

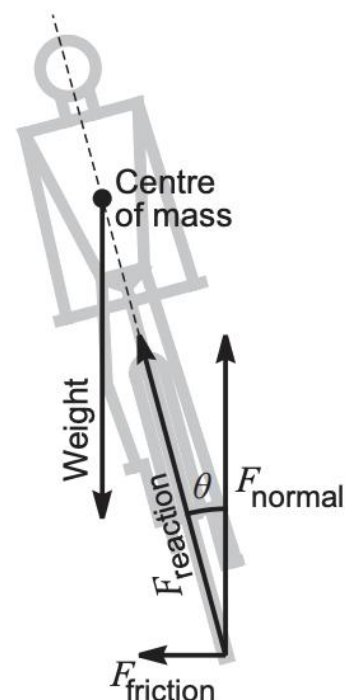
Question 8

(6 marks)

When a cyclist goes around a corner, they lean into the curve so that the resulting friction from the road on their tyres provides the centripetal force to push them around the corner. The road also pushes upward with a normal force to balance their weight. The normal and friction forces add together to form the overall reaction force of the road, which acts through the centre of mass of the cyclist, leaning at angle θ to the vertical.

- (a) Derive the following expression that relates the angle of lean θ , to the speed v of the cyclist, the radius r of the circular path of the cyclist's centre of mass and the acceleration due to gravity g . (3 marks)

$$\tan \theta = \frac{v^2}{rg}$$



- (b) With reference to the expression given in part (a), explain how the cyclist could go around the same corner at a greater speed. (3 marks)
