Exercise 10.3 Force and Acceleration (Year 1 Applied Maths)

1 *A trolley of mass 75 kg is pulled from rest along a straight horizontal path in a straight line, by means of a horizontal cable attached to the front of the trolley. It accelerates at a constant rate and after 3s its speed is 2 ms^{-1}. As the trolley moves, it experiences a resistance to motion of magnitude 35 N. Find:*

(a) the acceleration of the trolley. (3 marks)

(b) the tension in the cable. (3 marks)

2 A lift of mass 600 kg is lowered or raised by means of of a cable attached to its top. The lift contains passengers whose total mass is 400 kg. The lift starts from rest and accelerates at a constant rate, reaching a speed of 2 ms^{-1} after moving a distance of 5 m. Find:

(a) the acceleration of the lift. (3 marks)

(b) the tension in the cable if the lift is moving vertically downwards. (2 marks)

(c) the tension in the cable if the lift is moving vertically upwards. (2 marks)

3 *The engine of a car of mass 500 kg cuts out when it is moving along a straight horizontal road with speed 20 ms^{-1}. The car comes to rest without the brakes being applied . In a model of the situation, it is assumed that the car is subject to a resisting force with constant magnitude of 250 N.*

(a) Find how long it take the car to stop. *(3 marks)*

(b) Find how far the car travels before it stops. *(2 marks)*