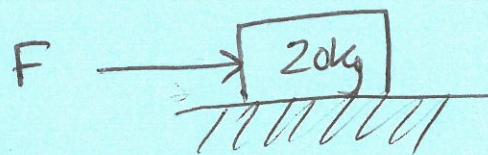
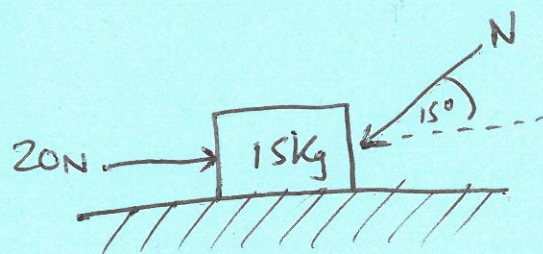


Q1)



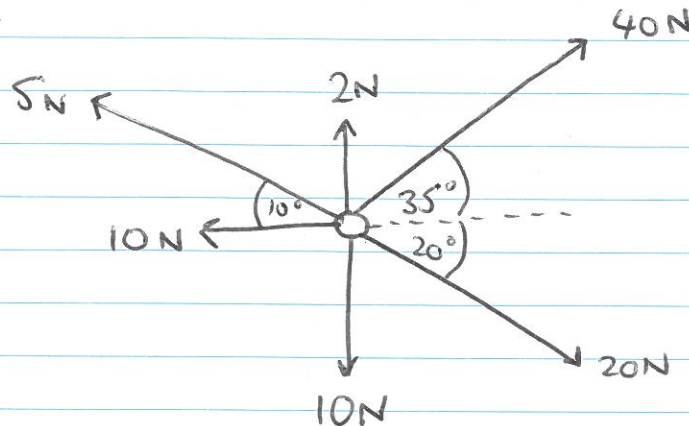
Calculate the force F , to accelerate the above mass at 2ms^{-2} .

Q2)



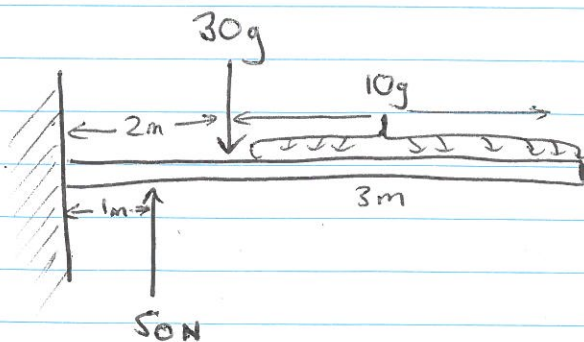
Calculate the force N to keep the above mass from moving along the surface. If N is removed, what would the acceleration of the mass be?

- Q3) Calculate the resultant force & direction to the horizontal for the following:

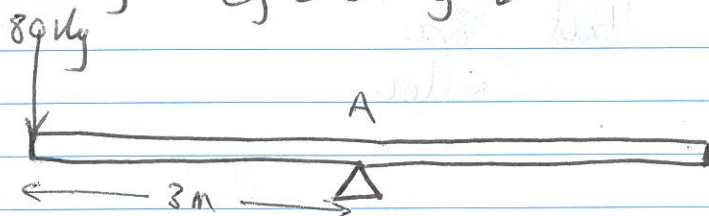


If the mass of the particle is 8 kg, calculate the acceleration.

- Q4) Calculate the resultant moment of the following.

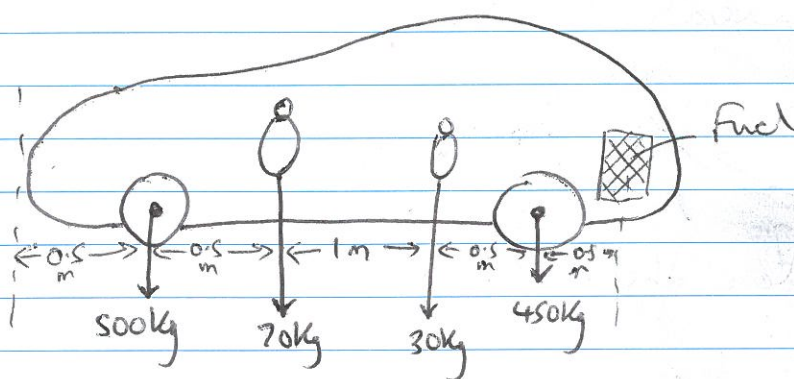


(Q5)

Two weights of 280kg and

A weight of 80kg is placed at the end of a symmetrical see-saw. Find how far to the right of point A that a ~~weight~~ ^{mass} of 100kg needs to be placed to keep the system in equilibrium.

