FORCES TEST: REVIEW PROBLEMS (PART 1)

TOPICS TO BE COVERED:

Review Part 1

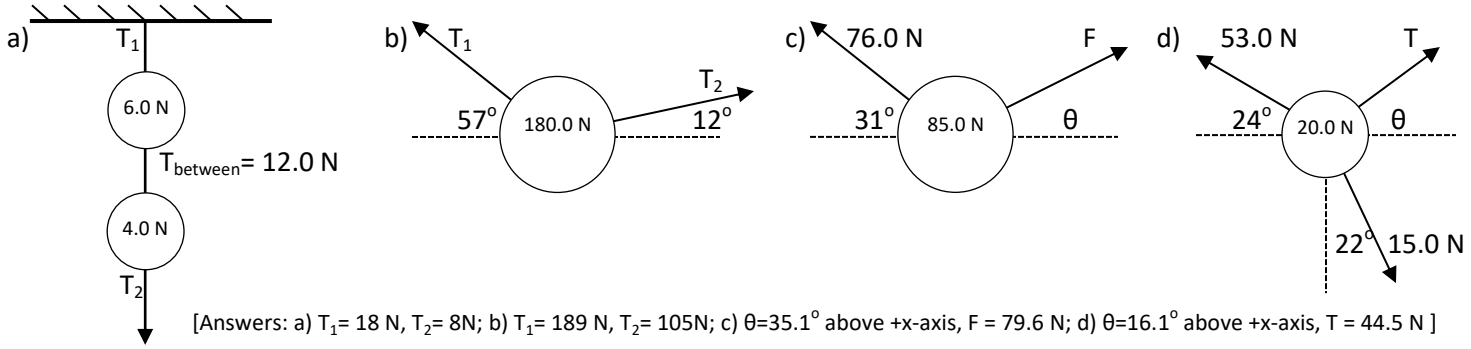
- The difference between weight and mass
- Units of force
- Freebody diagrams
- PULLEYS
- TORQUE = (F) x (lever arm)
- STATICS:
  - Translational Equilibrium: Forces in the x-direction sum to zero, and forces in the y-direction sum to zero.
  - Rotational Equilibrium: Sum of the torques taken about any pivot equal zero.

Review Part 2

- SPRINGS
- FRICTION (Kinetic and Static and the difference between the two); $F_f = \mu N$
- DYNAMICS:
  - Sum of all forces = net force = $\Sigma \mathbf{F} = m\mathbf{a}$
  - Direction of the acceleration of an object is in the direction of the net force.
  - Problems involving inclines (acceleration of gravity down an incline is a fraction of the acceleration of gravity)

PROBLEMS

1. Find the missing forces (F), tensions (T), or angles (θ) for each of the following:



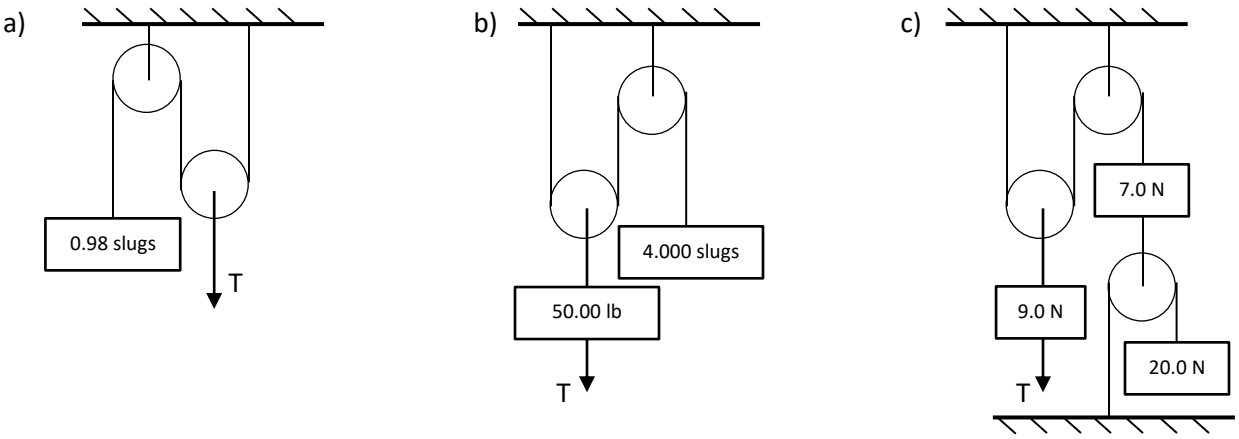
[Answers: a) T_1= 18 N, T_2= 8N; b) T_1= 189 N, T_2= 105N; c) θ=35.1° above +x-axis, F = 79.6 N; d) θ=16.1° above +x-axis, T = 44.5 N]

