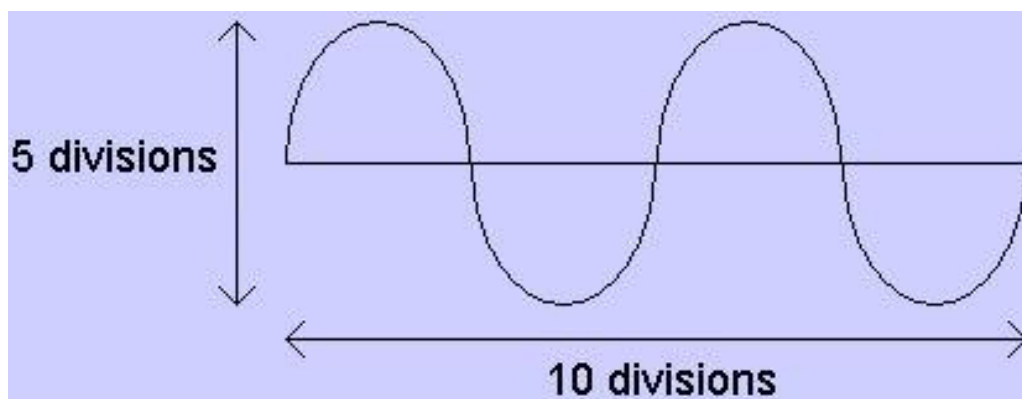


# Higher AC Circuits Questions

1.



The **wave profile** above was observed on an **oscilloscope**.

The following settings were used:

- **Y- Gain setting =  $0.5V \text{ div}^{-1}$**
- **Time - Base setting =  $10ms \text{ div}^{-1}$**

Calculate or find:

- a)  **$V_p$** , the peak voltage.
- b)  **$V_{rms}$** , the root mean square voltage.
- c) **Frequency** of the wave.

The **Time – Base** setting was then **reduced to  $5ms \text{ div}^{-1}$** .

- d) **Comment on** how the **wave profile** would look now in terms of **amplitude and frequency**.

2. a) How is the **root mean square** value of **voltage** or **current** defined?

- b) A **12V ac power supply** is connected to a ray box to be used in a reflection experiment.

**Find the equivalent dc voltage** supplied to the ray box.

3. a) State the value of the **UK mains voltage** supply.

- b) Find the **peak value** of the UK mains voltage supply.

- c) The root mean square voltage is loosely referred to as the '**average ac voltage**'

**Explain why this is technically incorrect.**

4. State which instruments are used to measure the following types of voltage:

- a) Peak Voltage.
- b) Root mean square voltage.
- c) DC voltage.

5. a) A 100W lamp has a resistance of  $4\Omega$ .

Calculate the peak current passing through the lamp during normal operation.

b) A lamp is connected to an ac supply with the following readings being taken:

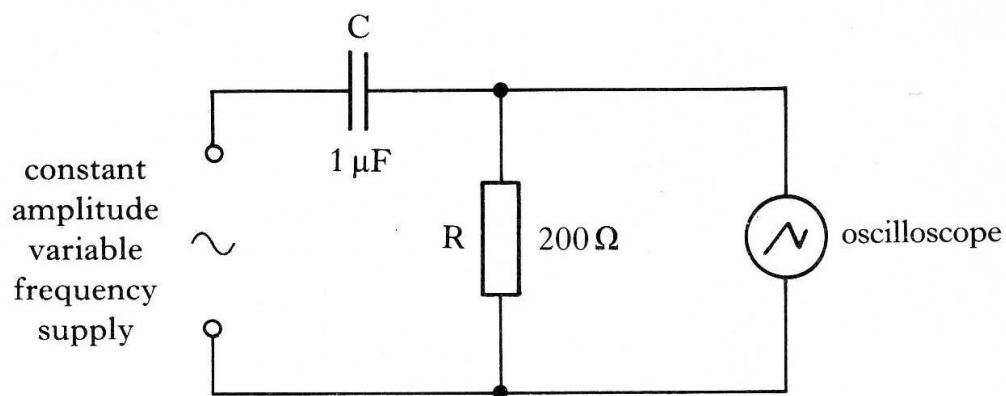
Peak Voltage = 11.3V

Peak Current = 7.07A

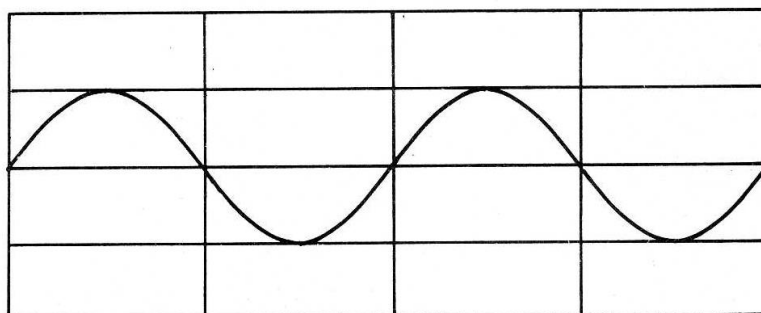
Calculate the Power of the lamp.

