or,

$$t = \frac{v \pm \sqrt{v^2 - 2ad}}{a}$$

The pickpocket will be caught if t is real and positive.

This will be possible if $\quad v^2 \geq 2ad \quad$ or, $\quad v \geq \sqrt{2ad}$

REACTION TIME

When a situation demands our immediate action. It takes some time before we really respond. Reaction time is the time a person takes to observe, think and act.

Example.10 A driver takes 0.20 s to apply the brakes after he sees a need for it. This is called the reaction time of the driver. If he is driving a car at a speed of 54 km/h and the brakes cause a deceleration of 6.0 m/s^2, find the distance travelled by the car after he seeds the need to put the brakes on.

Solution. Distance covered by the car during the application of brakes by driver -

$u = 54$ km/h $\quad = 54 \times \frac{5}{18} m/s \qquad = 15$ m/s

$s_1 = ut \qquad$ or $\qquad s_1 = 15$ x 0.2 = 3.0 meter

After applying the brakes;

$v = 0 \quad u = 15$ m/s, $\quad a = 6$ m/s^2 $\quad s_2 = ?$

Using $\quad v^2 = u^2 - 2as$

$\qquad 0 = (15)^2 - 2 \times 6 \times s_2$

$\qquad 12\, s_2 = -225$

$\Rightarrow s_2 = \frac{225}{12} = 18.75 \text{metre}$

Distance travelled by the car after driver sees the need for it

$s = s_1 + s_2$

$s = 3 + 18.75 = 21.75$ metre. $\qquad$ **Ans.**