Unit	Lesson name	Lesson No.	Learning objective	Expected Standard (EXS)	Greater depth (GDS)
Mixtures and separation	Mixtures	1	**Knowledge**: To describe mixtures. **Working scientifically:** To research using a range of secondary resources.	Defining the term 'mixture' and naming some common examples; researching a mixture to find out what substances it is made from.	Describing how to identify a mixture (by appearance); describing the properties of the components of a mixture; suggesting how different mixtures could be separated.
	Sieving	2	**Knowledge**: To explain the process of sieving. **Working scientifically:** To draw and annotate a diagram to explain a concept.	Defining the term 'sieving' and explaining how it can be used to separate mixtures; identifying when sieving should be used and alternatives (magnetism); drawing and annotating a diagram to explain how sieving separates a solid-solid mixture.	Annotating a diagram in more detail; suggesting and describing real world applications of sieving (including in farming, gold panning and cooking).
	Filtering	3	**Knowledge**: To explain the process of filtering. **Working scientifically:** To identify testable questions and how to answer them.	Defining the term 'filtering' and explaining how it separates mixtures; identifying when filtering should be used; identify and justify which type of enquiry to use to answer testable questions.	Listing real world examples of filtering; applying their knowledge of filtering to real world examples such as making a cup of tea; explaining why solutions cannot be separated using filtering.
	Solutions	4	**Knowledge**: To describe solutions and how they can be identified. **Working scientifically:** To make observations about solutions.	Defining dissolving and describing the formation of mixtures and solutions and how to tell the difference; naming some examples of mixtures and solutions. **Key learning: Dissolve does not mean disappear.**	Describing the particle arrangement before and after dissolving; using the terms soluble and insoluble.
	Dissolving	5	**Knowledge**: To identify which factors affect the time taken to dissolve. **Working scientifically:** To plan a fair test with consideration of variables and measurements.	Listing factors that affect the time taken to dissolve; suggesting variables to change, measure and control; recording data correctly; analysing a graph to draw simple conclusions.	Explaining how to implement changing, measuring and controlling variables; taking accurate repeat measurements; measuring the temperature of the water and considering the implications for fair testing; analysing a graph to describe the relationship between the variables being changed and measured (the hotter the water, the faster the sugar dissolved).
	Evaporating	6	**Knowledge**: To describe the process of evaporation.	Defining the term 'evaporation', describing the evaporation technique and identifying when it should be used.	Identifying conditions that will increase the time taken to evaporate (including wind and temperature).
Properties and changes	Hardness	1	**Knowledge**: To determine the hardness of materials and link this to their uses. **Working scientifically:** To evaluate the hardness test to determine the degree of trust in the results.	Defining the term 'hardness'; testing, comparing and grouping hard and soft materials; selecting materials for a specific purpose based on their hardness; identifying variables which are difficult to control; judging how these variables affect the degree of trust in results.	Testing soft materials with surprising results and explaining why they do not scratch.
	Transparency	2	**Knowledge**: To determine the transparency of different materials and link this to their uses. **Working scientifically:** To plan and draw a table of results.	Defining the term 'transparency'; testing, comparing and grouping transparent, translucent and opaque materials; selecting materials for a specific purpose based on their transparency; identify which information should be recorded in a table and drawing a results table.	Testing a greater range of materials; recording observations of how the clarity of an object viewed through different transparency material differs; suggesting uses for the materials tested based on their transparency.
	Conductivity	3	**Knowledge**: To determine the conductivity of different materials and link this to their uses. **Working scientifically:** To write a detailed, organised method which is easy to follow.	Defining the terms 'thermal conductivity' and 'electrical conductivity'; testing and comparing the thermal conductivity of different materials; choosing the appropriate material for a specific purpose; using sequential steps to write a method in a logical sequence; including necessary details in a method (variables, measurements, equipment and safety).	Designing a multi-layered insulated cup; comparing the results of multi-layered cups with those of a single-material cups; analysing how the combination of materials affects heat retention.

	Reversible changes	4	**Knowledge**: To demonstrate reversible changes. **Working scientifically:** To write a prediction using prior knowledge of the states of matter.	Defining the term 'reversible change'; describing how to reverse mixing and dissolving using separation techniques; describing how to reverse changes of state by heating and cooling; using previous scientific knowledge and evidence to inform predictions.	Describing a greater range of reversible changes; identifying examples of reversible changes in everyday life; considering how reversible changes are linked to the water cycle.
	Irreversible change: Burning and rusting	5	**Knowledge**: To demonstrate irreversible changes. **Working scientifically:** To analyse observations about rusting and use them to support a conclusion.	Defining the term 'irreversible change'; identifying and describing burning and rusting as irreversible changes; using observations to determine the necessary conditions for rusting.	Accurately recording how long each material burnt for; writing an independent conclusion.
	Irreversible changes: Mixing	6	**Knowledge**: To demonstrate irreversible changes. **Working scientifically:** To measure the circumference of a balloon accurately.	Identifying and describing cooking and mixing vinegar and bicarbonate of soda as irreversible changes; measuring the circumference of a balloon accurately using string and a ruler.	Calculating an average using repeat data.
