**Year 9 Light and sound revision**

1. List the electromagnetic waves in order of increasing frequency:

Infrared microwave X-ray ultraviolet Gamma rays radio wave visible light

Radio wave microwave infrared visible light ultraviolet x-ray gamma ray

1. The number of cycles or vibrations per second is known as:

Frequency

1. The distance from one point on the wave to the same point on another wave is called:

Wavelength

1. Five sound waves hit the eardrum in one second. What is the frequency?

5 Hz

1. By increasing the loudness of the sound, what changes are made to the wave?

Increasing the amplitude of the wave.

1. How does SONAR work?

A submarine emits a sound wave which hits an object under water and is reflected back to the submarine. The time it takes to reach the submarine is used to find out the distance of the object from the submarine.

## What is the function of the Eustachian tube?

## Equalize pressure on both sides of the eardrum.

1. When light enters a convex lens, it does what?

It converges.

1. When light enters a concave lens, it does what?

It diverges.

1. Explain why an object in the water looks shallower (close to the surface).

Light reflected from the object refracts as it reaches the water air-boundary. This refraction changes the direction of the light and the eye interprets the objects as being shallow.

1. How are window glass and shower glass different?

Window glass transmit all visible light through it making it transparent. Shower glass allows some light to be transmitted through and some is reflected giving a blurry image.

1. What happens to a beam of light as it enters a prism?

The velocity of the light waves slows down as the waves interact with electrons of the atoms in the prism. The **red** wave is slowed down the **least**, but the **violet** wave is slowed down the **most**. Because the waves exit the prism in separate colours, it is said that the light is **dispersed**.

1. What features of a string in a guitar will give a low pitch/frequency?

Long string, thick string and not tightly wound.

1. What happens when a beam of light hits a black shirt and a blue shirt?

A black shirt absorbs all light waves and nothing is reflected, hence the colour of black- the lack of light.

In the case of the blue shirt, all light waves are absorbed except the blue spectrum of light, which is reflected back to our eyes and we see blue.

1. What is the difference between a transverse and a longitudinal wave?

In a longitudinal wave a particle vibrates in the same direction as the wave. In a transverse wave the particles vibrate perpendicular to the direction of the wave.

1. Why do shadows form?

Because light travels in a straight line and is absorbed by an object and is not transmitted through it.

1. What is the speed of light? 300 000 km per second
2. What happens to the iris when different light intensities go through it?

Intense light causes the iris to constrict limiting the amount of light entering the eye to protect the retina from damage. Low intense light causes the iris to relax and dilate allowing more light to go through for better vision.

1. What is the function of the following parts of the eye?

Cornea – bends light slightly as it enters the eye.

Iris – control the amount of light entering the eye.

Lens – converges light on the retina.

Ciliary body – control the shape of the lens, a process known as **accommodation**.

Vitreous humour – gives the eyeball its spherical shape and holds the retina in place.

Retina – holds photoreceptors that convert light energy into electrical energy.

Optic nerve – carries electrical message from retina to brain.

Sclera – protects the eyeball.

1. What is the function of the following parts of the ear?

Pinna – funnel sound into the ear canal.

Auditory canal – transmits sound waves to the eardrum.

Eardrum – vibrates and transmit sound waves to ossicles, thereby converting sound wave to mechanical waves.

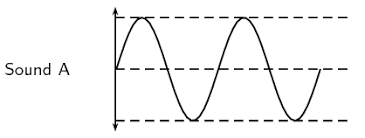
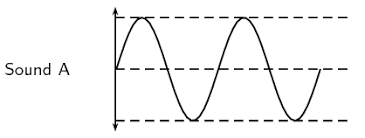
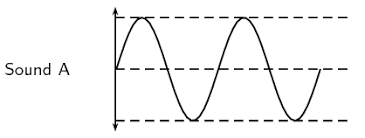
Ossicles – transmit signal to inner ear (the oval window) and magnify signal (due the large diameter of eardrum and the small diameter of the stirrup).

Cochlea – hairs inside the cochlea convert mechanical waves to electrical waves.

