FORM 2 SCIENCE  CHAPTER 1 THE WORLD THROUGH OUR SENSES

1.  **SENSE** | **ORGAN** | **STIMULUS**
---|---|---
| a. Touch | Skin | Pain, Heat, Touch, Cold, Pressure |
| b. Smell | Nose | Chemicals in the air |
| c. Taste | Tongue | Chemicals dissolve in the saliva. |
| d. Hearing | Ears | Sound |
| e. Sight | Eyes | Light |

2. **SKIN** = the biggest sensory organ of touch

   a. The sensitivity of the skin depends on the:
      i. Thickness of the epidermis
         (thickness ↑ = sensitivity ↓)
      ii. Number of receptors presence
         (number ↑ = sensitivity)
   b. The skin on the neck, lips, fingertips, and armpit are more sensitive because these parts have
      i. thin epidermis
      ii. more receptors
         than the skin of the knee and elbow or heel.
   c. Different parts of the body have different degree of sensitivity because receptors are not distributed evenly.
   d. The blind people used their fingertips (touch receptor) to ‘read’ Braille.
   e. The skin also:
      i. Control the temperature of the body.
      ii. Preventing microorganisms from entering the body.
      iii. Help to get rid of excretory waste products.
      iv. Give colour to the skin

3. **NOSE** (SENSORY OF SMELL)

   a. Smell receptors are located at the top of the nasal cavity and covered by mucus.

   b. Only chemical vapour entering the nose and dissolved in the mucus can stimulate the smell receptors.

   c. Two situation where the sense of smell is reduced:
      i. When a person has a cold, he cannot smell very well because too much mucus is produced
         preventing chemical from stimulating the smell receptors.
      ii. Prolong exposuer to strong smell also reduce the sensitivity of the nose.
4. EYES (SENSE OF SIGHT)

<table>
<thead>
<tr>
<th>Part of the eye</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choroid (black colour) to supply oxygen and food to the retina</td>
<td>Absorbs light and prevents reflection of light.</td>
</tr>
<tr>
<td>Retina (place where image is formed)</td>
<td>Detect light and produces impulse.</td>
</tr>
<tr>
<td>Cornea</td>
<td>Helps to focus light that enters the eye onto the retina</td>
</tr>
<tr>
<td>Iris</td>
<td>controls the amount of lights that enters the eye by controlling the size of the pupil.</td>
</tr>
<tr>
<td>Eye Lens</td>
<td>Focuses light rays onto the retina</td>
</tr>
<tr>
<td>Pupil</td>
<td>To allow light / control amount of light entering the eyes</td>
</tr>
</tbody>
</table>

**b. Mechanism of sight** (Refraction of light)

Cornea → Aqueous humour → Pupil → Lens → Vitreous humour → Retina → Optic nerve

c. The characteristic of image forward on the retina are: (same as camera / convex lens)

i. Real
ii. Diminished / smaller
iii. Upside down / inverted

www.andrewchoo.edu.my
1. a. **Looking at far object**
   - Eye lens become thinner.

   ![Diagram showing eye focusing on distant object](image1)

   b. **Looking at near object**

   ![Diagram showing eye focusing on near object](image2)

   - Eye lens become thicker

   c. **Astigmatism**
   - Image form on the retina is not very clear because the **cornea is not evenly curved**
   - Overcome by wearing glasses with **cylindrical lenses**.

   d. **Presbyopia**.
   - Both long-sightedness and shortsightedness that old people get.
   - Corrected by wearing **bifocal lenses** to see near and distant object.

2. a. **Optical illusion.**
   i. The brain **cannot interpret accurately** the information sent by the receptors in the eye caused by disturbances.

   ![Diagram illustrating optical illusion](image3)

   b. **The blind spot**.
   - Part of the retina that behind the optic nerve.
   - Cannot detect the images that fall on this spot as it does not contain any **receptors sensitive to light**.
3. **Intensity of light**

<table>
<thead>
<tr>
<th>Bright</th>
<th>Dark</th>
</tr>
</thead>
<tbody>
<tr>
<td>- pupils become smaller.</td>
<td>- pupils become bigger.</td>
</tr>
</tbody>
</table>

4. **Object Of Distance**

<table>
<thead>
<tr>
<th>Near</th>
<th>Far</th>
</tr>
</thead>
<tbody>
<tr>
<td>- image bigger.</td>
<td>- image smaller.</td>
</tr>
</tbody>
</table>

**LIGHT AND SIGHT**

1. **Light and sight**
   a. Travels at a speed of $3 \times 10^8 \text{ms}^{-1}$ in vacuum. (Travel faster than sound. Therefore, you can see the lightning before you hear the thunder.)
   b. Can be reflected or refracted
   c. Absorb by dark surface
   d. 

