

PHYS101=012 final

Q1 Q0 Consider a simple harmonic motion, say as described  
ch Q0 by a mass-spring system. The ACCELERATION of the mass  
16 Q0 will be maximum when the

\*\*\*Q0

- A1 displacement of the mass is maximum
- A2 velocity of the mass is maximum
- A3 displacement of the mass is minimum
- A4 potential energy is minimum
- A5 kinetic energy is maximum

Q0

Q2 Q0 What happens to the FREQUENCY if the length of a  
ch Q0 simple pendulum is INCREASED by a factor of FOUR?

16 Q0

- \*\*\*A1 it decreases by a factor of TWO.  
A2 it increases by a factor of TWO.  
A3 it remains constant(i.e. does not change).  
A4 it increases by a factor of FOUR.  
A5 it decreases by a factor of FOUR.

Q0

Q3 Q0 A particle of mass 0.10 kg is vibrating with simple  
ch Q0 harmonic motion with a period of 0.20 s and a maximum  
16 Q0 speed of 10 m/s. Find the maximum DISPLACEMENT of the

\*\*\*Q0 particle.

Q0

- A1 0.32 m
- A2 0.12 m
- A3 0.53 m
- A4 0.98 m
- A5 0.00 m

Q0

Q4 Q0 A simple harmonic oscillator is oscillating with an  
ch Q0 amplitude A. For what value of the DISPLACEMENT does  
16 Q0 the kinetic energy equal the potential energy?

\*\*\*Q0

- A1  $0.707 * A$
- A2  $0.500 * A$
- A3  $1.414 * A$
- A4  $0.816 * A$
- A5  $1.633 * A$

Q0

Q5 Q0 A 3-kg block, attached to a spring, executes simple  
ch Q0 harmonic motion on a horizontal frictionless surface  
16 Q0 according to  $x = 2 \cos(10 t + 3.14)$  where x is in

\*\*\*Q0 meters and t is in seconds. Find the magnitude of the  
Q0 maximum ACCELERATION.

Q0

- A1 200 m/s\*\*2
- A2 400 m/s\*\*2
- A3 20 m/s\*\*2
- A4 500 m/s\*\*2
- A5 00 m/s\*\*2

