

To Expected and Beyond (Exceeding)

A resource to help teachers assess pupils against the individual statements in the science programme of study Upper Key Stage 2 - Years 5 and 6

Introduction

This resource is designed to help teachers when assessing pupils against the individual statements of science in the national curriculum. It is to help teachers decide whether a pupil is working at expected or exceeding for any particular statement.

There are no success criteria in this document for emerging, it was decided that assessing a pupil as emerging was reasonably straightforward.

The document focuses on the knowledge part of the curriculum, not Working Scientifically.

The criteria must not become a tick list! The document is not a planning tool. The success criteria represent a selection of things that a pupil at a particular age/stage might be able to do. There will be many exceptions to the examples given here. A pupil does not have to be able to do each of the bullet points under a statement in order to be assessed as expected or exceeding.

On some occasions the criteria for 'exceeding' includes material from the next stage. This DOES NOT imply that the teacher has taught this material, or needs to teach this material, but that the pupil already has a knowledge beyond expected, perhaps due to a personal interest in that particular subject area.

It is assumed that a pupil who is assessed as 'exceeding', also meets the criteria for expected.

Living things and their habitats Year 5

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

Expected

- Understands which animals are classified as mammals, amphibians, insects and birds and why
- Describes a life cycle of at least one animal from each of the above groups, e.g. hatching eggs into chicks and seeing them develop into fully grown chickens
- Compares the life cycles of animals from different groups, describing the differences and similarities
- Explains possible reasons for similarities and differences in observed life cycles

Exceeding

- Compares animals within one group,
 e.g. a variety of mammals sheep,
 dolphin, elephant and human
- Explains why death is not usually included in a life cycle

Describe the life process of reproduction in some plants and animals

Expected

- Knows about sexual reproduction in plants, e.g. foxgloves, buttercups, dandelions, naming the male and female parts of a plant associated with reproduction and each parts function i.e. petals, stigma, stamen (anther and filament), style, ovary and ovule, seed
- Knows about asexual reproduction in plants, e.g. tubers, bulbs and runners (spider plant, strawberry plant)
- Knows that sexual reproduction in animals needs an egg and a sperm

- Knows that sexual reproduction produces new varieties of the organism whereas asexual reproduction produces an exact copy of the parent
- Is aware that DNA is the 'building block' of life

Animals, including humans Year 5

Describe the changes as humans develop to old age

Expected

- Lists and orders the changes as humans develop from birth to old age, e.g. baby, child, teenager, adult, elderly adult
- Describes the differences in humans as they develop, relating to the following characteristics - height and weight, movement, speech, teeth, nutrition, excretion
- Describes the changes experienced during puberty, e.g. change in body structure (i.e. broadening of the hips/shoulders, deepening of the voice, facial and pubic hair, development of the reproductive organs and the menstrual cycle) and change in emotions

- Compares the amount of bones between a baby and an adult
- Compares the cognitive skills of a human at different developmental stages
- Knows that animals other than humans develop at different rates, e.g. that a guinea pig can reproduce within weeks of being born
- Knows that changes in body structure and emotions are the effect of hormones
- Knows about the menopause

Properties and changes of materials Year 5

Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets

Expected

- Explores and compares everyday
 materials and groups them using the
 correct vocabulary to explain their
 properties, e.g. soluble, transparent,
 conductive or magnetic
 e.g. recognises that some electrical
 conductors will produce a brighter bulb
 in a circuit than others
 e.g. recognises that some thermal
 conductors will feel hotter than others
 when a heat source is placed against
 them
- Identifies similarities and differences when comparing the properties of everyday materials

Exceeding

 Knows that certain groups of materials have particular properties but that these are not generic to the whole group, e.g. although materials that are magnetic are metals, not all metals are magnetic

Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution

Expected

- Knows that when a solid dissolves in a liquid the solid is no longer visible
- Knows that a solution is a mixture of a solid (or a liquid) with a liquid where the solid had dissolved
- Identifies a variety of materials that are soluble and those which are not
- Knows that melting changes a solid to a liquid as a result of heating
- Explains how the process of evaporation will recover the original material from the solution
- Has a clear understanding of the difference between dissolving and melting and can give examples of both, e.g. ice melts, sugar dissolves, chocolate melts, salt dissolves

- Knows that a solution can become saturated when too much solute is added
- Knows some of the additional vocabulary, e.g. solvent and solute
- Is aware that some materials do not dissolve and form a mixture (emulsion), e.g. oil droplets in water

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

Expected

- Explains the difference between filtering and sieving and when it would be appropriate to use each method depending on particle size
- Separates mixtures of two materials, e.g. soil in water using filtering, sieving and evaporating and explains why they chose those methods

Exceeding

 Can separate a mixture of three or more materials that requires separation in order, e.g. sand, salt and lentils using knowledge of solubility and evaporation

Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

Expected

- Based on the results from their own tests, explains why materials are suited to their purpose, e.g. testing a range of fabrics to decide which is the best for a raincoat, testing a range of metals to make a switch in a circuit
- Carries out research to find out how scientists create new materials for specific purposes

Exceeding

- Recognises that materials are suitable for a purpose due to a combination of their properties, although one property may be dominant, e.g. glass is used in most windows but not just because it is transparent!
- Offers alternative suggestions for the use of a material, based on knowledge of properties discovered during testing, e.g. recognises that the best fabric for a raincoat would also be suitable for a tent or caravan awning

Demonstrate that dissolving, mixing and changes of state are reversible changes

Expected

- Given a range of materials to select from, can demonstrate dissolving, mixing and changes of state and knows how to reverse the change, e.g. dissolves sugar in water, coffee granules in water and uses evaporation to reverse the change e.g. mixes pasta and tapioca and selects appropriate sieves to separate e.g. freezes an unfrozen ice pop (or water in a container) and removes from the freezer to reverse the change
- Understands and uses the vocabulary 'reversible' and 'irreversible' change

Exceeding

 Gives further examples of reversible change and can talk about their application, e.g. compressing a metal spring (in the front forks of a bike) Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Expected

- Recognises changes that are irreversible and explains why in simple terms, e.g. when we burn wood we can't get it back
- Recognises that new materials can be made as a result of irreversible changes, e.g. mixing vinegar and bicarbonate of soda gives carbon dioxide gas, iron oxide forms as a result of rusting

- Recognises that during some irreversible changes heat is produced, e.g. when mixing plaster of Paris
- Gives further examples of irreversible change and can talk about their application, e.g. reaction of yeast when making bread

Earth and space Year 5

Describe the movement of the Earth, and other planets, relative to the Sun in the solar system

Expected

- Knows that the Sun is a star
- Knows that the Sun is at the centre of the solar system
- Knows the names of the eight planets in the solar system
- Knows that the Earth and the other planets in the solar system orbit the Sun
- Knows the order (distance from Sun) of the eight planets in the solar system
- Knows that it takes 365¼ days for Earth to orbit the Sun
- Recognises that it is dangerous to look at the Sun, even when wearing sunglasses

Exceeding

- Knows that the planets take a different amount of time to orbit the Sun
- Knows that planets orbiting the Sun travel at different speeds
- Knows how long it takes planets in the solar system to orbit the Sun (other than Earth)
- Describes the conditions on the planets
- Explains an eclipse lunar or solar
- Explains what a leap year is

Describe the movement of the Moon relative to the Earth

Expected

- Knows that a moon orbits a planet (not a star)
- Knows that one moon orbits the Earth
- Knows that it takes 29.5 days for Earth's Moon to orbit the Earth

Exceeding

- Describes the Moon as Earths natural satellite
- Knows that although the Moon rotates on its own axis we only see one face of the Moon from Earth, because the Moons rotational period is exactly the same as its orbital period
- Knows about the phases of the Moon
- Knows that planets other than Earth have moons, e.g. the four moons of Jupiter

