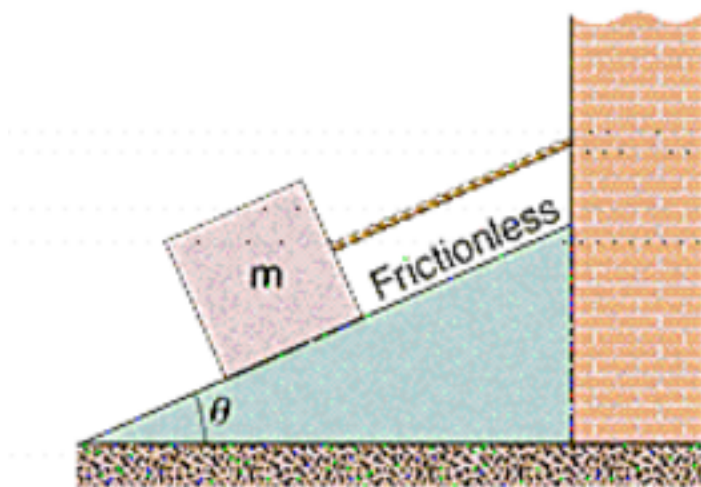


1. A 200 [kg] rocket sled can be accelerated at a constant rate from rest to 525 [m/s] in 1.9 [s]. What is the magnitude of the required net force?

2. A firefighter with a weight of 720 [N] slides down a vertical pole with an acceleration of 2.75 [m/s²], directed downward. Assume (as always) that the positive direction is upwards.
 - a. What are the magnitude and direction of the vertical frictional force exerted by the pole on the firefighter?
 - b. What are the magnitude and direction of the vertical frictional force exerted by the firefighter on the pole?

3. An elevator has a mass of 1800 [kg]. Find the tension in the supporting cable when the elevator, originally moving downward at 13 [m/s], is brought to rest with constant acceleration in a distance of 41 m.

4. In the figure below the mass of the block is 9.3 [kg] and the angle θ is 45°.



- a. Calculate the tension in the cord.
- b. Calculate the normal force acting on the block.
- c. If the cord is cut, calculate the magnitude of the block's acceleration.

5. A sphere of mass 3.5×10^{-4} [kg] is suspended from a cord. A steady horizontal breeze pushes the sphere so that the cord makes a constant angle of 33° with the vertical.
- Calculate the magnitude of that push.
 - Calculate the tension in the cord.
6. AP Exam FRQs
- 2016 #2 a only
 - 2013 #2 a only
 - 2011 #2 a only
7. The position of a particle moving along the x-axis is given as a function of time by the expression $x(t) = 3t^4 + 6t + 1$ where x is in meters and t is in seconds.
- What is the velocity of the particle at 3 [s]?
 - Sketch x vs. t and explain how the answer in (a) can be found graphically on the graph.
 - What is the acceleration of the particle at 3 [s].
 - Sketch v vs. t and explain how the answer in (c) can be found graphically on the graph.
8. The velocity of an object is moving along the x-axis is given as a function of time by the expression $v(t) = 2t^2 + t + 1$ where x is in meters and t is in seconds. The mass of the object is 4 [kg].
- What is the velocity of the object at $t = 3$ [s].
 - What is the acceleration of the object at $t = 3$ [s].
 - What is the force acting on the object at $t = 3$ [s]

HW Set 4 Answers

1. 55,263.15 [N]
- 2a. 518 [N]
2b. -518 [N]
3. 21,349 [N]
- 4a. 64.4 [N]
4b. 64.4 [N]
4c. 6.93 [m/s²]
- 5a. 0.00223 [N]
5b. 0.00409 [N]
6. FBDs will be discussed in class
- 7a. 330 [m/s]
7b. Will discuss in class
7c. 324 [m/s²]
7d. Will discuss in class
- 8a. 22 [m/s]
8b. 13 [m/s²]
8c. 52 [N]