Q0

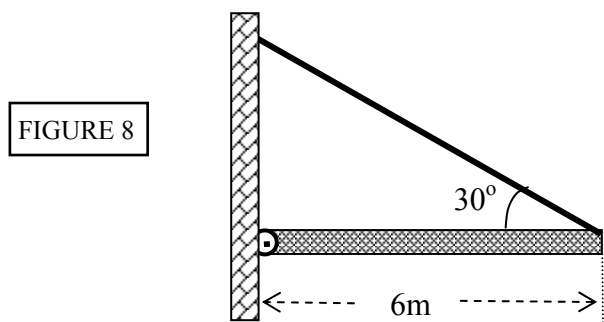
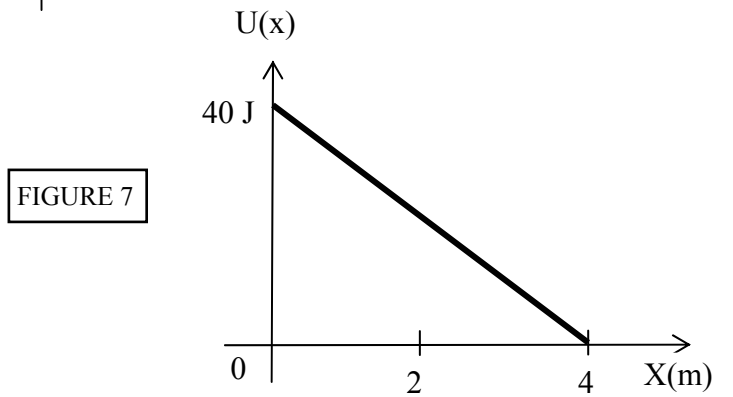
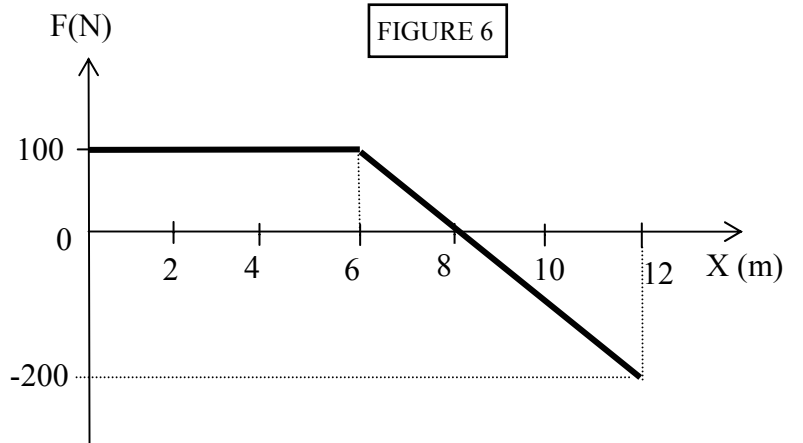
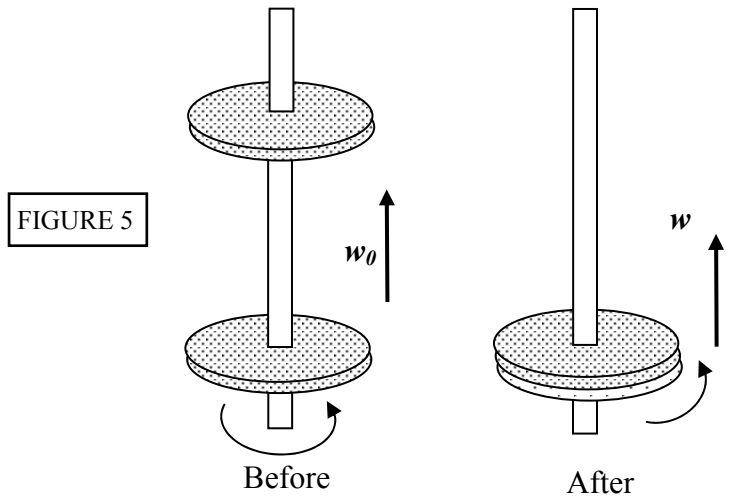
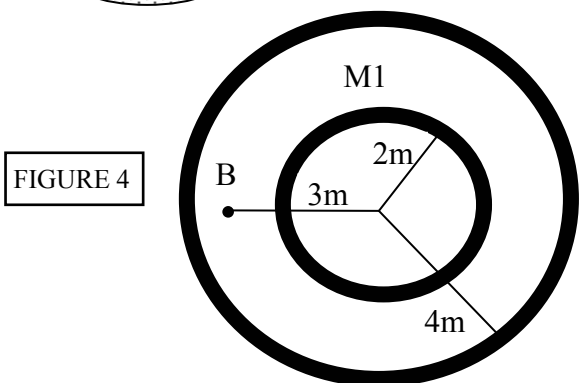
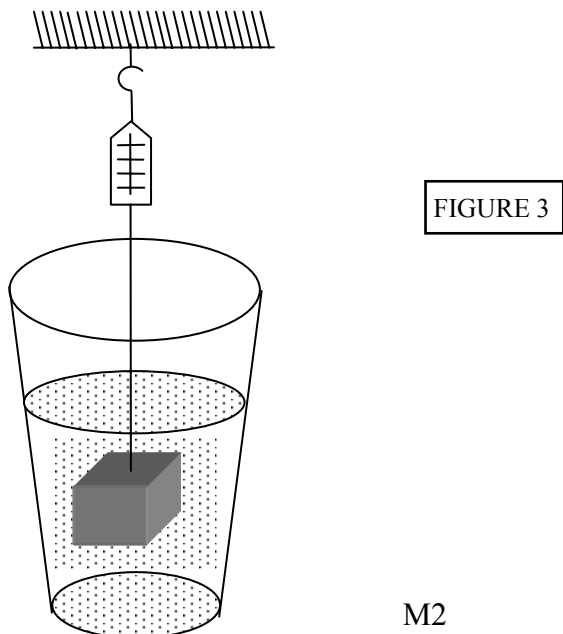
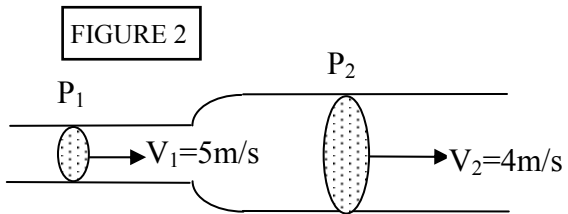
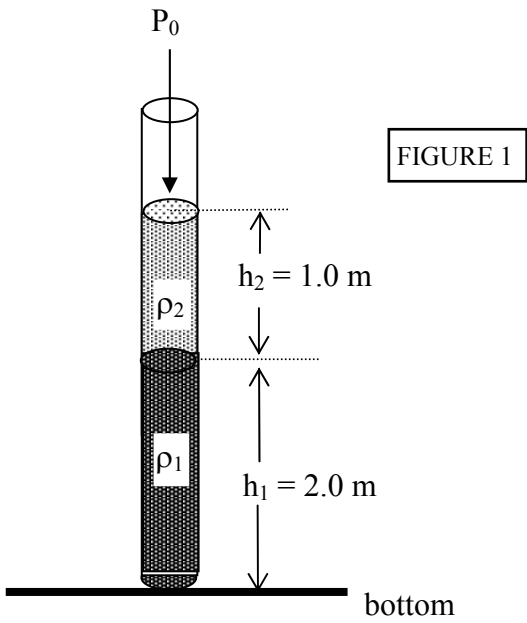
Q6 Q0 The open vertical tube in FIGURE 1 contains two liquids  
ch Q0 of densities  $\rho_{01} = 1000 \text{ kg/m}^{**3}$  and  $\rho_{02} = 600 \text{ kg/m}^{**3}$ ,  
15 Q0 which do not mix. Find the PRESSURE (in N/m\*\*2) at the

