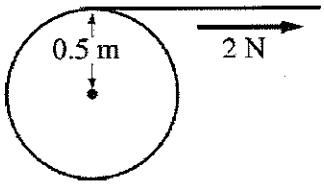
Name: _____ Class: _____ Date: _____ ID: A

Energy(Forces secondary) Practice Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

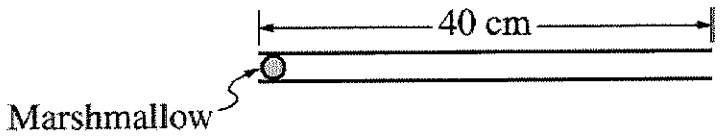
D 1. (#3-3)



A disk with the radius of 0.5m is free to rotate around is center without friction. A string wrapped around the disk is pulled, as shown above, exerting a 2N force tangent to the edge of the disk for 1 s. If the disk starts from rest, what is its angular speed after 1 second?

a. 0 rad/s
b. 1 rad/s
c. 4 rad/s
d. it can not be determined with out knowing the rotational inertia of the disk.

C 2.

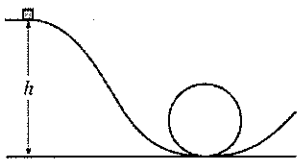


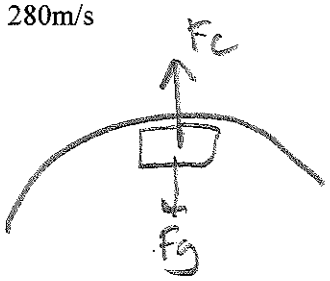
(#3-1) A 2.5g marshmallow is placed in one end of a 40cm pipe, as shown in the figure above. A person blows into the left end of the pipe to eject the marshmallow from the right end. The average net force exerted on the marshmallow while it is in the pipe is 0.7N. The speed of the marshmallow as it leaves the pipe is most nearly

a. 4.7m/s b. 11m/s c. 15m/s d. 280m/s

D 3.

Interesting Q
- must be greater than "g" or it would acc. down.





Note: Figure not drawn to scale.

(#2) A small block slides without friction along a track toward a circular loop. The block has more than enough speed to remain firmly in contact with the track as it goes around the loop. The magnitude of the block's acceleration at the top of the loop is

a. zero
b. greater than zero but less than g
c. equal to g
d. greater than g

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A 4. (#3-1) Anna knocks her folder with mass (m) off her desk height y. What is the speed of the folder upon hitting the floor.

a. $\sqrt{(2gy)}$
b. 2gy
c. my
d. mgy

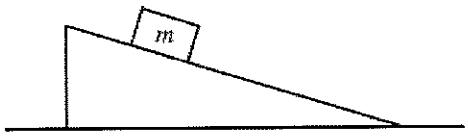
B 5. (#3-1) A 2kg block slides down a ramp with a height of 3m. As the block reaches the ground it has 50J of kinetic energy. The amount of work friction does on the block is approximately

a. 6J
b. 9J
c. 18J
d. 44J

D 6. (#3-1) A box is pushed 30m across a horizontal floor by a constant 25N force. The kinetic energy of the of the box increases to 300J. How much total internal energy is produced in the system?

a. 150J
b. 250J
c. 450J
d. 750J

D 7.



(#2) A block of mass m is at rest on a rough incline, as shown in the figure above. Which of the following forces must have a magnitude equal to mg?

(A) The total force exerted on the block by the incline
(B) The normal force exerted on the block by the incline
(C) The force of friction exerted on the block by the incline
(D) The gravitational force exerted on Earth by the block

a. B and C
b. C and D
c. A and C
d. A and D

B 8. (#2) Two satellites are in a circular orbit around Earth. Satellite A has a speed v_A, Satellite B has an orbital radius nine times that of satellite A. What is the speed of satellite B?

a. $v_A/9$
b. $v_A/3$
c. $3v_A$
d. $9v_A$

B 9. (#3-2) A 12kg box is sliding on a horizontal floor has an initial speed of 4.0m/s. The coefficient of friction between the box and the floor is 0.2. The box moves a distance of 4.0m in 2.0s. The magnitude of the change in momentum of the box during this time is most nearly?

a. 12kgm/s
b. 48kgm/s
c. 60kgm/s
d. 96kgm/s

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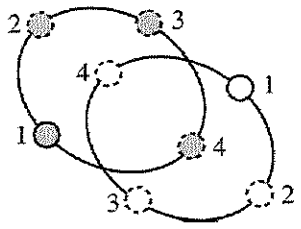
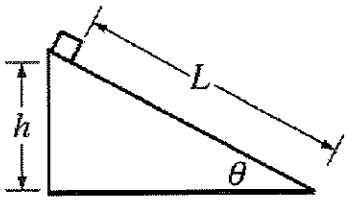
B 10.



(#2) Two stars are traveling around a common star. The paths are labeled as seen above. At which point are the planets at the greatest speed?

a. position 2
b. position 4
c. position 1 and 3
d. none, all points are of equal speed.

