22 The warning signal on an ambulance has a frequency of 600 Hz. The speed of sound is 330 $m\,s^{-1}$. The ambulance is travelling with a constant velocity of 25 $m\,s^{-1}$ towards an observer. The ambulance passes, and then moves away from the observer with no change in velocity.

Which overall change in observed frequency takes place between the times at which the ambulance is a long way behind the observer and when it is a long way in front of the observer?

A 49 Hz **B** 84 Hz **C** 91 Hz **D** 98 Hz

23 Brief pulses of red, blue and green light are emitted from the Sun at the same time.

The pulses travel the same distance to reach Mars. Assume that the pulses travel in a vacuum for the full duration of their journey.

In which order would these pulses of light arrive at Mars?

A all arrive at the same time

B blue first, then green, then red

C red first, then blue, then green

D red first, then green, then blue

24 Two coherent progressive waves from different sources meet at a point.

Which condition **must** be satisfied for there to be zero resultant amplitude at the point where the waves meet?

A The two waves must be emitted from their sources with the same intensity.

B The two waves must be in phase with each other at the point.

C The two waves must be travelling in opposite directions.

D The two waves must have the same amplitude at the point.