Earth and space	Models of our Solar System	1	**Knowledge**: To compare the contributions of Ptolemy, Alhazen and Copernicus to models of the Solar system. **Working scientifically:** To pose testable questions about the solar system.	Describing the geocentric model and heliocentric models of the Solar System; describing the shape of celestial bodies; posing questions about the movement of the celestial bodies in our Solar System; identifying testable questions and which enquiry type is best used to answer them; asking further questions about the Solar System.	Using evidence to support an argument; listing evidence to prove the Earth is not flat.
	Our Solar System	2	**Knowledge**: To describe the movement and shapes of the celestial bodies in our Solar System. **Working scientifically:** To develop a model to represent the Solar System.	Naming the celestial bodies in the solar system and the force that keeps them in their positions; describing the orbits of celestial bodies in the Solar System; using a model to represent the Solar System; identifying the problems with the model; making improvements to the model. **You must cover: Sun, moon, Mars, Venus, Earth, Mercury, Jupiter, Saturn, Uranus and Neptune.**	Independently researching the dwarf planet Pluto; explaining why Pluto does not fit the criteria to be a planet.
	The Moon	3	**Knowledge**: To describe the movement of the Moon relative to the Earth. **Working scientifically:** To design and draw a table.	Defining the term 'moon'; naming some of the phases of the Moon; describing the orbit of the Moon around the Earth; designing and draw a table to record data on moons; choosing appropriate headings for a table.	Naming all of the phases of the Moon; explaining the phases of the Moon using a model; researching the names of other moons.
	Day and night	4	**Knowledge**: To explain the causes of day and night and the seasons. **Working scientifically:** To draw a diagram to explain day and night.	Describing how the Earth rotates on its axis; describing the tilt of the Earth; describing the orbit of the Earth around the Sun; shading day and night on the Earth; labelling the day and night and seasons diagrams; researching the time of day and night in other parts of the world.	Using knowledge of day and night and the tilt and orbit of Earth to explain why Polar North and South do not have a 24 hour day and night cycle.
	Time	5	**Knowledge**: To devise a sundial to tell the time. **Working scientifically:** To calibrate and use a sundial to measure time.	Naming the parts of a sundial; explaining how a sundial works; calibrating a sundial using a compass and torch; using a sundial to measure time.	Comparing a sundial and a watch; identifying the disadvantages of a sundial.
	Satellites and space junk	6	**Knowledge**: To describe some uses of satellites and the problems posed by space junk. **Working scientifically:** To use temperature data to make predictions about climate change.	Listing some of the uses of satellites; explaining why space junk poses a problem to satellites; analysing patterns in temperature data for the Earth; drawing a line of best fit; predicting temperature values for the Earth in the future.	Independently researching a person of interest; writing a biography for a person of interest.
Life cycles and reproduction	Life cycles and reproduction in plants	1	**Knowledge**: To describe the life cycle of a plant, including the reproductive stage. **Working scientifically:** To observe and compare equivalent parts in different flowers.	Describing the plant life cycle; describing sexual reproduction in plants; dissecting a flower; observing the parts of a flower in detail using a magnifying glass; comparing equivalent parts in different flowers. **You must cover: anther, filament, ovary, stigma, ovule and style.**	Designing a three-column table; using sensitive scales to measure mass.
	Life cycle of a mammal	2	**Knowledge**: To describe the life cycle of a mammal. **Working scientifically:** To research the life cycles of different mammals.	Describing the life cycle of a mammal; comparing the life cycles of different mammals; describing sexual reproduction in mammals; researching using a fact sheet; identifying relevant information.	Explaining the unique method of diapause; linking life cycles to habitat adaptation.

	Life cycle of a bird	3	**Knowledge**: To describe the life cycle of a bird and compare with that of a mammal. **Working scientifically:** To pose questions to compare the life cycles of different birds.	Describing the life cycle of a bird; comparing the life cycles of different birds and the life cycles of mammals and birds; posing relevant questions about the life cycle of a bird; using technology to answer those questions; assessing the value of a question.	Making links between life cycle stages and habitats; predicting how habitat changes might impact life cycles.
	Life cycle of an amphibian	4	**Knowledge**: To describe the life cycle of an amphibian. **Working scientifically:** To suggest how temperature may affect egg hatching.	Describing the life cycle of an amphibian; comparing the life cycles of different amphibians; analysing data; using data to draw conclusions; identifying what further data is needed.	Planning and writing a detailed method to observe over time how the breeding seasons of amphibians change, accounting for variables.
	Life cycle of an insect	5	**Knowledge**: To describe the life cycle of an insect and compare it with that of an amphibian. **Working scientifically:** To use data to describe a relationship and make predictions.	Describing the three-stage life cycle of an insect; describing the four-stage life cycle of an insect; comparing the life cycles of insects and amphibians; identifying patterns in data; using data to make predictions.	Researching a greater range of insects; naming the larval and nymph stages of specific insects; explaining why insects often lay large numbers of eggs.
