Properties of waves

All EM waves travel at 300 000 000 m/s. BBC Radio 4 broadcasts at a frequency of 603 kHz. Calculate the wavelength of the radio wave. (4 marks, ★★★★)

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Watch out for prefixes and powers. Remember that 1 MHz means 1 megahertz. This means 1 million hertz or 1 000 000 Hz.

WORKIT!

a Calculate the period of a radio wave that has a speed of 3 000 000 m/s and frequency of 1 MHz. (2 marks, ★★★)

Step 1 You do not have to use the wave equation, but you will instead need the following equation provided on the physics equation sheet:

$$\text{frequency} = \frac{1}{\text{time period}} = \frac{1}{T} \quad (1)$$

Step 2 Rearrange and then substitute into the equation:

$$T = \frac{1}{f} = \frac{1}{1\,000\,000}$$

$$= 1 \times 10^{-6}\ \text{s} \quad (1)$$

You can leave the number in standard form as it is very small, otherwise it is 0.000001 s

b Calculate the wavelength of the radio wave. The wave speed is 3×10^8 m/s. (1 mark, ★★)

Use formula $v = f \times \lambda$ and rearrange:

$$\lambda = \frac{v}{f} = \frac{3 \times 10^8}{1 \times 10^6}$$

$$= \frac{300\,000\,000}{1\,000\,000}$$

$$= 300\ \text{m} \quad (1)$$

Don't forget to include the units in your final answer.