6. A car pulls a trailer along a straight horizontal road using a light inextensible towbar. The mass of the car is M kg, the mass of the trailer is 600 kg and the towbar is horizontal and parallel to the direction of motion.
There is a resistance to motion of magnitude 200 N acting on the car and a resistance to motion of magnitude 100 N acting on the trailer.

The driver of the car spots a hazard ahead. Instantly he reduces the force produced by the engine of the car to zero and applies the brakes of the car.
The brakes produce a braking force on the car of magnitude 6500 N and the car and the trailer have a constant deceleration of magnitude $4\,\text{m s}^{-2}$

Given that the resistances to motion on the car and trailer are unchanged and that the car comes to rest after travelling 40.5 m from the point where the brakes were applied,

find

(a) the thrust in the towbar while the car is braking,

(3)

(b) the value of M,

(3)

(c) the time it takes for the car to stop after the brakes are applied.

(3)

(Total for Question 6 is 9 marks)