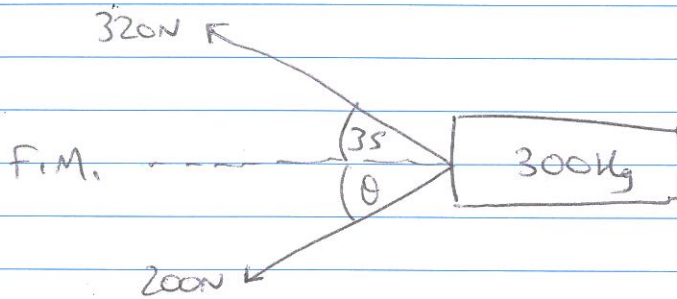
(Q6)



Calculate the centre of gravity of the above car, relative to the front nose.

The fuel is petroleum, which has density 0.82 kg/l . 50 litres of fuel is currently in the car.

- (Q7) Container pulled along by 2 people, one 35° N of Forward motion, one θ° S of F.M.
Calculate θ and acc. of container.



VER

$\uparrow = \downarrow$

$$320 \cos 35 = 200 \cos (90 - \theta)$$

$$183.54 = 200 \cos (90 - \theta)$$

$$0.92 = \cos (90 - \theta)$$

$$\cos^{-1}(0.92) = 90 - \theta$$

$$23.41 = 90 - \theta$$

$$\theta = 90 - 23.41$$

$$\theta = 66.59^\circ$$

HOR

~~Q.E.D.~~

$F = ma$

$$320 \cos 35 + 200 \cos 66.59 = 300 a$$

$$262.13 + 79.46 = 300 a$$

$$\frac{341.59}{300} = a$$

$$1.14 \text{ ms}^{-2} = a$$

Q1)

$$F = ma$$

$$F = 20^{(2)}$$

$$F = 40 \text{ N}$$

Q2)

$$\text{In eq. } \therefore \leftarrow = \rightarrow$$

(i)

$$N \cos 15 = 20$$

$$N = \frac{20}{\cos 15}$$

$$N = 20.71 \text{ N}$$

(ii)

$$F = ma$$

$$20 = 15 a$$

$$1.3 \text{ m/s}^2 = a$$

Q3) VER $\uparrow = \downarrow$

$$5 \cos 80 + 2 + 40 \cos 55 = 10 + 20 \cos 70$$

$$0.87 + 2 + 22.94 = 10 + 3.42$$

$$25.81 = 13.42$$

$$6.34$$

$$\therefore 12.39 \text{ N} =$$

~~12.39~~



HOR

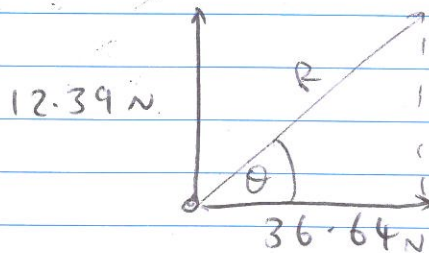


$$5 \cos 10 + 10 = 40 \cos 35 + 20 \cos 20$$

$$4.92 + 10 = 32.77 + 18.79$$

$$14.92 = 51.56$$

$$= 36.64 \text{ N}$$



$$R = \sqrt{12.39^2 + 36.64^2}$$

$$R = 38.68 \text{ N}$$

$$\tan \theta = \frac{12.39}{36.64}$$

$$\tan \theta = 0.34$$

$$\theta = 18.78^\circ \text{ above horizontal}$$

$$F = ma$$

$$38.68 = 8a$$

$$4.84 \text{ ms}^{-2} = a$$

Q4)

$$C_{wm} = CC_{wm}$$

$$(30g \times 2) + (10g \times 3.5) = (50 \times 1)$$

$$588.6 + 343.35 = 50$$

$$931.95 = 50$$

$$881.95 \text{ clockwise} \therefore$$

Q5)

$$C_{wm} = CC_{wm}$$

about pivot

$$100g \times x = 80g \times 3$$

$$981x = 2354.4$$

$$x = \frac{2354.4}{981}$$

$$x = 2.4m$$

Q6) $\rho = \frac{m}{V}$

$$0.82 = \frac{m}{50}$$

$41\text{ kg} = m$ (fuel)

$$\begin{aligned} \text{Sum of weights} &= 500\text{g} + 70\text{g} + 30\text{g} + 450\text{g} + 41\text{g} \\ &= 1091\text{g} \end{aligned}$$

$$= 10702.71\text{ N}$$

Mom. about nose

$$C_{wm} = CC_{wm}$$

$$(0.5 \times 500\text{g}) + (1 \times 70\text{g}) + (2 \times 30\text{g}) + (2.5 \times 450\text{g}) + (3 \times 41\text{g}) =$$

$$10702.71\text{ x}$$

$$2452.5 + 686.7 + 588.6 + 11036.25 + 1206.63 = 10702.71\text{ x}$$

$$15970.68 = 10702.71\text{ x}$$

$$1.49\text{ m} = x$$

from nose