Q0 bottom of the tube.

\*\*\*Q0

- A1  $1.3 * 10^{**5}$
- A2  $1.9 * 10^{**4}$
- A3  $2.1 * 10^{**4}$

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A4  $3.7 \times 10^5$   
A5  $0.3 \times 10^4$   
Q0

Q7 Q0 Water (density =  $1.0 \times 10^3 \text{ kg/m}^3$ ) flows through a  
ch Q0 horizontal pipe as shown in FIGURE 2. At the wider end  
15 Q0 its speed is 4.0 m/s and at the narrow end its speed  
\*\*\*Q0 is 5.0 m/s. The DIFFERENCE in pressure,  $P_2 - P_1$ , between  
Q0 the two ends is:  
Q0

A1  $+4.5 \times 10^3 \text{ Pa}$   
A2  $-4.5 \times 10^3 \text{ Pa}$   
A3  $+7.0 \times 10^2 \text{ Pa}$   
A4  $-7.0 \times 10^2 \text{ Pa}$   
A5  $0.0 \text{ Pa}$   
Q0

Q8 Q0 A 3.20-kg block of metal measuring 15 cm X 10 cm X 10 cm  
ch Q0 is suspended from a scale and totally immersed in water  
15 Q0 as shown in FIGURE 3. What is the READING of the spring  
\*\*\*Q0 scale (in N)? (density of water =  $1.0 \times 10^3 \text{ kg/m}^3$ )  
Q0

A1 16.7  
A2 10.3  
A3 28.9  
A4 31.4  
A5 14.7  
Q0

Q9 Q0 A block of wood floats in water with two-third of its volume  
ch Q0 submerged. Find the DENSITY of the wood (in  $\text{kg/m}^3$ ).  
15 Q0 (Density of water is  $1.0 \times 10^3 \text{ kg/m}^3$ ).  
\*\*\*Q0

A1 667  
A2 1500  
A3 1000  
A4 500  
A5 333  
Q0

Q10 Q0 The rate of flow of water through a horizontal pipe  
ch Q0 is  $2.0 \text{ m}^3/\text{minute}$ . Determine the SPEED of flow at  
15 Q0 a point where the radius of the pipe is 5.0 cm.  
\*\*\*Q0

A1 4.2 m/s  
A2 2.0 m/s  
A3 6.0 m/s  
A4 5.3 m/s  
A5 7.2 m/s  
Q0

Q11 Q0 Two concentric shells of uniform density having masses  
ch Q0  $M_1$  and  $M_2$  and Radii  $R_1 = 2.0 \text{ m}$ ,  $R_2 = 4.0 \text{ m}$  are situated  
14 Q0 as shown in FIGURE 4. Find the gravitational FORCE on  
Q0 a particle of mass  $m$  placed at point B at a distance of  
Q0 3.0 m from the center :  
\*\*\*Q0

A1  $(G \cdot M_1 \cdot m) / 9$   
A2  $G \cdot (M_1 + M_2) \cdot m / 9$   
A3  $G \cdot (M_1 + M_2) \cdot m / 3$   
A4  $(G \cdot M_2) \cdot m / 16$   
A5  $G \cdot (M_1 + M_2) \cdot m / 4$   
Q0

Q12 Q0 Three particles with equal mass  $M = 2.0 \text{ kg}$  are located  
ch Q0 at  $(0,0)$ ,  $(4,0)$  and  $(0,3)$  where the  $x$  and  $y$  coordinates  
14 Q0 are in meters. Find the magnitude of the gravitational

Q0 FORCE exerted on the particle located at the origin by  
Q0 the other two particles.

