

## TAP 307- 3: Book on a string

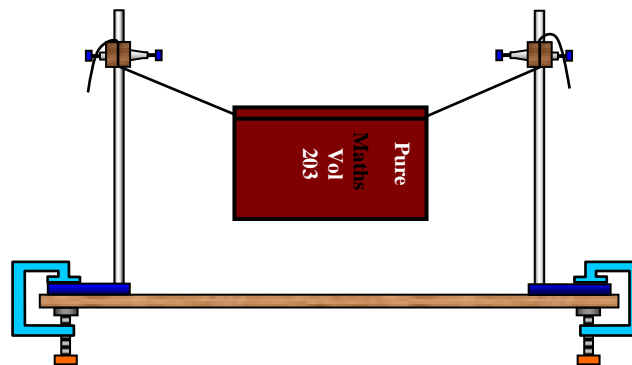
### Swing!

High-amplitude oscillations will build up when the driving frequency applied to an oscillator matches the natural frequency of the oscillator. This is a very quick and simple demonstration that shows just that.

### You will need

- ✓ heavy old textbook
- ✓ G clamps, 10 cm jaw
- ✓ retort stand, boss and clamp x2
- ✓ 1 m lengths of strong string
- ✓ drinking straw

### Blow by blow



The book can be made to swing quite dramatically by giving it short blows of air at the correct point of its motion. This is rather like pushing a child on a swing. Get the timing right and the book will move through a considerable angle.

What happens if you blow every second swing?

What happens if a friend blows from the other side in time with the swing?

### You have seen

1. That the book will swing through large angles (will have a large amplitude) when the driving frequency matches its natural frequency.

### **Practical advice**

This is a very simple but highly effective demonstration. It can be used for open days on a large scale, with strings hanging from the ceiling. It can be used as a vehicle for a qualitative discussion of damping and that steady amplitude is reached when:

energy in per cycle = energy out per cycle.

### **Social and human context**

Another use for outdated textbooks!

### **External reference**

This activity is taken from Advancing Physics chapter 10, 320E