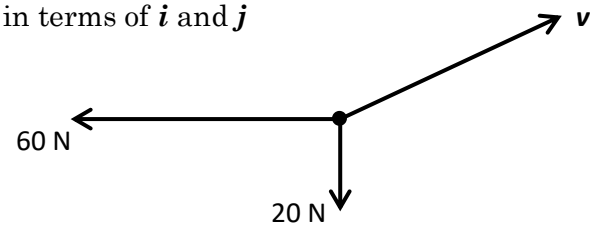
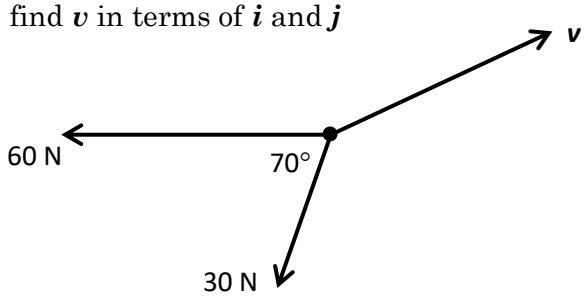
Resolving forces

In all the following questions take the x-direction as horizontal to the right and g as 9.8 m/s^2.

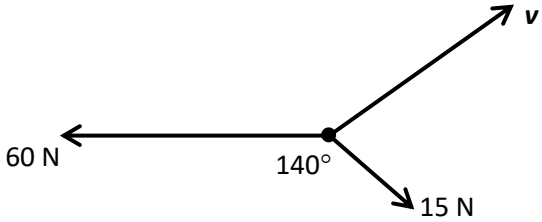
1. If these three forces are balanced, find $\boldsymbol{v}$ in terms of $\boldsymbol{i}$ and $\boldsymbol{j}$



2. If these three forces are balanced, find $\boldsymbol{v}$ in terms of $\boldsymbol{i}$ and $\boldsymbol{j}$



3. If these three forces produce resultant of 10 N vertically upwards, find $\boldsymbol{v}$ in terms of $\boldsymbol{i}$ and $\boldsymbol{j}$.



4. A 200 g lamb chop is lying on horizontal ground with a string attached. The coefficient of friction between the chop and the ground is 0.3. The string is pulled in a direction 45° from the horizontal. What tension is required in the string to make the chop move.

5. A 500 g tin of salmon is sitting on a plank which is tilted 20° from the horizontal. If it is not moving, find
   (a) the magnitude of the frictional force
   (b) the magnitude of the reaction of the plank on the tin
   (c) the minimum coefficient of friction.

6. In the previous question, find the angle to which the plank can be tilted without the tin slipping if the coefficient of friction is 0.35

7. A 6 kg dead dog is lying on a 15° slope. The coefficient of friction between the dog and the slope is 0.3. The dog's lead is pulled up the slope but parallel to the slope. What tension is required in the lead to make the dog move at a steady 5 m/s?

8. A 2 kg toy car is pointing straight up a 30° slope. A string is attached to the car and is angled directly up the slope, but 20° steeper than the slope. What tension is required in the string to stop the car from rolling backwards. Assume there is no frictional resistance to motion.

Answers: 1. 60i + 20j 2. 70.26i + 28.19j 3. 48.5i + 19.64j 4. 0.6397 N 5. 1.68 N, 4.6 N, 0.37
6. 19.3° 7. 32.26 N 8. 10.43 N