2 A parallel sound beam is emitted from a source perpendicularly towards a wall 15 cm away.

(a) Explain why a stationary wave will be formed between the source and the wall. [2]

(b) The source can be considered to be a node. There are only two more nodes between the source and the wall.

Draw in the space below a diagram representing the stationary wave. Include the source and the wall in your diagram. [1]

(c) The speed of sound is 360 m s^{-1}. Calculate the frequency of the sound. [2]

(d) The location of the node nearest (but not at) the source is marked as 'X'. The source is then replaced with a point source that emits sound uniformly in all directions.

(i) When the sound wave travels directly from the point source to location X, it has an amplitude of 3.0×10^{-5} m. Calculate the amplitude of the wave after it has been reflected by the wall and travels back to location X. Assume that no energy is lost when the wave is reflected by the wall. [3]

(ii) Calculate the amplitude of the resultant sound wave at location X due to the interference of the wave that comes directly from the point source, and the wave that is reflected by the wall. Explain your reasoning. [2]