2. What is the weight of a 12.6 kg mass on Earth? [124 N]

3. What mass has a weight of 42.8 lbs? [1.33 slugs]

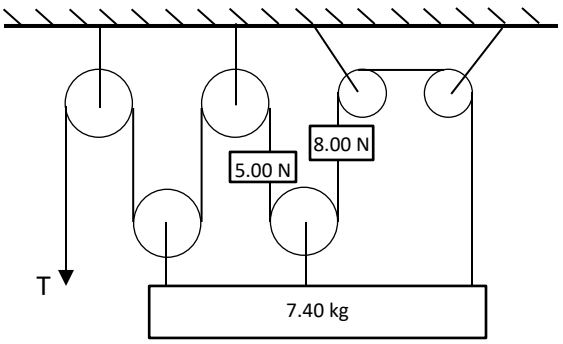
4. A block of wood of density 730.0 kg/m^3 has dimensions 1.20m by 0.400m by 0.700m. What is the tension in a string if it is lifted by a string by an astronaut standing on the moon (where gravity is 1.63 m/sec^2)? [4.00x10^2 N]

5. Find the tensions necessary to support the weights. [a) 63 lb; b) 207.6 lb; c) 85 N]

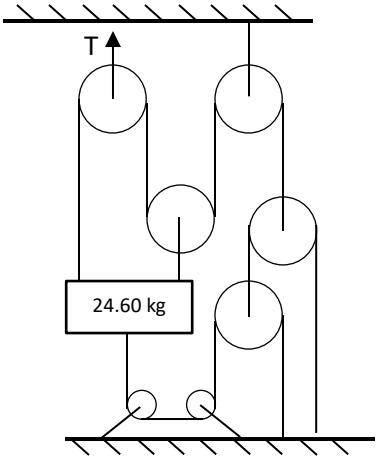


6. Find the tensions necessary for equilibrium. [a) 15.9 N; b) 175.3 N]

a)

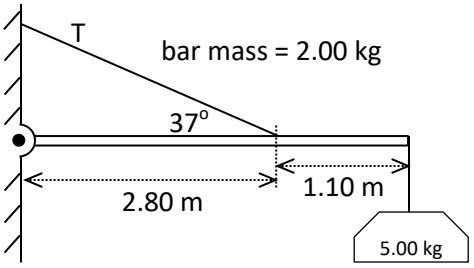


b)

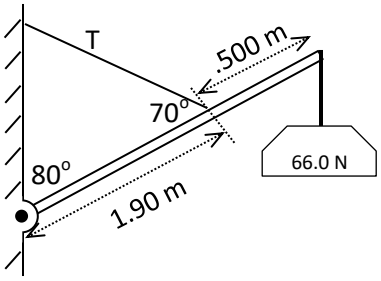


7. Find the tensions T in each case. [a) 136 N; b) 99.3 N]

a)



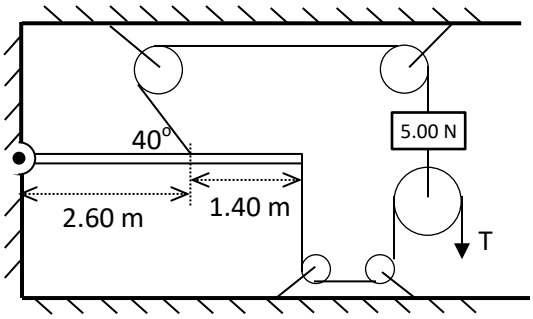
b)



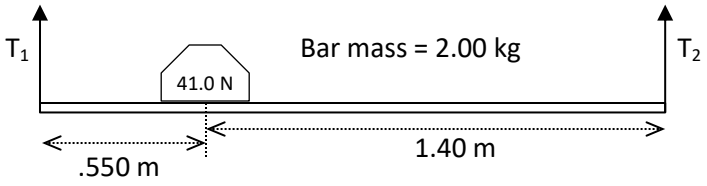
Bar weight = 18.0 N

8. Find the tension in the string. [0.588 N]

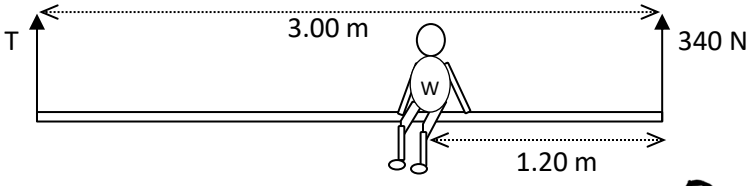
Uniform bar with mass of 2.00 N



9. Find the tensions in each string supporting the weight and the board. [T_1 = 39.2 N; T_2 = 21.4 N]



10. A painter sits on a piece of 20.0-kg scaffolding, 3.00 m long. If the tension in the right hand rope is 340.0 N, what is the weight of the painter? What is the tension in the left hand rope? [W = 403 N; T = 259 N]



11. Cole LaDrinque snags a big one, which exerts a 30.0 pound tension in his line. What force must he apply (perpendicular to the pole) with the upper hand to support his 15.0-lb, 3.00-ft long pole as well as the fish? (Cole holds the pole at 60.0 degrees to the horizontal). [F = 125 lb]