Describe the Sun, Earth and Moon as approximately spherical bodies

Expected

- Describes the Sun, Earth and Moon as being similar to a ball in shape and knows that the term for this shape is spherical
- Names other items that are spherical or approximately spherical

- Describes the Earth and the Moon as spheroid (almost spherical) whereas the Sun is very nearly a perfect sphere
- Knows that although the Sun, Earth and Moon are all approximately spherical in shape, they are very different in size

Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Expected

- Knows that the Earth spins on its own axis whilst it orbits the Sun
- Knows that it takes one day (24 hours) for the Earth to make a complete rotation on its own axis
- Explains the Earth's axis as an imaginary line passing through the North and South Poles
- Explains that when it is light on one side of the Earth, it is dark on the other (because the side of the Earth where it is dark is facing away from the Sun and vice versa)
- Explains why it appears that the Sun moves across the sky and knows that this is caused by the rotation of the Earth
- Knows that the Sun (appears to) rise in the east and set in the west (approximately)

- Knows that the Sun, the Moon, the planets, and the stars all (appear to) rise in the east and set in the west because Earth spins toward the east, in an anticlockwise direction
- Describes the difference between geocentric and heliocentric models of the solar system

Forces Year 5

Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

Expected

- Knows that all forces are either pushes or a pulls
- Knows that gravity is an invisible 'pull' force
- Knows that all unsupported objects will fall towards the ground, due to the gravitational pull of Earth
- Communicates their research findings about the different theories on gravity

Exceeding

- Knows that most forces usually occur in pairs
- Knows that all objects 'pull' other things to themselves but heavier objects have a bigger 'pull'
- Knows that falling objects increase their speed as they fall because their weight (the force of gravity) pulls them to Earth
- Explains that gravity acts upon mass and gives objects weight
- Knows that all objects free fall at the same rate of acceleration regardless of their mass
- Explains why supported objects do not fall to the ground and refers to balanced forces
- Compares and contrasts gravity on different planets
- Knows that whilst there is no air in space there is gravity (keeping the planets in orbit)
- Talks about objects as having a 'centre of gravity' and can demonstrate this by balancing, e.g. a ruler on their finger

Identify the effects of air resistance, water resistance and friction, that act between moving surfaces

Expected

- Knows that friction occurs when two objects rub against each other
- Knows that air resistance and water resistance are both kinds of friction
- Explains that air resistance is a force that is caused by air. The force acts in the opposite direction to an object moving through the air, e.g. a falling parachute
- Explains that water resistance is a force that is caused by water; the force acts in the opposite direction to an object moving through the water, e.g. a moving boat

- Knows that when friction occurs, energy is lost to the surroundings as heat
- Knows that friction can generate static electricity
- Talks about friction in everyday life and says whether the friction is helpful or unhelpful

- Knows that friction can be reduced explains how a streamlined object is
 designed or built with a smooth shape
 so that it moves with less resistance
 through air or water, e.g. a rocket or a
 submarine
- Knows that friction can be reduced by adding a lubricant, e.g. oil in a car engine, oil on a bicycle gears
- Knows that friction can be increased, e.g. by having a thicker/deeper tread on bicycle tyres

Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

Expected

- Gives examples of levers used in everyday life, e.g. bottle opener, a screwdriver used to open a paint tin, scissors, oars on a boat, a shoehorn
- Knows that a lever helps you lift or move something heavy
- Gives examples of pulleys used in everyday life, e.g. a crane, a roller blind
- Knows that a pulley helps you raise, lower or move a load
- Gives examples of gears used in everyday life, e.g. on a bicycle
- Knows that a gear can increase speed, increase force or change direction

- Knows that levers, pulleys and gears are simple machines
- Gives more everyday examples of gears, pulleys and levers and explains their purpose

Living things and their habitats Year 6

Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals

Expected

- Explains what a classification system is and why classification is used
- Groups animals and plants according to certain observable characteristics or similarities and differences, e.g. animals that have wings, plants that produce flowers
- Knows that the broad groups can be subdivided, e.g. animals into invertebrates/invertebrates
- Uses a classification system or key (e.g. a branching tree) to help identify animals or plants common to their immediate environment
- Recognises the significance of the work of scientists in this field, e.g. Carl Linnaeus

