

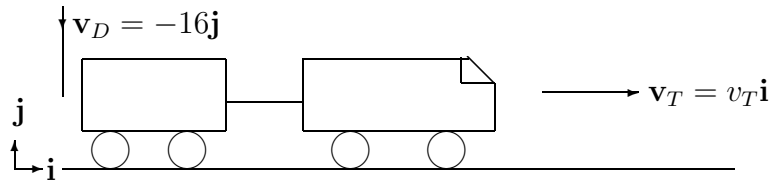
Question

In steady rain, raindrops fall at 16kmh^{-1} . Draw up a table of values of the angles of raindrop streaks on train windows which would enable a passenger in the train to estimate his speed in units of 10kmh^{-1} up to 100kmh^{-1}

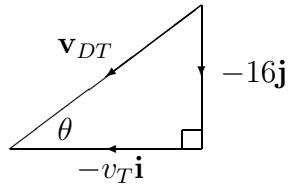
Answer

We require to find the velocity of raindrops relative to the train, \mathbf{v}_{DT} .

So we will use the equation $\mathbf{v}_{DT} = \mathbf{v}_D - \mathbf{v}_T$, where \mathbf{v}_D is the velocity of the raindrops and \mathbf{v}_T is the velocity of the train.



$$\mathbf{v}_{DT} = -16\mathbf{j} - v_T\mathbf{i} \Rightarrow \theta = \tan^{-1} \frac{16}{v_T}$$



v_T	$\theta(\text{rads})$	v_T	$\theta(\text{rads})$	v_T	$\theta(\text{rads})$
0	0	40	0.38	80	0.197
10	1.01	50	0.31	90	0.176
20	0.67	60	0.26	100	0.158
30	0.48	70	0.22		