Q0

A1  $3.4 \times 10^{(-11)}$  N

A2  $4.6 \times 10^{(-11)}$  N

A3  $5.2 \times 10^{(-12)}$  N

A4  $1.7 \times 10^{(-10)}$  N

A5  $2.6 \times 10^{(-11)}$  N

Q0

Q13Q0 A moon is moving in a circular orbit around a planet with  
ch Q0 a period of  $2.75 \times 10^{4}$  s. Find the MASS of the planet if the  
14 Q0 radius of the orbit is  $9.4 \times 10^{6}$  m.

\*\*\*Q0

A1  $6.5 \times 10^{23}$  kg

A2  $5.9 \times 10^{26}$  kg

A3  $2.3 \times 10^{25}$  kg

A4  $4.2 \times 10^{23}$  kg

A5  $7.6 \times 10^{35}$  kg

Q0

Q14Q0 A 1000-kg rocket is fired vertically from Earth's surface  
ch Q0 with zero total mechanical energy. With what KINETIC energy  
14 Q0 was it fired?

\*\*\*Q0 (Mass of Earth =  $6.0 \times 10^{24}$  kg,  $R_e = 6.4 \times 10^6$  m)

Q0

A1  $6.3 \times 10^{10}$  J

A2  $3.1 \times 10^{10}$  J

A3  $5.2 \times 10^6$  J

A4  $1.0 \times 10^9$  J

A5  $9.8 \times 10^7$  J

Q0

Q15Q0 Calculate the WORK required to move an Earth satellite of  
ch Q0 mass  $m$  from a circular orbit of radius  $3R_e$  to one of radius  
14 Q0  $4R_e$ . ( $R_e$  = radius of the the earth,  $M_e$  = Mass of the Earth and  
Q0  $G$  = Gravitational constant)

\*\*\*Q0

A1  $(G \cdot m \cdot M_e) / 24 \cdot R_e$

A2  $(G \cdot m \cdot M_e) / 12 \cdot R_e$

A3  $(G \cdot m \cdot M_e) / 6 \cdot R_e$

A4  $(G \cdot m \cdot M_e) / 8 \cdot R_e$

A5  $(G \cdot m \cdot M_e) / 4 \cdot R_e$

Q0

Q16Q0 A 5.00-kg ball moving horizontally hits a wall with a  
ch Q0 speed of 5.00 m/s and rebounds with a speed of 2.00 m/s.  
10 Q0 Find the magnitude of the IMPULSE exerted on the ball

\*\*\*Q0 by the wall.

Q0

A1 35.0 N.s

A2 25.0 N.s

A3 10.0 N.s

A4 15.0 N.s

A5 40.0 N.s

Q0

Q17Q0 As shown in FIGURE 5 a disk rotates about a vertical,  
ch Q0 frictionless axle with angular velocity 50 rad/s.  
12 Q0 A second identical disk, initially NOT rotating, drops  
\*\*\*Q0 onto the first disk and the two disks eventually reach  
Q0 an angular velocity  $W$ . Calculate  $W$  (in rad/s).

Q0

A1 25

A2 50

A3 75

A4 35  
A5 15  
Q0

Q18Q0 The only force acting on a 1.5-kg particle as it moves along  
ch Q0 the x-axis varies as shown in FIGURE 6. The particle was at  
7 Q0 rest at  $x = 0$ . Find the SPEED of the particle at  $x = 12$  m.

\*\*\*Q0  
A1 20 m/s  
A2 30 m/s  
A3 45 m/s  
A4 15 m/s  
A5 0.0 m/s  
Q0

Q19Q0 One end of a 0.80 m string is fixed, the other end  
ch Q0 is attached to a 2.00-kg stone. The stone swings in  
6 Q0 a vertical circle, passing the bottom point at 10.0 m/s.

\*\*\*Q0 The RADIAL acceleration of the stone at the top of the  
Q0 circle is:

Q0  
A1 86 m/s\*\*2  
A2 125 m/s\*\*2  
A3 100 m/s\*\*2  
A4 39 m/s\*\*2  
A5 0 m/s\*\*2  
Q0

Q20Q0 As a particle moves along the x-axis it is acted on by  
Ch Q0 a conservative force  $F(x)$ . The potential energy  $U(x)$  of  
8 Q0 the particle as a function of  $x$  is shown in Figure 7.

