HAREWOOD JUNIOR SCHOOL KEY SKILLS, KNOWLEDGE AND UNDERSTANDING
Design and technology

Purpose of study
Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

Aims
The national curriculum for design and technology aims to ensure that all pupils:
develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
critique, evaluate and test their ideas and products and the work of others
understand and apply the principles of nutrition and learn how to cook.

Attainment targets

Key stage 2
Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment]. When designing and making, pupils should be taught to:

Design
- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Make
- select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately

- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities

Evaluate

- investigate and analyse a range of existing products
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- understand how key events and individuals in design and technology have helped shape the world

Technical knowledge

- apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of computing to program, monitor and control their products.

Cooking and nutrition

As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life. Pupils should be taught to:

- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques
- understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.

Design				
	Y3	**Y4**	**Y5**	**Y6**
Research: *Investigate and analyse a range of existing products*	Research existing products and identify key design features	Research existing products and identify key design features	Use a wide range of sources to research existing products and identify key design features	Use a wide range of sources to research existing products and identify key design features
Develop design criteria: *Ensure that products that are fit for purpose, aimed at particular individuals or groups*	Develop design criteria considering the purpose and the intended user/s of the product	Develop design criteria considering the purpose, the intended user/s of the product, materials & aesthetics	Develop design criteria considering the purpose, the intended user/s of the product, materials, aesthetics and performance	Develop design criteria considering the purpose, the intended user/s of the product, materials, aesthetics, performance, environmental issues and budget constraints
Design: *Develop, model and communicate ideas*	Generate ideas for a product with growing confidence	Generate realistic ideas for a product, focusing on the needs of the user	Generate several ideas and select the most appropriate	Generate several innovative ideas and select the most appropriate
	Use annotated sketches to develop and communicate their ideas	Use exploded diagrams/ cross-sectional drawings to develop and communicate their ideas	Use computer-aided design to develop and communicate their ideas	Use computer-aided design to develop and communicate their ideas
	Make a simple mock up/ prototype to test ideas	Make a simple mock up/ prototype to test ideas	Model their ideas using prototypes and pattern pieces	Model their ideas using prototypes and pattern pieces
Evaluate:				
Analyse	Evaluate how well existing products meet their intended purpose	Evaluate how well existing products meet their intended purpose	Evaluate how well existing products meet their intended purpose and the user's needs and wants	Evaluate how well existing products meet their intended purpose and the user's needs and want
Evaluate	Discuss whether the final product met the design specification and the user's needs	Explain the extent to which the final product meets the design specification and the user's needs	Evaluate the final product against the original design specification, taking into account the views of others, e.g. intended user(s).	Critically evaluate final product against the original design specification, considering the effectiveness of materials used, method of manufacture and fitness for purpose, taking into account the views of others, e.g. intended user(s).
Improve	Recognise what worked well and suggest things that could be improved	Identify strengths and areas for development and discuss ways that the original	Identify strengths, areas for development and ways in which the original design may	Critically evaluate strengths, areas for development and ways

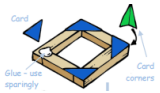
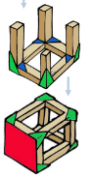
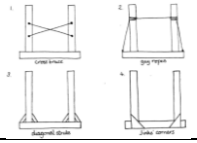
		design may have changed	have been improved or adapted and why	in which the original design may have been improved or adapted and why
Vocabulary:				
	Design, design specification, design brief, user, purpose, features, label, annotated sketch, ideas, mock-up, choose, decide, evaluate, try out ideas	Design, design specification, design brief, user, purpose, product, features, label, annotated sketch, exploded diagrams, cross-sectional drawings, ideas, mock-up, prototype, choose, decide, evaluate, try out ideas, design decisions, functionality, innovation	Design, design specification, design brief, user, purpose, product, features, label, annotated sketch, exploded diagrams, cross-sectional drawings, computer-aided design, ideas, mock-up, prototype, pattern pieces, choose, decide, evaluate, try out ideas, design decisions, functionality, functional purposes, innovation, market research, survey, interview, questionnaire	Design, design specification, design brief, user, purpose, product, features, label, annotated sketch, exploded diagrams, cross-sectional drawings, computer-aided design, ideas, mock-up, prototype, pattern pieces, choose, decide, evaluate, try out ideas, design decisions, functionality, functional purposes, aesthetics, innovation, market research, survey, interview, questionnaire, manufacture, fitness for purpose