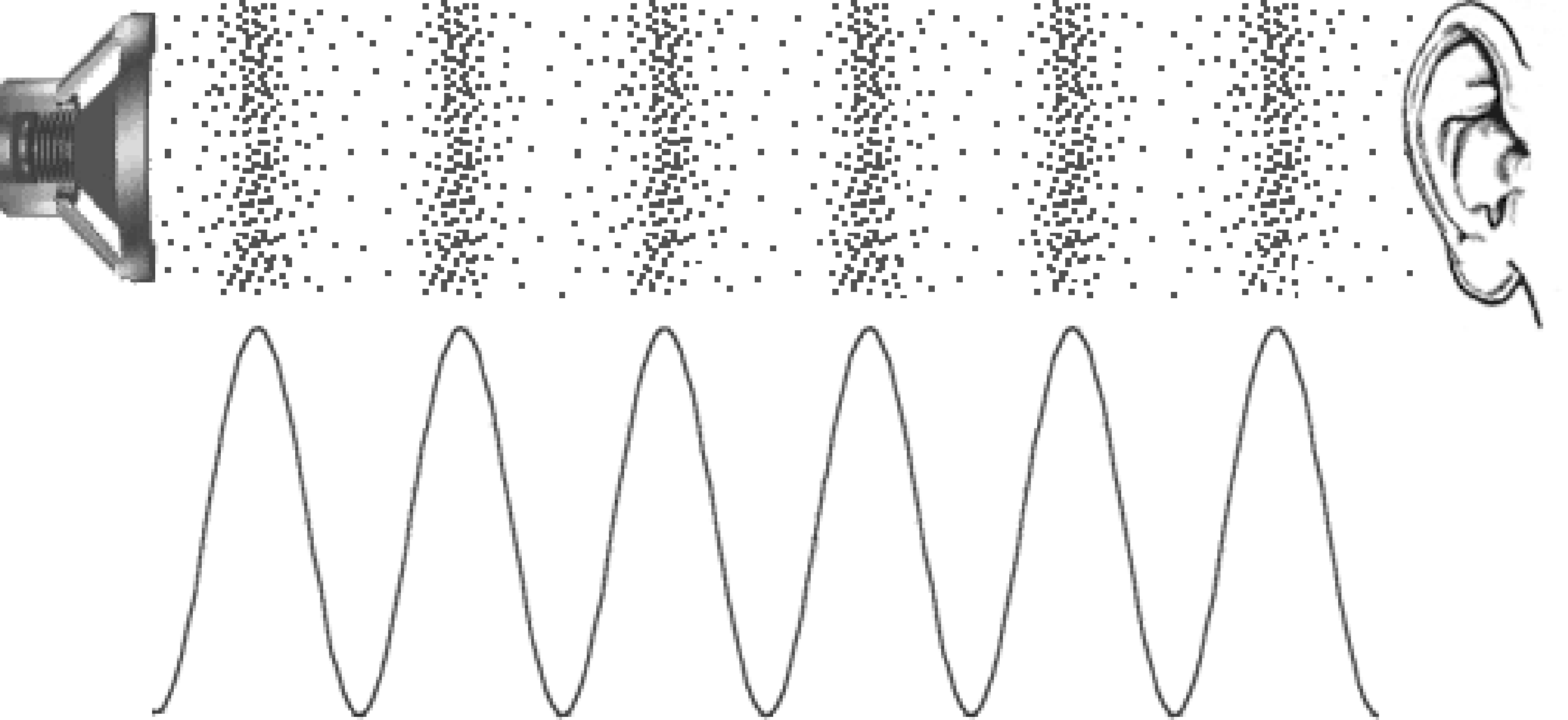
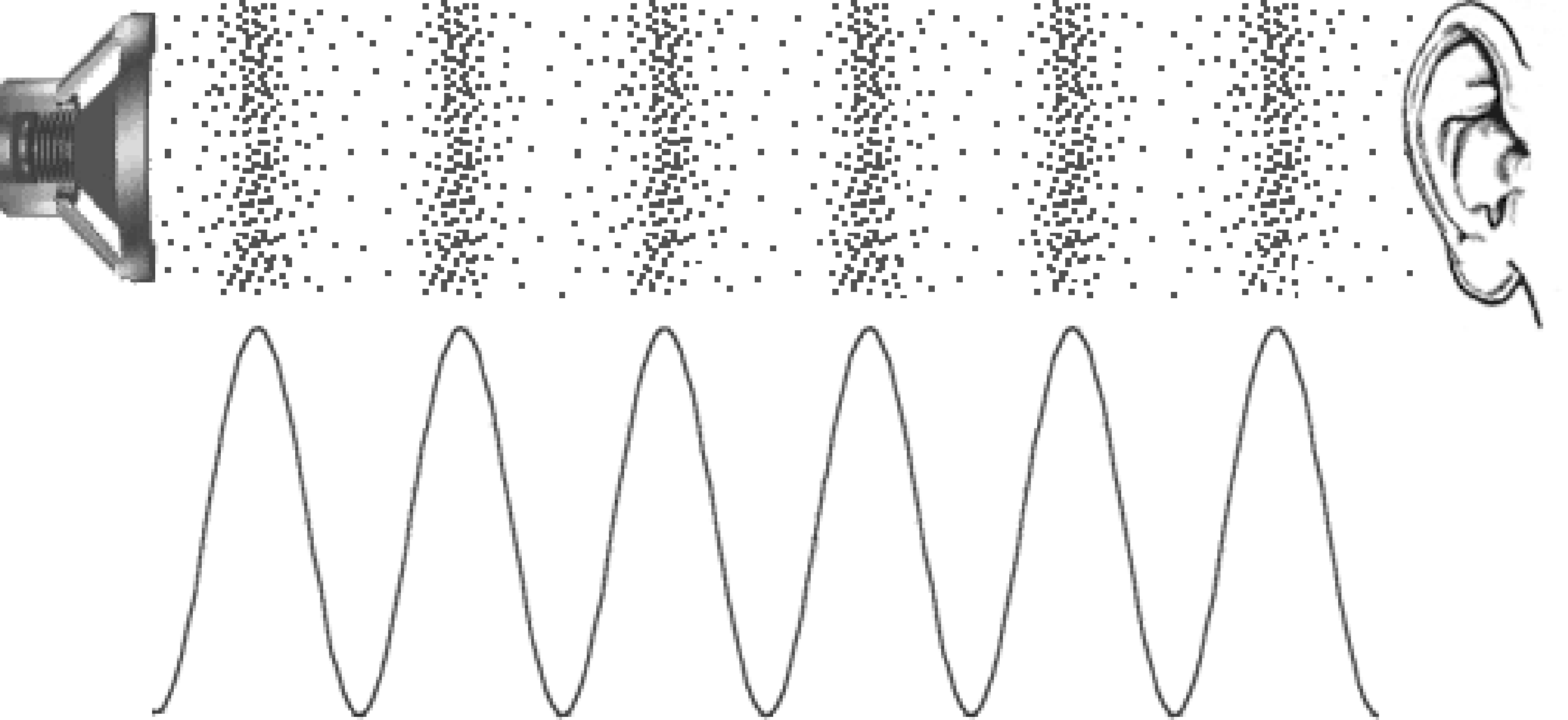
Semi-circular canals – balance and awareness of position in space.

