Physics 105 second exam 2021

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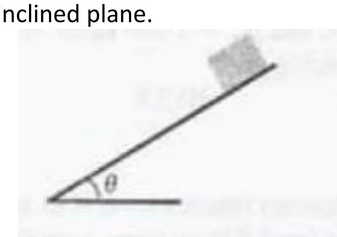
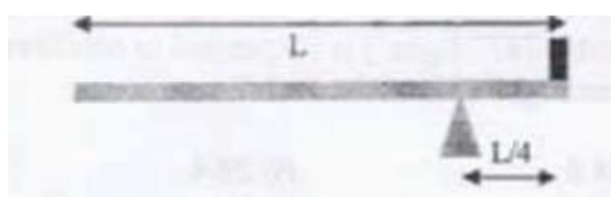
1. A stone is released from rest at a height h above the ground's surface. Just before it hits the ground its kinetic energy is 200 J. Ignoring air resistance, the change in the potential energy of this stone is (in J) is:
   A. 200
   B. 0
   C. -200
   D. 100
   E. -100

2. The figure shows a box of mass M= 4.0Kg , which slides down a rough inclined plane that makes an angle Ø= 30 with the horizontal. If the object starts from rest and the coefficient of kinetics friction is M_K = 0.2 , find the speed of the box (in m/s) when it has moved 3.0 m down the inclined plane.
   A. 4.4
   B. 6.3
   C. 7.1
   D. 3.1
   E. 5.3

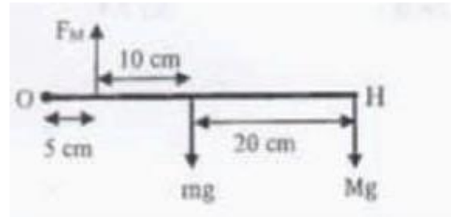


3. A ball is thrown vertically upwards with an initial speed v_1. When it has reached a height of one-fifth of its maximum height, its speed is 16.0 m/s upwards. The initial speed v_1 of the ball (in m/s) is: (ignore air resistance)
   A. 39.2
   B. 25.1
   C. 27.7
   D. 17.9
   E. 20.6

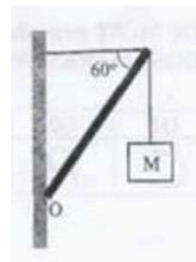
4. A 40Kg box is placed at the end of a uniform board of length L and mass M. the pivot is placed a distance L/4 from the end of the board as shown. If the board is in static equilibrium, then the weight of the board (in N) is:
   A. 200
   B. 392
   C. 120
   D. 196
   E. 784



5. The figure represents a forearm of mass m in a horizontal position as shown. The elbow joint, O, is 5 cm from the force exerted by the biceps muscle, F_M . when a mass M is held in the hand at the position H, the forearm is in static equilibrium. If F_M = 185 N , and M = 2.0 Kg, then the mass m (in Kg) is:
   A. 1.9
   B. 2.1
   C. 0.5
   D. 1.1
   E. 1.6

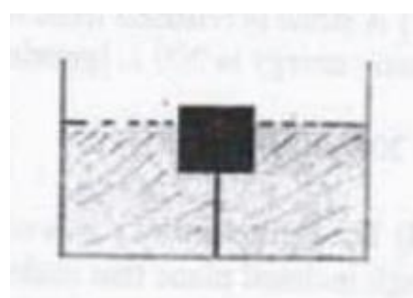


6. A 25.0 Kg uniform beam is attached to the wall by a hinge at point O. it is held in static equilibrium by connecting it to a 1.5 m horizontal rope which is tied to the wall. A mass M=18.0Kg is suspended in equilibrium from the beam using another vertical rope as shown. The magnitude of the horizontal component of the hinge force (in N) that acts on the beam at point O is:
   A. 172.6
   B. 297.9
   C. 99.6
   D. 122.1
   E. 23.5

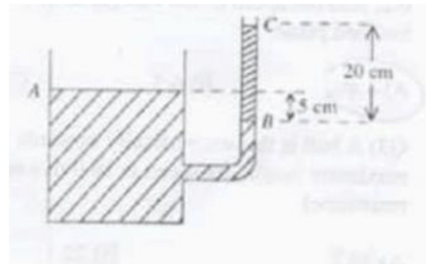


7. Consider a plastic cube of side length 20 cm and density of 0.5 grams/cm^3 . if you push the cube until it is completely submerged under water (of density of 1.0 grams/cm^3), and continue to push the cube deeper below the water surface, which of the following statements is correct?
   A. The weight of the cube is greater than the buoyant force acting on it.
   B. If you remove your force that acts on the cube, it will always move down and will never move up.
   C. The buoyant force acting on the cube becomes large as the cube moves deeper below the water surface .
   D. The buoyant force acting on the cube remains constant as the cube moves deeper below the water surface.
   E. The buoyant force that acts on the cube when its fully under water depends on the density of the cube.

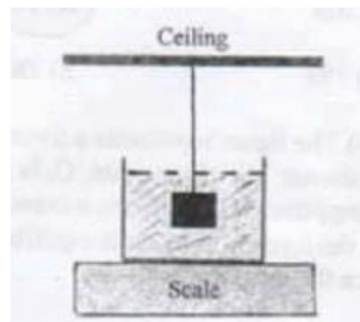
8. The figure shows a box with exactly 0.8 of its volume submerged in water. If the volume of the box is 0.001 m^3 , and p_o= 0.2 p_w, where p_o is the density of the box, and p_w =1000 Kg/m^3 is the density of the water, then the tension (in N) in the string is:
   A. 0.2
   B. 7.8
   C. 0
   D. 9.8
   E. 5.9



9. Mercury reaches level A in an open, wide, vertical container and reaches level B in an open, narrow, vertical tube. The wide container and the narrow tube are connecter through a hole of inner radius 32.00 mm, as shown. Level A is 5.0 cm higher then level B . the mercury supports a 20.0 cm high column of unknown liquid, between levels B and C. the density (in Kg/m^3) of the unknown liquid is : (density of mercury is 13600 Kg/m^3)
   A. 54400
   B. 3400
   C. 13600
   D. 10200
   E. 6800



10. A 1.00-Kg beaker containing 2.00Kg of oil (density=916 Kg/m^3) rests on a scale. A 3.00-Kg block of iron (density=7870 Kg/m^3) is suspended in equilibrium from a rope and is completely submerged in the oil. What is reading (in N) of the scale?
   A. 58.8
   B. 29.4
   C. 32.8
   D. 26.0
   E. 3.4



Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
C	A	D	B	E	A	D	E	B	C