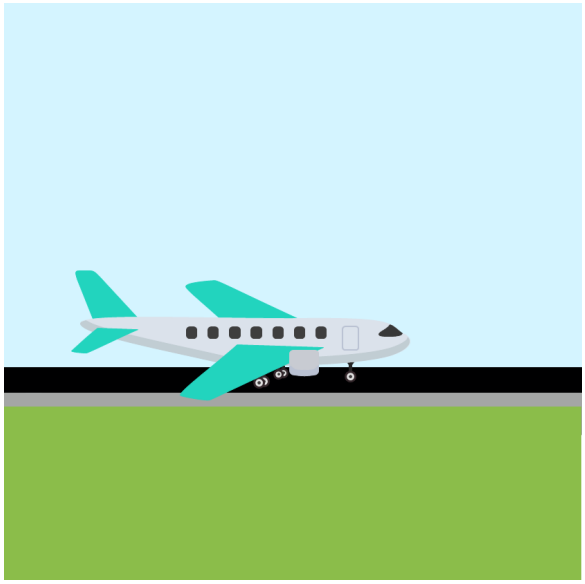
Acceleration Jet Transport



A jet transport with a landing speed of 270 km/h reduces its speed to 90 km/h with a negative thrust from its jet thrust reverses in a distance of 625m along the runway with a constant deceleration. Compute the deceleration in m/s^2 of the jet.

Using known expressions:

$$a = \frac{\mathrm{d}v}{\mathrm{d}t} \quad \Rightarrow \quad \mathrm{d}t = \frac{\mathrm{d}v}{a} \tag{1}$$

$$v = \frac{\mathrm{d}s}{\mathrm{d}t} \quad \Rightarrow \quad \mathrm{d}t = \frac{\mathrm{d}s}{v} \tag{2}$$

Combining both expressions results in:

$$\frac{\mathrm{d}v}{a} = \frac{\mathrm{d}s}{v} \tag{3}$$

$$a\mathrm{d}s = v\mathrm{d}v = \frac{1}{2}({v_1}^2 - {v_0}^2) \tag{4}$$

Given:
Distance: $s = 625m \Rightarrow ds = 625 - 0 = 625m$
Initial velocity: $v_0 = 270km/h = 75m/s$

End velocity: $v_1 = 90km/h = 25m/s$

This results in:

$$a \cdot 625 = \frac{1}{2}(25^2 - 75^2) \quad \Rightarrow \quad a = -4m/s^2 \tag{5}$$

Thus the acceleration is $-4m/s^2$, but since the deceleration is asked, the final answer becomes $4m/s^2$.