Auditory nerve – carries electrical signal from cochlea to brain.

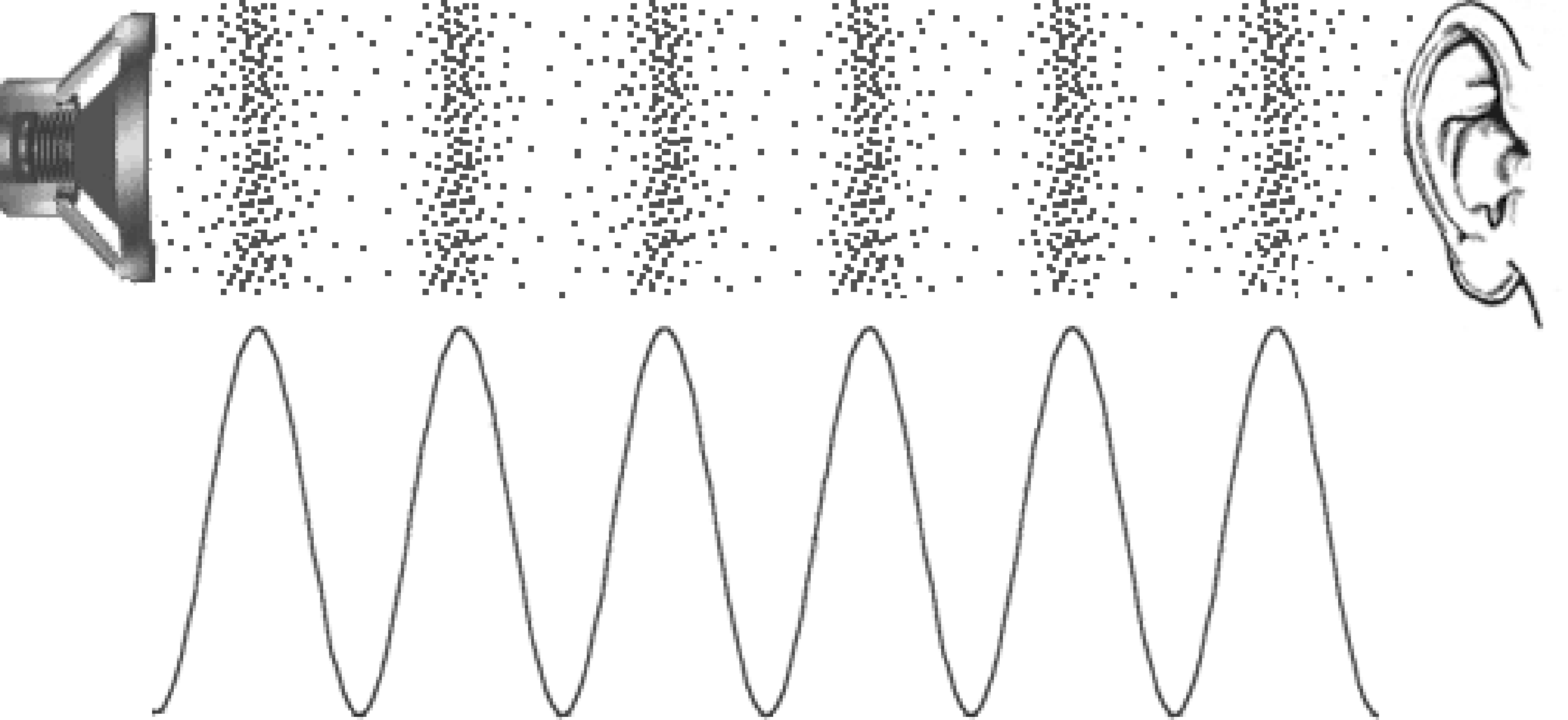
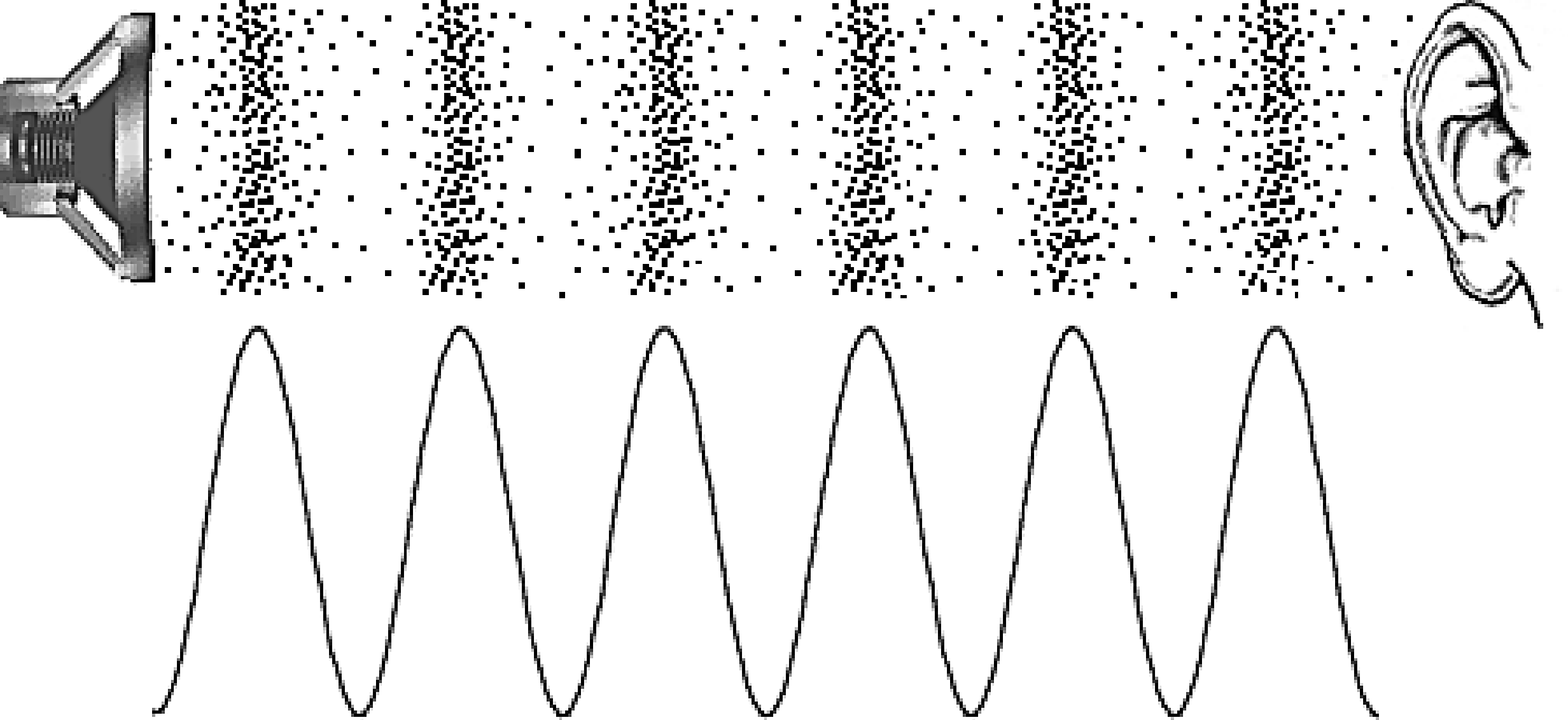
1. If this is a sound wave with an amplitude and frequency as shown, redraw the wave according to changes indicated below.



