PHYSICS 101 -FINAL EXAM – 022, KFUPM - PHYSICS

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Q1 Q0 In landing, a jet plane decelerates uniformly and comes to a
2  Q0 stop in 30 s, covering a distance of 1500 m along the runway.
   Q0 What was the jet's landing speed when it first touched the
   Q0 runway?
   Q0
   A1 100 m/s
   A2 39 m/s
   A3 21 m/s
   A4 170 m/s
   A5 19 m/s
   Q0
Q2 Q0 A projectile is fired with an initial velocity of 49 m/s at an
 4 Q0 angle of 30 degrees above the horizontal. If air resistance is
   Q0 negligible, how much time elapses before the projectile reaches
   Q0 its maximum height?
   Q0
   A1 2.5 s
   A2 6.4 s
   A3 5.0 s
   A4 3.2 s
   A5 4.5 s
   Q0
Q3 Q0 Earth has a mass of 5.98 x 10**24 kg. The average mass of the
 1 Q0 atoms that make up Earth is 40 u (1 u (atomic mass units)
   Q0 = 1.66 x 10**-27 kg). How many atoms are there in Earth?
   Q0
   A1 9.0 x 10**49
   A2 1.5 x 10**50
   A3 3.6 x 10**51
   A4 9.9 x 10**50
   A5 6.6 x 10**49
   Q0
Q4 Q0 The angle the vector 2.50 j + 4.33 k makes with the y axis is:
3  Q0
   A1 60 degrees
   A2 30 degrees
   A3 0 degrees
   A4 90 degrees
   A5 45 degrees
   Q0
Q5 Q0 A crane lifts a 3900 kg shipping container through a vertical
7  Q0 height of 4.5 m in 8.0 s. What is the average power that the
   Q0 crane motor must supply? Assume the crane to be moving with
   Q0 constant velocity and ignore friction.
   Q0
   A1 2.1 x 10**4 W
   A2 7.7 x 10**4 W
   A3 2.7 x 10**3 W
   A4 1.7 x 10**3 W
   A5 5.7 x 10**5 W
   Q0
Q6 Q0 A student applies a horizontal 20 N force to move a crate at a
7  Q0 constant velocity of 4.0 m/s across a rough floor. How much net
   Q0 work is done on the crate in 6.0 s?
   Q0
   A1 0   J
   A2 480 J
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PHYS101 FINAL Exam Term-022

