Answer on Question 62843, Physics, Other

Question:

A car left skid marks $78\ m$ long on a road as it slid to a stop. If the car's acceleration was $-3.9\ m/s^2$, what was its velocity before it began to skid, to the nearest m/s? Record your answer in the grid below.

Solution:

We can find the velocity before the car began to skid from the kinematic equation:

$$v_f^2 = v_i^2 + 2as,$$

here, v_f is the final velocity of the car, v_i is the initial velocity of the car (or the velocity before the car began to skid), $a = -3.9\ m/s^2$ is the deceleration of the car and $s = 78\ m$ is the skidding distance.

Since the car is slid to a stop and $v_f = 0\ m/s$, we get:

$$0 = v_i^2 + 2as,$$

$$0 = v_i^2 + 2 \cdot \left(-3.9\ \frac{m}{s^2}\right) \cdot 78\ m,$$

$$v_i = \sqrt{2 \cdot \left(3.9\ \frac{m}{s^2}\right) \cdot 78\ m} = 25\ \frac{m}{s}.$$

Answer:

$v_i = 25\ \dfrac{m}{s}.$