

HW 4.3—Forces

Instructions: Draw free body diagrams, write net force equations, and solve.

1. A 12 kg statue of a gazelle sitting on a smooth shelf undergoes an acceleration of 5 m/s/s. What is the magnitude of the horizontal force that causes this acceleration?

FBD:



Write the net force equations in **letters** in the boxes below.



$\Sigma F_x$ :

$\Sigma F_y$ :

Plug in numbers and do the math below.




2. A box containing brass gazelle paperweights which **weighs** 80 N is to be pushed across a smooth floor with a horizontal force of 15 N. What acceleration will be produced?

FBD:



$\Sigma F_x$ :

$\Sigma F_y$ :



3. An elevator accelerates upward at 1.5 m/s/s. If the elevator has a mass of 200 kg, find the tension in the supporting cable.

FBD:



$\Sigma F_x$ :

$\Sigma F_y$ :



4. The elevator in the question above is now accelerating downward with an acceleration of 1.5 m/s/s. Find the tension in the supporting cable.

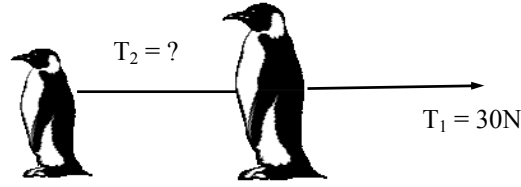
FBD:



$\Sigma F_x$ :

$\Sigma F_y$ :

5. Two penguins of masses 4 kg and 7 kg, are pulled across the frictionless surface of a frozen pond by an ice fisherman. If he exerts a force of 30 N on the first penguin as shown, determine the acceleration of the system and the tension in the cord connecting the penguins.



$T_2 =$

$a =$

FBD:



$\Sigma F_x:$

$\Sigma F_y:$

FBD:



$\Sigma F_x:$

$\Sigma F_y:$

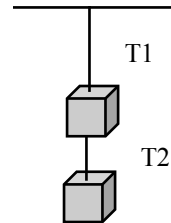
6. Two 10 kg boxes containing gazelle food are fastened to the ceiling of an elevator as shown. The elevator accelerates upward at the rate of 2 m/s/s. Find the tension in each rope.

FBD:



$\Sigma F_x:$

$\Sigma F_y:$



$T_1$

$T_2$

FBD:



$\Sigma F_x:$

$\Sigma F_y:$