

- 16** A particle of mass  $2\text{ kg}$  slides down a plane inclined at  $20^\circ$  to the horizontal. The particle has an initial velocity of  $1.4\text{ ms}^{-1}$  down the plane. Two models for the particle's motion are proposed.

In model A the plane is taken to be smooth.

- (a)** Calculate the time that model A predicts for the particle to slide the first  $0.7\text{ m}$ . **[5]**
- (b)** Explain why model A is likely to underestimate the time taken. **[1]**

In model B the plane is taken to be rough, with a constant coefficient of friction between the particle and the plane.

- (c)** Calculate the acceleration of the particle predicted by model B given that it takes  $0.8\text{ s}$  to slide the first  $0.7\text{ m}$ . **[2]**
- (d)** Find the coefficient of friction predicted by model B, giving your answer correct to 3 significant figures. **[6]**