**24** A vehicle carries a microwave transmitter that emits microwaves of a constant frequency. A stationary observer has a microwave receiver.

The vehicle moves directly towards the observer at constant speed. The observer detects microwaves of frequency $F_o$.

The vehicle then accelerates, still moving towards the observer, travels at higher steady speed for a time and then decelerates until it stops.

What is the variation in the frequency of the microwaves that are detected by the observer?

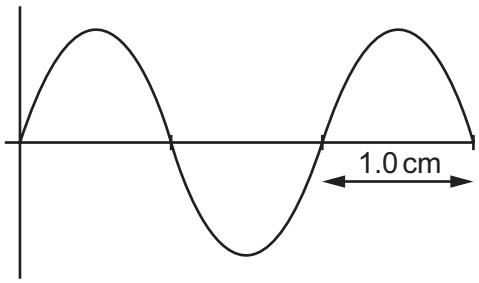
**A** The observed frequency will fall, then remain steady then return to the frequency $F_o$.

**B** The observed frequency will fall, then remain steady then rise to a higher frequency than $F_o$.

**C** The observed frequency will rise, then remain steady then fall to a lower frequency than $F_o$.

**D** The observed frequency will rise, then remain steady then return to the frequency $F_o$.

**25** The diagram shows a cathode-ray oscilloscope display of an electromagnetic wave.




The time base setting is $0.20\,\mu s\,cm^{-1}$.

Which statement is correct?

**A** The frequency of the wave is 2.5 MHz and it lies in the microwave region of the electromagnetic spectrum.

**B** The frequency of the wave is 2.5 MHz and it lies in the radio-wave region of the electromagnetic spectrum.

**C** The frequency of the wave is 5.0 MHz and it lies in the microwave region of the electromagnetic spectrum.

**D** The frequency of the wave is 5.0 MHz and it lies in the radio-wave region of the electromagnetic spectrum.

**26** In a double-slit interference experiment, light of frequency $6.0 \times 10^{14}$ Hz is incident on a pair of slits. Bright fringes that are 3.0 mm apart are observed on a screen some distance away.

What is the separation of the bright fringes when the frequency of the light is changed to $5.0 \times 10^{14}$ Hz?

**A** 1.8 mm **B** 2.5 mm **C** 3.0 mm **D** 3.6 mm