Cooking & Nutrition				
Practical Skills - prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques				
	Y3	**Y4**	**Y5**	**Y6**
S (Strengthening)	Add or substitute one or more ingredients, to change the appearance, taste, texture and aroma for desired effect			
M (Measuring)	Use simple measuring aids (spoons, cups, scoops)	Use a variety of measuring aids (e.g. weighing scales, measuring jugs, cups) with guidance	Use a variety of measuring aids (e.g. weighing scales, measuring jugs, cups) accurately	Use a variety of measuring aids (e.g. weighing scales, measuring jugs, cups) accurately
I (Incision)	Cut, grate, peel, slice and spread foods under close supervision	Cut, grate, peel, slice and spread foods with guidance	Cut, grate, peel, slice and spread foods safely	Use a range of kitchen equipment safely and hygienically
L (Linking)	Mix ingredients with hands or a spoon	Combine ingredients by kneading, moulding and shaping dough	Combine ingredients by blending	Combine ingredients by mixing and whisking.
E (Evaluating)	Investigate and evaluate a range of breads and sandwich fillings	Investigate and evaluate a range of pizza bases, sauces and toppings	Investigate and evaluate a range of soups and stews	Investigate and evaluate a range of biscuits
S (Substitute/ Style)	Start to consider ways to present a dish so that it is appealable to the consumer	Consider ways to present a dish so that it is appealable to the consumer	Present a dish so that it is appealable to the consumer	Present end product so that it is appealable to the consumer for a commercial gain
Knowledge *(Could be covered as a Short Focussed Task as a discreet lesson)*				
Where does food come from? *Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.* *(link to science and PSHE)*	Know the difference between and Identify if a food is a fruit or a vegetable	Know that some food is reared from animals (such as pigs, chickens and cattle) and caught (such as fish)	Know and identify some crops grown in the UK e.g. wheat and potatoes	Describe the process of 'Farm to Fork' for a given ingredient e.g. beef to bolognese
	Know that some food is grown (such as tomatoes, wheat and potatoes)	Name produce from livestock e.g. cattle, poultry, milk, eggs, wool	Know that seasons may affect the food available.	Know that imported foods travel from far away and this can negatively impact the environment
Importance of a healthy and varied diet *(link to science and PSHE)*	Know that a healthy diet is made up from a variety and balance of different food and drink, as depicted in 'The eatwell plate' and that these are needed to provide energy for an active and healthy body			
	Name 1 foods from each of the different food groups	Name 1 or 2 foods from the different food groups.	Name 2 or 3 foods from the different food groups.	Name 3 or more foods from the different food groups.
Food preparation	Know that I have to wash my hands and keep my work	Know that I have to wash my hands and keep my work	Know how to avoid cross contamination when cooking	Work safely and hygienically with independence

	surface clean when preparing food	surface clean when preparing food		
	To be aware of Covid-19 safety procedures regarding contamination of food			
Understand how key events and individuals in design and technology have helped shape the world *To be confirmed*	John Montagu, the 4th Earl of Sandwich (1718-1792 – the creation of the sandwich	Chefs e.g. Italian?? Antonio Carluccio Gino D'Acampo	Chefs e.g. Jamie Oliver Ainsley Harriott James Martin Mary Berry	Louis Pasteur??– pasteurisation (link to science)
Vocabulary				
	cut, mix, spread, slice, blend, grate, chop, chopping board, knife, grater sandwich, filling, ingredients, fridge, food groups, hygiene, healthy eating, 'balanced plate', fruits, vegetable	cut, mix, spread, slice, blend, grate, chop, chopping board, knife, grater, weighing scales, measuring jugs ingredients, livestock, cattle, poultry, food groups, hygiene, healthy eating, 'balanced plate', carbohydrates, proteins, fats, vitamins, minerals	cut, mix, spread, slice, blend, grate, chop, chopping board, knife, grater, blender, hob, weighing scales, measuring jugs, cups, ingredients, food groups, hygiene, healthy eating, 'balanced plate', carbohydrates, proteins, fats, vitamins, minerals, nutrients	cut, mix, spread, slice, blend, grate, chop, bake, whisk weighing scales, measuring jugs, cups, chopping board, knife, grater, hob, ingredients, food groups, hygiene, healthy eating, 'balanced plate', carbohydrates, proteins, fats, vitamins, minerals, nutrients, fibre