	Asexual plant reproduction	6	**Knowledge**: To describe asexual reproduction in plants. **Working scientifically:** To represent root growth over time on a line graph.	Describing the changes to a cutting as it grows; explaining the difference between a clone and other offspring; plotting data accurately on a line graph; estimating missing data from a line graph; extrapolating a line graph.	Drawing multiple data lines on a line graph; comparing model data to their data and suggesting reasons for any differences.
Unbalanced forces	Gravity	1	**Knowledge**: To describe gravity and its effects. **Working scientifically:** To analyse data to write a conclusion.	Defining the term gravity; explaining why unsupported objects fall towards the Earth; describing the relationship between mass and gravity; analysing data and identifying anomalies; comparing data to a prediction; describing the relationship between two variables.	Describing the relationship between distance and gravity; explaining the interplay between mass and distance and how these affect the gravity of different planets.
	Air resistance	2	**Knowledge**: To describe air resistance and its effects. **Working scientifically:** To plan a fair test to investigate air resistance.	Defining the term air resistance; describing the relationship between surface area and air resistance; identifying variables; writing a method.	Describing the relationship between weight and air resistance.
	Water resistance	3	**Knowledge**: To describe water resistance and its effects. **Working scientifically:** To design a results table.	Defining the term water resistance; describing the effects of water resistance; describing the relationship between surface area and water resistance; measuring time accurately; designing a results table for repeat data; calculating an average.	Applying knowledge of air and water resistance and surface area to design streamlined objects; explaining the features that make them streamlined.
	Friction	4	**Knowledge**: To describe friction and its effects. **Working scientifically:** To evaluate a method.	Defining the term friction; describing the effects of forces; predicting the outcomes of balanced and unbalanced forces; evaluating the degree of trust; identifying steps that need improving; suggesting improvements.	Extending an experiment into a new context; applying knowledge of friction to meet a design challenge.
	Levers, pulleys and gears (Part 1)	5	**Knowledge**: To describe the effects of levers, pulleys and simple machines on movement. **Working scientifically:** To draw and label a diagram.	Explaining the purpose of levers, pulleys and gears; drawing a diagram of a wind powered pulley; labelling a diagram.	Annotating a diagram to explain the important design features; identify design improvements; explain how pulleys work.
	Levers, pulleys and gears (Part 2)	6	**Knowledge**: To describe the relationship between lever length and effort. **Working scientifically:** To draw an accurate line graph.	Naming the three things needed for a lever; listing uses of levers; explaining how changing the length of a lever will affect the effort needed to lift the load; labelling the axes on a line graph; plotting data on a line graph; drawing a line of best fit.	Extrapolating a line graph; estimating missing data using a line graph.
Human timeline	Growing old	1	**Knowledge**: To describe how humans change from babies through to old age. **Working scientifically:** To use a line graph to identify patterns in height and predict values.	Ordering the stages in growth and development from birth to old age; describing physical and developmental changes from a baby through to old age; describing growth from baby to adult; identifying where on a graph the rate of growth changes; using a line graph to make predictions about height.	Independently adding their own examples to the human timeline; explaining why some are more difficult to sort than others.
	Puberty	2	**Knowledge**: To identify changes in males and females as a result of puberty.	Describing changes that occur in males and females during puberty; suggesting ways to manage the changes that occur during puberty.	Explaining which aspect of puberty they would most like to remove and justifying scientifically.

	Comparing human gestation	3	**Knowledge**: To explore the gestation periods of humans and other animals. **Working scientifically:** To plot data on a scatter graph.	Recalling what is meant by a gestation period; describing how gestation varies across animals and comparing this to humans; choosing a suitable title and axes labels for the scatter graph; plotting data on the scatter graph.	Plotting the points on the scatter graph accurately; comparing the dependency of newborn animals to that of humans alongside the gestation period.
How does the size of an asteroid affect the diameter of its impact crater?	Investigating asteroid craters - Planning	1	**Knowledge**: To revise the units 'Earth and space' and 'Life cycles and reproduction'. **Working scientifically:** To plan a comparative test.	Comparing an asteroid to a celestial body; describing the bird life cycle; forming a prediction; identifying variables; designing a data table.	Identifying the forces involved in an asteroid collision; suggesting reasons why it could be useful to mine asteroids.
	Investigating asteroid craters - Gathering data	2	**Knowledge**: To revise the units 'Unbalanced forces' and 'Mixtures and separation'. **Working scientifically:** To gather and record data.	Describing the effects of gravity and air resistance; comparing the properties of materials; gathering data; recording data; measuring accurately in centimetres.	Identifying anomalous data; suggesting reasons why mining in space might be difficult.
	Investigating asteroids - Analysing, concluding and evaluating	3	**Knowledge**: To revise the Separating mixtures and Unbalanced forces units. **Working scientifically:** To conclude and evaluate the investigation.	Choosing the appropriate separation technique for separating different mixtures; describing the effects of unbalanced forces; writing a conclusion that refers to data; evaluating the trustworthiness of a method; suggesting further questions.	Estimating from a line graph; extrapolating a line of best fit; predicting new values.