FIGURE-1

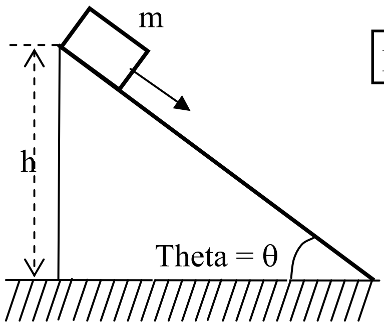


FIGURE-2

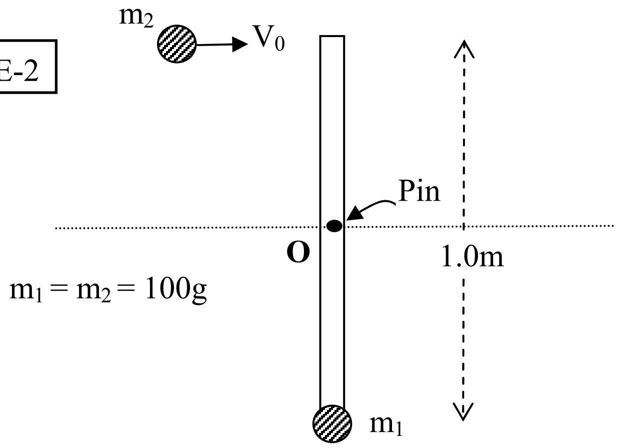


FIGURE-3

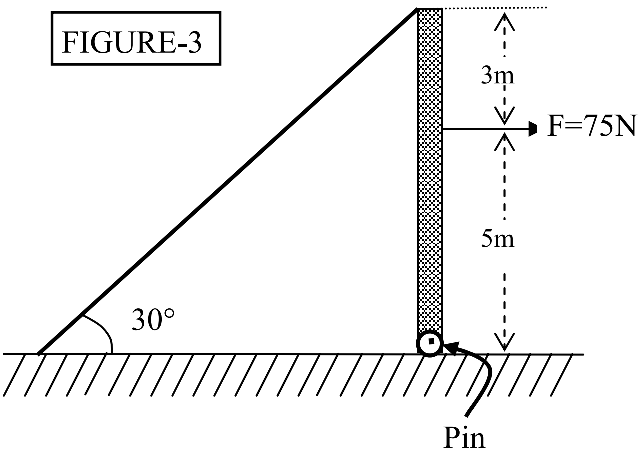


FIGURE-4

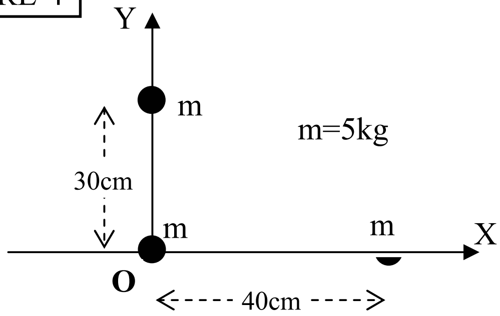


FIGURE-5

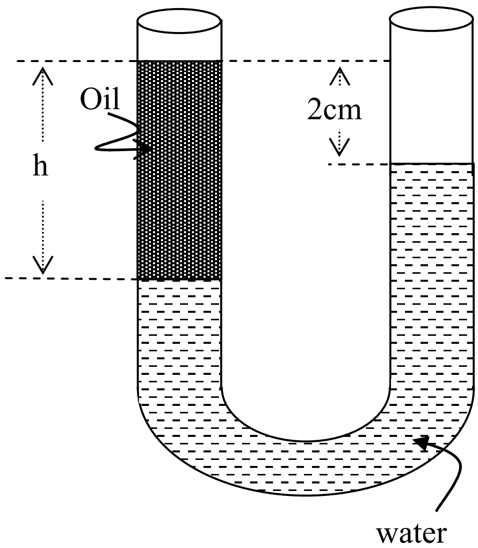


FIGURE-6

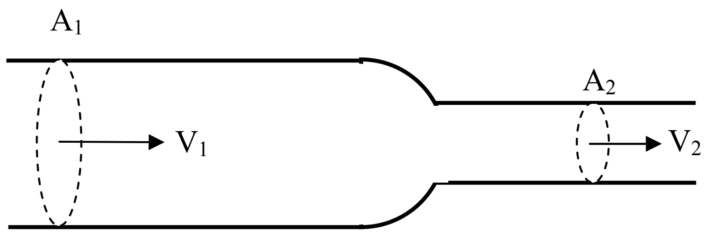
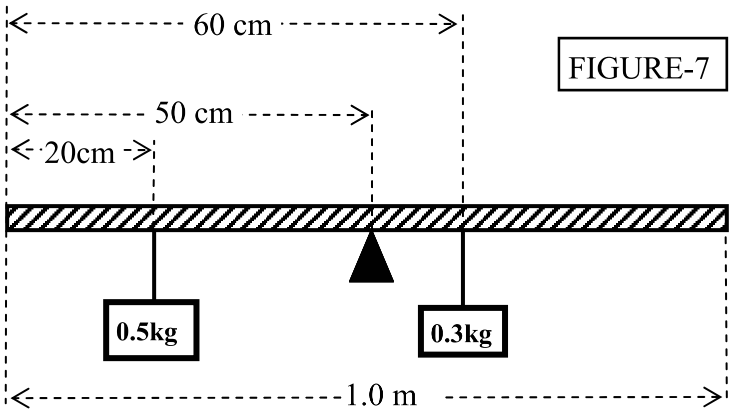


