

A Cessna aircraft has a lift-off speed of 112 km/h. What minimum constant acceleration does this require if the aircraft is to be airborne after a take-off run of 253 m? Answer in units of m/s²

Equation of motion with uniform acceleration:

$$l = \frac{v^2}{2a}$$

where l – distance, v – speed, a – acceleration.

Therefore:

$$a = \frac{v^2}{2l}$$

$$a = \frac{\left(112 \frac{\text{km}}{\text{h}}\right)^2}{2 * 253\text{m}} = \frac{\left(\frac{112 \text{ m}}{3.6 \text{ s}}\right)^2}{2 * 253\text{m}} = 1.91 \text{ m/s}^2$$

Answer: 1.91 m/s²