   ![Law of Reflection Diagram]

   f. According to the **Law of Reflection**:
      i. The incident ray, reflected ray and the normal are all on the **same plane**.
      ii. The **angle of incident** is equal to the **angle of reflection**.

   g. **Characteristic of images of a plane mirror**.
      i. Virtual (image cannot be focused on the screen)
      ii. Upright
      iii. Laterally inverted
      iv. Same size as the object
v. Same distance behind the mirror as the object is in front.

2. **Experiment showing light travels in a straight line.**

![Diagram showing light travels in a straight line]

- Light from the candle could only be seen when the holes in the cardboards are arranged in a straight line.

3. **Formation of shadow**, eclipse of moon and sun is because of
   i. Light travels in a straight line.
   ii. Light cannot pass through an opaque object

4. **Characteristic of images of camera/eye.**
   a. Real
      - Image can be formed on the screen
   b. Upside down
   c. Laterally inverted
   d. Small size / diminished

5. **Daily phenomena of refraction of light** are shown below:

   ![Diagram showing effects of refraction]

   - Drinking straw in a glass of water appears bent.
   - The pond appears shallower than it actually is.
   - The fish appears to be closer to the surface.
   - The star appears to be higher than it actually is.
   - The coin cannot be seen in P.
   - The coin can now be seen as it appears to be closer to the surface in Q.
### Sound And Hearing

1. **Sound**
   a. Is a form of **energy produced by vibration / kinetic energy**.
   b. **kinetic energy** → sound energy

2. **Musical instruments that produce sounds by vibrations:**
   a. **Strings vibrates** – guitar, violin, piano.
   b. **Air columns vibrates** – Trumpet, angklung, Saxophone.
   c. **Skin vibrates** – Drum, kompang, gong.

3. **Sounds needs medium to travel.**
   a. cannot travel through vaccum because vaccum is without medium / without particles.
   b. travels faster through solids than liquids. It travels slowest through gases. The particles in solid are arranged closely together and able to pass on vibration more quickly.

4 a. **Experiment showing sound needs medium to travel.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. The electrical bell is switched on.</td>
<td>The electrical bell vibrates and rings.</td>
</tr>
<tr>
<td>ii. The vacuum pump is switch on. The air molecules getting looser.</td>
<td>The ringing sound gets weaker</td>
</tr>
<tr>
<td>iii. All the air is absorbed. Absence of air molecules / no medium. (vacuum)</td>
<td>The bell is vibrating but <strong>no sound is heard</strong> because absence of air molecules to transfer sound.</td>
</tr>
<tr>
<td>iv. The vacuum pump is switch off. The air slowly re-enters the jar.</td>
<td>The sound of the bell ringing can be heard again.</td>
</tr>
</tbody>
</table>

*Vacuum pump* absorbs air molecules.
* Vaseline – prevent air from entering the bell jar.

**Conclusion:** Sound requires a medium to travel. **Sound cannot travel through vacuum.**

5. **Reflection and absorption of sound.**
   a. Surfaces that are **hard** and **smooth** reflect sound e.g. wall of buildings, glass or metal.
   b. Surfaces that are **soft** and **rough** absorb sound e.g. carpet, curtains or sponge.

6. **Ultrasonic Frequencies.**
   a. Frequencies exceeding 20,000Hz.
   b. Humans cannot hear sounds of this frequency but some animals can.
   c. Dogs can hear the Galton’s whistle which produce sounds at frequencies reaching 35,000Hz.
   d. Bats and dolphins move by using ultrasonic sounds.

7. **Stereophonic Hearing**
   a. Hearing using both ears
   b. Able to determine the **direction** of the sound accurately.

8. **Devices to overcome hearing limitations of sound**
a. **Stethoscope**  
   - used by doctors to listen to the heartbeat / pulse.

b. **Loudspeaker**  
   - to make announcement during school assembly.

c. **Earphones**  
   - to hear radio / hand phone

d. **Hearing aids**  
   - used by old people / people with hearing problem