FIGURE-7



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   A3 80  J
   A4 120 J
   A5 240 J
   Q0
Q7 Q0 A block of mass m sliding down a rough incline (coefficient of
8  Q0 kinetic friction u) at constant speed is initially at a height
   Q0 h as shown in Fig. 1. What is the increase in thermal energy
   Q0 of the block-incline system when the block reaches the bottom?
   Q0
   A1 mgh
   A2 mgh/u
   A3 umgh/sin(theta)
   A4 mgh cos(theta)
   A5 0
   Q0
Q8 Q0 Calculate the rotational inertia of a 0.56 kg meter stick
11 Q0 about an axis perpendicular to the stick and located at
   Q0 the 80 cm mark. (Treat the stick as a thin rod).
   Q0
   A1 9.7 x 10**-2 kg.m**2
   A2 4.7 x 10**-2 kg.m**2
   A3 6.5 x 10**-2 kg.m**2
   A4 3.8 x 10**-2 kg.m**2
   A5 1.7 x 10**-2 kg.m**2
   Q0
Q9 Q0 A 1.0 m massless rod with a mass m1 = 100 g at the lower end is
12 Q0 pivoted at O. The rod is at rest when a mass m2 = 100 g moving
   Q0 with velocity Vo strikes the top end and stick to it (see
   Q0 Fig.2). If the angular velocity of the system just after this
   Q0 collision is 32 rad/s, find Vo.
   Q0
   A1 32 m/s
   A2 15 m/s
   A3 18 m/s
   A4 24 m/s
   A5 10 m/s
   Q0
Q10Q0 A uniform solid sphere is rolling smoothly up a ramp that is
12 Q0 inclined at 10 degrees. What is the acceleration of its center
   Q0 of mass?
   Q0
   A1 1.2 m/s**2 down the ramp
   A2 2.5 m/s**2 up   the ramp
   A3 0
   A4 3.5 m/s**2 up   the ramp
   A5 3.5 m/s**2 down the ramp
   Q0
Q11Q0 A particle of mass M moving with Vo=(5 i) m/s explodes into
9  Q0 three equal mass particles. The first particle moves with V1
   Q0 = (3 i) m/s, and the second particle moves with V2=(3 j) m/s.
   Q0 Find the velocity of the third particle.
   Q0
   A1 (12 i - 3 j) m/s
   A2 (3  i + 3 j) m/s
   A3 (-5 i +   j) m/s
   A4 (10 i - 2 j) m/s
   A5 (-9 i - 3 j) m/s
   Q0
Q12Q0 A 3.0-kg ball with an initial velocity of (3i+2j) m/s collides
10 Q0 with a wall and rebounds with a velocity of (-3i+2j) m/s. what
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   Q0 is the impulse exerted on the ball by the wall?
   Q0
   A1 (-18i) N.s
   A2 (+18i) N.s
   A3 (-12j) N.s
   A4 (+12j) N.s
   A5 (+9i)  N.s
   Q0
Q13Q0 A particle A of mass M and initial kinetic energy K has an
10 Q0 elastic head-on collision with a particle B of the same mass
   Q0 M initially at rest. The kinetic energy of the particle A
   Q0 after collision is:
   Q0
   A1 0
   A2 K/2
   A3 K
   A4 K/SQRT(2)
   A5 K/4
   Q0
Q14Q0 A uniform 50-kg beam is held in a vertical position by a pin at
13 Q0 its lower end and a cable at its upper end. A horizontal force
   Q0 F = 75 N acts as shown in the figure. What is the tension in the
   Q0 cable?
   Q0
   A1 54 N
   A2 69 N
   A3 47 N
   A4 61 N
   A5 75 N
   Q0
Q15Q0 A horizontal uniform meter stick is supported at the 50-cm mark.
13 Q0 A mass of 0.50 kg is hanging from it at the 20-cm mark and a
   Q0 0.30 kg mass is hanging from it at the 60-cm mark (see Fig.7).
   Q0 Determine the position on the meter stick at which one would
   Q0 hang a third mass of 0.60 kg to keep the meter stick balanced.
   Q0
   A1 70 cm
   A2 74 cm
   A3 65 cm
   A4 86 cm
   A5 62 cm
   Q0
Q16Q0 A 20-m long steel wire (cross-sectional area 1.0 cm**2, Young's
13 Q0 modulus 2.0 x 10**11 N/m), is subjected to a force of 25000 N.
   Q0 How much will the wire be stretched?
   Q0
   A1 2.5  cm
   A2 0.25 cm
   A3 12   cm
   A4 25   cm
   A5 1.2  cm
   Q0
Q17Q0 A satellite circles a planet (mass M = 5.0x10**24 kg) every
14 Q0 98 min. What is the radius of the orbit?
   Q0
   A1 6.6 x 10**6  m
