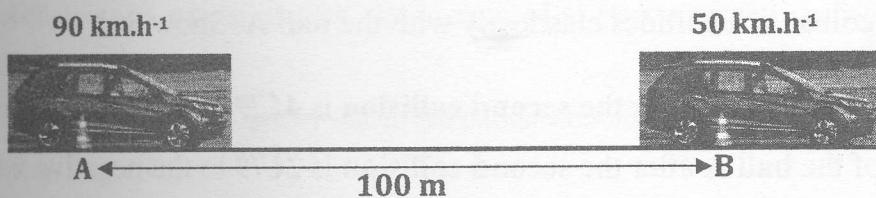e: 01 hour

swer __ALL__ Questions.

Briefly explain the physical meaning of *speed*, *velocity* and *acceleration* of a car moving on a straight line.

A car is moving on a straight road with a speed of 90 km h^{-1} and suddenly apply the brake to reduce the speed to 50 km h^{-1} over a distance of 100 m as shown in the below figure. Assume all the resistance are negligible.


90 km.h⁻¹   **50 km.h⁻¹**

A ←——————————————→ **B**
                    100 m

(a) Calculate the *acceleration* of the car under uniform motion with constant speed.

(b) Estimate the *elapsed* time to breaks from 90 km h^{-1} to 50 km h^{-1}.

(c) The car continues to slow down from point A estimate the *time* and distance to bring the car **to rest from 90 km h^{-1}**.

(d) What is the *total breaking time*, if the car moving in a different initial velocity, with the acceleration calculated in part (a) and **come to rest** after traveling **500 m**?

02. A particle of mass m is moving horizontally along the x-axis with velocity U and
with a stationary particle of mass M in a head on elastic collision. Show that the
of the *two particles* immediately after the collision are

$$V_1 = \left[\frac{m-M}{m+M}\right] U \quad \text{and} \quad V_2 = \left[\frac{2m}{m+M}\right] U.$$

Two identical balls of **equal mass 5m** are **initially at rest**. As show in the figure
of **mass m** moving with **speed U** along the positive x-direction undergoes a head
collision with one of the ball **B**. Show that
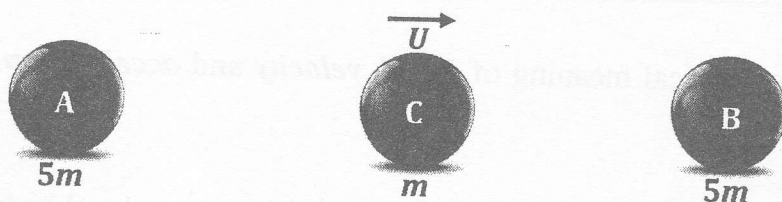
(a) **after the first collision**, the **ball C** has a **speed** of $2U/3$ to the negative x-direc
(b) the **ball B** has a **speed** of $U/3$ to the positive x-direction.

After the first collision it collides elastically with the **ball A**. Show that

(c) the **speed** of the **ball C** after the **second collision** is $4U/9$ to the positive x-dire
(d) the **speed** of the **ball A** after the **second collision** is $2U/9$ to the negative x-dir
(e) state whether any possibilities for further collision to be occur between the ball