Light
Seasonal changes
Earth and space

EYFS	Year 1	Year 2	Year 3
	Observe changes across the four seasons Pupils will: Be able to say what season we are in. That the four seasons are Autumn, Winter, Spring and Summer **Take a photo of the same place during each season and compare.** Observe and describe weather associated with the seasons and how day length varies. Pupils will: Be able to say it gets darker earlier in Autumn and winter and lighter in Spring and Summer Be able to say that it is more likely to snow in Winter. It is more likely to be sunny in Summer. Pupils should be warned not look at the sun		Recognise that they need light in order to see things and that dark is the absence of light. Pupils will: Be able to say: Dark is the absence of light. We need light to see things. Notice that light is reflected from surfaces. **Use real life objects to set in context. eg cats' eyes in the road, reflective clothing etc.** Pupils will: Be able to write down things that reflect light (cats' eyes, high vis vests, moon) Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Pupils will: Know that looking at the sun is dangerous and they can protect their eyes by: not looking at the sun during an eclipse (look at the shadow) wear a hat

	Pupils will sort out natural and man-made light sources. Natural sources- the sun, stars Man-made- torches, phone		Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Pupils will: Know what opaque means and that light cannot bend around an object. **Shadow puppets.** **Use of data loggers to record the amount of light in lux.** **Pupils will:** Understand what opaque, translucent and transparent means and name at least two things that are opaque (the table in the classroom, the door) two things that are transparent (window and water) two things that are translucent (paper, bathroom windows) Know that a shadow is formed when a light source is blocked by an opaque object Conduct a fair test to see how opaque things are when a torch is shined on it use a log box to measure the light in lux Find patterns in the way that the size of shadows change. **Pupils will:** **Know that shadows change size depending on the location of the light source.**

			Shadows are shorter at midday and longer at the end of the day. The sun rises in the east and sets in the west. **<u>Earth's Atmosphere</u>** The composition of the Earth's atmosphere depends upon the balance of substances that are continually entering and leaving it. This affects the earth's climate. **Pupils will Know:** **The structure of the earth.** **The rock cycle and the formation of igneous, sedimentary and metamorphic rocks.** **Our sun as a star and other stars in our galaxies and other galaxies.** **The seasons and the Earth's tilt, day length at different times of the year in different hemispheres.**
Scientist:	**Scientist:** **Al-Battani**	**Scientist:**	**Scientist:** **Sir Charles Kao**
Enrichment:	**Enrichment:**	**Enrichment:**	**Enrichment:**
<u>Year 4</u>	<u>Year 5</u> Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. **Drama** **Pupils will:** know that the sun is at the centre of our solar system	<u>Year 6</u> Recognise that light appears to travel in straight lines. Pupils will: Be able to draw a line on a diagram to show how light travels in a straight line from the light source	<u>Year 7</u> Explain the similarities and differences between light and sound waves in matter. Explain the transmission of light through materials including absorption and reflection and refraction.

	Know the names of the planets and the order of the planets The further away from the sun that the planet is, the longer the year is Know that the Earth is tilted on its axis, which causes seasons. Describe the movement of the Moon relative to the Earth. Pupils will: Know the moon orbits the Earth and know that there are different phases Be able to name all 8 phases. The Moon orbits the Earth in roughly 28 days. Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Pupils will: Know that the Earth rotates. Know that when the Earth is facing the sun it is day and when the Earth is facing away from the Sun it is night. Know that the sun DOES NOT move that it is the Earth rotating on its axis as well as orbiting around the Sun. The Earth takes 365 days to orbit the Sun.	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Pupils will: Know that an object reflects light from a light source into our eyes. Give an example to explain this- a laptop gives off light which travels in a straight line to our eye or our writing books reflect the light from the classroom back to our eye Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	**Pupils will:** Know that refraction of light can occur when light travels through different objects. Describe the law of reflection. Explain how and why we see objects as different colours. Understand that light waves travelling through a vacuum: speed of light **Pupils will :** Use a ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of a convex lens in focussing the human eye. Understand light transferring energy from source to absorber leading to chemical and electrical effects: photosensitive material in the retina and cameras. **Key Concept** **The composition of the Earth's atmosphere depends upon the balance of substances that are continually entering and leaving it.** Pupils will: Learn about the greenhouse gases and emissions that are affecting our climate. Earth's resources are limited, therefore there is a need for recycling and new types of energy

	The Earth takes 24 hours to rotate on its axis		
Scientist:	**Scientist:** **Ptolemy,** **Alhazen** **Copernicus.**	**Scientist:** **Ibn al-Haytham (965 in Basra - c. 1040 in Cairo)** **Muslim scientist that discovered that light travels in straight lines.** **Lewis Latimer** **Phillip Lenard**	**Scientist:**
Enrichment:	**Enrichment:** **Space centre Leicester** **Planetarium visit**	**Enrichment:**	**Enrichment:**

Possible Careers:
Optician, Production manager, photographer, camera man/woman, climate change scientist, environmentalist, eco-designer, politician, recycler, miner,

Common misconceptions:

- sight is purely an active human process 'I am looking at something, which is why I can see it' or that eyes give out a form of light to enable us to see
- reflective surfaces emit light
- only shiny surfaces or water reflect light
- opaque objects do not reflect light
- opaque surfaces give out colour or 'darkness'

Year groups	Vocabulary/Statements
Birth to 3	Repeat actions that have an effect.
Nursery	light, torch, bulb, lamp, spotlight, shiny, bright, brighter, brightest, Sun, shine, glow, mirror
Reception	Sun, sunny, light, shadow, shady, clouds, torch, see-through, not see-through, source, light source
Year 1	senses, see, eyes (Y1 - Animals, including humans) shiny, dull, see-through, not see-through (Y1 - Materials)

Year 2	opaque, transparent, translucent, reflective, non-reflective (Y2 - Uses of everyday materials)
Year 3	light, light source, dark, absence of light, surface, shadow, reflect, mirror, Sun, sunlight, dangerous
Year 4	
Year 5	
Year 6	straight lines, light rays
KS3	• The similarities and differences between light waves and waves in matter • Light waves travelling through a vacuum; speed of light • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

Earth and Space

Year groups	Vocabulary/Statements
Birth to 3	• Explore and respond to different natural phenomena in their setting and on trips
Nursery	
Reception	Sun, Moon, Earth, star, planet, sky, day, night, space, round, bounce, float
Year 1	
Year 2	
Year 3	light, light source, Sun, sunlight, dangerous (Y3 - Light)
Year 4	
Year 5	Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit
Year 6	
KS3	• Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres • The light year as a unit of astronomical distance

Seasonal changes

Year groups	Vocabulary/Statements
Birth to 3	Explore natural materials, indoors and outside
Nursery	grow, shoot, die, dead (Nursery - Plants) egg, chick, bird, caterpillar, cocoon, chrysalis, butterfly, frog spawn, tadpole, froglet, frog, grow, change, die, names of animals and their young (Nursery - Animals, excluding humans)
Reception	spring, summer, autumn, winter, seasons, sunny, cloudy, hot, warm, cold, shower, raining, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, windy, rainbow, animals, young, plants, flowers
Year 1	weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer, spring, autumn, Sun, sunrise, sunset, day length
Year 2	
Year 3	
Year 4	
Year 5	
Year 6	
KS3	The seasons and the Earth's tilt, day length at different times of year, in different hemispheres