\*\*\*Q0 The FORCE  $F(x)$  is:

Q0  
A1 +10 N  
A2 -10 N  
A3 +20 N  
A4 -20 N  
A5 0.0 N  
Q0

Q21Q0 At time  $t$ , a 2.0-kg object has a position vector  
ch Q0  $r = (3.5 + 1.6 t) i - 2.7 j + 3.0 k$ , with  $r$  in meters  
9 Q0 and  $t$  in seconds. The LINEAR momentum of the object is  
Q0 (in kg.m/s):

\*\*\*Q0  
A1 3.2 i  
A2 7.0 i  
A3 -5.4 i  
A4 7.0 i + 3.2 j  
A5 0.0  
Q0

Q22Q0 By exerting a horizontal force of 200 N a man pushes a  
ch Q0 box of weight 3000 N over a horizontal distance of  
7 Q0 5 m along a level road. The WORK done by the man is:

\*\*\*Q0  
A1 1000 J  
A2 15000 J  
A3 1531 J  
A4 8000 J  
A5 7500 J  
Q0

Q23Q0 A certain wheel has a rotational inertia of  $12 \text{ kg}\cdot\text{m}^2$ . Under  
ch Q0 the application of a certain CONSTANT torque, it turns through  
11 Q0 5.0 revolutions and its an angular velocity increases from

\*\*\*Q0 5.0 rad/s to 6.0 rad/s. Find the value of the TORQUE.  
Q0

- A1 2.1 N.m
- A2 5.7 N.m
- A3 3.3 N.m
- A4 1.1 N.m
- A5 3.6 N.m

Q0

Q24Q0 Increasing the angular speed of a rotating body will not  
ch Q0 cause an increase in (Choose the CORRECT answer):  
11 Q0

- \*\*\*A1 the moment of inertia  
A2 angular momentum  
A3 linear speed  
A4 rotational kinetic energy  
A5 the frequency  
Q0

Q25Q0 A horizontal uniform beam of weight  $W = 200$  N and length  
ch Q0  $L = 6.0$  m is supported by a hinge and a cable as shown  
13 Q0 in Figure 8. The system is in equilibrium. find the  
Q0 TENSION in the cable.

- \*\*\*Q0  
A1 200 N  
A2 100 N  
A3 400 N  
A4 500 N  
A5 150 N  
Q0

Q26Q0 For two vectors  $A = 3i + 2j$  and  $B = i - 3j$ ,  
ch Q0 find  $(A \times B) / (A \cdot B)$ .  
3 Q0

- \*\*\*A1  $(+ 11/3)$  k  
A2  $(- 11/3)$  k  
A3  $(+ 7/9)$  k  
A4  $(- 7/9)$  k  
A5  $(+ 11/9)$  k  
Q0

Q27Q0 A 27.6-gram gold is in the form of a right circular  
ch Q0 cylinder of radius 2.50 micrometer and length L. Find  
1 Q0 L ( Take the density of gold to be  $19.32 \text{ g/cm}^3$  ).

- \*\*\*Q0  
A1  $7.3 \times 10^4$  m  
A2  $7.3 \times 10^8$  m  
A3  $1.2 \times 10^3$  m  
A4  $1.2 \times 10^5$  m  
A5  $6.4 \times 10^7$  m  
Q0

Q28Q0 A gunner can hit a target 200 m away if he aims his  
ch Q0 gun at 55 degrees above the horizontal. At what OTHER  
4 Q0 ANGLE can he aim his gun and still hit the target?

- \*\*\*Q0  
A1 35 degrees  
A2 15 degrees  
A3 45 degrees  
A4 75 degrees  
A5 60 degrees  
Q0

Q29Q0 Find the COEFFICIENT of kinetic friction for which  
ch Q0 a body of mass  $m = 2.0$  kg will slide down a 10 degree  
6 Q0 inclined plane with constant velocity.  
Q0

A1 0.18  
A2 0.32  
A3 0.23  
A4 0.00  
A5 0.50

Q0

Q30Q0 A stone is thrown vertically upward with a speed of  
ch Q0 8.0 m/s. Find its ACCELERATION just before it hits  
2 Q0 the ground.

\*\*\*Q0

A1 9.8 m/s\*\*2 (downward)

A2 9.8 m/s\*\*2 (upward)

A3 8.0 m/s\*\*2 (downward)

A4 8.0 m/s\*\*2 (upward)

A5 0.0 m/s\*\*2

Q0