

Homework of chapter 6

Date:

Name:

Student ID:



1 A 2000-kg truck is being used to lift a 400-kg boulder B that is on a 50-kg pallet A. Knowing the acceleration of the rear-wheel-drive truck is 1 m/s^2 , determine (a) the reaction at each of the front wheels, (b) the force between the boulder and the pallet.

2 Gear A weighs 1 lb and has a radius of gyration of 1.3 in; gear B weighs 6 lb and has a radius of gyration of 3 in.; gear C weighs 9 lb and has a radius of gyration of 4.3 in. Knowing a couple \mathbf{M} of constant magnitude of $40\text{ lb}\cdot\text{in}$ is applied to gear A, determine (a) the angular acceleration of gear C, (b) the tangential force which gear B exerts on gear C. ($I = mk^2$)

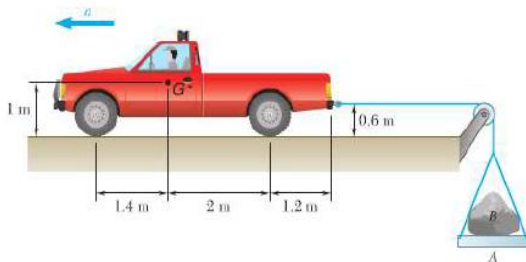


Fig.1

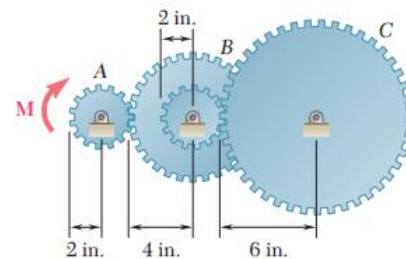


Fig.2

3 A sled is jet-propelled along a straight track by a force P that increases linearly with time according to $P=kt$, where k is a constant. The coefficient of sliding friction between the sled runners and the track is μ_k , the coefficient of static friction is μ_s , and the mass of the sled is m . Determine (a) the time at which the tip of the rocket begins to rotate downward, (b) the acceleration of the sled at this instant. Neglect loss of mass due to fuel consumption and assume that the sled will slide before it tips.

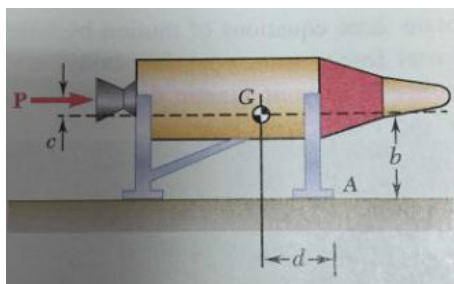


Fig.3

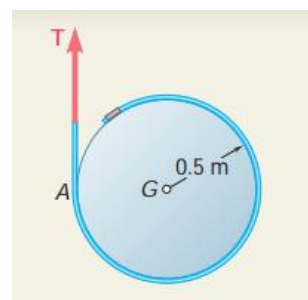


Fig.4

4 A cord is wrapped around a homogeneous disk of radius $r=0.5\text{ m}$ and mass $m=15\text{ kg}$. If the cord is pulled upward with a force \mathbf{T} of magnitude 180 N , determine (a) the acceleration of the center of the disk, (b) the angular acceleration of the disk, (c) the acceleration of the cord.