Exceeding

- Decides which group a variety of unfamiliar animals or plants belong to
- Identifies the further subdivision of broad groups e.g. invertebrates could be divided into; insects, molluscs, crustaceans, corals, arachnids, worms etc

Give reasons for classifying plants and animals based on specific characteristics

Expected

- Identifies and explains some of the specific characteristics used to classify plants and animals, e.g. all mammals produce milk but not all have a covering of hair (dolphins)
- Explains why it is necessary to classify plants and animals (it is the way scientists categorise and organise all of life. It can help to distinguish how similar or different living organisms are to each other)

Exceeding

No statements provided

Animals, including humans Year 6

Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood

Expected

- Knows the following vocabulary: heart, lungs, pulse, circulation, blood vessels, blood
- Describes the functions of the heart (pumping the blood), blood vessels (channelling the blood around the body), blood (transports nutrients and gases around the body)
- Knows that the heart is a muscle
- Labels a given diagram of the circulatory system using the words: heart, lungs, blood vessels, blood

Exceeding

- Knows some of the additional vocabulary: veins, arteries, capillaries, chambers, valves, aorta, oxygenated/deoxygenated blood, oxygen and carbon dioxide
- Begins to explain the function of some of the above
- Begins to understand the structure of the heart, e.g. valves to stop blood flowing the wrong way
- Draws and labels a diagram of the circulatory system

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Expected

- Knows that eating a balanced diet can help to keep the body healthy and recognises the main food groups (i.e. proteins, carbohydrates, fats, fibre, vitamins and minerals) and their functions, e.g. carbohydrates for energy
- Plans a diet suitable for a person with specific needs, e.g. for an athlete, an elderly person
- Knows the effects of exercise on the body, e.g. strengthens the heart and other muscles, strengthens bones, increases the body's ability to burn fat
- Defines what a drug is (a substance that has a known biological effect on humans or other animals)
- Knows about drugs common to everyday life, e.g. caffeine, nicotine and alcohol and that these can be addictive
- Knows that all medicines are drugs but that not all drugs are medicines and that some medicines are only prescribed by a doctor/dentist
- Recognises some of the effects of drugs on the human body, e.g. caffeine increases heart rate

- Knows about calories and how the amount of calories different people need varies, e.g. according to age, gender, lifestyle
- Explains how different forms of exercise develop different aspects of fitness, e.g. muscular strength, aerobic, cardio-vascular fitness, flexibility
- Begins to understand the dangers of recreational drugs
- Describes the impact of drugs on the body in more detail, e.g. how alcohol affects the liver, how tar (smoking) affects the lungs

- Recognises that taking certain drugs can have serious impact on a person's health
- Knows that lifestyle i.e. the combination of sleep, stress, diet and exercise, all impact upon health

Describe the ways in which nutrients and water are transported within animals, including humans

Expected

 Knows that the foods we eat are broken down (by saliva and stomach acids) into smaller particles (nutrients) and are absorbed into the blood to be transported around the body

Exceeding

 Knows that nutrients are absorbed when food passes through the small intestine

Evolution and inheritance Year 6

Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

Expected

- Explains how fossils can be used to find out about the past, including animals that are now extinct, e.g. fossil records of dinosaurs
- Recognises that new fossil discoveries change scientists understanding of, e.g. dinosaurs
- Explains that living things, e.g. humans, have changed over time and continue to change

Exceeding

 Knows that organisms can be turned into fossils in a number of ways, e.g. unaltered preservation – insects trapped in amber

Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

Expected

- Recognises that offspring often have similar characteristics to their parents, e.g. parents can have children with similar facial features as their family e.g. parent Labrador dogs of the same colour i.e. brown can have a black or cream puppy
- Knows that scientists/breeders try to combine parent species to create a new generation with selected qualities, e.g. GM crops, Labradoodle dogs

