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1Bb Physics for Scientists and Engineers: Oscillations, Waves, Electricity and Magnetism

Midterm #1. Monday 24th April.

Instructor: Steve Cowley

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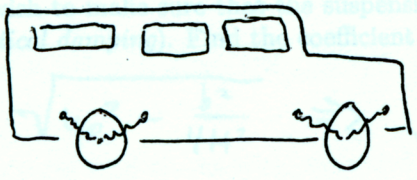
Question 1.	18
Question 2.	19
Total.	37

Open book, open notes – no talking. Please write your answers in the space provided below. Partial credit is given for answers that are on the right track so show your working. You may use rough paper but please put the working on these sheets. Answers need not be more accurate than two significant figures. If you don't have much time you will get almost all of the credit for writing down the right expression (with the right numbers inserted) and leaving the arithmetic undone.

No calculators or cell phones are to be used in the exam.

Question 1. Hummer. *20 points*

Arnold has asked you to adjust the suspension on his Hummer. The mass of the Hummer is about $3800kg$ the springs have a spring constant of $15200N/m$. You can take $g = 10m/s^2$ and $\pi = 3.14$



(a) Calculate the period of oscillations of the Hummer assuming no damping. *4 points*

$T = \frac{2\pi}{\omega_0}$ $\omega_0 = \sqrt{\frac{k}{m}} = \sqrt{\frac{15200}{3800}} = \sqrt{4} = 2$

$\Rightarrow \frac{2(3.14)}{2} =$ 3.14 seconds

4

(b) Suppose that at $t = 0$ the Hummer is $0.2m$ above its equilibrium position and at rest. Write down a formula