

普通物理學試題

(限用答案本作答)

可以使用計算機

1. Two blocks are connected by a massless cord that passes over a frictionless pulley and a frictionless peg, as in Figure 1. One end of the cord is attached to a mass $m_1=3.00$ kg that is a distance $R=1.20$ m from the peg. The other end of the cord is connected to a block of mass $m_2=6.00$ kg resting on a table. From what angle θ (measured from the vertical) must the 3.00-kg mass be released in order to just begin to lift the 6.00-kg block off the table? (20%)

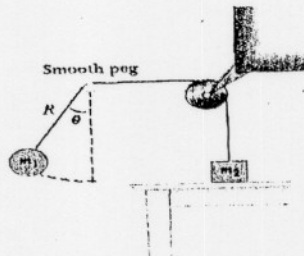


Figure 1

2. The only two forces acting on a 5.00 kg mass are indicated in Figure 2.
 (a). Determine the total force acting on the mass. (10%)
 (b). Determine the magnitude of the acceleration of the mass. (10%)

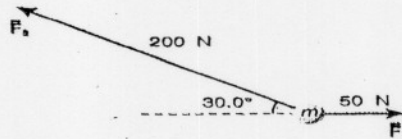


Figure 2

3. Calculate the force exerted by each rocket, called its thrust T , for the situation shown in Figure 3. The sled's initial acceleration is 49.0 m/s², the mass of the system is 2100 kg, and the force of friction opposing the motion is known to be 600 N. Note that each rocket creates an identical thrust T and there are four engine thrusts in this system. (20%)

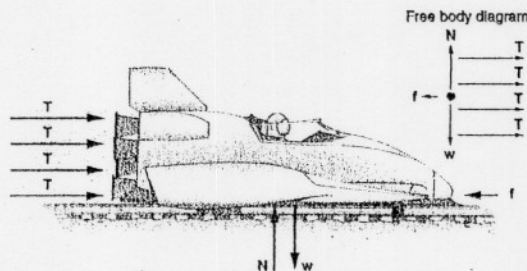


Figure 3

4. A beam of light of wavelength 550 nm traveling in air is incident on a slab of transparent material. The incident beam makes an angle of 40.0° with the normal, and the refracted beam makes an angle of 26.0° with the normal. Find the index of refraction of the material. Note that the index of refraction is equal to unity for air. (20%)
5. When a 12.0 V car battery runs a single 30.0 W headlight, how many electrons pass through it each second? (10%)
6. (a). What current is needed to transmit 100 MW of power at 200 kV? (5%)
 (b). What is the power dissipated by the transmission lines if they have a resistance of 1.00Ω ? (5%)

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