KESTEVEN AND SLEAFORD HIGH SCHOOL

Science Scheme of Learning

Year 7 – Term 2/Units 2

Intent – Rationale

Students learn about the male and female reproductive systems, followed by puberty and the menstrual cycle. They consider the role of sexual intercourse, gametes and fertilisation, pregnancy and birth. They move on to learn about reproduction in plants, starting with flowers. This is followed by seed and fruit formation and seed dispersal.

Students learn about atoms and their arrangements. They consider atomic structure and subatomic particles. Followed by elements, the periodic table and measuring physical properties of elements.

Students learn about force interactions including at the atomic level. They consider the effect of forces on shapes and balanced and unbalanced forces. They also learn about friction forces; when they are useful and not useful.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
KS2 NC Y5 Properties and changes of materials **KS2 NC Y5 Forces** **B7.1 Cells and tissues** **C7.1 Particles** **P7.1 Energy transfers**	• Topic B8.12 Microbes. Topic C7.2 Atoms and Elements, C7.5 Simple chemical reactions, C7.6 Compounds, C8.9 Reactions of acids, C8.10 Describing reactions. Topic P7.2 Forces and effects, P7.3 Electricity, P7.4 Energy resources, P7.5 Magnets and electromagnets, P7.6 Motion, P8.10 Application of forces, P8.11 Heat transfer. • GCSE Units B1 Cell structure and transport, B2 Cell Division, B3 Organisation and the digestive system, B4 Organising animals and plants. • CGSE Chemistry Topic 1 Atomic Structure and the Periodic Table, Topic 3 Bonding • GCSE Physics Units P8 Forces in balance, P9 Motion, P10 Forces and motion
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work	• Use the coded help guides to complete this section
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
FROM THE LIBRARY *Making Life*; Richard Walker 612 *Fertility and Reproduction*; Cara Acred. Issues section *Everything You Ever Wanted to Know About Periods*; Charlotte Owen- 613 *Incredible Plants*; Barbara Taylor-581 *Plant; DK eyewitness*- 581 *Plant Classification;* Richard Spilsbury-580.12 *Energy;* J. Challoner-531 *Fatal Forces* ;Nick Arnold -531 *Force and Motion*; DK eyewitness Guide-531	• Calculate the volume of cuboids • Mean • Calculate resultant forces

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Science Scheme of Learning

Year 7 – Term 2/Units 2

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- Describe the differences between asexual and sexual reproduction. Describe the changes that occur during puberty in men and women. Describe how sexual intercourse leads to pregnancy. Describe how a baby develops within the uterus. Describe the structure and function of a flower. Describe the steps that occur during fertilization. Describe four ways in which seeds are dispersed. Describe steps in an investigation planning for repeats.
- Recall the symbols for some common elements. State the meaning of the term atom. Name the three types of sub-atomic particle and state their mass and charge. State and use the equation used to calculate density.
- Describe what forces are and what effect they have on objects. Explain the difference between elastic and plastic deformation. Describe the effects of balanced and unbalanced forces. Explain what causes fiction and what it is.

Apply

- Describe the male and female reproductive systems. Describe the adaptations of sperm and eggs. Dissect flowers and identify parts. Describe all the changes that happen in a flower after fertilisation. Selected one independent variable and one dependent variable. Identified controlled variables in order to make it a valid test.
- State that all elements are listed on the Periodic Table in such a way that patterns can be seen in their properties. Calculate the volume of cuboids.
- State which forces are contact and non-contact forces. Explain the pattern shown in the data based on prior knowledge. Identify from real examples balanced and unbalanced forces.

Extend

- Explain some reasons and treatments for infertility. Describe the menstrual cycle. Explain how fertilisation occurs. Describe the process of birth. Explain two ways in which flowers are pollinated. Explain the difference between fruits and vegetables. Explain the adaptations of seeds. Suggest a hypothesis that relates to the independent and dependant variable.
- Give some examples of diatomic elements. Describe how ideas about atoms have changed over time. Describe how scientists used evidence from experiments to help develop ideas about atoms. Describe how to measure the volume of irregular objects.
- Explain what some common forces are. Explain how you can practically investigate Hooke's Law. Calculate resultant forces. Describe examples of when friction is useful and not useful.

