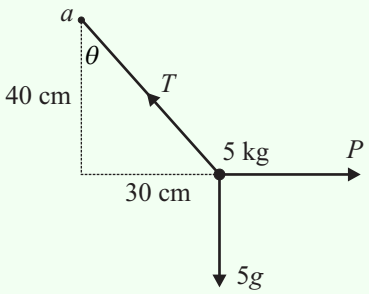
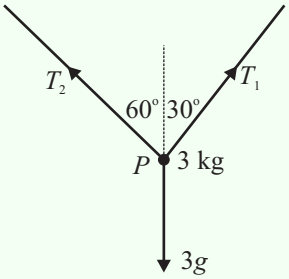
EXERCISE 1. STATICS OF PARTICLES 1

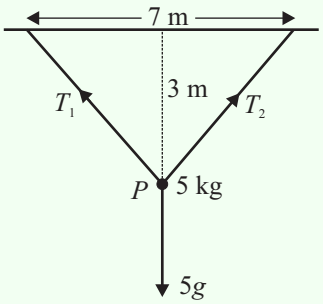
1. A 5 kg particle is held in equilibrium by a string attached to a fixed point a and by a horizontal force P.
Find T and P.



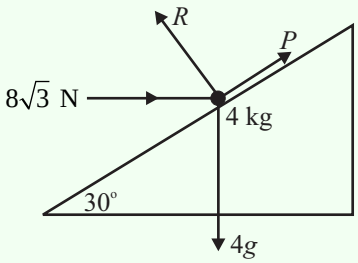
2. A particle P is suspended by two strings as shown. Find T_1 and T_2.



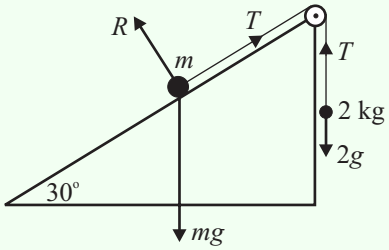
3. A particle P is suspended by two strings as shown. Find T_1 and T_2.



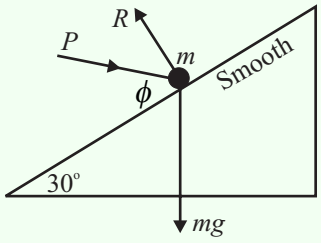
4. Find P if the 4 kg particle is in equilibrium.



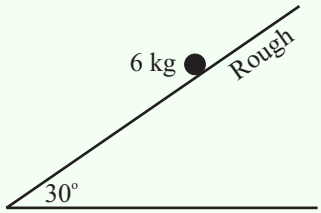
5. If the system is in equilibrium find
(i) T
(ii) m
(iii) R



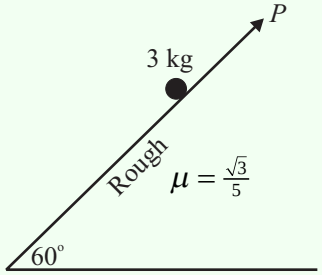
6. If $R = 1.5mg$ find ϕ if the particle is in equilibrium.



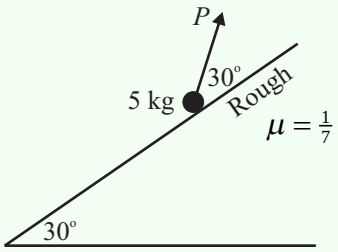
7. Draw in all the forces. If the 6 kg mass is on the point of slipping down the plane find the coefficient of friction.



8. A 3 kg particle rests on a rough plane inclined at 60° to the horizontal. Find P which acts parallel to the plane which just prevents the particle sliding down the plane.

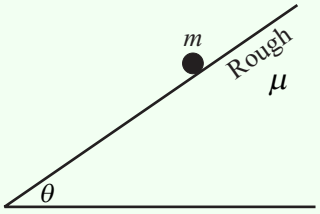


9. Find the force P which just prevents the particle sliding down the plane.



10. A horizontal force P just prevents a particle sliding down the plane. A horizontal force $4P$ applied to the same particle just prevents it moving up the plane. Show that

$$5\mu\tan^2\theta - 3(\mu^2+1)\tan\theta + 5\mu = 0.$$



Exercise 1.
Answers

1. $T = \dfrac{25g}{4}$ N, $P = \dfrac{15g}{4}$ N

2. $T_1 = \dfrac{3\sqrt{3}g}{2}$ N, $T_2 = \dfrac{3g}{2}$ N

3. $T_1 = T_2 = \dfrac{5\sqrt{85}g}{12}$ N

4. 7.6 N

5. (i) $T = 2g$ (ii) $m = 4$ kg (iii) $R = 2\sqrt{3}g$ N

6. $\tan\phi = 3 - \sqrt{3}$

7. $\mu = \dfrac{1}{\sqrt{3}}$

8. $\dfrac{6\sqrt{3}g}{5}$ N

9. $\dfrac{5g(7-\sqrt{3})}{7\sqrt{3}-1}$ N