D&T Conceptual Knowledge

Part 1 of 8

	Responsibility
EYFS	To be added
Y1	
Y2	• **Re-using** and **re-purposing** things we no longer want or need helps to protect our planet by making less rubbish and saving natural resources.
Y3	• The "Responsible Decision-Making Framework" can be used when analysing existing products, developing design criteria and evaluating.
Y4	• The "Responsible Decision-Making Framework" considers why the product exists and how well it does what it is supposed to do (user, function, aesthetics, materials, size and safety).
Y5	• The "Responsible Decision-Making Framework" considers the true cost of a product (environmental). • There is a growing focus on sustainable and "responsible" design.
Y6	• To design in a more sustainable way consider the 6 R's: Reduce, Reuse, Refill, Repair, Recycle, Refuse. • Re-cycling means turning the materials from things we no longer want or need into new material that can be used to make new things. • Upcycling is where we re-purpose a product in a way that creates a new product of higher quality or value than the original. • A product's life cycle is the whole 'life' of the product, from its design, production, use and disposal. • Responsible design involves making choices that are complicated and difficult - there are many different conflicting factors and choices to be made.

D&T Conceptual Knowledge

Part 2 of 8

	Design in the Past, Present and Future
EYFS	To be added
Y1	• Everything around us that is man-made has been designed by humans. • Design is when you create something new (or improve something) to help solve a problem or meet a need.
Y2	
Y3	• Design has a rich and complex history stretching from early human tool-making through the industrial revolution to today's digital age. • Designs have changed over time, for example how phones evolved from early telephones to smartphones. • How we design has changed: From craft-based intuition to systematic methods and computer-aided tools. • User-centred design and human factors are new ways of thinking about design.
Y4	
Y5	• Why we design has changed: From pure functionality to considering sustainability, inclusivity, and social impact. • What we design has changed: From physical objects to services, systems, and experiences.
Y6	• Design is the intentional act of creating solutions and systems that solve problems through planning, creativity, and decision making. • The digital revolution has enabled new forms of design across almost all industries, such as fashion, agriculture and architecture.

D&T Conceptual Knowledge

Part 3 of 8

	Designing
EYFS	To be added
Y1	• **Design values** are all the things you need to think about when designing (or redesigning) something. They can include values such as **materials** and **function**. • **Function** is an important design value because it affects how well a product works and if it does what it is supposed to do. • **Materials** are an important design value because materials can affect the **function** of a product. • **Design criteria** are a list of the things that are important for designing (or redesigning) a specific product and can include different design values. • Designing involves different steps including identifying a problem and generating ideas. • **Identifying a problem** means finding out what is wrong, what needs to be fixed or what could be improved. • **Ideation** is the next part of the design process after you have identified the problem and the design criteria. It involves thinking of lots of different ways you could solve the problem. • There are different ways to help you to think of design ideas including using photographs and existing products as inspiration. • Designing is about trying something and seeing what works and then trying again. • **Testing** is where we look at a product (or prototype) and see if it looks and works as expected and that it is easy and safe to use.
Y2	• Designing involves different steps including identifying a problem, generating ideas, making, testing and evaluating your designs. • A 2D sketch is a flat drawing that shows how something will look from just one side. • **Aesthetics** is an important design value because it affects how people relate to a product. • Materials are an important design value because materials can affect both the **aesthetics** and the function of a product.
Y3	• **Users** are an important design value because it ensures that products meet their needs. • **Size** is an important design value because it ensures that a product fits well in its intended space and is comfortable and practical for users to handle and use. • Problem definition means clearly identifying and articulating what specifically needs to be solved before attempting to create design solutions. • Ideation involves generating and exploring multiple potential design solutions through creative techniques. • COPY-TRANSFORM-COMBINE is a framework you can use for ideation. • Design development can be a cycle where you make (or prototype) an idea, test it and try to improve it. • A prototype is a model of a design idea that you make so that you can test your ideas, see what works and what can be improved. • 2D refers to flat designs with width and height only, 3D adds depth, creating objects with volume and perspective. 2D designs often serve as a planning tools before developing them into 3D forms. • **Computer Aided Design** (CAD) is the use of computer software to create digital designs. • Computer Aided Manufacturing (CAM) is when a machine, for example a 3D printer, is programmed to make a product or part from a CAD design.

D&T Conceptual Knowledge

Part 3 of 8

	Designing
Y4	• The design process is iterative and includes generating and developing ideas; evaluating; testing and refining (making improvements). • **Safety** is an important design value as it protects both the manufacturer and the user from injury. • An exploded diagram shows all the parts of something floating apart like they've been pulled away from each other, so you can see exactly how they all fit together. • A cross-sectional diagram shows what something looks like if you cut it in half and look inside.
Y5	• Design Values help us to make responsible decisions and include why the product exists, how well the product does what it is supposed to do and what the environmental, economic, ethical and social cost of the product is. • **Environmental** is an important design value because it ensures that products are designed in a way that conserves the Earths natural resources. • Designers can design for self, for others, for groups.
Y6	• Review of the above.

