



QUESTION ONE

- (a) Rearrange the formula $d = \frac{4mlv^2}{2kh-v^2}$ to give an expression for v in terms of d , m , l , k , and h . (6 marks)

- (b) The acceleration, a , of an object in vibration is given by:

$$a = g - k^2 w^2$$

Where g is acceleration due to gravity, w is angular frequency and k is a constant. Express ' a ' in a factorised form, stating the factorising technique you are using. (5 marks)

- (c) By applying Kirchoff's law in a circuit we obtain the two simultaneous equations:

$$25(I_1 - I_2) + 56I_1 = 2.225$$

$$17I_2 - 3(I_1 - I_2) = 1.31$$

Where I_1 and I_2 represent currents.

Firstly, simplify both equations and hence solve the resulting linear equations simultaneously to find I_1 and I_2 . (8 marks)

- (d) The bending moment M of a beam is given by:

$$M = 0.3x^2 + 0.35x - 2.6$$

where x is the distance, in metres, along a beam from one end. By using the quadratic equation formulae, find the value of x for which $M = 0$, giving your answer to one significant figure. (6 marks)