DESIGN TECHNOLOGY PROGRESSION MAP –

SUBSTANTIVE KNOWLEDGE (specific factual content)

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Knowledge of Structures						
Materials can be joined and assembled in different ways (e.g. tape, glue, pins, string).	A structure is something that has been made and put together. Gluing is a way of joining wooden sticks to make a frame Triangular corners will reinforce strength where wood has been joined. Scissors, glue guns/sticks are suitable tools for joining materials Cylinders are strong types of structures	Shapes and structures with wide, flat bases or legs are the most stable. A 'stable' structure is one which is firmly fixed and unlikely to change or move There are different ways to manipulate structures to strengthen and stiffen: Joining together – Strong glue, stapling, paper clips or strong tape will join paper and card together. Rolling - Rolling paper or card into tubes can produce a strong structure. You can fix a number of tubes together to create a strong base. Folding - Concertinaing paper and card then adding a layer of card above and below it. Layering - Corrugated card can be layered to create an extra strong base.	Shell structures are hollow structures with a thin outer covering. They are used to make buildings (e.g. the O2 and Shard in London), furniture and packaging (e.g. sweet tubes, sandwich boxes). Nets of 3D shapes are used to build the basic shell structure. Diagonal struts can be used to strengthen shell structures A wide base will make my structure more stable When a material is shaped, it increases the strength and can hold heavy weights.	A frame structure is a structure made from thin components e.g. tent Frame structures are rigid structures that support the frame using beams, columns and slabs to hold large forces of gravity and weight. Hinges can be used to allow part of the structure move/open.	There are different ways to reinforce structures. Triangles can be used to reinforce frame structures like bridges There are different ways to strengthen and reinforce frame structures - crease and insert, flattened and glue, pipe cleaner, sleeve, sticky tape.	Structures can be strengthened by manipulating materials and shapes
Knowledge of Process – to know how to…						
Construct with some purpose by using junk materials to see how to connect them securely	Construct simple structures, models or other products using a range of materials.	Make a structure stronger, stiffer and more stable.	Create a shell structure using diagonal struts to strengthen them. Use knowledge of nets of cubes and cuboids and more complex 3D shapes.	Create frame structures, showing awareness of how to strengthen, stiffen and reinforce them.	Build a framework using a range of materials to reinforce the structure	Select the most appropriate materials and frameworks for different structures, explaining what makes them strong.

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Knowledge of Mechanisms / Mechanical Structures						
Wheeled objects can move fast if pushed.	**Mechanism is the parts of an object that move together** **T**ypes of movement – up and down, left to right and curved. **Mechanism** – a device used to create movement in a product. **Lever** – a stiff bar which moves around a pivot. **Slider** – a stiff bar which moves backwards and forwards along a straight line. **Slot** – the hole through which a lever or slider is placed to enable part of a picture to move. **Pivot** - the point on which a mechanism turns.	Mechanisms are a collection of moving parts that work together as a machine to produce movement. There is always an input and output in a mechanism. **Wheel** - a circular object that revolves on an axle and is fixed below a vehicle or other object to enable it to move easily over the ground **Axle** - a rod or spindle (either fixed or rotating) passing through the centre of a wheel or group of wheels. **Friction** - the action of one surface or object rubbing against another	**Lever** - The simplest type of mechanism is called a lever. A lever is a stiff bar which moves around a pivot. The pivot can be loose or fixed. Levers are used in many products. **Linkage** - the card strips joining one or more levers to produce the type of movement required. **Loose pivot** - a split pin that joins card strips together. **Fixed pivot** - a split pin that joins card strips to the backing card.	Pneumatics use air to help a mechanism move. Pneumatic systems operate by drawing in, releasing and compressing air. All moving things have kinetic energy. Kinetic energy is the energy that something (object/person) has by being in motion. Air resistance is the level of drag on an object as it is forced through the air.	**Pulley** - a mechanism that is used to reduce the time to lift heavy, cumbersome objects. Pulleys consist of at least one grooved wheel (sheave) and a length of rope. **Gears** - simple machines that can transmit forces from one place to another and increase the size of a force As one gear is turned, it transmits a force to the gear it is locked to, causing it to turn in the opposite direction. A small gear will turn rapidly with less force whereas a larger gear will turn more slowly with greater force.	Mechanism in an automata uses a system of cams, axles and followers. Cams generally do the opposite job to cranks: they turn rotary motion into reciprocating motion. As the cam rotates, the object it supports rises up and down. The shape of the cam changes the movement e.g. an egg shaped cam would create a different movement pattern to a circular one. Thick corrugated card is the best choice of material to make a cam from as the thickness provides a surface for the follower to run over.
Knowledge of Process – to know how to…						
Explore using different wheeled objects.	Explore and use sliders and levers.	Explore and use wheels, axles and axle holders	Explore and use a range of mechanisms (levers, sliders, axles, wheels and cams) in models or products.	Use mechanical systems in their products, such as pneumatics and hydraulics.	Explore and use a range of mechanisms (levers, axles, cams, gears and pulleys) in models or products. :	Explain and use mechanical systems in their products to meet a design brief. A mechanical process involving electricity and pulleys will be needed in order for the vehicle to be able to move by itself.

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Knowledge of Electrical Systems						
			An electrical system is a group of parts (components) that work together to transport electricity around a circuit.		A **pulley** is a simple machine that makes it easier to lift or move a heavy object. It	Batteries contain acid, which can be dangerous if they leak.