D&T Conceptual Knowledge

Part 4 of 8

	Materials
EYFS	To be added
Y1	• Different materials (including different fabrics) have different properties that make them useful for making different objects. • Paper and card are human-made materials that are made from wood pulp, they can also be made by recycling old paper and card. • Paper and card are exceptionally good at being shaped, formed and layered.
Y2	• Wood is a natural material made from trees, it can be re-used or recycled into new products such as paper, cardboard and fibreboard. • Cotton, wool, linen and bamboo are all natural materials that can be used to make fabrics. • Natural textiles are exceptionally good at producing fabrics that work well with the body as they are comfortable, flexible and strong. • Felt is made from short fibres matted together and can be natural (using wool fibres) or human-made (using plastic fibres).
Y3	• Wood is exceptionally good at supporting a load and being shaped. • Concrete and steel are excellent "all-round" materials so are often used as construction materials for structures like bridges and buildings.
Y4	• Metals are natural materials mined from the ground; most metals can be recycled into new products. • Metals excel at providing strength and durability while conducting heat and electricity. • Copper is a good example of a highly conductive metal; it is used for electronic circuits and wires. • Aluminium is the most sustainable metal; it is lightweight and is easy to re-use and recycle.
Y5	• The properties of materials are important when designing and making different products. • All materials are a compromise of different factors such as properties, cost, sustainability. • Plastics are human-made materials made from oil; many plastics can be recycled to produce more plastic. • Polyester, acrylic and nylon are types of human-made plastics that can be used to make fabrics.
Y6	• Bio plastics are made from plants (like corn, potato, seaweed) instead of oil, they are better for the environment because they break down naturally and don't leave harmful plastic waste behind.

D&T Conceptual Knowledge

Part 5 of 8

	Making
EYFS	To be added
Y1	• We must listen to and follow safety instructions. • We need to keep our work area tidy to stay safe. • There is a basic making process: this includes **measuring**, **marking**, **cutting** (or adding) materials and **assembling**.
Y2	• Tools can be dangerous if not used correctly, different tools have specific safe ways to be used and some need adult supervision. • We must wear safety equipment when told to. • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, assembling and **finishing**.
Y3	• We can reduce risk through proper behaviour and procedures. Safe working practices include preparation and cleanup. • Personal protective equipment (PPE) protects specific body parts, examples include aprons, goggles and oven gloves. • Tools have specific hazards we need to understand, some tools require training before use. Different materials can also require different safety approaches. • Emergency procedures exist for different situations. • Materials can be shaped by folding to make a new 3D shape. • Materials can be shaped by building up layers of materials, for example by laminating. • Materials can be shaped by removing from a block of material (subtractive manufacturing), for example by cutting or carving. • Materials can be shaped by forming, this is where the material is pushed and squashed into a new 3D shape, a mould can be used for forming. • Materials can be shaped by casting, this is where the material is melted and poured into a mould, when the material cools down it solidifies in the new 3D shape. • Materials can be shaped by extruding and by building up layers of materials (additive manufacturing), for example by laminating or 3D printing. • **Computer Aided Manufacturing** (CAM) is when a machine, for example a 3D printer, is programmed to make a product or part from a CAD design.
Y4	
Y5	• There is a basic making process: this includes measuring, marking, cutting (or adding) materials, **refining**, assembling and finishing. • Refining means shaping or adding small changes to a product to improve its form or function.
Y6	• In industry 3D printers are often used to make quick prototypes of products directly from 3D CAD designs to test their form or function.

D&T Conceptual Knowledge

Part 6 of 8

	Structures
EYFS	To be added
Y1	• 2D shapes have a length and width, 3D shapes have a length and width and height. • Free-standing structures can be made stronger with stiffer materials, thicker materials, by folding materials or with more layers of material (laminating). • Free-standing structures can be made more stable by having a wider base or a heavier base.
Y2	
Y3	• Triangulation makes structures and joints stronger and more stable. • A shell structure has a continuous outer 'shell' and does not have a frame, like an eggshell or a dome in a building. • A frame structure is made from separate pieces of material called members that form a frame, like climbing frames or houses.
Y4	
Y5	
Y6	• Free-standing structures can be made more stable by adding, stands, ties or buttresses.

