FRICTION
PART-II

EXAMPLE

Example 8.1. *A body of weight 300 N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body, while acting at an angle of 25° with the horizontal.*

Solution. Given: Weight of the body (W) = 300 N; Coefficient of friction (μ) = 0.3 and angle made by the force with the horizontal (α) = 25°

Let P = Magnitude of the force, which can move the body, and

                             F = Force of friction.

Resolving the forces horizontally,

$$F = P \cos \alpha = P \cos 25° = P \times 0.9063$$

and now resolving the forces vertically,

$$R = W - P \sin \alpha = 300 - P \sin 25°$$
$$= 300 - P \times 0.4226$$

We know that the force of friction (F),

$$0.9063\ P = \mu R = 0.3 \times (300 - 0.4226\ P) = 90 - 0.1268\ P$$

or $90 = 0.9063\ P + 0.1268\ P = 1.0331\ P$

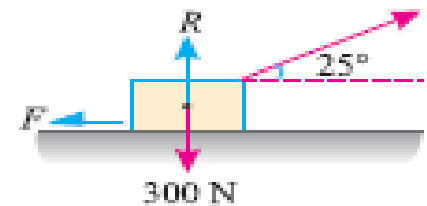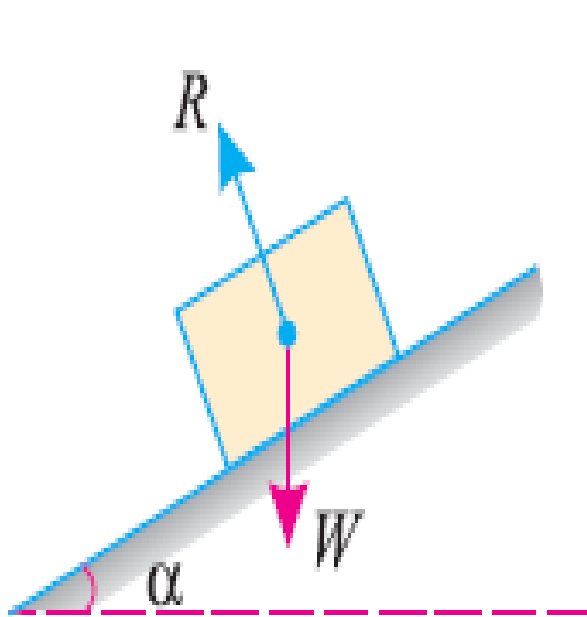$\therefore$ $P = \dfrac{90}{1.0331} = 87.1 \text{ N}$ **Ans.**

R

25°

F

300 N
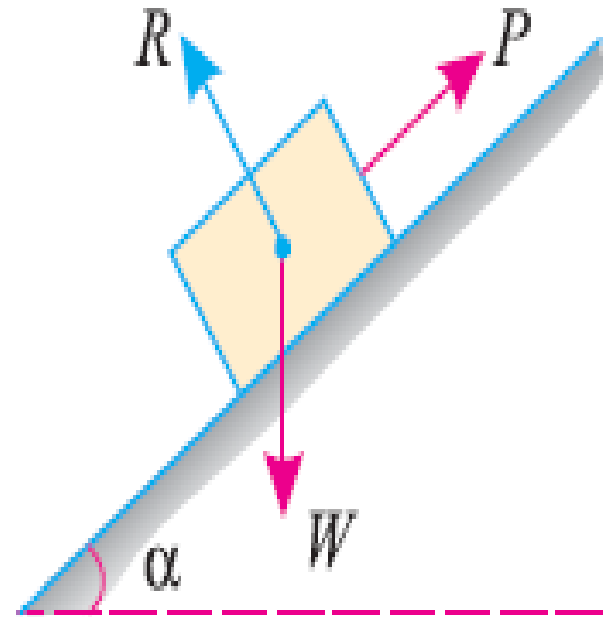
Fig. 8.2.

Q. A body, resting on a rough horizontal plane, required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction.

Equilibrium of a Body on A Inclined Plane

(a) Angle of inclination less than the angle of friction

(b) Angle of inclination more than the angle of friction

Equilibrium of a Body on A Inclined Plane

- A little consideration will show, that if the inclination of the plane, with the horizontal, is less the angle of friction, the body will be automatically in equilibrium as shown in figure *a*. If in this condition, the body is required to be moved upwards or downwards, a corresponding force is required, for the same.

- But, if the inclination of the plane is more than the angle of friction, the body will move down. And an upward force (P) will be required to resist the body from moving down the plane as shown in fig b.

- Though there are many types of forces but these are important from subject point of view.

  1. Force acting along the inclined plane.

  2. Force acting horizontally.

  3. Force acting at some angle with the inclined plane.