What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
	• B7.2 L2 quick quiz puberty and the menstrual cycle • Show you can challenge B7.2 L3, B7.2 L4, C7.2 L1, C7.2 L2, C7.2 L3, P7.2 L1, P7.2 L3 • B7.2 L8 **Planning** an investigation into the factors that affect seed dispersal. • C7.2 L2 *Analysing skills* • P7.2 L2 Making a force meter practical ***Analysis and evaluation***

Word	Definition
Amnion	One of the protective membranes that surrounds a developing foetus in the uterus. The amnion is also present in reptiles and birds. Inside the amniotic sac is amniotic fluid that supports, protects and insulates the foetus.
Amniotic fluid	A liquid that is found inside the amniotic sac, surrounding the developing foetus. It protects the foetus from knocks and allows it to move freely. Amniotic fluid is mainly water with some urea and other substances dissolved in it. The foetus drinks small quantities of amniotic fluid and then excretes the liquid as urine.
Cervix	The lower, narrow part of the uterus (womb), where it joins the top of the vagina. The cervix has an opening that allows menstrual fluid to leave the uterus and pass into the vagina, and allows sperm cells to swim from the vagina into the uterus.
Egg	The gamete (sex cell) that is produced by a female animal. An egg is also called an ovum (plural ova). Eggs are produced in ovaries.
External fertilisation	When the nuclei of eggs and sperm fuse outside the body. Animals that use external fertilisation include fish and amphibians.
Fertilisation	When the nuclei of male and female gametes (sex cells) fuse together. Fertilisation in many animals is internal, which means that it takes place inside the body of the female (mammals, reptiles, birds, insects), and in others is external (fish, amphibians).
Foetus	The developing baby inside the womb after 8 weeks of pregnancy. Before eight weeks it is known as an embryo.
Gametes	The cells involved in reproduction. In humans and other animals, one gamete comes from the man and one from the woman: In humans the sperm cells and egg cells are the gametes.
Gestation	Another term for pregnancy. The length of gestation in humans is around 40 weeks. In general, the larger the mammal, the longer the gestation period.
Hormones	Chemicals produced inside an animal or plant that cause changes to other parts of the body. Hormones are often complicated molecules, and in vertebrates they are usually carried in the blood. Examples of hormones in humans include oestrogen, testosterone, adrenaline, insulin and glucagon.

Implantation	In pregnancy, implantation is when the developing embryo attaches to the lining of the uterus (womb). At the point where it attaches to the lining, an organ called the placenta grows.
Infertility	When a man, woman or couple are unable to reproduce. In men, infertility is often caused by the sperm cells being unable to swim effectively, or by there being insufficient sperm to have a good chance of one reaching the ovum. In women, infertility can be caused by the ovaries not releasing an ovum on a regular basis or by problems in the Fallopian tube.
Internal fertilisation	When the sperm and egg meet (and their nuclei fuse) inside the female's body. This occurs after sexual intercourse has taken place. Internal fertilisation takes place in mammals, reptiles, birds, insects and some other animals from other groups.
IVF (in-vitro fertilisation)	A type of fertility treatment that involves the ovum (egg) being fertilised by a sperm outside the woman's body. One method of IVF involves extracting an ovum from a woman's body and injecting the sperm cell into the cytoplasm of the ovum, in the hope that the nuclei of the two cells will then fuse.
Menstrual cycle	The cycle of events in a female human that relates to her ability to reproduce. The cycle starts on the first day of her period (menstruation) and finishes the day before her next period starts. The average length for menstrual cycles is 28 days.
Menstruation	When the lining of the uterus (womb) breaks down and passes out of a woman's body through her vagina. This usually has the appearance of thick dark blood. In most women, menstruation takes about 3–5 days.
Oestrogen	A group of female sex hormones produced by the ovaries in all vertebrates (including humans) which are responsible for the development of female secondary sexual characteristics during puberty (e.g. the development of breasts). They are also involved in some aspects of the menstrual cycle.
Ovary	In animals, this is an organ in the female in which eggs are produced. In plants, this is the part of a carpel that surrounds the ovules and forms the fruit after fertilisation.
Oviduct	The tube in the female reproductive system between the ovary and the uterus. This is also normally where fertilisation occurs. The oviduct is also called the Fallopian tube.
Ovulation	The release of an egg from an ovary. In humans, ovulation occurs around day 14 of the woman's menstrual cycle.
Penis	The male sex organ that is inserted into the woman's vagina during sexual intercourse. Semen is ejaculated from the penis when a man has an orgasm and this is the fluid that contains the sperm cells. Urine is also excreted through the penis.
Placenta	The organ that provides a developing foetus with oxygen, glucose and other essential chemicals from the mother's blood without the blood of the foetus and the mother actually mixing. The placenta also removes carbon dioxide, water and other waste products from the foetus' blood.
Puberty	A period during growing up when the reproductive system in boys and girls matures and starts to become active. Puberty describes physical changes that take place (breasts develop, pubic and body hair grows, etc.), whereas adolescence describes emotional changes.

