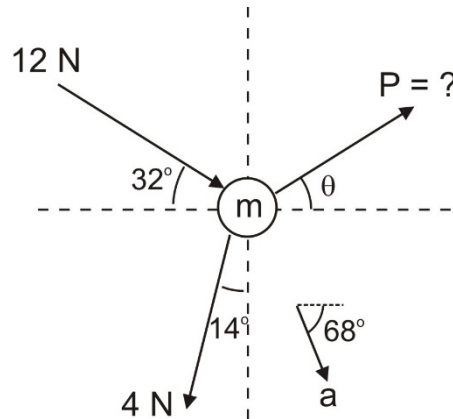# Dynamics 2 – Tutorial 1
Dynamics of a Single Particle and d'Alembert's Method

1. The figure shows a mass m of 2.4 kg with forces acting. The acceleration is 6.5 m/s^2 in the direction shown. Find the magnitude and angular position of the force P. [5.4 N, -51.5°]

12 N

P = ?

32°

m

θ

14°

68°

4 N

a

2. Force P is pulling mass of 14 kg up a slope with an acceleration of 2.6 m/s^2. Find P. The coefficient of friction is 0.18. [116.85 N]

P

25°
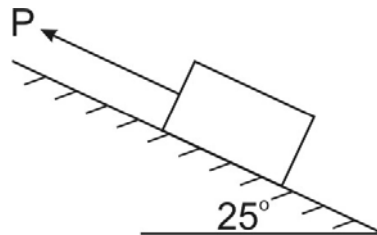
3. The figure shows two masses hanging from wires from the underside of a platform that is accelerating upwards at 6 m/s^2. Draw clear FBDs for each of the masses and calculate the forces in all of the wires.

6 m/s^2

22°

54°

1.2 kg

0.8 kg
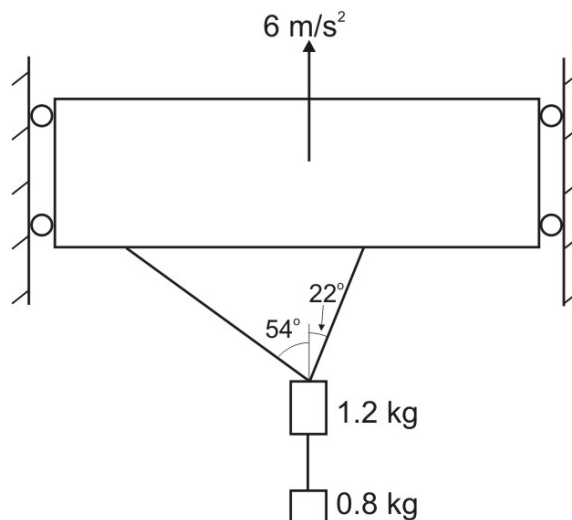
4. A truck driver accelerates from the traffic lights up a 15° incline. If the 550 kg box on the back is to avoid slipping what would you recommend as the maximum acceleration? Take coefficient of friction between the truck floor and box as 0.35. [0.78 m/s^2]

Box

15°
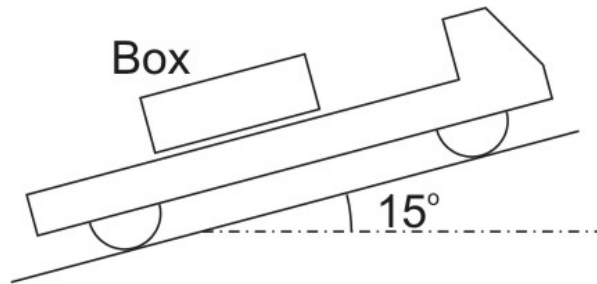
5. A 12 kg mass on a table has a force P of 200 N applied by means of a wire acting at an angle of θ below the horizontal as shown (μ= 0.35 for the table). (a) Find the acceleration of the mass for θ = 35°. (b) Now try this for θ = 65°; think carefully before you decide on the answer. [6.87 m/s^2, ?]

12 kg

θ

P