

- 2 (a) State *Newton's second law of motion*.

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[1]

- (b) A magician demonstrates that the beaker can remain at the position shown despite its weight, when he pushes the block with a force F on a smooth horizontal surface as shown in Fig. 2.1. The masses of the beaker and the block are 0.10 kg and 2.00 kg respectively.

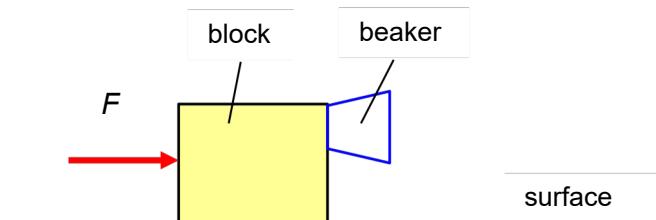
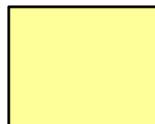


Fig. 2.1 (not to scale)

- (i) Draw the free-body diagrams of the

1. block

2. beaker



[4]

- (ii) The relationship between the frictional force f and normal contact force N on the beaker by the block is given by the expression,

$$f = \mu N,$$

where the coefficient of static friction between block and beaker, μ is 0.40.

Show that the minimum acceleration of the beaker is 24.6 m s^{-2} for the beaker to remain in the position shown in Fig. 2.1.

[3]

- (iii) The system is released on a smooth slope at an angle 50° from the horizontal.

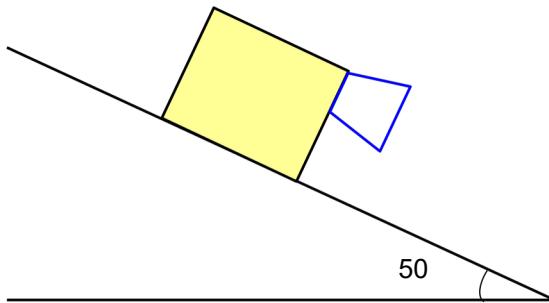


Fig. 2.2 (not to scale)

1. Determine the normal contact force on the beaker for it to remain in the position shown in Fig. 2.2.

normal contact force = N [2]

2. Comment if the beaker is able to remain in the position as it moves down the slope in Fig. 2.2. Show calculations to support your comments.

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..... [3]