Sperm	The male gamete (sex cell). Sperm are produced in the testes. When a man ejaculates, approximately 250 million sperm cells are released in his semen.
Sperm tube	One of the two tubes that carry sperm from the testes to the urethra; also called the vas deferens. During a vasectomy operation, the two sperm tubes are cut, tied and a section of each tube is often removed.
Testis (plural testes)	An organ in the male reproductive system that produces sperm. In humans, the testes are held in the scrotal sac outside the body, below the penis.
Testosterone	A male sex hormone that is produced by the testes. It controls the development of male sexual characteristics.
Umbilical cord	A collection of blood vessels and connective tissue that join the foetus to the placenta. The umbilical cord is clamped and cut a few minutes after a baby is born. The short section that is left joined to the newborn baby falls off about a week after birth and leaves the navel (belly button) behind.
Urethra	The tube that carries urine out of the body from the bladder. In a man it also carries sperm during sexual intercourse.
Uterus	The organ in a female mammal's reproductive system where the foetus develops during pregnancy. Also called the womb.
Vagina	An organ in the female reproductive system of mammals that joins the uterus to the outside of the body. During sexual intercourse, the penis is inserted into the vagina.

Word	Definition
Adaptation	A physical or behavioural characteristic that an organism has evolved in order to allow it to have the best chance of survival in a particular habitat
Anther	The part of the stamen that contains the pollen grains. The other part of the stamen is called the filament. In wind-pollinated plants, the anthers hang outside the plant to catch the wind. In insect-pollinated plants, the anthers are positioned so that they rub against the insect when it visits the flower to feed.
Carpel	The female part of a flower, which consists of three parts. The ovary contains the ovules; the style is a fleshy stalk; and at the top of the style is the stigma, which has a sticky surface to capture pollen grains.
Competition	Living things within a habitat will fight for resources that are valuable to them.
Filament	When this term is applied to plants, the filament is the part of the male section of the flower that holds the anther at its tip.
Germinate	When a seed sprouts a root and a shoot as it begins to turn into a plant. Seeds are very stable and often capable of lasting for many years in conditions that would not allow a plant to survive; however, when the conditions are suitable, they can germinate. Water, warmth and oxygen are needed for germination.
Nectar	A sweet liquid produced by some flowers to attract insects, which will result in the insects pollinating the flowers.
Ovary	In plants, this is the part of a carpel that surrounds the ovules and forms the fruit after fertilisation.
Ovule	The part of a carpel containing the female sex cell. The ovule forms a seed after fertilisation.
Pollen grain	The part of a flower that contains the male gamete (sex cell). Pollen grains can either be transported by the wind or by insects. The shape of the pollen grain tends to indicate the method by which it is transferred to another flower.
Pollen tube	The tube that grows from a pollen grain down the style and to the ovule and carries the male sex cell in the later stages of pollination.
Pollination	The process in plants by which a pollen grain is transported (usually by an insect or by the wind) from the male part of a flower on one plant to the female part of a flower on another plant. This is an important stage in the reproduction of flowering plants.
Seed dispersal	The spreading of seeds away from the parent plant by wind, animals, water or the explosive mechanisms of a seed pod.
Stamen	The male part of a flower. The stamen consists of a filament and an anther, which is the part that holds the pollen grains.

Stigma	The part of the carpel where the pollen lands. The stigma has adaptations to help it to capture pollen grains.
Style	The part of the carpel that joins the stigma to the ovary.

Word	Definition
Atom	The smallest particle of an element
Calibrated	When a piece of measuring equipment, such as a top pan balance or ruler, has been checked against a known standard reference to ensure that it is accurate.
Compound	A pure substance made from more than one element in which the atoms combine in a fixed ratio.
Density	A measurement of an object's mass compared to its volume.
Diatomic	When a molecule is made from two identical atoms.
Element	A pure substance made from only one type of atom.
Molecule	A cluster of atoms that are joined by covalent bonds.
Properties	The characteristics of a substance that make it well suited (or poorly suited) for a particular purpose.
Relative atomic mass	The mass of an atom in terms of the total number of protons and neutrons in its nucleus.
Subatomic	Smaller than an atom, or part of an atom.

