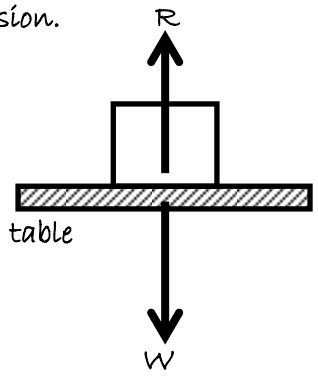
Section 1: Force diagrams and equilibrium

Solutions to Exercise level 1

1. (i) W is the weight of the television and R is the resultant normal reaction of the table on the television.

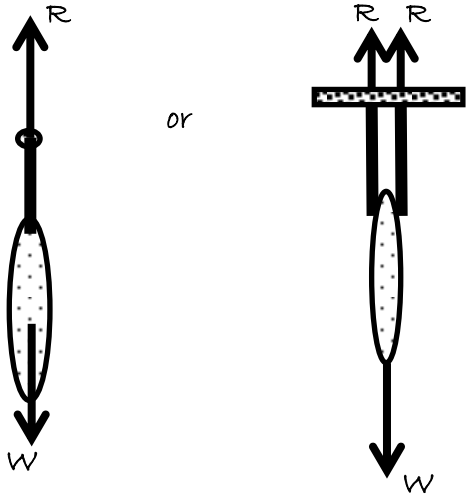


(ii) W is the weight of the circus artist

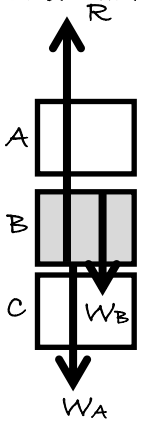
In the first diagram R is the resultant normal reaction of the trapeze on the artist.

In the second diagram there is a reaction of the trapeze on the artist at each point of contact (each hand).

The sum of the two reactions in the second diagram is equal to the reaction shown in the first diagram.

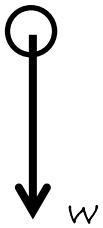


(iii) W_A is the weight of the top box, W_B is the weight of the middle box and R is the resultant normal reaction of the bottom box on the middle box.

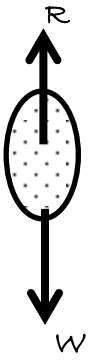


Edexcel AS Maths Force and Newton's laws 1
Exercise solns

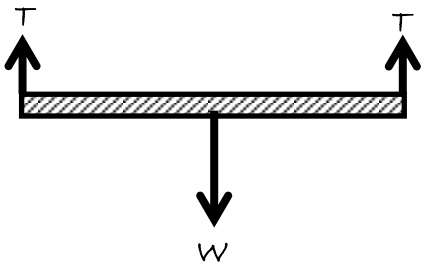
(iv) W is the weight of the ball. There are no other forces as air resistance is assumed to be 0.



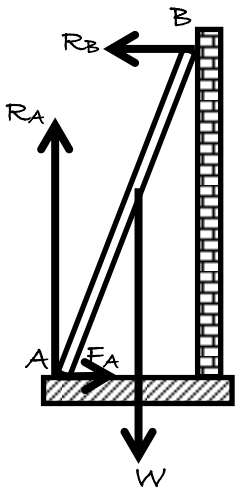
(v) W is the weight of the parachutist and R is air resistance.



(vi) W is the weight of the plank (assuming it is uniform so its weight acts through its centre of mass) and T is the tension of each wire.
If the plank is uniform then this force is the same at each end and $2T = W$

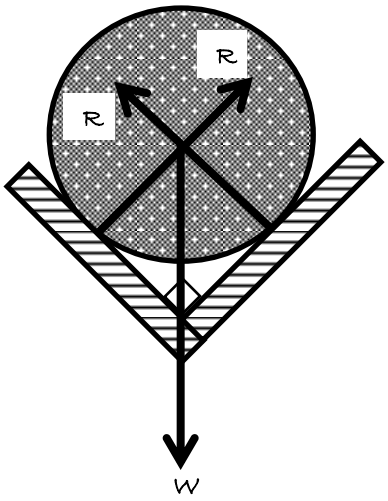


(vii) W is the weight of the ladder (assuming it is uniform so its weight acts through its centre of mass).
R_A is the normal reaction of the ground on the ladder.
F_A is the frictional force of the ground on the ladder.
R_B is the normal reaction of the wall on the ladder.

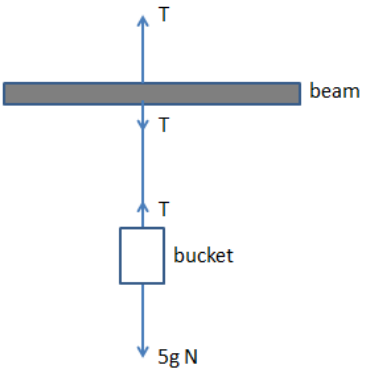


Edexcel AS Maths Force and Newton's laws 1
Exercise solns

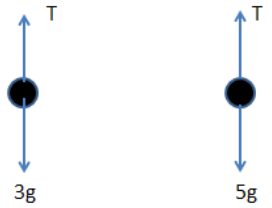
(viii) W is the weight of the cylinder
R is the normal reaction of each surface on the cylinder.



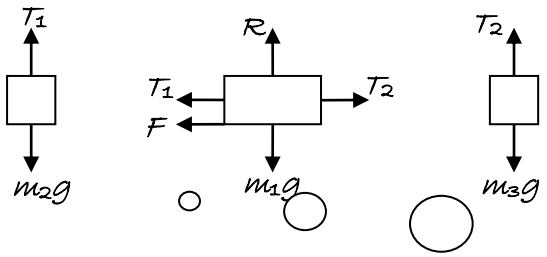
2.



3. The string is light and the pulleys are smooth.



4.



Since $m_3 > m_2$, the mass m_1 will tend to move to the right, so the frictional force will oppose this.