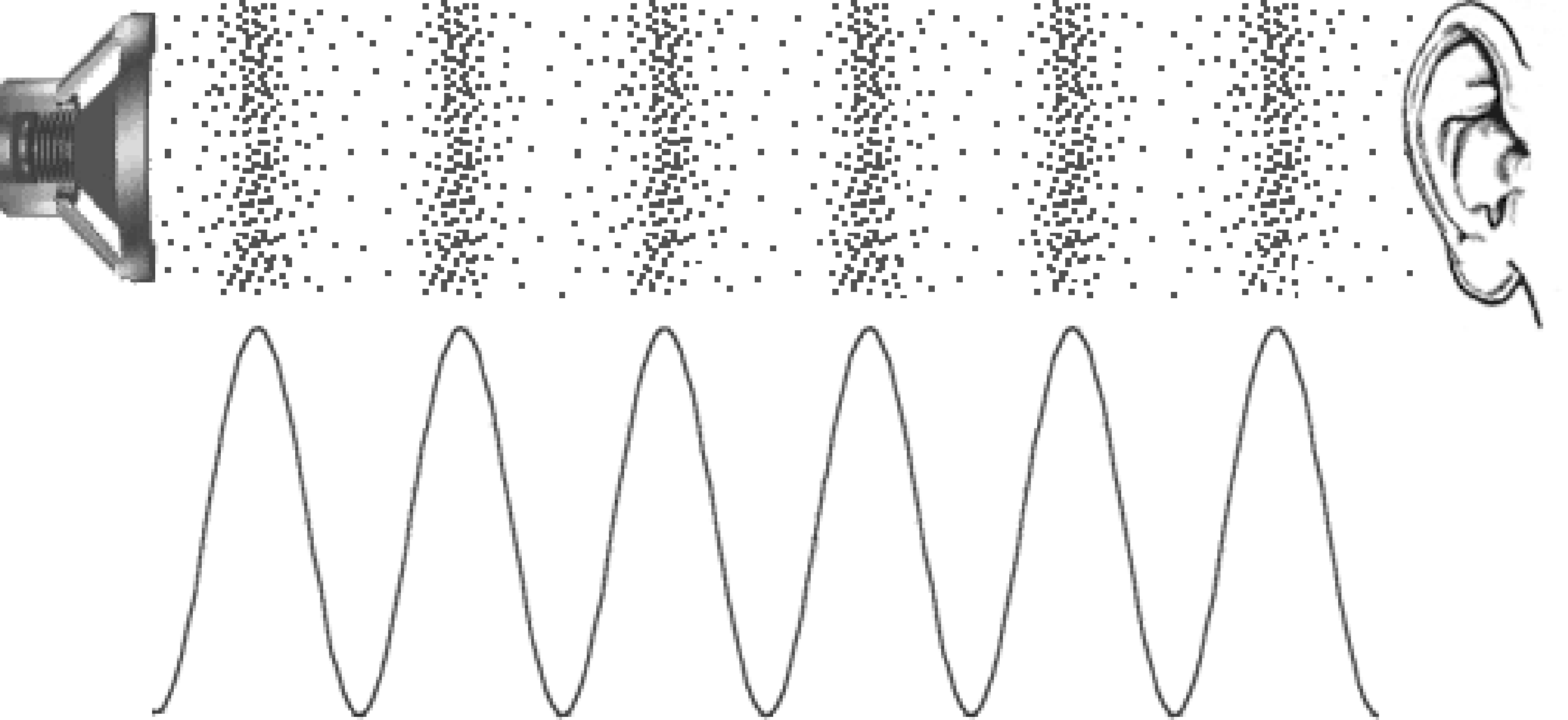
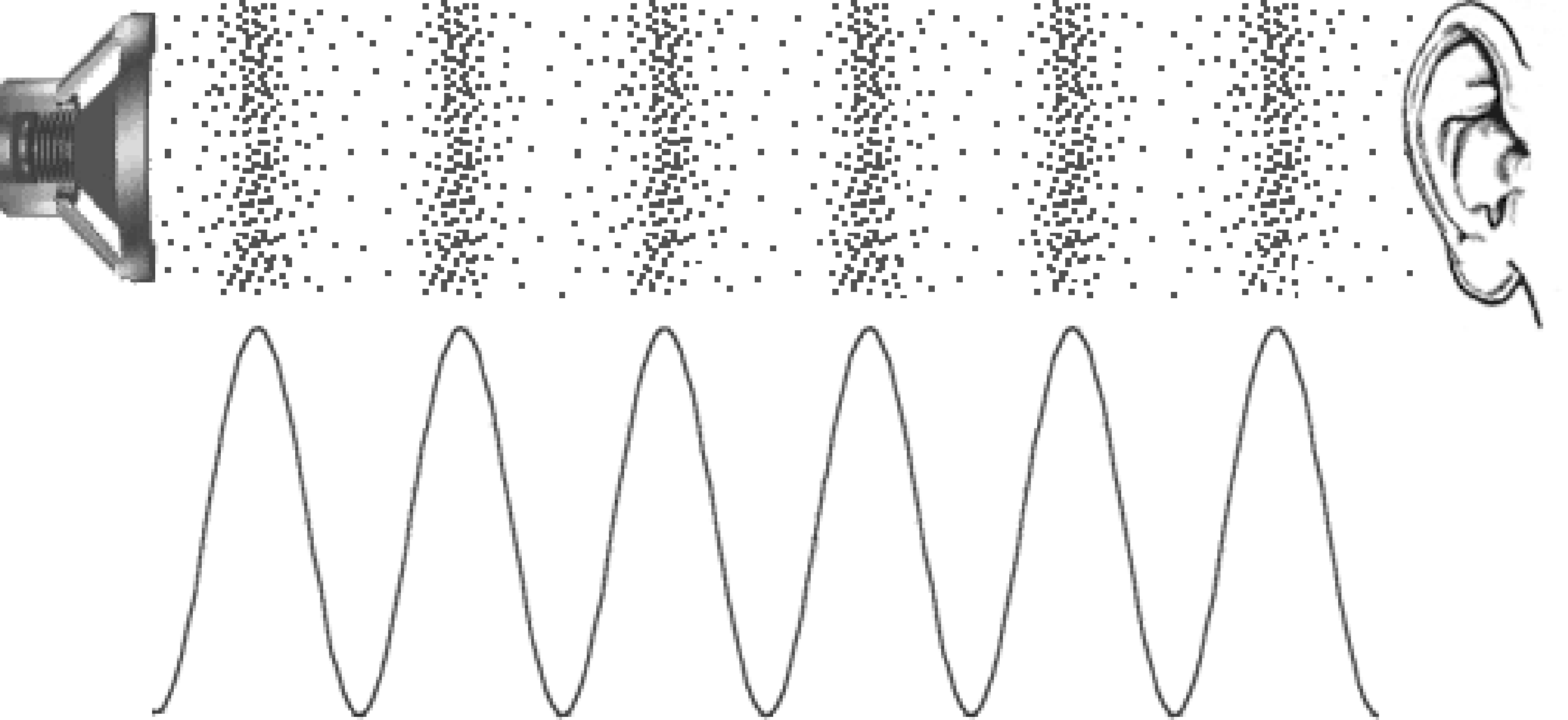
1. Same pitch but louder c) same pitch but softer



