1. Humans and other animals are able to detect a range of stimuli from the external environment, some of which are useful for communication

Identify the role of receptors in detecting stimuli

- Transfer of information from one organism to the other
- Role of receptors is to detect changes in the environment and send information about the conditions to the control centers.
- Sight is a common form of communication
- Most animals that use sound as a form of communication make calls or sound for identification purposes
- A **Stimulus** is a change in the internal or external environment for an organism
- The sense organs contain non-sensory tissue aside from the special sensory cells that can monitor stimuli
- A **response** is a reaction in an organism or its tissues as a result of receiving a stimulus
- *Photoreceptors are sensitive to light energy*
- *Mechanoreceptors respond to mechanical energy*
- *Thermoreceptors respond to heat and cold*

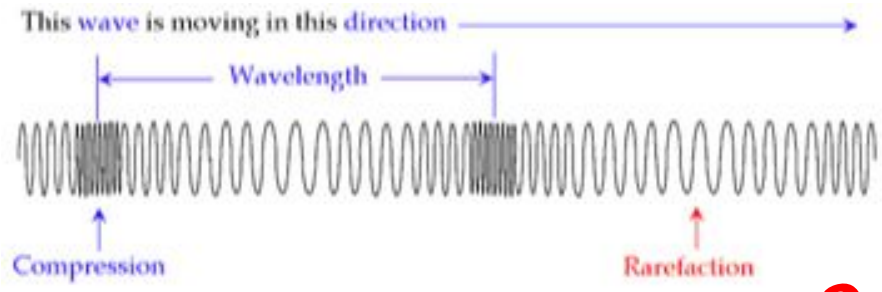
Explain that the response to a stimulus involves:

- **Stimulus**
- **Receptor**
- **Messenger**
- **Effector**
- **Response**
- Central Nervous system consists of the brain and spinal cord, triggers the response
- Receptors such as the CNS means of nerves
- Sense organs change the stimuli received by a sense organ into electrochemical signals called nerve impulses
- Impulses travel along nerves which as as messengers
- The brain and spinal cord interpret and make sense of the messages they receive, either by taking into account past experience or as inherited reflex
- The result of this pathway is what we term animal behaviour

5. Sound is a very important communication medium for humans and other animals

Explain that sound is produced by vibrating objects and that the frequency of the sound is the same as the frequency of the vibration of the source of the sound

- Sound originates when something vibrates rapidly
- Particles move backwards and forwards in the same direction as the flow of energy
- Frequency is expressed in cycles per second - **Hertz**
- Frequency determines the **pitch** of a sound
- Wavelength of a sound wave is the distance between the centres of two adjacent compression or rarefactions



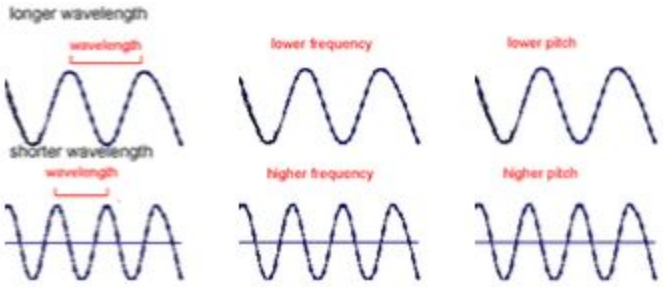
Explain why sound is a useful and versatile form of communication

- Sound bends around objects and travels around corners
- Travels through all substances, solids, liquids and gases
- Sound can be used for hunting and navigation as well as communication
- They don't have to see each other to hear sound
- Speed of sound is faster in water than in air

Plan and perform and first-hand investigation to gather data to identify the relationship between wavelength, frequency and pitch of a sound

Materials

- Cathode ray oscilliocscope (CRO)
- Audio oscillator/amplifier
- Seclection of tuning forks of different pitch
- Microphone
- Sounding boxes to suit the forks



Method

1. Play a pure note repeatedly on a musical instrument into the microphone attached to the CRO and you should be able to produce a simple waveform (Control)
2. Make a labeled pencil drawing of this wave and identify the wavelength, frequency and pitch
3. Play different notes on your instrument until you find one that changes just the wavelength of the control note
4. Find a note that changes just the frequency of the control note
5. Find a note that changes just the pitch of the control note

Outline the structure of the human larynx and the associated structures that assist the production of sound

The Larynx

Describe the anatomy and the function of the human ear, including:

- **Pina**
- **Tympanic membrane**
- **Ear ossicles**
- **Oval window**
- **Round window**
- **Cochlea**
- **Organ of Corti**
- **Auditory nerve**

Structure	Description of Anatomy	Function
pinna	large fleshy external part of the ear	collects sound and channels it into the ear
tympanic membrane	the eardrum - a membrane that stretches across the ear canal	vibrates when sound waves reaches it and transfers mechanical energy into the middle ear
ear ossicles	three tiny bones, the hammer, anvil and stirrup	amplify the vibrations from the tympanic membrane
oval window	region that links the ossicles of the middle ear with the cochlea in the inner ear	picks up the vibrations from the ossicles and passes them onto the fluid in the cochlea
round window	membrane between cochlea and middle ear	bulges outward to allow pressure differences in the cochlea
cochlea	circular fluid filled chamber	changes mechanical energy into electrochemical
organ of Corti	a structure within the cochlea	location of the hair cells that transfer vibrations into electrochemical signals
auditory nerve	the nerve that travels from the ear to the brain	Transmits electrochemical signals to the brain

Gather, process and analyse information from secondary sources on the structure of a mammalian ear to relate structure to functions

Use information from above dot point