Strand:	Forces and Energy	**Sub-Strand:**	Energy

BASIC 9

WEEKLY LESSON PLAN – WEEK 10

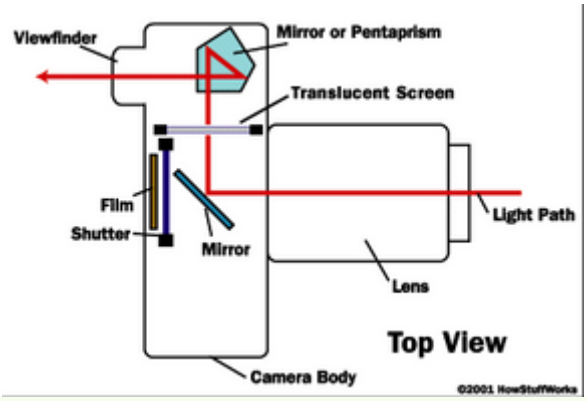
Content Standard:	B9.4.1.2 Evaluate the application of light energy in life.				
Indicator (s)	B9.4.1.2.1 Demonstrate that light changes path when it travels from one medium to a different medium. B9.4.1.2.2 Describe how images are formed in cameras. B9.4.1.2.3 Describe the formation of shadows. B9.4.1.2.4 Demonstrate the formation of an eclipse.		**Performance Indicator:** learners can describe how image, shadow and eclipse are formed.		
Week Ending	15-11-2024				
Class	B.S.9	**Class Size:**		**Duration:**	
Subject	Science				
Reference	Science Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook				
Teaching / Learning Resources	Poster, camera, Video and Pictures, mirror, water, touch light.	**Core Competencies:**	• Creativity and Innovation (CI) • Digital Literacy (DL)		

DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**
MONDAY	Learners brainstorm to explain the term "Light".	1. Discuss the properties of light with the Learners. 2. Demonstrate a practical activity to show that light bends as it travels from one medium to another. E.g. A rod appears bent in water; deep water appears shallow than its real depth 3. Learners brainstorm to identify the changes that happen when light travels from one medium to another. **Properties of Light;** ▪ **Speed of Light** In a vacuum, visible light travels at the speed of approximately 299 792 458 metres per second (m/s). This is known as the speed of light. It is the fastest that anything in the universe is able to move! For comparison, the speed of sound is only approximately 300 m/s. ▪ **Waves of Light** Light has the properties of waves. Like ocean waves, light waves have crests and troughs. The distance between one crest and the next, which is the same as the distance between one trough and the next, is called the wavelength. The frequency of a wave is the number of crests (or troughs) that pass a point in one second. The wavelength multiplied	Reflect on the properties of light. **Exercise;** With the aid of a diagram explain how light travels.

		by the frequency equals the speed at which the wave travels. ▪ **Colours of Light** You will remember from art class that the primary colours are red, yellow and blue. You can mix these to form the secondary colours orange, green and purple. Red, yellow and blue are called "primary" because they are said to be colours that cannot be made by mixing other colours. This is technically not true. **How Light Travels** The final important property of light to remember is that light always travels in a straight line. We get shadows when light is blocked by an object. Light can pass through some but not all objects. We call objects and materials that light can pass through **transparent**. We can objects and materials that light cannot pass through **opaque**. We call objects that let some, but not all light pass through **translucent**.	
THURSDAY	Show Learners a digital camera for them to observe. Learners brainstorm to create a model of a camera.	1. Using a Poster displaying how camera works, describe to the Learners on how image is formed. 2. Assist Learners to draw a picture to explain how image is formed. 3. Discuss with the Learners on why image formed with camera is always inverted but not erected. 4. Learners brainstorm to explain the importance of using cameras. **Image formation on analog cameras** In analog cameras, an image is formed by a chemical reaction which takes place on the strip. A 35mm strip is used in an analog camera. These strips are coated with silver halide. Silver halide is a chemical substance. Light rays are small particles known as photon particles. This photon particle passes through the camera and reacts with silver halide particles on the strip. And it generates a negative of the image.	Assist Learners to practice using camera to take pictures. **Exercise;** 1. Briefly explain how camera works. 2. Draw a diagram to explain how image is formed.

