3055 BA SANGAM COLLEGE

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Worksheet 10

School: Ba Sangam College **Year/Level**: 11

Subject: Physics

Strand	2-Energy
Sub-strand	2.5 Conservation of Energy
Content Learning Outcome	Objective: ➢ Understanding of its conservation interms of the energy transformations occurring in a given situation.

Law of Conservation of Energy

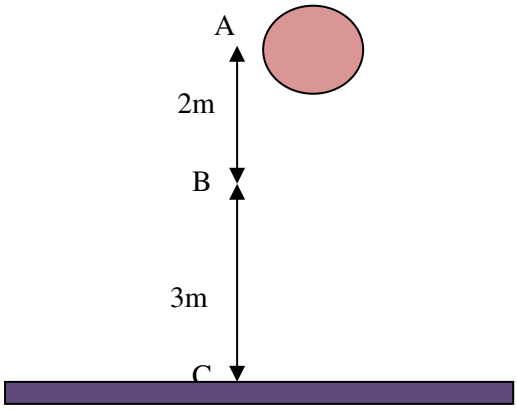
States that energy can neither be created nor destroyed, it only changes from one form to another, that is, the total energy in an isolated system is always conserved.

In a mechanical system, total energy is given by :

$$E_T = E_P + E_K$$

Example

A 200g ball is dropped from a height at shown below:



a) What is the Potential energy at point:

(i) A

Ep = mgh = 0.2 (10) (5) = 10J

(ii) B

Ep = mgh = 0.2 (10) (3) = 6J

(iii) C

Ep = mgh = 0.2 (10) (0) = 0J

b) What is the Total Energy at point:

(i) A

E_k = ½ mv^2= ½ (0.2) $(0)^2$= 0J

Ep = 10J

$E_T = E_P + E_K = 10 + 0 = 10J$

(Note: The ball was at rest before it was released, therefore initial velocity at A = 0J)

(ii) B

E_T = 10J

Total Energy is always conserved (remains same, only E_P and E_k changes ie, if Ep decreases, Ek increases and vice versa)

(iii) C

E_T = 10J

b) What is the kinetic energy at point B?

$E_T = E_P + E_K$ **Or Ep loss = mgh_{loss}**

10 = 6 + E_K **= 0.2(10)(2)**

E_K = 4J **= 4J**

Ep loss = Ek gain

=4J

Note: The ball loses height, means loses Ep but gains Ek since the ball is undergoing free fall with a constant accelelation of 10 m/s^2. Since the total energy is always conserved, Eploss = Ek gain

c) Calculate the velocity at point B?

Ek = **½ mv^2**

4 = ½ (0.2) v^2

V^2 = 40

V = 6.32 m/s

d) What is the kinetic energy at which the ball hits the floor at C?

E_T = Ek + Ep

10J = Ek + 0

Ek = 10J

e) What is the velocity at point C?

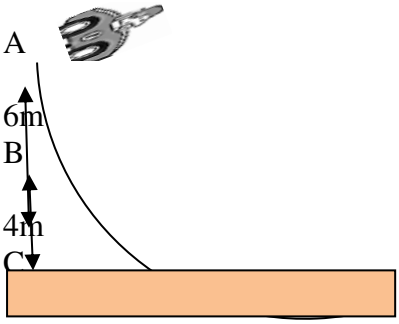
Ek = ½ mv^2

10 = ½ (0.2) v^2

V^2 = 100 V = 10 m/s

ACTIVITY **(20 marks)**

1. Consider a situation in which a toy car of mass 800g rolls down a slope as shown below.



a) What is the total energy at point :

(i) A

(1 mark)

(ii) B

(½mark)

(iii) C

(½ mark)

b) What is the kinetic energy at point B?

(1 mark)

c) Calculate the velocity at point B?

(2 marks)

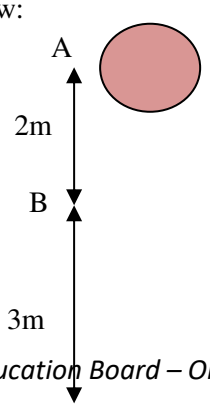
d) What is the kinetic energy at point C?

(1 mark)

e) What is the velocity at point C?

(2 marks)

2. A 200g ball is dropped from a height at shown below:



a) What is the total energy of the ball?

(2 marks)

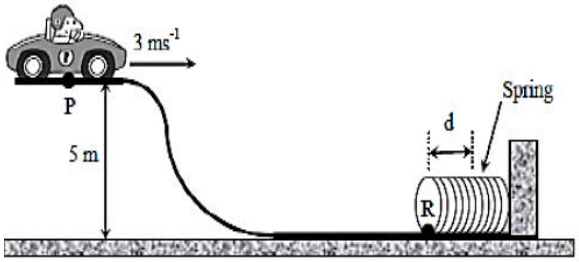
b) What is the Kinetic Energy at B?

(1 mark)

c) What is the speed at C?

(2 marks)

3. The diagram given below shows a 0.8kg being at a height of 5m where its velocity is m/s. A spring 100N/m is used to slow the toy car and to stop it at distance, d, from point R. Assume the track is frictionless.



(i) potential energy at P

(2 marks)

(ii) kinetic energy at P

(2 marks)

(iii) total energy at R

(1 mark)

(iv) distance, d, the spring is compressed

(2 marks)

THE END