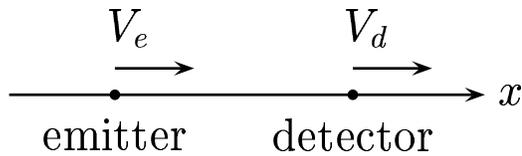


Consider the set up shown. Now the detector is accelerating, while the emitter is kept at a constant speed.



What will happen to the detected frequency?

- A) increases.
- B) stays the same.
- C) decreases.

The detector is moving away from the sound waves.

So $v_{detected} = v_s - v_d$.

The emitter is moving toward the detector.

So the detected wavelength is shortened, i.e.,

$$\lambda_{detected} = \lambda_0 - v_e T = \frac{v_s - v_e}{f_0}.$$

So the detected frequency

$$f' = \frac{v_{detected}}{\lambda_{detected}} = \frac{v_s - v_d}{v_s - v_e} f_0.$$

In turn, as the detector increases in its speed, f' decreases.

Answer **C**