- Starts to consider the ethical implications of human intervention, including cloning
- Suggests further examples of selective breeding that would be beneficial
- Recognises that selective breeding can have negative and often unpredictable side effects

Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Expected

- Defines the words adaptation and evolution in simple terms adaptation - the special characteristics that enable plants and animals to be successful in a particular environment evolution - a gradual process in which something changes into a different and usually more complex or better form
- Explains a link between adaptation over time and evolution, e.g. the change over time of the colouration of the Peppered Moth
- Recognises that an animal or plant has adapted over time due to changes in its environment, e.g. temperature, lack of water, lack of food
- Independently researches the work of a palaeontologist, e.g. Mary Anning or Charles Darwin

- Predicts how humans might evolve in the future
- Discusses how global warming might affect the evolution of plants and animals
- Talks about how non-living things have been adapted over time to become more complex and better for purpose, e.g. cars, mobile phones

Light Year 6

Expected • Knows that light travels from a source - artificial and natural • Using e.g. mirrors, a periscope, a torch and three pieces of cards with a hole in the middle or by drawing a diagram,

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

Expected

 Explains the difference between sources of light and objects that only reflect light (that without a light source it is dark and therefore we cannot see objects that do not emit light)

explains how they know that light appears to travel in straight lines

- Explains using arrows (drawn on diagrams or using cardboard arrows) that light from a source enters the eye when we see it
- Explains (using arrows as above) how we see objects that do not emit light and shows how the light from a source reflects off them then into our eyes

Exceeding

 Explains using diagrams, how light travels through a series of reflections then into your eye, such as viewing the back of your head using mirrors when at the hairdressers

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	
Expected	Exceeding
 As for above statement 	 As for above statement

Use the idea that light travels in straight lines to explain why shadows have the same shape as objects that cast them

Expected

- Explains the difference between a reflection and a shadow
- Understands that a shadow is formed when light travelling in straight lines is blocked by an object
- Predicts, using accurate drawings, what shadows formed by different objects will look like

- Predicts, using accurate drawings, how shadows formed by different objects might change when the direction or brightness of the light changes
- Knows that the size of a shadow depends not only on the size of the object casting the shadow but also on the position of the light source

Electricity Year 6

Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

Expected

- Recognises that increasing the number of cells in a circuit will make the lamp (bulb) brighter or the buzzer louder
- Knows that the more cells added to a circuit, the bigger the voltage
- Knows that cells must be connected the right way round if their voltages are to add up
- Knows that with too many volts, the current is too big and the lamp (bulb) will burn out

Exceeding

- Knows the difference between current and voltage
- Knows that voltage tells us how much a battery pushes the current

Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches

Expected

- Knows that the length of wires and thickness of wire can alter the brightness of the lamp (bulb), the loudness of a buzzer or the speed of a motor
- Knows the effect on the brightness of the lamp (bulb) when additional lamps are added to the circuit
- Makes and uses a simple switch to use in a series circuit and explains how the switch works, using the terms open switch and closed switch
- Knows that a switch can be anywhere in the circuit

- Knows that a cell pushes the current round the circuit and through e.g. the lamps
- Knows that current is a measure of how much electric charge flows through a circuit
- Explains that the more e.g. lamps (bulbs) there are, the harder it is for the current to flow because there is more resistance in the circuit
- Knows that resistance tells us how difficult it is for the current to flow
- Explains how a component in a parallel circuit can keep working when another component is removed or damaged
- Knows that when additional lamps (bulbs) are added to a parallel circuit the brightness of the lamps (bulbs) will not be any dimmer

Use recognised symbols when representing a simple circuit in a diagram

Expected

- Knows the recognised symbols that represent the common components in a simple circuit
- Draws a simple (correct) series circuit using the recognised symbols

- Uses recognised symbols to draw a representation of a more complicated circuit, e.g. a parallel circuit
- Knows (and correctly uses in a circuit representation) the recognised symbols for components other than those in a simple circuit e.g. a resistor, a LED