

NEATH PORT TALBOT COLLEGE COLEG CASTELL NEDD PORT TALBOT

School of Maths & Science Science Practical

Resonance of a Loaded Hacksaw Blade

◆ Aim

In this experiment you are going to measure the period of a loaded hacksaw blade and consider how it could be made to resonate.

◆ Safety

Control Measures



- You are reminded of the need of good laboratory practice in order to maintain a safe working environment.
- **Goggles must be worn at all times.**

Hazards



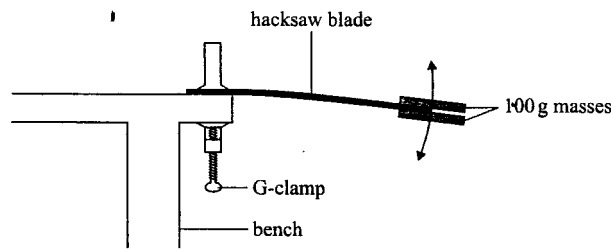
General Danger

Make sure that the hacksaw blade is securely fastened to the bench using a G – clamp.

Take care with the serrated edge of the blade is pointing away from your work area to minimise the risk of cutting yourself.

◆ **Apparatus Required**

Loaded hacksaw blade, G-clamp, stopwatch, spring, retort stand and clamp.



◆ **Procedure**

1. Set up the apparatus shown above.
2. Take readings which will allow you to measure the period of the hacksaw blade when it is set into vertical oscillation by slightly displacing the blade and releasing it.
3. Tabulate your readings and calculate f_b , the frequency of the oscillating blade.

T_1 / s	T_2 / s	T_{av} / s	T_{av} / s (one oscillation)	f_b

4. Estimate the maximum percentage uncertainty in your value for f_b .

5. You are provided with a spring suspended from a retort stand. The spring has a spring constant, k , equal to the force per unit extension. Measure and record the extension of the spring when a $(200 \pm 10)g$ mass is hung on the spring.

6. Hence calculate k for the spring in $N m^{-1}$.

7. Estimate the maximum percentage uncertainty in your value for k . Show all your working and explain the reasoning behind your estimate.

8. The frequency f_s of the oscillations of the loaded spring is given by the equation:

$$f_s = \frac{1}{2\pi} \sqrt{k/m}$$

9. Calculate the mass that should be suspended from the spring in order for f_s to be equal to f_b .

10. Without performing an experiment, describe what you believe would happen if the spring, loaded with this mass, were to be hung from the hacksaw blade (as shown below) and set in oscillation.