			Common features of an electric product (switch, battery or plug, dials, buttons etc.). An electric product uses an electrical system to work (function). Name bulb, battery, battery holder and crocodile wire to build simple circuits. Electrical conductors are materials which electricity can pass through. Electrical insulators are materials which electricity cannot pass through. A battery contains stored electricity that can be used to power products. An electrical circuit must be complete for electricity to flow. A switch can be used to complete and break an electrical circuit.	includes at least one wheel and a length of rope. **A Drive Belt** connects and transfers movement between two pulleys. The speed of rotation can change in a pulley train. A belt and pulley system can reverse the direction of rotation (by twisting the belt through 180 degrees). An electric motor converts electrical energy into rotational movement, causing the motor's axle to spin.	Name bulb, battery, battery holder, buzzer, motor and crocodile wire to build simple circuits. Create simple circuit diagrams.
Knowledge of Process – to know how to…						
			Incorporate a simple series circuit into a model. Create a product containing a simple circuit with a switch.	Use electrical circuits of increasing complexity in their models or products, showing an understanding of control.	Understand and use electrical circuits that incorporate a variety of components (switches, lamps, buzzers and motors) and use programming to control their products.

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Knowledge of Textiles						
Some materials can be glued together more easily than others. Texture is how something feels.	'joining technique' means connecting two pieces of material together. There are various temporary methods of joining fabric by using staples. glue or pins	Sewing is a method of joining fabric. Different stitches can be used when sewing. – running stitch is simple stitch Tying a knot after sewing the final stitch will stop the stiches coming apart	Applique is a way of mending or decorating a textile by applying smaller pieces of fabric to larger pieces. When two edges of fabric have been joined together it is called a seam.	A fastening is something which holds two pieces of material together for example a zipper, toggle, button, press stud and velcro. Different fastening types are useful for different purposes.	Blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric. Small, neat stitches which are pulled taut are important to ensure that stuffing is secured in a pouch	Using a template (or clothing pattern) helps to accurately mark out a design on fabric Fabrics can be strengthened, stiffened and reinforced.

	Different techniques for joining materials can be used for different purposes. A template (or fabric pattern) is used to cut out the same shape multiple times.	A thimble can be used to protect my fingers when sewing	It is important to leave space on the fabric for the seam. Some products are turned inside out after sewing so the stitching is hidden.			
Knowledge of Process – to know how to…						
To combine fabrics using glue To experiment with different textures	Using joining techniques to join material together	Sewing running stitch, with evenly spaced, neat, even stitches to join fabric. Neatly pinning and cutting fabric using a template.	Selecting and cutting fabrics with ease using fabric scissors. Threading needles with greater independence. Tying knots with greater independence. Sewing cross stitch to join fabric. Decorating fabric using appliqué.	Measuring, marking and cutting fabric using a paper template. Selecting a stitch style to join fabric. Working neatly by sewing small, straight stitches. Incorporating a fastening to a design.	Measuring, marking and cutting fabric accurately and independently. Creating strong and secure blanket stitches when joining fabric. Threading needles independently. Using appliqué to attach pieces of fabric decoration.	Marking and cutting fabric accurately, in accordance with their design. Sewing a strong running stitch, making small, neat stitches and following the edge. Tying strong knots.

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Knowledge of Computer Aided Design (CAD)						
					In Process	
Knowledge of Process – to know how to…						

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Knowledge of Food and Nutrition						
Know that food can be healthy or unhealthy. Sort food into groups and identify the criteria.	**Where food comes from** All food comes from plants or animals. **Food preparation, cooking and nutrition** Know there are five food groups and know that a healthy diet is a balance of these five groups.	**Where food comes from** Food has to be farmed, grown elsewhere (e.g. Home) or caught. **Food preparation, cooking and nutrition** How to name and sort foods into the five groups in The Eatwell Plate. Know that everyone should eat at least 5 portions of fruit and vegetables every day.	**Where food comes from** Know that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. **Food preparation, cooking and nutrition** Know that a healthy diet is made of from a variety and balance of different food and drink as depicted in the Eatwell plate. Know that to be active and healthy, food and drink are needed to provide energy for the body.	**Where food comes from** Know that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. **Food preparation, cooking and nutrition** Know that a healthy diet is made of from a variety and balance of different food and drink as depicted in the Eatwell plate. Know that to be active and healthy, food and drink are needed to provide energy for the body	**Where food comes from** Know that seasons may affect the food available. Know how food is processed into ingredients that can be used in cooking or eaten. **Food preparation, cooking and nutrition** Know that recipes can be adapted to change the appearance taste, texture and aroma Know that different food and drink contain different substances- nutrients, water, fibre – that are needed for health	**Where food comes from** Know that seasons may affect the food available. Know how food is processed into ingredients that can be used in cooking or eaten. **Food preparation, cooking and nutrition** Know that recipes can be adapted to change the appearance taste, texture and aroma Know that different food and drink contain different substances- nutrients, water, fibre – that are needed for health
Knowledge of Process – to know how to…						

Using techniques such as cutting, chopping, spreading, and grating.	Preparing simple dishes safely and hygienically, **without** a heat source. Using techniques such as cutting, chopping, spreading, squeezing, peeling and grating.	Preparing simple dishes safely and hygienically, **without a** heat source. Using techniques such as cutting, chopping, spreading, squeezing, peeling and grating.	Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically, including where appropriate, a heat source. How to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading and kneading.	Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically, including where appropriate, a heat source. How to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading and kneading.	Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically, including where appropriate, a heat source. How to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading and kneading.	Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically, including where appropriate, a heat source. How to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading and kneading.