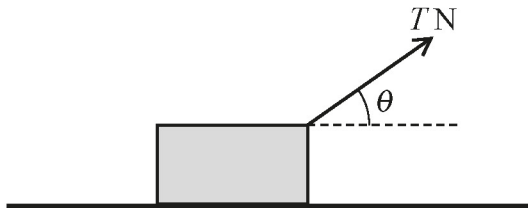


- 16** A block of mass  $m$  kg rests on rough horizontal ground. The coefficient of friction between the block and the ground is  $\mu$ . A force of magnitude  $T$  N is applied at an angle  $\theta$  radians above the horizontal as shown in the diagram and the block slides without tilting or lifting.



- (a)** Show that the acceleration of the block is given by  $\frac{T}{m} \cos \theta - \mu g + \frac{T}{m} \mu \sin \theta$ . **[4]**

For a fixed value of  $T$ , the acceleration of the block depends on the value of  $\theta$ . The acceleration has its greatest value when  $\theta = \alpha$ .

- (b)** Find an expression for  $\alpha$  in terms of  $\mu$ . **[3]**