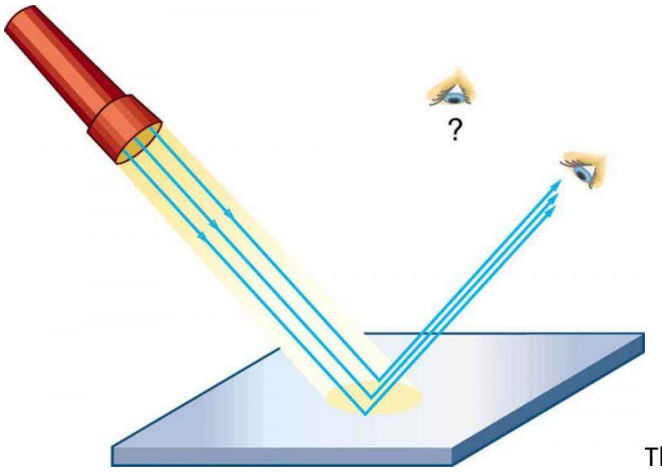
Image formation on digital cameras

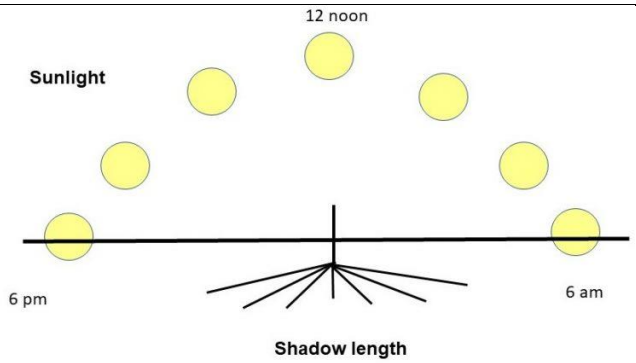
In digital cameras, image formation is not through the chemical reaction. Rather than, it is more complex. A CDD array of sensors is used to form an image.



The image is formed by the lens of a camera.

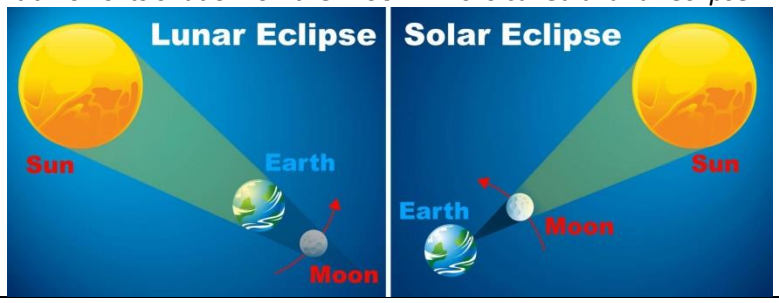
1. The camera lens collects so many of the light rays which are bouncing about and redirects them to a single point using glass, resulting in a crisp image.
2. Since most of these light beams collide on a digital camera sensor or a piece of film, a crisp image is formed.
3. A camera lens is an optical lens or collection of lenses used in conjunction with a camera body and mechanism

		to capture pictures of things on photographic film or other media capable of preserving an image chemically or electronically.	
FRIDAY	Discuss with the Learners on the terms umbra and penumbra in relation to the formation of shadows.	1. Assist Learners to explain how shadows are formed. 2. Put Learners in small groups to discuss about the meanings of the two types of shadow. 3. Discuss with the Learners about the significance of shadows. 4. Learners brainstorm to explain what an eclipse is. 5. Use a model to illustrate how an eclipse is formed whilst Learners observe. 6. Assist Learners to describe how eclipse is formed. **Factors that determine the size, shape, and depth of shadow** **1. Source of light:** Shadows are sharp when the light source is bright, like direct sunlight. Shadows can also be formed under artificial light. Shadows are sharper in the bright beam of a flashlight than in overhead light. If the light source is not bright, the shadows will be blurred. **2. Position of light:** When the light falls at 90 degrees perpendicular to the object, the shadows are shorter. When the angle between a light beam and the object increases, then the shadow gets longer. **3. Size and shape of the object:** The shape and the size of the object determine the boundaries of the shadow. For example, if you hold a ball in the path of light, then its shadow will be circular, and if you hold a rectangular box, then its shadow will have that shape. **The position of light determines the shape of the shadow** Step out on a sunny day and observe your shadow at several times throughout the entire day. You will be fascinated by how the shadow changes over time. The length of the shadow is determined by the position of the sun in the sky. When the sun is low on the horizon in the morning and evening, long shadows are formed. During mid-day, when the sun is high in the sky, the shadows are much shorter.  The Law of Reflection	Learners brainstorm to identify the factors that determines the size, shape and depth of a shadow. **Exercise;** Draw to explain how shadow and eclipse are formed.



Shadow and eclipse

An eclipse is caused when celestial bodies form shadows. There are two types of eclipses: the solar and the lunar eclipse. Eclipses occur when the Sun, Earth, and Moon are aligned in the same straight line. When the Moon is between the Sun and the Earth, it throws its shadow on the Earth. This is called a *solar eclipse*. When the Earth comes between the Sun and the Moon, it throws its shadow on the Moon. This is called a *lunar eclipse*.



Name of Teacher: **School:** **District:**