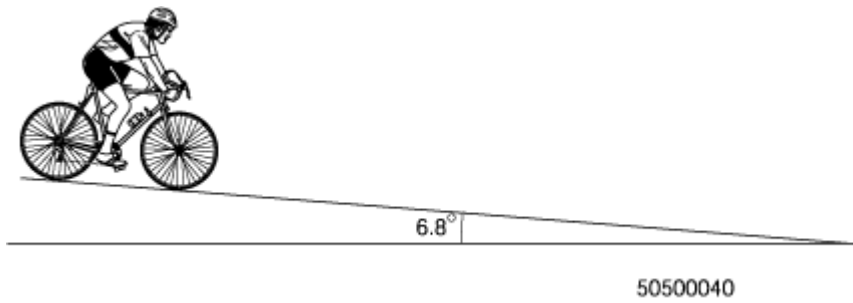


A Cyclist on a Slope



The combined mass of the cyclist and his bicycle is 85 kg.

- 1) Calculate the component of his weight which acts parallel to the slope.
- 2) Assuming the cycle is frictionless at rest, calculate the initial acceleration if the cyclist starts to move by rolling down the slope without pedalling.
- 3) At a velocity of 4.8 ms^{-1} , the air resistance and rolling friction combined is equal in magnitude and opposite in direction to the component of weight parallel to the slope.
 - a) Draw a free body diagram which represents this situation.
 - b) Calculate the kinetic energy of the cyclist and bicycle combined in this situation.
 - c) When the bicycle travels 20m,
 - i) calculate the work done against frictional forces;
 - ii) calculate the loss in gravitational potential energy.
 - iii) Comment on these answers. Your comment should involve work done, gravitational potential energy and kinetic energy.