D&T Conceptual Knowledge

Part 7 of 8

	Mechanical Systems
EYFS	To be added
Y1	• A **machine** is something that does work for us to help us do things more easily, for example scissors help us to cut materials easier and vacuum cleaners help us to clean the floor. • A **mechanism** is a single part of a machine, mechanisms make changes to movement or make movement easier. • There are different types of movement, these include **linear**, **reciprocating** and **oscillating** movement. • A **slider** is a simple mechanism. It is a rigid beam that moves back and forth on a straight line, for example drawers, sliding doors and extending ladders. • A **lever** is a simple mechanism. It is a rigid beam that pivots (turns), for example door handles, see-saws, scissors and windscreen wipers. • A **linkage** mechanism is a system of levers that are joined together to control movement, for example umbrellas, scissor lifters, tool-boxes and camping chairs.
Y2	• A **wheel** is a round part that turns on a stick (called an **axle**), it is a mechanism that makes it easier to move things. • Wheeled vehicles have different parts including the body, wheels, axles, axle holders and a chassis. • There are different types of movement, including linear, reciprocating, oscillating and **rotary** movement. • There are two types of axle: fixed and free. **Fixed axles** attach to the chassis and can not rotate. **Free axles** are not attached to the chassis and can rotate within the chassis.
Y3	
Y4	• A component is a standard mechanical or electrical part. • (Mechanical) systems have an input, a process and an output. They use mechanisms (the process) to change an input movement (or force) to an output movement (or force). • Mechanisms are components in a mechanical system that change the input movement (or force) to the output movement (or force). • A cam is a simple mechanism that changes rotary motion to reciprocating motion. It is a shaped wheel that pushes a stick (called a follower) up and down as it rotates. Examples of cams are in the pop up mechanism of a mechanical toy or a toaster. • Different-shaped cams produce different follower movements. • A **pulley** is a simple mechanism. It is a grooved wheel that spins on an **axle**, with a rope around it that helps to lift or move heavy things more easily. Pulleys are used on flagpoles for raising flags, for lifting heavy objects on cranes and in elevators. • A **drive belt** can connect two pulleys and transfers movement from one pulley to another. Pulleys and drive belts are used in window blinds and cable cars. • A **gear** is a simple mechanism. It is a wheel with teeth that connects with other gears to help machines move. Gears can make things move more easily or can be used to change the speed (or direction) of movement. Examples of gears include bicycle gears that make it easier to pedal up hills. • A machine is a collection of mechanisms that helps people do work more easily.
Y5	
Y6	• Connecting different-sized gears will change the output speed of a shaft by making it spin faster or slower than the input shaft.

D&T Conceptual Knowledge

Part 8 of 8

	Electrical Systems
EYFS	To be added
Y1	
Y2	
Y3	
Y4	• A **cell** contains chemicals that react to provide an electrical power supply (electrical energy). A **battery** is made from multiple cells and provides more electrical power than a single cell. • Batteries and cells have an anode (positive side) and a cathode (negative side). • Switches can be used as input components as they can connect and disconnect the electrical power supply to different parts of a circuit. • Output devices are components that produce something in an electrical circuit such as a lamp that lights up or a buzzer that makes a sound. • An LED is a type of light often used as an output component that uses very little electrical power and is available in different colours. • LED's have an anode leg and a cathode leg; they need to be connected the right way round in a circuit to work. • Circuits are made by using conducting materials (eg metal, wire) to join electronic components together.
Y5	• Electronic systems have **inputs, processes** and **outputs**. • **Microcontrollers** (such as a Micro:bit or a Crumble) are **process** devices that can be programmed to respond to changes to inputs and control output devices. • **Speakers** are output components that produce sounds. • **Motors** are components often used as output devices that turn electrical power into rotational movement by spinning a shaft. • A **servo motor** is a small motor that can move things to a specific position. • An electronic **input** device, like a switch or sensor, is something that helps a machine know when to turn on or off, or when something is happening. • A **pressure switch** is a switch that connects (or disconnects) when pressed. • A **tilt switch** is a switch the connects (or disconnects) when it is tilted. • A **reed switch** is a magnetic switch that connects when a magnet is close to it. • A **sensor** is an input component that helps a machine know when something in the environment changes, like light level, temperature, sound or movement. • **Light sensors (LDRs)** are components that detect changes in light levels. • **Sound Sensors** are components that can detect sound and changes in noise levels. • **Temperature Sensors** are components that detect changes in temperature levels.
Y6	• Solar cells are devices that convert sunlight to electricity, a solar panel is made up of lots of solar cells. • Wind turbines are machines that convert wind power to electricity. • Motors can be used to generate electricity by spinning the shaft.

