**Assignment: Forces**

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1. **A force of 3.0 N act on a 6.0 kg mass as shown. What is the acceleration of the 6.0 kg mass? (7 marks)**



The following is given data.

Using the cosine law to get the value of Fnet using the cosine of the opposite angle and its other two sides.

Using the sine law to get the angle x.

Therefore, the acceleration is [S15°E]

1. **In a rescue, a helicopter of mass 6000 kg accelerates upwards at the rate of 0.50 m/s2 while lifting a 2500 kg piece of concrete. What is the upward force exerted by the rotors of the helicopter? What is the tension in the cable attaching the concrete to the helicopter? (8 marks)**

Solution.

The following is the given data.



The first equation is which is the first diagram (mh).

The second equation is which is the second diagram (mc).

Add both equation.

--- This force is countering the effect of gravity and also giving an acceleration to the helicopter.

Thus, the upward force exerted by the rotors of the helicopter is , while the tension in the cable is .

1. **In diagram of the pulley, there is a coefficient, , of 0.15 between the 5.0 kg mass and the surface. Calculate the tension in the cable connecting the two masses and the resulting acceleration. (10 marks)**



Solution.

Let the body accelerate downward for a 5kg block.

--- the equation 1.

The following is for a 2kg block.

--- the equation 2.

Add first equation to the second equation.

Thus, the resulting acceleration is .

From the second equation, we can get the following involved.

Thus, the tension between the cable connecting two masses is .

1. **Calculate the tension in the cable connecting the two masses. Assume all surfaces are frictionless. (8 marks)**

Solution.



From the diagram see above,

... the equation 1

... the equation 2

Add the first equation to the second equation.

Put the value of in the first equation.

Thus, the tension between the cable connecting two masses is

1. **Determine the acceleration of a 1500 kg automobile that rolls down an incline of 30 degrees from the horizontal if a coefficient of friction between the tires and the incline is 0.12. (8 marks)**

**Solution.**

Recall the equation of forces.

Render the friction force as the following.

Then,

Therefore, the acceleration is