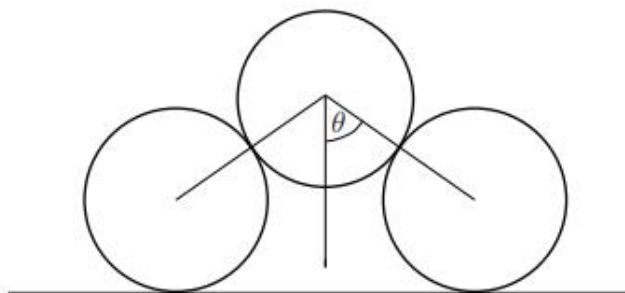


STEP II, 2013, Q9

- 9 The diagram shows three identical discs in equilibrium in a vertical plane. Two discs rest, not in contact with each other, on a horizontal surface and the third disc rests on the other two. The angle at the upper vertex of the triangle joining the centres of the discs is 2θ .



The weight of each disc is W . The coefficient of friction between a disc and the horizontal surface is μ and the coefficient of friction between the discs is also μ .

- (i) Show that the normal reaction between the horizontal surface and a disc in contact with the surface is $\frac{3}{2}W$.
- (ii) Find the normal reaction between two discs in contact and show that the magnitude of the frictional force between two discs in contact is $\frac{W \sin \theta}{2(1 + \cos \theta)}$.
- (iii) Show that if $\mu < 2 - \sqrt{3}$ there is no value of θ for which equilibrium is possible.



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