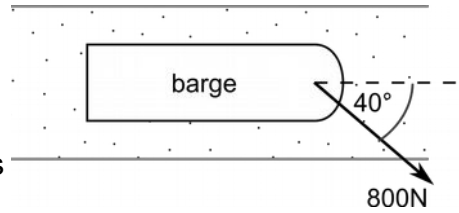


Forces – 1 – Tutorial

1. A barge is pulled by a rope along a canal as shown.

The rope applies a force of 800 N at an angle of 40° to the direction of travel.
 The force of friction between the barge and the water is 100 N.



Calculate the resultant force in the direction of travel acting on the barge. (512N)

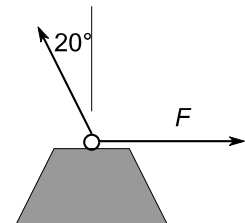
2. A lunar lander approaching the surface of the Moon has a mass of 200kg.
 A rocket is fired horizontally, producing a thrust of 100N.
 The strength of gravity near the surface of the Moon is 1.6N/kg.

Calculate:

- (a) the weight of the lunar lander in this situation, (320N)
 (b) the resultant force acting on the lunar lander. (335N, 73° below horizontal)

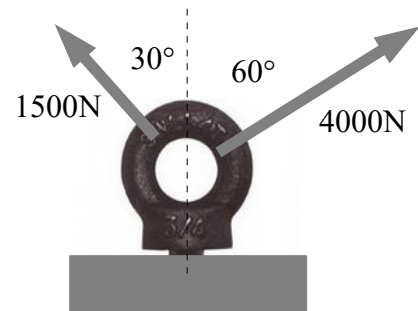
3. A concrete block is being lifted by a cable at 20° to the vertical, and a second horizontal cable is used, so that the resultant force is vertical.
 The tension in the first cable is 600N.

Calculate the force F needed in the horizontal cable. (205N)
 (hint: the resultant force must be vertical, to support the block)



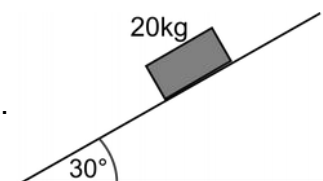
4. A ring bolt has two cables attached to it. One has a tension of 1500N at 30° to the vertical, the other a force of 4000N at 60° to the vertical.

Calculate the size and angle of the resultant.
 (4.27kN, 39° to right of vertical)



5. A 20 kg block of wood is placed on a slope as shown.
 The block remains stationary.

Calculate the size and direction of the frictional force on the block.
 (hint: consider the components of the forces parallel to the slope)



(98N; upwards, parallel with slope)