   A2 7.8 x 10**6  m
   A3 7.4 x 10**6  m
   A4 1.3 x 10**7  m
   A5 8.1 x 10**6  m
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   Q0
Q18Q0 Three 5.0 kg masses are located at points in the xy plane as
14 Q0 shown in the Fig.4. What is the magnitude of the resultant force
   Q0 caused by the other two masses on the mass at the origin?
   Q0
   A1 2.1x10**(-8) N
   A2 2.7x10**(-8) N
   A3 1.8x10**(-8) N
   A4 2.4x10**(-8) N
   A5 2.9x10**(-8) N
   Q0
Q19Q0 A rocket is fired vertically from the surface of a planet (mass
14 Q0 = M, radius = R). What is the initial speed of the rocket if
   Q0 its maximum height above the surface of the planet is 2R ?
   Q0 (Assume there is no air resistance)
   Q0
   A1 SQRT(4GM/3R)
   A2 SQRT(8GM/5R)
   A3 SQRT(3GM/2R)
   A4 SQRT(5GM/3R)
   A5 SQRT(GM/3R)
   Q0
Q20Q0 A spaceship (mass = m) orbits a planet (mass = M) in a circular
14 Q0 orbit (radius = R). What is the minimum energy required to make
   Q0 the spaceship escape the gravitational force of the planet?
   Q0
   A1 GmM/(2R)
   A2 GmM/R
   A3 GmM/(3R)
   A4 2GmM/(5R)
   A5 GmM/(4R)
   Q0
Q21Q0 A 12-kg crate rests on a horizontal surface and a boy pulls on
6  Q0 it with a force that is 30 deg. above the horizontal. If the
   Q0 coefficient of static friction is 0.40, the minimum force he
   Q0 needs to start the crate moving has a magnitude of:
   Q0
   A1 44 N
   A2 47 N
   A3 54 N
   A4 56 N
   A5 71 N
   Q0
Q22Q0 The density of water and oil are 1.0 g/cm**3 and 0.80 g/cm**3
15 Q0 respectively. The height h of the column of oil, shown in
   Q0 Fig.5, is:
   Q0
   A1 10  cm
   A2 4.6 cm
   A3 8.0 cm
   A4 2.0 cm
   A5 12  cm
   Q0
Q23Q0 An incompressible ideal liquid flows along the pipe as shown in
15 Q0 Fig.6. The ratio of the speeds v2/v1 is:
   Q0
   A1 A1/A2
   A2 A2/A1
   A3 (A1/A2)**2
   A4 (A1/A2)**0.5
```

A5 v1/v2
Q0
Q24Q0 Bernoulli's equation can be derived from the conservation of:
15 Q0
A1 energy
A2 mass
A3 angular momentum
A4 volume
A5 pressure
Q0
Q25Q0 A liquid of density 791 kg/m**3 flows smoothly through a
15 Q0 horizontal pipe (see Fig. 6). The area A2 equals A1/2. The
Q0 pressure difference between the wide and the narrow sections of
Q0 the pipe (P1-P2) is 4120 Pa. What is the speed v1?
Q0
A1 1.86 m/s
A2 2.91 m/s
A3 4.50 m/s
A4 5.21 m/s
A5 0.19 m/s
Q0
Q26Q0 A 3-kg block, attached to a spring, executes simple harmonic
16 Q0 motion according to x = 2*cos(50*t) where x is in meters and
Q0 t is in seconds. The spring constant of the spring is:
Q0
A1 7500 N/m
A2 100 N/m
A3 150 N/m
A4 1.0 N/m
A5 2100 N/m
Q0
Q27Q0 Mass m oscillating on the end of a spring with spring constant
16 Q0 k has amplitude A. Its maximum speed is:
Q0
A1 A*SQRT(k/m)
A2 (A**2)*k/m
A3 A*SQRT(m/k)
A4 A*m/k
A5 (A**2)*m/k
Q0
Q28Q0 A 0.25-kg block oscillates on the end of the spring with a
16 Q0 spring constant of 200 N/m. When t=0, the position and
Q0 velocity of the block are x=0.15 m and v=3.0 m/s. What is
Q0 the maximum speed of the block?
Q0
A1 5.2 m/s
A2 0.18 m/s
A3 3.7 m/s
A4 0.13 m/s
A5 13 m/s
Q0
Q29Q0 An object undergoing simple harmonic motion takes 0.25 s to
16 Q0 travel from one point of zero velocity to the next such point.
Q0 The distance between those points is 40 cm. The amplitude and
Q0 frequency of the motion are:
Q0
A1 20 cm, 2 Hz
A2 40 cm, 2 Hz
A3 30 cm, 2 Hz
A4 30 cm, 4 Hz

A5 20 cm, 4 Hz
Q0
Q30Q0 A 13-N weight and a 12-N weight are connected by a massless
5 Q0 string over a massless, frictionless pulley. The 13-N weight
Q0 has a downward acceleration equal to:
Q0
A1 g/25
A2 g/12
A3 g/13
A4 g
A5 (13g/25)