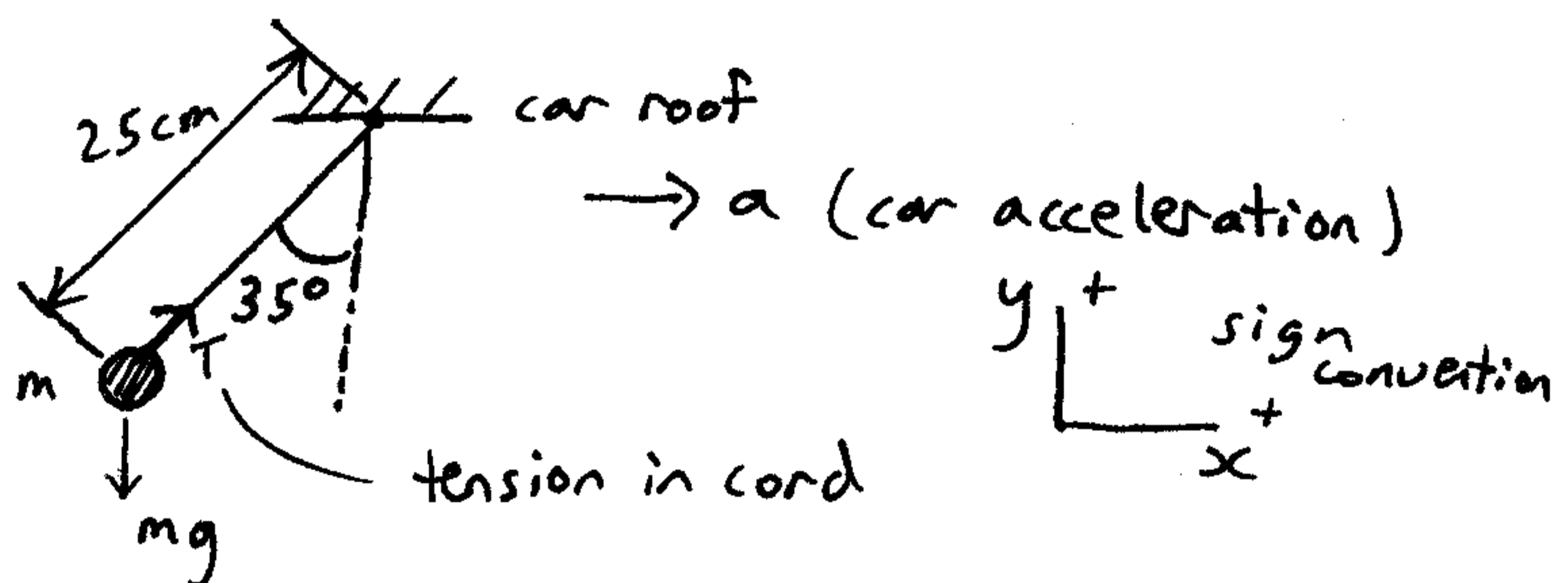


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This is a force and motion ^{problem} involving Newton's laws.

A sphere of mass m is suspended from the roof of a car with a cord of length 25 cm. As the car accelerates, the cord makes an angle of 35° with the vertical. What is the acceleration of the car?

Solution:



Apply Newton's 2nd law in the x -direction:

$$\sum F_x = T \sin 35^\circ = ma \quad (1)$$

Apply Newton's 2nd law in the y -direction:

$$\sum F_y = T \cos 35^\circ - mg = m(0) \\ \Rightarrow T \cos 35^\circ = mg \quad (2)$$

Combine (1) & (2):

$$\tan 35^\circ = \frac{a}{g} \Rightarrow a = g \tan 35^\circ \\ a = 9.8 \tan 35^\circ \\ a = \underline{6.86 \text{ m/s}^2} \text{ (answer)}$$