1. (a) A car of total mass 1200 kg is travelling at a constant speed of 20 ms^{-1} down a sloping road inclined at 10° to the horizontal. The engine of the car is producing a power of 112.5 kW. What is the resistive force experienced by the car (from air resistance and friction on the road) during the motion? You may assume the resistive force to be constant.

[3 marks]

1. (b) While travelling down the slope at 20 ms^{-1}, the driver suddenly sees an obstacle at a distance 40 m directly in front of the car. He immediately stops the engine of the car and then steps hard on the brake in an attempt to stop the car. Assuming that the reaction time of the driver is 0.5 s, what is the minimum force that the brake must exert on the car to avoid collision with the obstacle? Take the resistive force calculated in part 1(a) to remain constant.

[4 marks]

1. (c) Suppose the braking force on the car is only 95% of the minimum value found in part 1(b). What is the impulse experienced by the car during the impact?

[3 marks]