2 A rider of mass 70 kg was confined in a Rotor, an amusement park ride, as show in Fig 2.1. The Rotor is a large vertical barrel, rotated about a vertical axis of the Rotor. The radius R of the Rotor is 2.5 m. When the Rotor is rotated sufficiently fast, the floor is dropped and the rider is stuck to the wall of the Rotor. The rider moves in a horizontal circular motion.
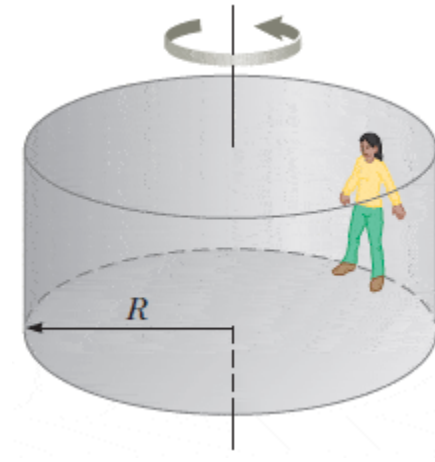

Fig 2.1

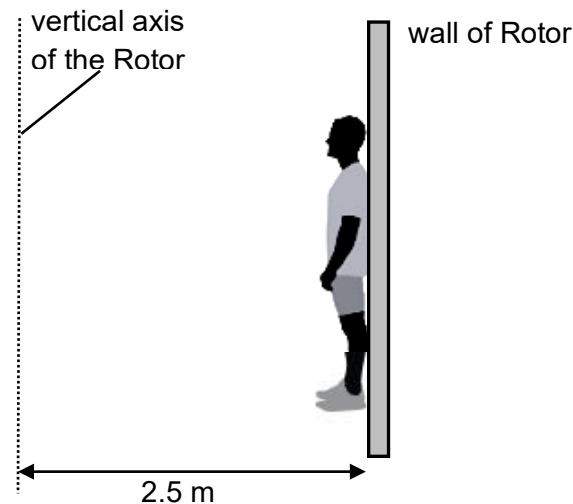Fig. 2.2 below shows a side-view of the position of a rider when the floor was dropped.

vertical axis of the Rotor

wall of Rotor

2.5 m

Fig. 2.2 (not drawn to scale)

(a) By considering the motion of the rider, explain why the rider experiences a resultant force.

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....

....[2]

(b) The barrel is rotating at 32 revolutions per minute. Determine the resultant force on the rider.

resultant force = …………………………. N [3]

(c) Explain why a resultant force acts on the rider, but there is no change to the kinetic energy of the rider.

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....[2]