

A level Physics A
H556/03 Unified physics

Question Set 16

- 1 At an airport, the conveyor belt for suitcases moves at a constant speed of 1.5 ms^{-1} . In Fig. 4.1, a suitcase of mass 8.0 kg has reached the line labelled **XX'**.

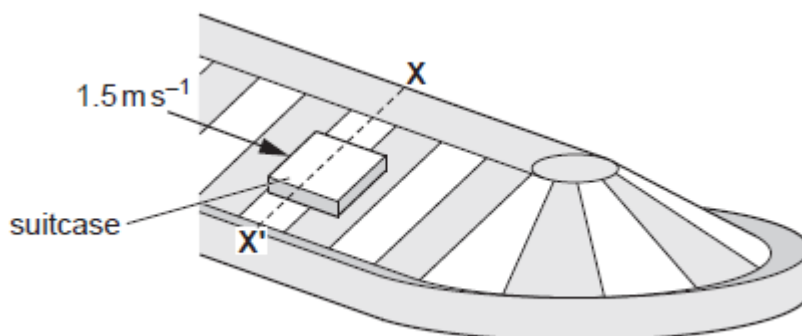


Fig. 4.1

Fig. 4.2 shows the situation in vertical cross-section. The frictional force F prevents the suitcase of weight W from sliding to the bottom of the belt. The normal contact force on the suitcase is R . The belt is inclined at an angle of 30° to the horizontal.

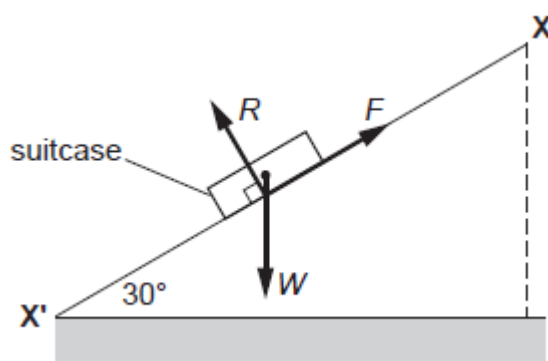


Fig. 4.2 (not to scale)

- (a) By using a vector triangle, or by resolving forces, calculate the magnitude of forces F and R .

$F = \dots\dots\dots \text{N}$

$R = \dots\dots\dots \text{N}$

[3]

(b) Fig. 4.3 shows the suitcase and the forces acting on it at the line labelled YY'.

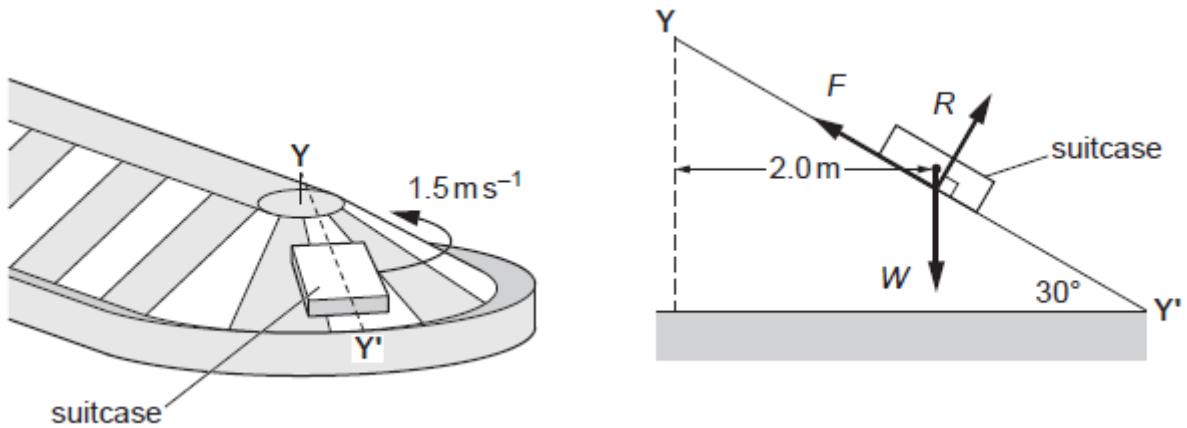


Fig. 4.3

The centre of mass of the suitcase is now moving at 1.5ms^{-1} along a semi-circular arc of radius 2.0m .

- (i) Calculate the magnitude of the centripetal force acting on the suitcase.

centripetal force = N [2]

- (ii) When the suitcase is at line YY', the magnitude of force F is larger and the magnitude of force R is smaller than at XX'.

Explain why this is so.

[4]

Total Marks for Question Set 16: 9



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