6.

A student sets up the circuit shown below.



When the frequency of the supply is set at 1 kHz, the trace on the oscilloscope is as shown below.

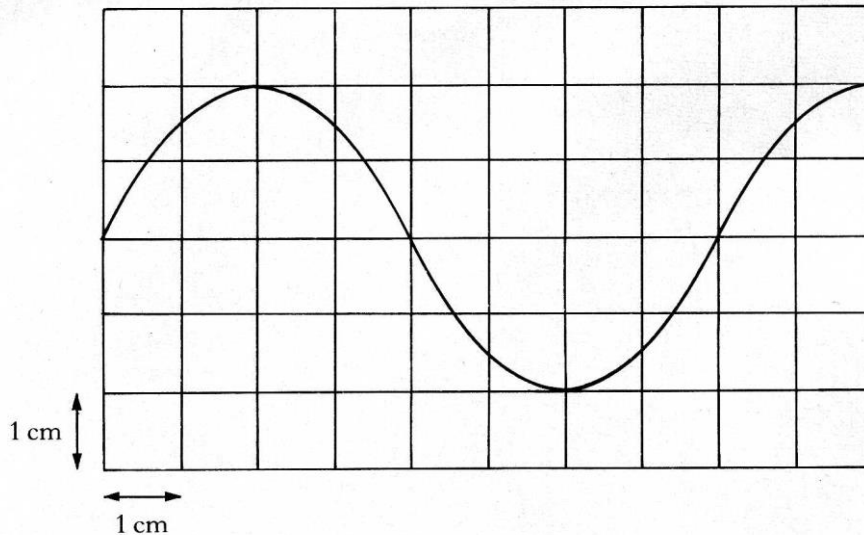


The frequency is now increased to 2 kHz while the oscilloscope controls are left unaltered.

Make a sketch, with grid lines as shown, of the trace you would now expect to see on the oscilloscope.

7.

An oscilloscope is connected across a resistor in a circuit. The trace obtained is shown below.



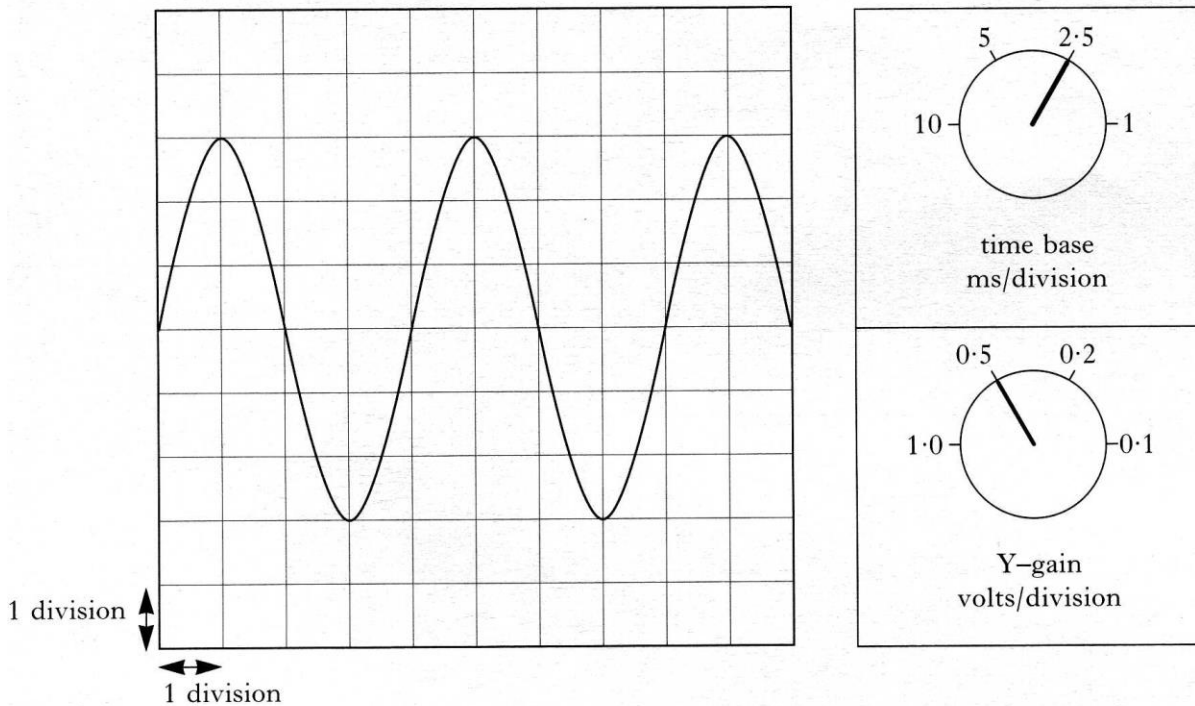
The peak voltage shown on the oscilloscope is 10 volts and the time base setting is  $0.2 \text{ ms cm}^{-1}$ .

