Physics I
Exam 3 Review

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Outline

1. Must knows!!
2. Multiple Choice
   - Chapter 7:Kinetic Energy and Work
   - Chapter 8: Potential Energy and Conservation of Energy
   - Chapter 9: Center of Mass and Linear Momentum
3. Problems
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   - Problem 2

Must Knows!!

$$KE = \frac{1}{2}mv^2$$
$$\Delta U = mgh$$
$$\Delta E_{th} = f_k d$$
$$U(x) = \frac{1}{2}kx^2$$

The difference between an elastic and inelastic collision

Multiple Choice

Chapter 7:Kinetic Energy and Work

Question 1

A man pulls a sled along a rough horizontal surface by applying a constant force $\vec{F}$ at an angle θ above the horizontal. In pulling the sled a horizontal distance d, the work done by the man is:

A Fd

B $Fd\cos\theta$

C $Fd\sin\theta$

D $\frac{Fd}{\cos\theta}$

E $\frac{Fd}{\sin\theta}$

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Answer: B

Question 2

Which of the following bodies has the largest kinetic energy?

A Mass $3M$ and speed V

B Mass $3M$ and speed $2V$

C Mass $2M$ and speed $3V$

D Mass$M$ and speed $4V$

E All four of the above have the same kinetic energy

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Answer: C

Question 3

The amount of work required to stop a moving object is equal to:

A the velocity of the object

B the kinetic energy of the object

C the mass of the object times its acceleration

D the mass of the object times its velocity

E the square of the velocity of the object

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D the mass of the object times its velocity

E the square of the velocity of the object

Answer: B

Chapter 8: Potential Energy and Conservation of Energy

Question 1

The sum of the kinetic and potential energies of a system of objects is conserved:

A only when no external force acts on the objects

B only when the objects move along closed paths

C only when the work done by the resultant external force is zero

D always

E none of the above

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D always

E none of the above

Answer: E

Question 2

A golf ball is struck by a golf club and falls on a green three meters above the tee. The potential energy of the Earth-ball system is greatest:

A just before the ball is struck

B just after the ball is struck

C just after the ball lands on the green

D when the ball comes to rest on the green

E when the ball reaches the highest point in its flight

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Answer: E

Question 3

A block slides across a rough horizontal table top. The work done by friction changes:

A only the kinetic energy

B only the potential energy

C only the internal energy

D only the kinetic and potential energies

E only the kinetic and internal energies

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E only the kinetic and internal energies

Answer: E

Chapter 9: Center of Mass and Linear Momentum

Question 1

A man sits in the back of a canoe in still water. He then moves to the front of the canoe and sits there. Afterwards the canoe:

A is forward of its original position and moving forward

B is forward of its original position and moving backward

C is rearward of its original position and moving forward

D is rearward of its original position and moving backward

E is rearward of its original position and not moving

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D is rearward of its original position and moving backward

E is rearward of its original position and not moving

Answer: E

Question 2

A projectile in flight explodes into several fragments. The total momentum of the fragments immediately after this explosion:

A is the same as the momentum of the projectile immediately before the explosion

B has been changed into kinetic energy of the fragments

C is less than the momentum of the projectile immediately before the explosion

D is more than the momentum of the projectile immediately before the explosion

E has been changed into radiant energy

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E has been changed into radiant energy

Answer: A

Question 3

The momentum of an object at a given instant is independent of its:

A inertia

B mass

C speed

D velocity

E acceleration

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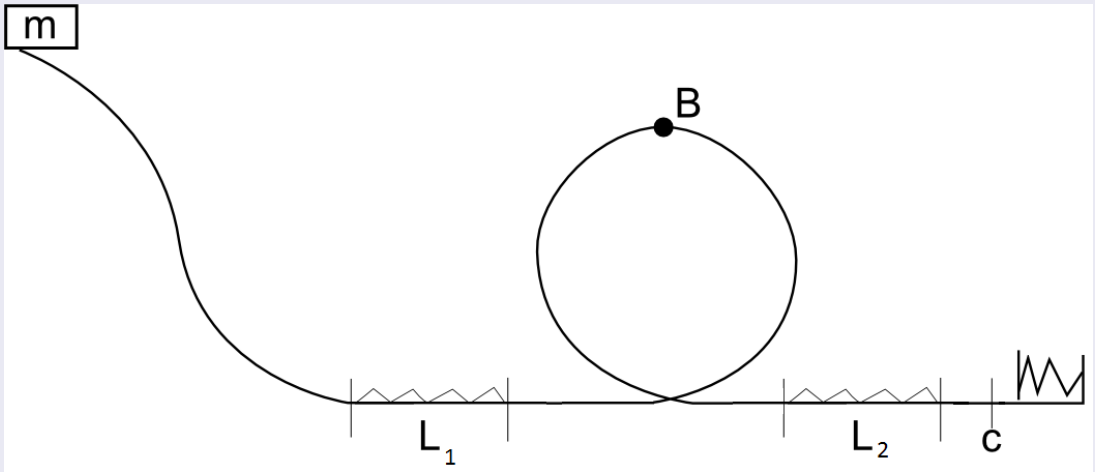
Answer: A

Problems

Problem 1

A block (m=1.0kg) when released will slide down a hill($h_1 = 10m$)and then across a frictinal patch($L_1 = 2.0m$), around a loop ($h_2 = 3.0m$),]across another frictional patch($L_2 = 1.0m$) and into a spring that is compressed($k = 4160\frac{N}{m}$). The coefficient of friction between the block and the frictional patches is $\mu_k = 0.50$. All other regions are considered frictionless.



a) Find the speed at point B

b) Find the speed at point C

c) how far the spring will compress

d) how much work is done by kinetic friction

Problem 2

A stationary block of mass m=1.0kg is struck by a bullet moving at 1000 $\frac{m}{s}$ which propells it up a hill of height h=2.0m and across a frictional patch($\mu_k = 0.5$)

a) How fast is the block moving just after the collision if the bullet goes through the block and emerges at 300 $\frac{m}{s}$

b) How long is the distance between L_1 and L_2

c) If the bullet embeds itself in the block how fast is the block moving just after the collision

d) What is the distance between L_1 and L_2 in part C
Bonus:How high does the hill need to be to just stop the block at the top in part A