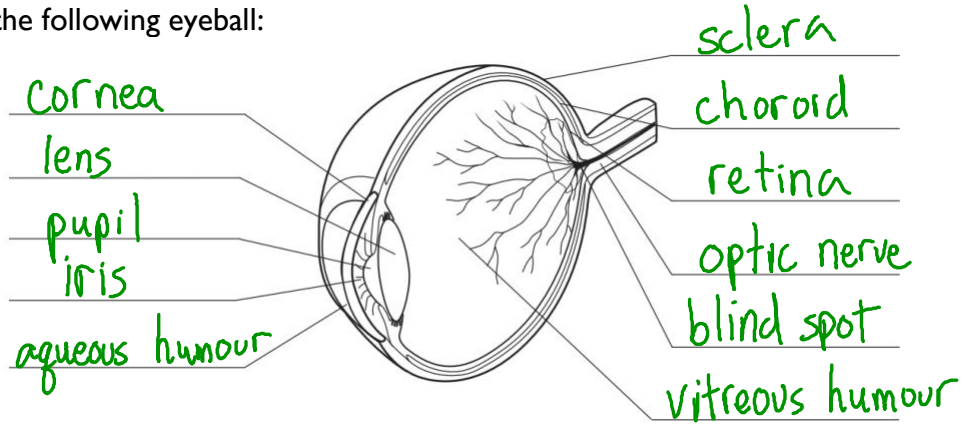
Eye, Ear, and Waves Review

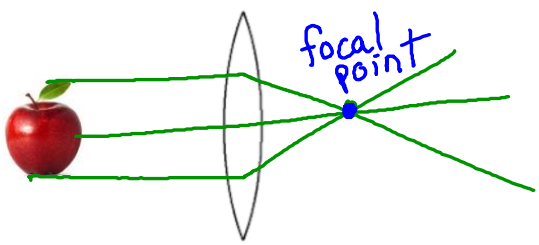
1. Name each part of the following eyeball:



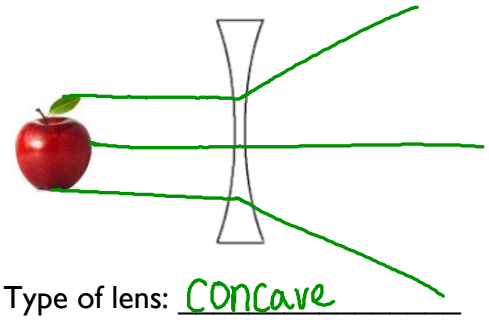
2. Identify the part of the eye being described for each of the following definitions.

sclera	The outer layer of the eye, sometimes referred to as "the whites of your eyes".
iris	The coloured part of your eye. It's muscular contractions control the amount of light that passes into your eye.
choroid	The layer of your eye that consists of nourishing blood vessels.
cornea	The transparent part of the eye at the front. If you were to touch your eye (don't touch it!), this is what you'd be touching.
pupil	The small hole that expands and retracts to allow varying amounts of light in.
lens	The convex part of your eye that focuses light onto the back surface. It can change shape to better focus on objects that are far away or close up.
retina	The back surface of your eye, composed of photoreceptors called rods and cones.
blind spot	The small area at the back of your eye that lacks photoreceptors.
optic nerve	The nerve that transfers the stimulus from photoreceptors to the brain.

3. What kind of lenses are shown below? Identify their names and draw the rays that come out of each.

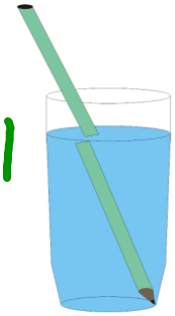


Type of lens: convex (converging)

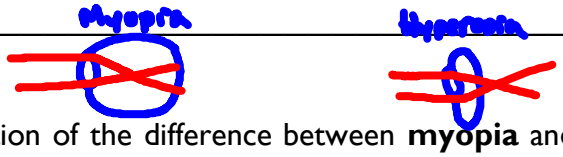


Type of lens: concave (diverging)

4. Explain what is going on in the adjacent image. Be as specific as you can.



Light is entering a new medium (going from air to water). This slows it down slightly, causing the light to bend, giving the appearance that the pencil is broken or bent. This is called REFRACTION



5. Give an explanation of the difference between **myopia** and **hyperopia**, and explain what type of lens you would use to correct each condition.

