Leave blank

3. A car is moving at a constant speed of $25\,m\,s^{-1}$ along a straight horizontal road.

The car is modelled as a particle.

At time $t = 0$, the car is at the point A and the driver sees a road sign 48 m ahead.

Let t seconds be the time that elapses after the car passes A.

In a **first** model, the car is assumed to decelerate uniformly at $6\,m\,s^{-2}$ from A until the car reaches the road sign.

(a) Use this first model to find the speed of the car as it reaches the sign.

(2)

The road sign indicates that the speed limit immediately after the sign is $13\,m\,s^{-1}$.

In a **second** model, the car is assumed to decelerate uniformly at $6\,m\,s^{-2}$ from A until it reaches a speed of $13\,m\,s^{-1}$. The car then maintains this speed until it reaches the road sign.

(b) Use this second model to find the value of t at which the car reaches the sign.

(4)

In a **third** model, the car is assumed to move with constant speed $25\,m\,s^{-1}$ from A until time $t = 0.2$, the car then decelerates uniformly at $6\,m\,s^{-2}$ until it reaches a speed of $13\,m\,s^{-1}$. The car then maintains this speed until it reaches the road sign.

(c) Use this third model to find the value of t at which the car reaches the sign.

(4)

Leave blank

Question 3 continued

Leave blank

Question 3 continued

Leave blank

Question 3 continued

(Total 10 marks)

Q3