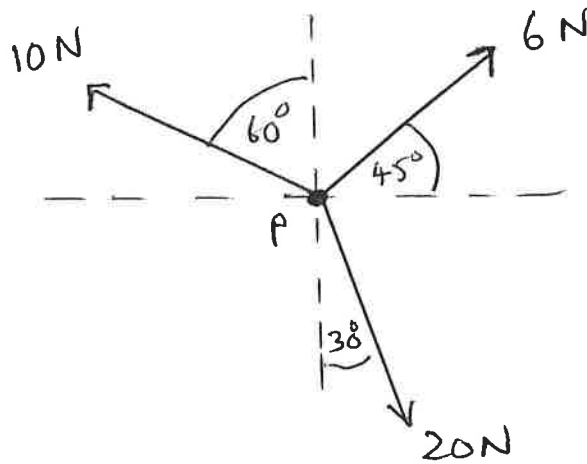
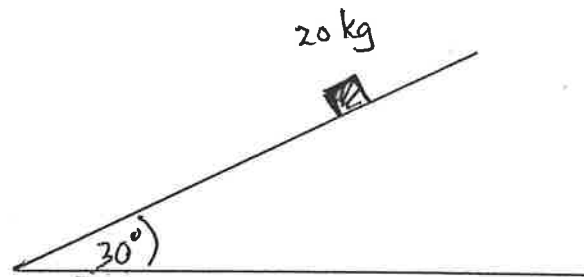


1. Find the resultant force of the following system of forces acting at point P



5

2.

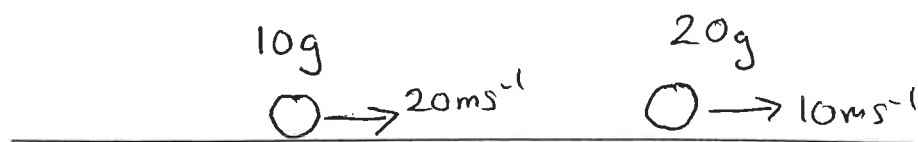


A body of mass 20 kg is on an inclined plane 30° to horizontal.

- (i) Calculate the acceleration of the body in the plane parallel to incline
- (ii) ~~If~~ what would the coefficient of friction be for the body to remain stationary?

7

3.



Two hard balls collide in a perfectly elastic collision. Determine the velocity of each ball after collision

10

4. A body of mass $40g$ is dropped from a vertical height of $2.5m$. Calculate the speed at impact on ground

3

5. A projectile of mass $40g$ penetrates an object to a depth of $0.5m$. If the speed at initial impact is $500ms^{-1}$ determine the resistive force that the body exerts on the projectile, assuming uniform resistance.

7

6. A steel wire of uniform cross-section $0.5cm^2$ has a natural length of $1.2m$. If a mass of $10kg$ is placed at the lower end of the wire, calculate

(i). Stress applied to wire

5

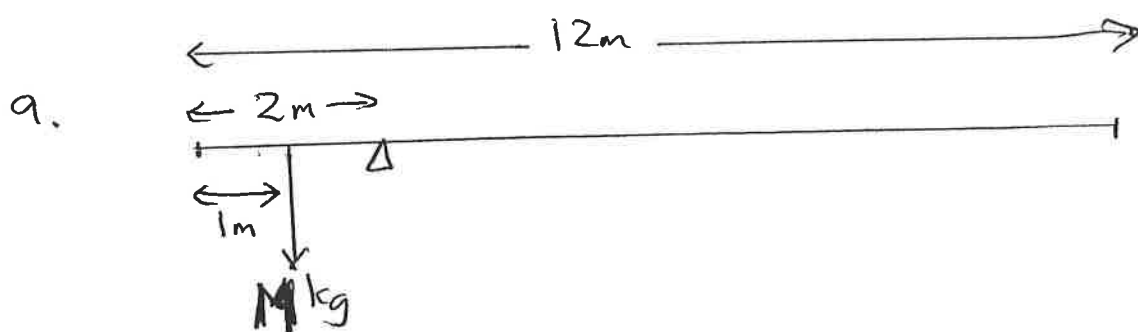
(ii). The new length of wire

5

Assume Young's Modulus is $100 \times 10^9 Pa$.

7. A body of mass 0.5 kg accelerates from rest to a final velocity of 20 ms^{-1} due to a constant force applied for 3 s . Calculate the force. [5]

8. Using simple illustrations, compare the stress-strain behaviour of typical brittle and ductile materials. [5]



A uniform plank of length 12 m has a mass of 5 kg . Determine the mass M required to maintain equilibrium. [7]

10. De Broglie postulated that particles can exhibit properties of waves:

$$\lambda = \frac{h}{p}$$

where λ wavelength
 h Planck's constant
 p momentum

If an electron has a speed of 10^8 ms^{-1} what would the corresponding wavelength be? [5]

$$h = 6.63 \times 10^{-34} \text{ Js}$$

$$m_e = 9.1 \times 10^{-31} \text{ kg}$$