

GCSE Physics required practical activity 20: Waves

Student sheet

Required practical activity	Apparatus and techniques
Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements.	AT 4

The activity is split into two parts:

- observing water waves in a ripple tank
- observing waves on a stretched string or elastic cord.

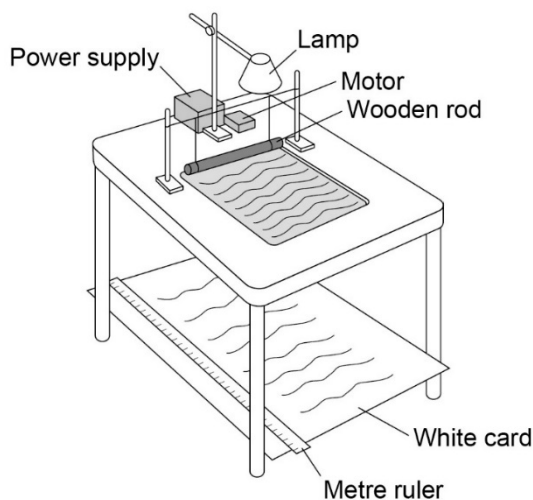
Activity 1 - Ripple tank

Apparatus:

- ripple tank plus accessories
- suitable low voltage power supply
- metre ruler.

Instructions

1. Set up the ripple tank. A large sheet of white card needs to be on the floor under the tank. Pour water to a depth of about 5mm into the tank.



2. Adjust the height of the wooden rod so that it just touches the surface of the water.
3. Switch on both the overhead lamp **and** the electric motor.
4. Adjust the speed of the motor. Low frequency water waves need to be produced.
5. Adjust the height of the lamp. The pattern needs to be clearly seen on the card on the floor.
6. Place a metre ruler at right angles to the waves shown in the pattern on the card. Measure across as many waves as possible. Then divide that length by the number of waves. This gives the **wavelength** of the waves.
7. Count the number of waves passing a point in the pattern over a given time (say 10 seconds). Then divide the number of waves counted by 10. This gives the **frequency** of the waves.
8. Calculate the speed of the waves using the equation:
$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

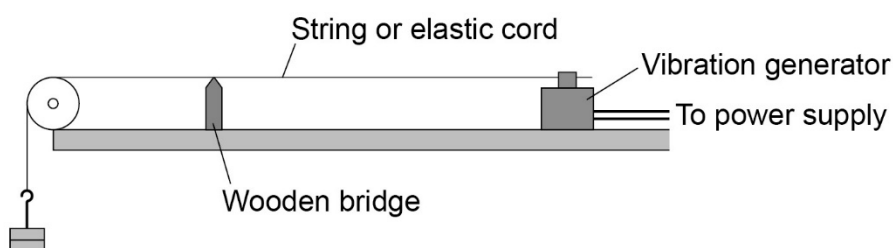
Activity 2: Observing waves on a stretched string or elastic cord

Apparatus

- vibration generator
- suitable power supply (variable frequency)
- suitable string or elasticated cord
- set of 100 g masses and hanger
- set of 10 g masses and hanger
- wooden bridge
- pulley on a clamp.

Instructions

1. Set up the apparatus as shown.



2. Switch on the vibration generator. The string (or elasticated cord) should start to vibrate.
3. A clear wave pattern needs to be seen. To do this, adjust the tension in the string or move the wooden bridge to adjust the length of the string. The waves should look like they are stationary.
4. Use a metre ruler to measure across as many half wavelengths as possible (a half wavelength is one loop). Then divide the total length by the number of half waves. Multiplying this number by two will give the **wavelength**.
5. The **frequency** is the frequency of the power supply.
6. Calculate the speed of the wave using the equation:
wave speed = frequency \times wavelength