# Physics Quiz - 2

**Answer the questions below then click Mark Now to see solutions.**

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**QUESTION 1**

(a) (i) Define the term escape velocity as applied in gravitation

(ii) Shown that for a planet of radius R and gravitational of free fall "g" the escape velocity.

$$Ve = \sqrt{2gR}$$

(iii) For the above planet is 5 a (ii) the satellite at height h from the surface, show that orbital velocity Vo is given by.

$$Vo = \sqrt{\frac{gR^2}{R+h}}$$

(b) (i) Briefly explain the gravitational potential at the point

(ii) State Kepler's law of planetary motion

(iii) A space probe is fired from the Earth towards the sun. How far away from the Earth will the sun's gravitational pull on the probe will balance to that of the Earth.

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**QUESTION 2**

(a) (i) State Hooke's law as applied in elasticity

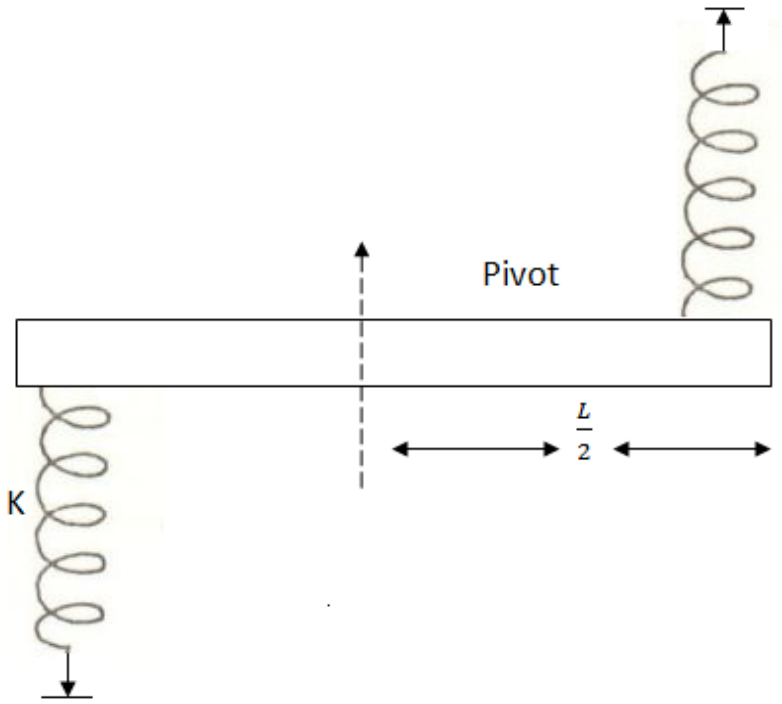
(ii) Define Young's modulus

(iii) Draw a graph of stress against strain of a ductile material and show the following points.

(b) (i) A uniform steel wire of length 4m and area of cross section is extended by 1mm. Calculate the energy stored in the wire if elastic limits is not exceeded

(ii) A rubber cord of catapult has a crossectional area of $2mm^2$ and initial length of 0.20m is stretched to 0.24m to fire a small object of 10g mass. Calculate the initial velocity of the object.

(c) A uniform stock as shown in the figure below 1.1 has mass m and length L and provide at its centre.




**QUESTION 3**

(a) (i) Define the angle of banking

(ii) The particle makes 100 oscillations per minutes its maximum velocity is 4. 5m/s. Find the length of the path describe by the particle and the maximum acceleration.

(b) A body oscillates vertically in simple harmonic motion with amplitude of 30mm and a frequency of 5.0 HZ. Calculate the acceleration of the particle.

(i) At the extremities of the motion

(ii) At the equilibrium position of the motion

(iii) At the position midway between the centre and extremity

(c) Explain what is responsible for the continual interchange of P.E in a mechanical oscillation. At what points in SHM in the acceleration greatest? Where is it least?

**QUESTION 4**

(a) (i) Define any four types of thermodynamic processes you know

(ii) Give three differences between two of the thermodynamic processes which take place slowly and the other one rapidly.

(b) (i) List down any four assumption of kinetic theory of gases

(ii) A helium gas occupies a volume of $0.04m^3$ at a pressure of $2 \times 10^5$ Pa and temperature 300K. Calculate; the mass of helium; the rms speed of its molecules, and the rms speed at 432K when the gas is heated at constant pressure to this temperature.

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**QUESTION 5**

(a) What vibrate in the following type of wave motion?

(i) Sound waves

(ii) X – rays

(iii) Water waves

(iv) Light waves

(b) A plane progressive a wave on a water surface is given by the equation $Y = 14 \sin 2\pi$ (17
where x and y are displacement in cm and its time in seconds. Determine.

i. The length of the wave motion

ii. The maximum speed of vibration of wave

iii. The phase difference in degree between two points of the train that are 50cm apart.

(c) (i) State the relationship between longitudinal and transverse waves

(ii) A progressive wave train in a medium along the x – direction is represented by the equation.

$$Y = 45 \sin\left(100\pi t - \frac{10^4\,\pi x}{65}\right)$$

Where x and y are displacement in cm t is time in second compute the speed of the wave motion.

(iii) A bat emits ultrasonic second of frequency 100 KHz in air. If this sound meets a water surface what is the wavelength of the reflected and transmitted sound?