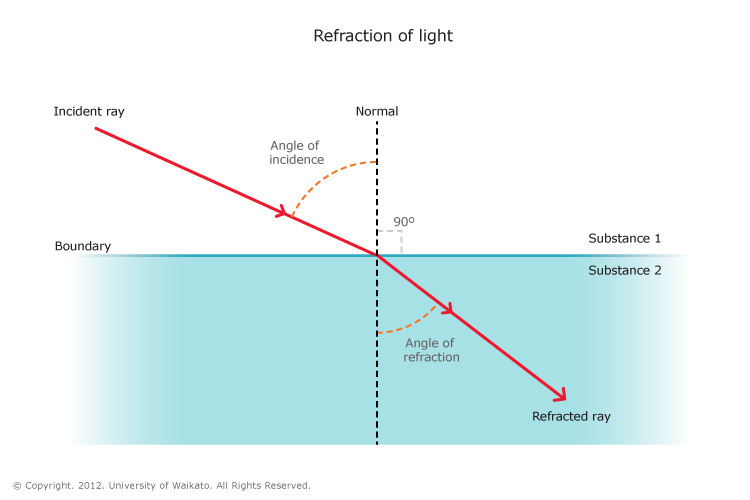
1. higher pitch but louder d) higher pitch but softer



e) lower pitch but louder f) lower pitch but softer



Air



Water

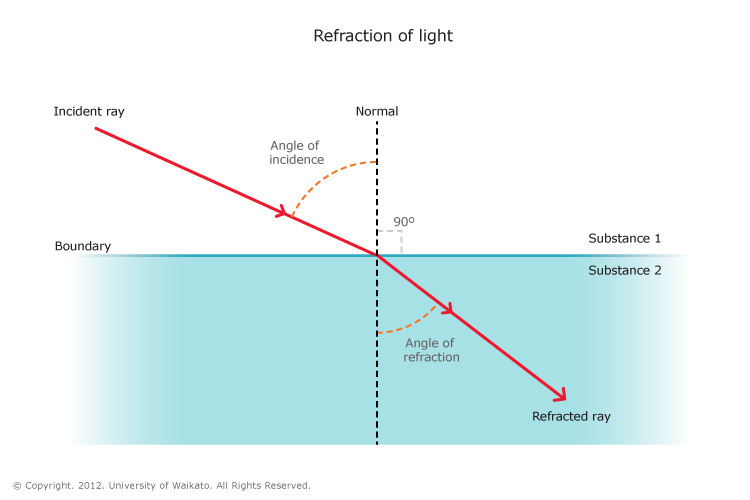
If a beam of light enters a body of water at 90º angle

(perpendicular) the beam will penetrate the water in

the same direction without changing direction.

The perpendicular line is called the ‘normal’.

**normal**

If a beam of light enters the water at an angle under or above

90º it will **refract**. As water is denser than air, the light will

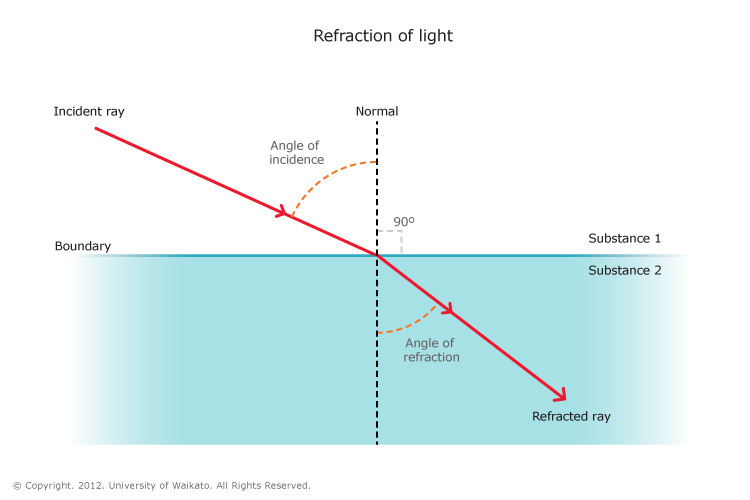
Slow down as it enters the water and curve towards the normal.

1. Draw a light beam as it exits from the water to the air.

Keep in Mind that air is less dense than water, therefore,

light will pick up speed as it exits water and it will curve **away** from the ‘normal’.

**normal**



**END**