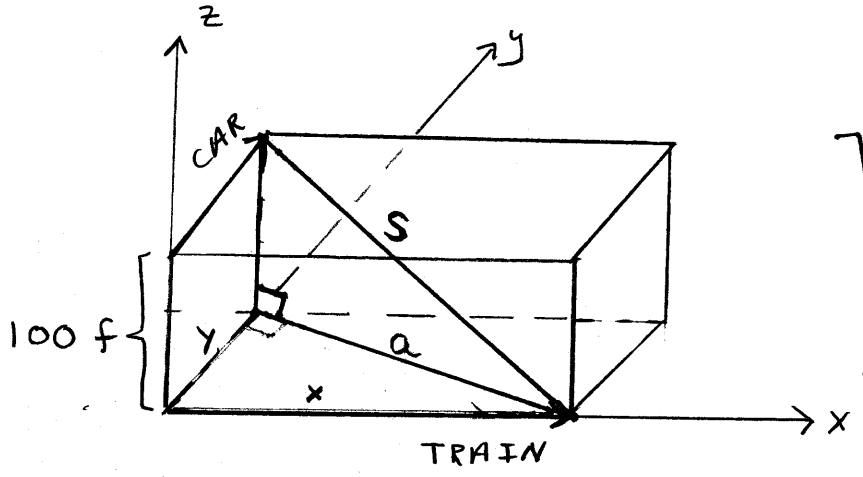
[3,9]
#19



S is diagonal of a cuboid. USE THM of pythagoras TWICE

$\frac{dy}{dt} = 66$ f/s

$\frac{dx}{dt} = 88$ f/s GET $\left.\frac{ds}{dt}\right|_{10\ SEC}$

NEED to Connect $\frac{dy}{dt}$ to $\frac{dx}{dt}$ to $\frac{ds}{dt}$. So must have a relation between x, y, s.

The distance s from car to train is the diagonal of a rectangular parallelepiped. Here's how you get it:

$$\left.\begin{aligned} x^2 + y^2 &= a^2 \\ a^2 + 100^2 &= s^2 \end{aligned}\right\} \Rightarrow \boxed{s^2 = x^2 + y^2 + 100^2}$$

Then $\frac{d}{dt} s^2 = \frac{d}{dt} x^2 + y^2 + 100^2$

$$\Rightarrow \quad 2s\frac{ds}{dt} = 2x\frac{dx}{dt} + 2y\frac{dy}{dt}$$

$$\Rightarrow \boxed{\frac{ds}{dt} = \frac{x\frac{dx}{dt} + y\frac{dy}{dt}}{s}}$$

at $t = 10$ SEC

$$x = \frac{66\,f}{s}(10\,s) = 660\,f, \qquad y = 88\,\frac{f}{s}(10\,s) = 880\,f,$$

$$\text{So} \quad \left.\frac{ds}{dt}\right|_{10\,sec} = \frac{660(66) + 880(88)}{\sqrt{660^2 + 880^2 + 100^2}} = 110 \text{ f/s}$$