C 11. (#3-1)



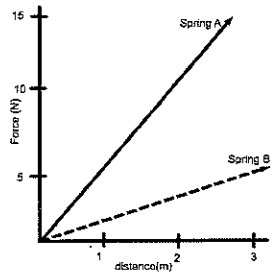
A box of mass m is initially at rest at the top of a ramp that is at an angle θ with the horizontal. The block is at a height h and length L from the bottom of the ramp. The block is released and slides down the ramp. The coefficient of kinetic friction between the block and the ramp is μ.

What is the kinetic energy of the box at the bottom of the ramp?

a. mgh
b. $\mu mgL\cos\theta$
c. $mgh - \mu mgL\cos\theta$
d. $mgL - \mu mgh\cos\theta$

C 12. (#3) A kid does 10 push ups, the first push consisted of a 40N force over the distance of 0.5m taking 2.5 seconds. The last pushup took the same 40N force but took over 5 seconds to complete. Which is correct relative to the amount of work done by the kid on the two pushups referenced.

a. Pushup 1 required less work due to the time is smaller
b. Push up 10 required more work due to the increased amount of time.
c. Both the push ups required the same amount of work.
d. Pushup 1 is more powerful then pushup 2.



A 13. (#2) Using the data above, what is the spring constant of spring B?

a. 1.6
b. 5
c. 3
d. 15

C 14. Two small objects of mass m0 and a rotating platform of radius R and rotational inertia Ip about its center compose a single system. Students use the system to conduct two experiments. The objects are assumed to be point masses.

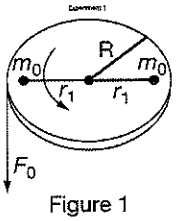


Figure 1

Each object of mass m0 is placed a distance r1 away from the center of the platform such that both masses are on opposite sides of the platform. A constant tangential force F_0 is applied to the edge of the platform for a time Δt_0, as shown in Figure 1. The system is initially at rest.

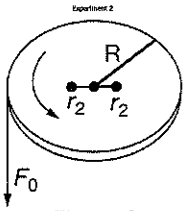
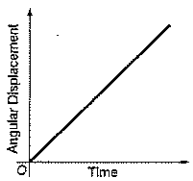
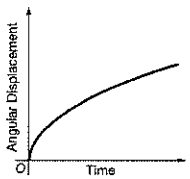


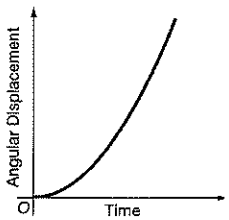
Figure 2

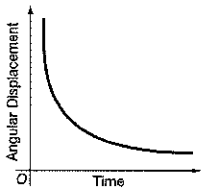
Each object of mass m_0 is placed a distance r_2 away from the center of the platform such that both masses are on opposite sides of the platform. Distance $r_2 < r_1$. A constant tangential force F_0 is applied to the edge of the platform for a time Δt_0 , as shown in Figure 2. The system is initially at rest.

Which of the following graphs represents the angular displacement of the system as a function of time for the system in experiment 1?

a. 

b. 

c. 

d. 

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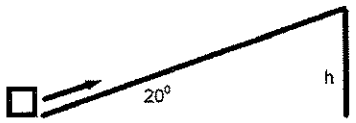
D 15.



(#4) A block is sliding up a hill with X energy. Which of the following formulas would calculate the correct height "h"?

a. $\frac{2v^2}{m} = h$

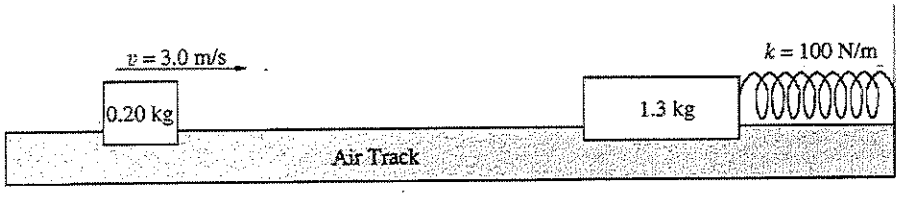
c. $\sqrt{mgh} = h$

b. $\sqrt{\frac{2v}{m}} = h$

d. $\frac{0.5v^2}{g} = h$

Short Answer

16.



As shown above, a 0.20-kilogram mass is sliding on a horizontal friction less air track with a speed of 3.0 meters per second when it instantaneously hits and sticks to a 1.3-kilogram mass initially at rest on the track. The 1.3-kilogram mass is connected to one end of a mass less spring, which has a spring constant of 100 newtons per meter. The other end of the spring is fixed.

(a) Determine the following for the 0.20-kilogram mass immediately before the impact.

Its linear momentum $m \cdot v = p$ $.2 \times 3 = .6$ kgm/s

Its kinetic energy $\frac{1}{2}mv^2 = KE$ $\frac{1}{2} \cdot .2 \cdot 3^2 = 0.9$ J

(b) Determine the following for the combined masses immediately after the impact

The linear momentum Cons. of Mom. $\rightarrow 0.6$

The kinetic energy $p = m \cdot v$ $.6 = 1.5v$ $v = .4$ m/s use $KE = \frac{1}{2}mv^2$ $= \frac{1}{2}(1.5)(.4)^2$ $= .12$ J

(c) Considering your last answer from letter b, how far will with spring compress?

$KE = U_s$ Need

$\frac{1}{2}mv^2 = \frac{1}{2}kx^2$

$.12 = \frac{1}{2}(100)x^2$

$x = 0.0489$ m