A car is traveling at 25 m/s along the highway. All of sudden the car in front slams on the brakes.

The average person has a reaction time of 0.2 seconds. The maximum deceleration that can be applied is 5.0 m/s^2.

How much room does the car need to safely come to a stop?

Part 1: Uniform motion: $\vec{v} = \frac{\vec{\Delta d}}{\Delta t}$

$$\vec{v} = \frac{\vec{\Delta d}}{\Delta t}$$

$$\vec{\Delta d} = \vec{v}\,\Delta t$$

$$= 25\ m/s\ (0.2\ s)$$

$$= 5\ m$$

Part 2: Uniform acceleration (4 equations)

$\vec{a} = -5\ m/s^2$

$\vec{v}_i = 25\ m/s$

$\vec{v}_f = 0$

$\vec{\Delta d} = ?$

$$\vec{v}_f^{\,2} = \vec{v}_i^{\,2} + 2\vec{a}\,\vec{\Delta d}$$

$$\vec{v}_f^{\,2} - \vec{v}_i^{\,2} = 2\vec{a}\,\vec{\Delta d}$$

$$\frac{\vec{v}_f^{\,2} - \vec{v}_i^{\,2}}{2\vec{a}} = \vec{\Delta d}$$

$$\frac{0 - (25\ m/s)^2}{2(-5\ m/s^2)} = \vec{\Delta d}$$

$$62.5\ m = \vec{\Delta d}$$

Total distance needed =

$$5m + 62.5\ m = 67.5\ m$$