

## Answer on Question #65341, Physics / Mechanics | Relativity |

A motorist traveling at 11 m/s encounters a deer in the road 45 m ahead. If the maximum acceleration the vehicle's brakes are capable of is  $-7 \text{ m/s}^2$ , what is the maximum reaction time of the motorist that will allow her or him to avoid hitting the deer? Answer in units of s.

### Solution

$$v_0 = 11 \text{ m/sec}$$

$$a = -7 \text{ m/sec}^2$$

$$L = 45 \text{ m}$$

$$t_{react} - ?$$

First we find the braking distance  $L_{br}$ . We use a formula for a velocity:  $v = v_0 + a \cdot t$ . In the moment of a complete stop  $v = 0$ ,  $v_0 + a \cdot t_{br} = 0$ . So a vehicle needs time to brake  $t_{br} = -v_0 / a = (-11) / (-7) = 1.6 \text{ (sec)}$ . Therefore  $L_{br} = v_0 \cdot t_{br} + (a t_{br}^2) / 2 = 11 \cdot 1.6 - 7 \cdot 1.6^2 / 2 = 8.6 \text{ (m)}$ .

Before the motorist must begin a braking, the vehicle can drive yet this distance:  $L - L_{br} = 45 - 8.6 = 36.4 \text{ (m)}$ . But on this distance the car is moving at a constant velocity. So, now we find a time easily:  $t_{react} = (L - L_{br}) / v_0 = 36.4 / 11 = 3.3 \text{ (sec)}$ .

**Answer:** 3.3 sec

Answer provided by <https://www.AssignmentExpert.com>