Food Conceptual Knowledge

Part 1 of 2

	Ingredients	Nutrition
EYFS	To be added	
Y1	• **Science:** A plant is a living thing that grows in one place. A tree is a type of plant. • **Science:** The basic parts of a plant include leaves, flowers, roots, stem (or trunk). • Fruits and vegetables come from plants (including trees). • Fruits contain a plant's seeds. Vegetables are part of the plant. • Food can come from farms, allotments and gardens. • Fruits and vegetables are usually harvested in a particular season. Different foods are in season at different times of the year.	• We should eat 5 portions of fruit or vegetables each day. • 'Eating a rainbow' means to different types of fruits and vegetables that might have lots of different colours. • Fruits and vegetables both contain lots of good things for our bodies. Fruits contain more sugar, so we should eat less of them
Y2	• **Science:** Many plants make fruits or vegetables. Some of these grow below ground. • **Science:** Some plants grow from bulbs. A bulb is a resting stage for certain plants. • Foods come from a range of sources, including plants (fruits and vegetables) and animals (meat and dairy products). • Milk comes from animals such as cows, sheep and goats, and plants such as almonds, soybeans and coconuts. • Foods made from animal milks are called dairy products. • Some foods are eaten as they are (e.g. milk; fruits and vegetables). Some foods are processed in some way before we eat them (e.g. cheese is made from milk).	• **Science:** Humans need to eat a healthy and balanced diet. This should include all the nutrients that we need, should be high in fruits and vegetables and low in fats, salt and sugars. • Some foods are sweet, and some are salty. • Texture is about how food feels in our mouths. Food textures include hard, soft, rough, smooth, crunchy, crispy, chewy, creamy. • Some foods have different textures when they are prepared in different ways. • Food is more interesting to eat if it has more than one texture at a time.
Y3	• Bread is made from flour, which is ground seeds of the wheat plant. • Sources of meat include chicken, sheep (lamb), pigs (pork products), tuna and other fish.	• **Science:** The main food groups are carbohydrates (starch and sugars), proteins, fats, fibre, vitamins and minerals. Humans need a balanced diet. • Some people are allergic to certain types of food, like nuts or gluten. This means their body reacts when they eat or are in contact with these foods. Some food allergies are mild, and some can be very serious.
Y4	• Beans and lentils are edible seeds from plants. • Seasoning adds to the taste of food. Seasoning can include salt, spices (like pepper), herbs, and sugar. • Spices are usually made from the seeds, roots, stem or fruits of a plant and add flavour to food. • Herbs are usually the leaves of a plant and add flavour to food. • Mushrooms are not plants nor animals. They are a type of fungus.	• Some people are intolerant to certain types of food, like gluten or dairy products. This means their bodies cannot digest the foods. It can cause discomfort.
Y5	• Sauce is a liquid or semi-liquid mixture served with food to add flavour, moisture, texture and colour. • Pasta is made from wheat flour and water (and sometimes egg). • Couscous is a type of pasta.	• Apply the principles of a healthy and varied diet.
Y6	• Foods can be minimally processed (like fresh fruit and vegetables); moderately processed (like cheese and flour); significantly processed (like baked beans); or ultra-processed (like ready meals; sugary cereals and crisps).	• A healthy diet is made up of mostly minimally and moderately processed foods. Too many ultra-processed foods should be avoided.

Food Conceptual Knowledge

Part 2 of 2

	Food Hygiene	Safety
EYFS	To be added	
Y1	• Wash hands and tie hair back to stop the tiny living things on our hands getting onto the food and into our bodies. • Wear an apron to protect our clothes and stop the tiny living things on them getting into food and into our bodies.	
Y2	• Tie hair back and wash hands after sneezing, coughing and going to the toilet to stop the tiny living things on our hands getting into our bodies.	• Use senses (sight, smell and touch) to check foods for any bits that should not be eaten.
Y3	• Hands should be washed after handling raw eggs to stop the tiny things living in there getting into our bodies, because they can make us unwell.	• Food should not be eaten after the 'use by' date. Foods can be eaten after the 'best before' date, but we should check them first. • High risk foods with a 'use by' date should be kept in the fridge. • Cheese, cooked meats and eggs are high-risk foods. • Consider the importance of the refrigerator for food safety.
Y4	• Food preparation sources should be wiped down before and after use to stop the tiny living things on the surfaces getting onto food. • Food preparation areas should be left clean so that food pests are not attracted.	• Hobs and hand blenders need to be used with care, keeping our fingers away. • When blending hot liquids, the blender should be on and/or it is kept well away from the user.
Y5		• Cooked pasta and couscous are high-risk foods and should be eaten immediately or kept in the fridge. • **Science:** Use a material that is a poor thermal conductor (thermal insulator) when stirring hot food or removing food from the oven.
Y6	• **Science:** The tiny living things that we need to stop getting into food are bacteria and viruses. They can sometimes make us unwell.	