Questions are for both separate science and combined science students unless indicated in the question

Q1.

The figure below shows some bumper cars.

Bumper cars are designed to withstand collisions at low speeds.

(a) During the collision, the change in momentum of the bumper car is 700 kg m/s.

The time taken for the collision is 0.28 s.
Calculate the force on the bumper car during the collision.

Use the Physics Equations Sheet. **(Physics only) (HT only)**

Force = _____ N

(2)

(b) The bumper car has a flexible bumper.

Explain how the flexible bumper reduces the risk of injury to the people in the bumper car during the collision. **(HT only)**

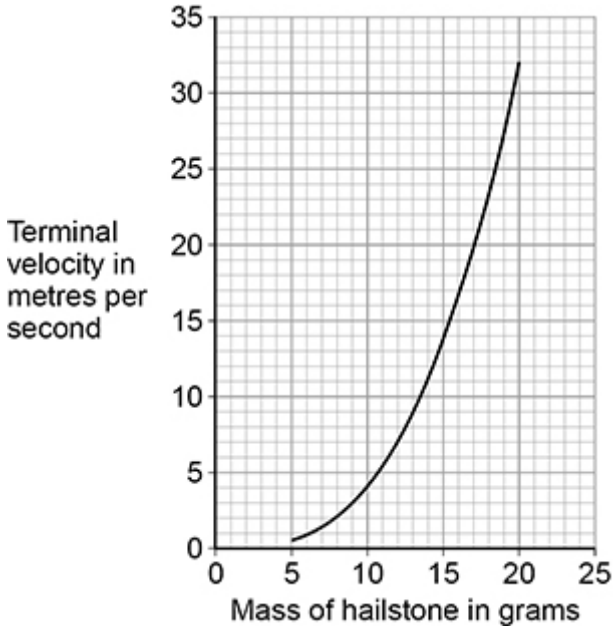
(3)

(Total 5 marks)

Q2.

Figure 2 is repeated below. **(HT only)**

Figure 2



(a) A hailstone hit the ground at its terminal velocity of 25 m/s.

The hailstone took 0.060 s to stop moving.

Determine the average force on the hailstone as it hit the ground.

Use information from **Figure 2**.

Use the Physics Equations Sheet.

Average force = _____ N

(3)

(Total 3 marks)