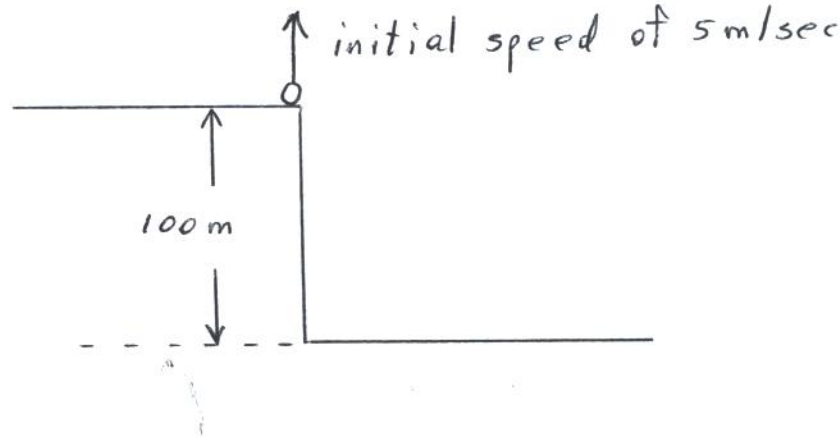
Quiz 5

Name: _____ Student Number: _____

1. A 0.5 kg ball is shot vertically up with an initial upward speed of 5 m/sec from the edge of a cliff as shown below.



a) (2 marks) What is the initial kinetic energy?

$$K.E. = \frac{1}{2}mv^2$$

$$= \frac{1}{2}\, 0.5\ kg\ (5\ m/sec)^2$$

$$= \frac{25}{4}\ J$$

b) (2 marks) What is the initial potential energy?

$$P.E. = mgh$$

$$= 0.5\ kg \times 10\ \frac{m}{sec^2} \times 100\ m$$

$$= 500\ J$$

c) (3 marks) What is the maximum height reached by the ball?

At max. height H, all energy is P.E.

$\therefore E_{TOT} = mgH$

$\frac{1}{2}mv^2 + mgh = mgH$

$\frac{25}{4} + 500 = 0.5\,kg \times 10\,\frac{m}{sec^2} \times H$

$\frac{2025}{4} = 5H$

$H = \frac{405}{4}$ meters

d) (3 marks) What is the speed with which the ball hits the Earth assuming it just misses the side of the cliff on its way down?

All energy is K.E. when it hits ground with speed v_f.

$\frac{1}{2}mv_f^2 = E_{TOT}$

$\frac{1}{2}0.5\,v_f^2 = \frac{2025}{4}$

$v_f = \sqrt{2025}$

$= 45$ m/sec

Total = 10 marks