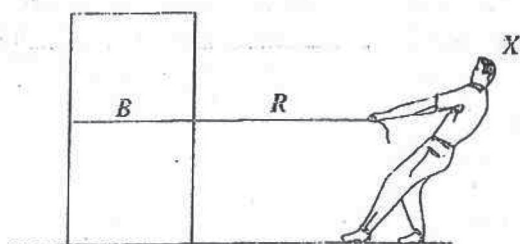


2000 A/L Structured Essay Question No (01)

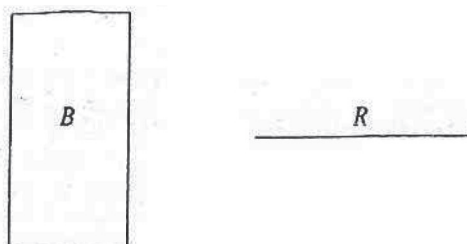


A man X pulls a wooden box B along a rough horizontal surface with a horizontal rope R attached to the box as shown in the figure.

- (a) (i) Indicate on the diagrams given on the next page, the **horizontal** forces acting on the box B and the rope R .

[Use the following notation to label each force.

- F_{RX} - the force exerted by the man on the rope
- F_{RB} - the force exerted by the box on the rope
- F_{BR} - the force exerted by the rope on the box
- F - the frictional force acting on the box]



- (ii) Which of the above forces can be considered as an action-reaction pair?

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- (b) When the man pulls the rope with a force of 100 N the box still continues to remain stationary. What is the frictional force acting on the box by the surface in this situation?

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- (c) (i) When the man pulls the rope with 150 N, the box is found to be on the verge of moving. In this instant what is the force exerted on the box by the rope ?

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- (ii) If the mass of the box is 50 kg, calculate the coefficient of static friction between the box and the surface.

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(d) (i) When the force exerted by the man is increased to 200 N, the box and the rope begin to move with a constant acceleration of 2 m s^{-2} . If the mass of the rope is 1 kg, calculate the force exerted on the box by the rope.

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(ii) Calculate the frictional force acting on the box by the surface under this situation.

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(iii) Determine the coefficient of kinetic friction between the box and the surface.

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