Word	Definition
Air resistance	A force that acts on a moving object as it passes through air, acting in the opposite direction to the direction of travel and thus having the effect of slowing the object down or preventing it from accelerating.
Applied force	The force that is applied to an object. It is an example of a contact force.
Balanced forces	Forces are balanced when they are equal in size and act in opposite directions. There will be no resultant (overall) force
Contact force	A force between two objects that are touching.
Electrostatic force	A non-contact force that acts between particles or objects that have electrical charges. If the charges are the same, the objects or particles will repel. If the charges are opposite, the objects or particles will be attracted.
Equilibrium	Balance. When an object is in equilibrium, there is no resultant (overall) force acting on it and it is stationary
Extension	The increase in length of an object
Friction	A force that acts when two substances touch each other. Friction always opposes motion, preventing two surfaces from sliding over each other, or acting to slow them down if they are already moving.
Gravity	A force that attracts any two objects together as long as they have mass. The strength of gravity is so small that we do not notice it unless one of the objects is very large indeed (like a planet). Gravity is the force that pulls all objects on or near Earth towards the centre of the Earth.
Hooke's law	A law devised by Robert Hooke in the 1600s that states that within a certain limit, the extension or compression of a spring is directly proportional to the force applied to the spring.
Load	A downwards force on an object due to the weight of the items it supports. For example, the load on a wheelbarrow is the weight of the bricks that are in it.
Lubricant	A substance (usually a liquid but sometimes a solid) placed between two surfaces in order to reduce the friction between them.
Magnetism	A non-contact force between two magnets (which can either attract or repel), or between a magnet and a magnetic material (which can only attract each other).
Newton meter	An instrument used to measure the size of a force, in newtons (N).
Non-contact force	A force that acts between two objects even if they are not touching
Plastic deformation	How much an object is permanently stretched (or squashed) by a force acting on it. This is not proportional to the force, and it leaves a permanent change of shape
Resultant force	The overall force on an object; calculated by adding all the forces acting on it.
Support force	The upwards force of a surface on an object that rests upon it; this force balances the downwards force of gravity on the object, and so keeps it stationary. It is also called the reaction force.

Tension	A contact force that occurs when a string, rope or elastic band is stretched. Tension always opposes the stretching force.
Unbalanced force	A force that is not cancelled out by another force, giving a resultant greater than zero. Where an unbalanced force acts, it will cause an object to change shape, speed or direction
Upthrust	The upwards force of a fluid (liquid or gas) on an object within it.

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
B7.2 L1 Reproduction	Can I describe the differences between asexual and sexual reproduction?	Can I explain some reasons and treatments for infertility?	
B7.2 L2 Puberty and the menstrual cycle	Can I describe the changes that occur during puberty in men and women?	Can I describe the menstrual cycle?	
B7.2 L3 Sexual intercourse and fertilisation	Can I describe how sexual intercourse leads to pregnancy?	Can I explain how fertilisation occurs?	
B7.2 L4 Pregnancy and birth	Can I describe how a baby develops within the uterus?	Can I describe the process of birth?	
B7.2 L5 Flowers	Can I describe the structure and function of a flower?	Can I explain two ways in which flowers are pollinated?	
B7.2 L6 Seed and fruit formation	Can I describe the steps that occur during fertilization?	Can I explain the difference between fruits and vegetables?	
B7.2 L7 Seed dispersal	Can I describe four ways in which seeds are dispersed?	Can I explain the adaptations of seeds?	
B7.2 L8 Planning and designing investigations	Can I describe steps in an investigation planning for repeats?	Can I suggest a hypothesis that relates to the independent and dependant variable?	
C7.2 L1 Elements	Can I recall the symbols for some common elements?	Can I give some examples of diatomic elements?	
C7.2 L2 Atoms	Can I state the meaning of the term atom?	Can I describe how ideas about atoms have changed over time?	
C7.2 L3 Atomic structure	Can I name the three types of sub-atomic particle and state their mass and charge?	Can I describe how scientists used evidence from experiments to help develop ideas about atoms?	

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C7.2 L4 Measuring physical properties of elements	Can I state and use the equation used to calculate density?	Can I describe how to measure the volume of irregular objects?	
P7.2 L1 Force interactions	Can I describe what forces are and what effect they have on objects?	Can I explain what some common forces are?	
P7.2 L2 Effects of forces on shape	Can I explain the difference between elastic and plastic deformation?	Can I explain how you can practically investigate Hooke's Law?	
P7.2 L3 Balanced and unbalanced forces	Can I describe the effects of balanced and unbalanced forces?	Can I calculate resultant forces?	
P7.2 L4 Friction forces	Can I explain what causes fiction and what it is?	Can I describe examples of when friction is useful and not useful?	
Summative test	Topic 2 Test		