In myopia, the eye is too long, so the image lands in front of the retina. This can be corrected with a concave lens.
In hyperopia, the eye is too short, so the image lands behind the retina. This can be corrected with a convex lens.

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

In a transverse wave, the energy input is perpendicular to propagation
In a longitudinal wave, the energy input is parallel to propagation

7. What is the difference between a **mechanical wave** and an **electromagnetic wave**? Give an example of each.

A mechanical wave needs a medium to propagate (Ex: sound in air, tidal waves in water, seismic waves in the ground). An electromagnetic wave does not need a medium (Ex: X-rays, radio waves, visible light)

8. The graph on the right shows a wave.

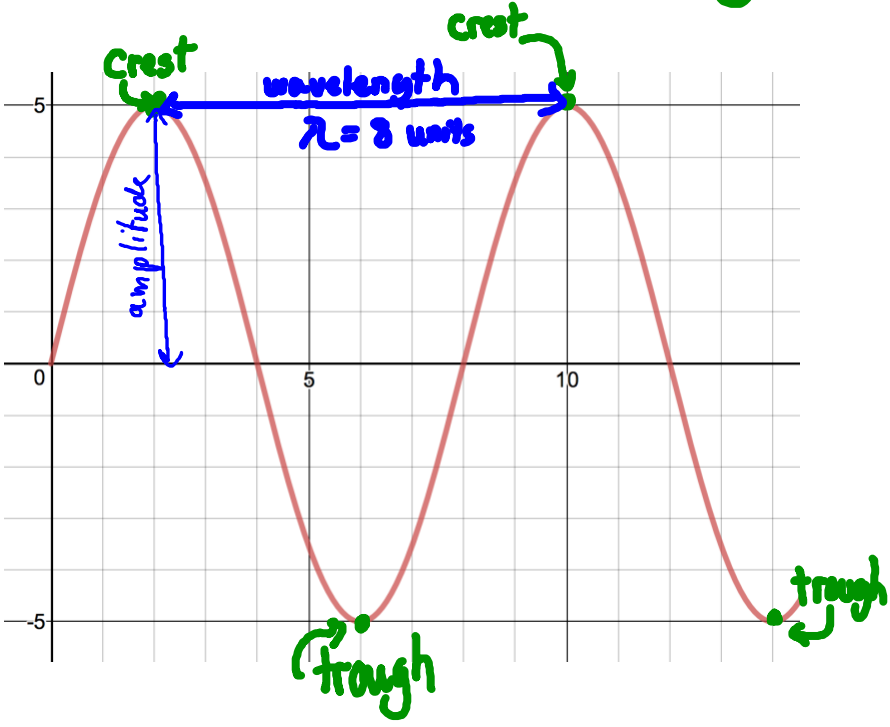
a. Label a **crest** and a **trough** directly on the graph.

b. What is the **wavelength** of this wave? Give a numerical answer.

8 units

c. What is the **amplitude** of this wave? Give a numerical answer.

5 units



9. Calculate the frequency of the following situations.

a. You count 138 crests from a wave pass by you in 2 minutes.

2 min = 120 s $F = \frac{138 \text{ cycles}}{120 \text{ s}} = 1.15 \text{ cycles/s} = 1.15 \text{ Hz}$

b. 2 312 500 000 radio wave crests are picked up by your antenna in 25 seconds. What radio station are you listening to?

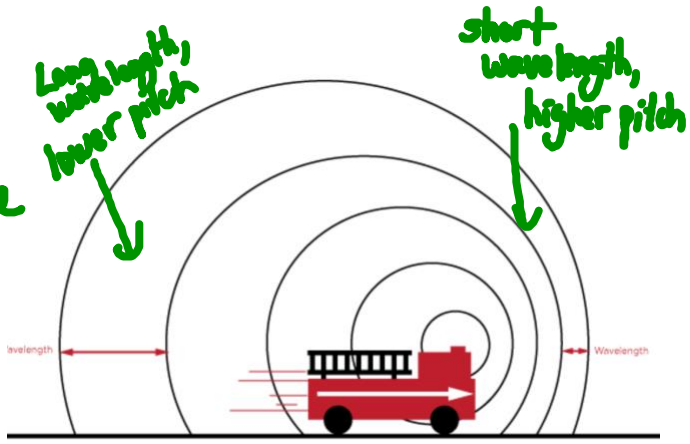
$F = \frac{2\,312\,500\,000 \text{ cycles}}{25 \text{ s}} = 92\,500\,000 \text{ Hz} = 92.5 \text{ MHz}$ = The Beat

10. Write all the colours of the visible spectrum in **increasing order** of energy.

Red Orange Yellow Green Blue Indigo Violet

(ROY G. BIV)

11. This image shows a firetruck racing toward the right of the page. As it moves, its siren blares at a constant frequency.



a. If you are standing in front of the firetruck as it approaches you, will the pitch of the sound you hear be higher or lower? Justify your answer.