Calculate

- the r.m.s. voltage across the resistor
- the frequency of the a.c. voltage.

8.

The output from a signal generator is connected to the input terminals of an oscilloscope. A trace is obtained on the oscilloscope screen. The oscilloscope control settings and the trace on the oscilloscope screen are shown in the diagram below.

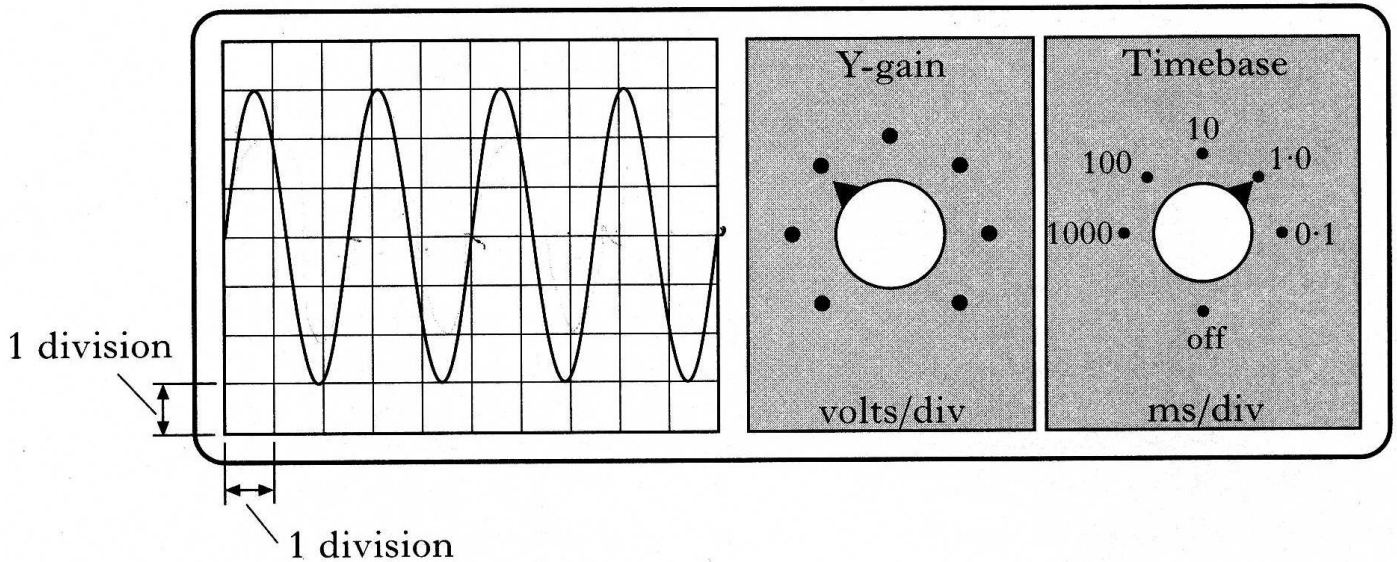


- Calculate the frequency of the output from the signal generator.
- The frequency and amplitude of the output from the signal generator are kept constant. The time base control setting is changed to  $5 \text{ ms/division}$ . What will be the effect on the trace shown on the oscilloscope?

9.

(a) A signal generator is connected to an oscilloscope. The output of the signal generator is set to a peak voltage of 15 V.

The following diagram shows the trace obtained, the Y-gain and the timebase controls on the oscilloscope. The scale for the Y-gain has been omitted.

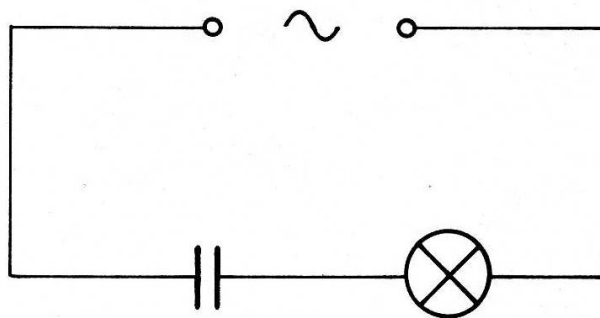


Calculate:

- (i) the Y-gain setting of the oscilloscope;
- (ii) the frequency of the signal in hertz.

10.

The circuit below shows a capacitor connected to a lamp and a signal generator.



When the frequency of the signal generator is set at 100 Hz, the lamp glows.

The frequency of the signal generator is now altered while the amplitude is kept constant. The lamp glows more brightly.

Explain this effect.