A. Key Concepts

1. Explain the term 'Simple Harmonic Motion'
2. How would you prove if an object motion was simple harmonic?
3. From earlier in the course, what equation is used to equate angular velocity, frequency & period?
4. Write down the expression for simple harmonic motion.
5. Write down the equation to find the velocity of an object exhibiting SHM.
6. When would the object be at its maximum velocity? Write an equation to show this.
7. Write down an equation for the kinetic energy of an object exhibiting SHM.
8. When would the object has maximum kinetic energy? Write an equation to show this.
9. Write down the equation for the potential energy of an object exhibiting SHM.
10. Explain the term 'damping', include the terms 'critical damping' and 'over damping'.

B. Past Paper Practice

1. A mass of 0.4kg is suspended from a spring as shown in Figure 2. The mass is then displaced vertically and released. Its subsequent motion is recorded using a motion sensor linked to a computer. The mass moves with simple harmonic motion. The displacement-time graph of the mass is shown in Figure 3.

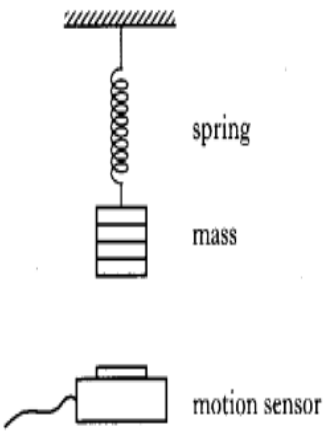

Figure 2

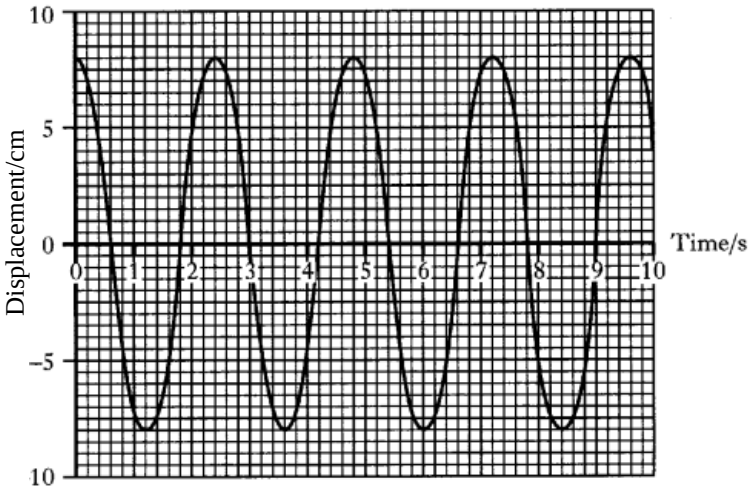

Figure 3

a) Using values from the graph (Figure 3), obtain an expression, in the form $y = A\cos\omega t$ for the vertical displacement *y* of the mass. **3**

b)

i. Using the solution part a), derive an expression which gives the relationship between acceleration *a* of the mass and time *t*. **2**

ii. Calculate the maximum kinetic energy of the mass. **3**

c) The mass is now changed and dropped again.
Between points X and Y the object moves with constant sped.
Explain **fully** why the motion of the object cannot be described as simple harmonic. **2**