Higher pitch, because the waves become compressed

b. If you are standing behind it as it approaches you, will the pitch be higher or lower? Justify your answer.

Lower pitch, because the waves are elongated

c. What's the name of this phenomenon? Doppler Effect

12. Explain what a **sonic boom** is.

When a moving, sound-emitting object reaches the speed of sound, its waves all perfectly overlap creating a massive amount of sound energy. Also called breaking the sound barrier.

13. A busy intersection registers at approximately 80 dB in sound intensity. A rock concert registers at 110 dB, and an airplane taking off registers at 120 dB.

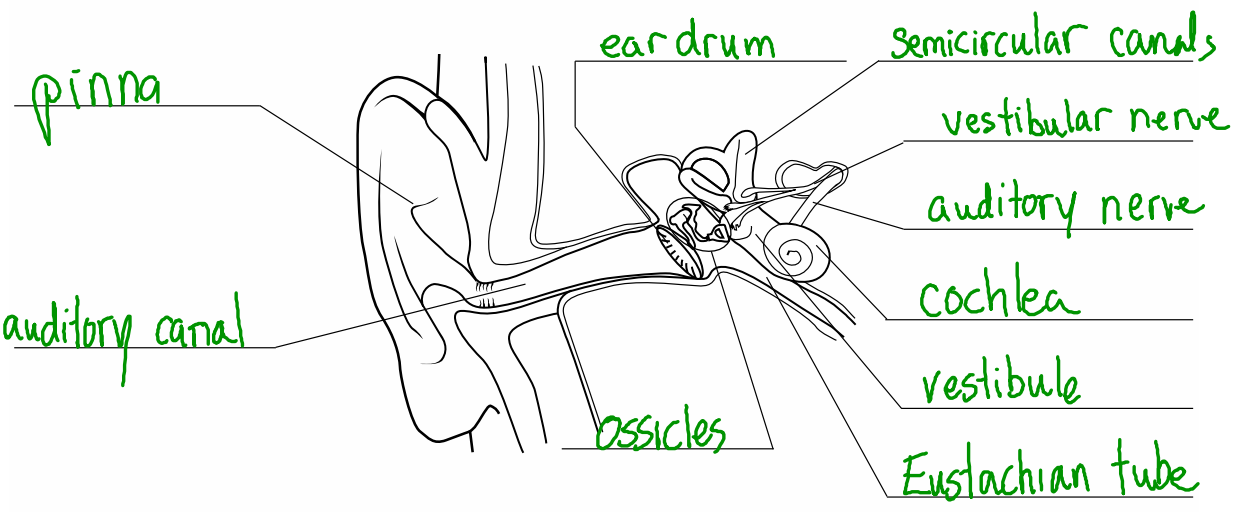
80 dB ×10 90 dB ×10 100 dB ×10 110 dB 120 dB

a. The sound intensity of an airplane taking off is 10 times more powerful than the intensity of a rock concert.

b. The sound intensity of a rock concert is 1000 times more powerful than that of a busy intersection.

c. The sound intensity of an airplane taking off is 10 000 times more powerful than that of a busy intersection.

14. Label the different parts of the ear.



15. Identify the part of the ear being described by each of the following definitions.

auditory canal	The canal that is part of the outer ear. It's filled with wax to keep out dust and germs.
semicircular canals	Three canals (are) filled with fluid that moves around as your head moves in different directions. This gives your body a sense of positioning.
auditory nerve	The nerve responsible for carrying the auditory stimulus to the brain.
pinna	The outer part of the ear whose flap-like shape funnels sound into the auditory canal.
ear drum	A small, thin membrane at the end of the auditory canal that oscillates with sound waves.
cochlea	A spiral-shaped portion of the ear that is composed of fibres of varying length that resonate to different frequencies of sound. From this, a particular sound can be recognized.
ossicles	The small bones that vibrate and amplify the oscillations they sense from the ear drum. They are called the hammer, anvil, and stirrup.