Textiles				
Practical Skills				
	Y3	**Y4**	**Y5**	**Y6**
S (Strengthening)	With support, tie a knot		Independently tie a knot	
			Modify threads by plaiting to strengthen drawstring fastening	
M (Measuring)	Measure and draw a 2D paper pattern on squared paper		Measure and draw a 3D paper mock-up	
	Measure and mark fabric, with support		Measure and mark fabric with increasing accuracy	
			Demonstrate an awareness of seam allowance (*SFT)	
I (Incision)	Cut fabrics using fabric scissors		Cut fabrics with greater accuracy, using fabric scissors or pinking shears	
L (Linking)	With support, thread a needle		Thread a needle independently	
			Pin or tack pieces of fabric together	
			Join fabric with neater accuracy e.g. running, cross, back, over sew, blanket	
E (Evaluating)	Investigate and evaluate a range of fabrics and decorative stitching		Investigate and evaluate a range of canvas bags	
S (Substitute/ Style)	Use cross stitch, running stitch and back stitch to add decoration		Consider how a suitable fastening that is fit for purpose	
	Consider complimentary colour choices for aesthetic purpose *(linked to art & colour wheel)*		Use complimentary colour choices for aesthetic purpose *(linked to art & colour wheel)*	
Knowledge				
How textile products are formed	Start to recognise some common fabrics e.g. cotton, wool, silk		Know that some fabrics are used for a specific purpose due to their properties *(linked to science)*	
			Know that most fabrics are made by weaving or knitting yarn	

Stitches	Identify and name two decorative stitches (e.g. running stitch and cross stitch)		Have an awareness of how some stitches are better suited for different purposes e.g. strengthening, decorative	
Understand how key events and individuals in design and technology have helped shape the world	George De Mestral – Velcro fastening		Charles Macintosh – waterproof raincoat from rubberised fabric	
Vocabulary:				
	fabric, binca, thread, sewing, needle, pins, running stitch, cross stitch, weaving, knitting, embroidery, fabric scissors, cotton, wool, silk		fabric, thread, sewing, needle, pins, running stitch, back stitch, cross stitch, over sew stitch, blanket stitch, weaving, knitting, tacking, embroidery, applique, seam, fastenings, fabric scissors, pinking shears, cotton, wool, silk, polyester, nylon, linen	

Structures				
Practical Skills (Short Focussed Tasks)				
	Y3	**Y4**	**Y5**	**Y6**
S (Strengthening)	Create a strong, stiff shell structure e.g. • Use thicker card • Glue several layers of paper/ card together • Apply sticky back plastic to reinforce	Use Jinks' corners to strengthen frame structures 	Use a Jinks' corner brace to strengthen upright joints 	Use the most appropriate technique to strengthen a frame structure e.g. cross braces, guy ropes, diagonal struts or Jinks' corners 
M (Measuring)	Using a ruler accurately and measure with support	Using a ruler, measure to the nearest 1 cm	Using a ruler, measure and mark material to the nearest 0.5 cm	Using a ruler, measure and mark material to 1mm accuracy
I (Incision)	Use scissors to cut along a line with some accuracy	Use scissors to cut shapes accurately	Use scissors to cut complex shapes accurately	Cut complex shapes (from a range of materials & thicknesses) accurately
	Fold a shape accurately	With support, use a ruler and scissors to score card	Use a ruler and scissors to score card	Use a ruler and scissors to score card accurately
	With support, make an incision within the surface area of a shape (away from the edge) (*SFT)	Make an incision within the surface area of a shape (away from the edge) (*SFT)	Make an incision within the surface area of a shape (away from the edge) with greater accuracy (*SFT)	Make an incision within the surface area of a shape (away from the edge) accurately, considering the impact on aesthetics of the product (*SFT)
		With 1:1 supervision, cut wood with a hacksaw and bench hook	Under supervision, cut wood with a hacksaw to a marked line (to 1 cm accuracy)	Under supervision, cut wood with a hacksaw to a marked line (to 0.5 mm accuracy)
L (Linking)	Use glue or tape to join components	With 1:1 supervision, use a glue-gun	Under supervision, use a glue-gun	Under supervision, use a glue-gun with greater precision and considering the impact on aesthetics of the product
E (Evaluating)	Investigate and evaluate a range of packaging nets	Investigate and evaluate a range of existing frame structures e.g. photo frames and games	Investigate and evaluate a range of existing moving vehicles	Investigate and evaluate a range of moving toys and games e.g. carousel

S (Substitute/ Style)	Use felt-tip pens and paint to add colour to design	With growing confidence, apply a range of finishing techniques e.g. Pens, paint, stickers, decoupage, sanding	Apply a range of finishing techniques with improved precision and skill	Apply a range of suitable finishing techniques considering aesthetic appearance and functional purposes
Knowledge (Short Focussed Tasks)				
Safety Procedures	Understand the importance of following safety procedures during construction			
		Know how to set up a G-clamp and use a hacksaw safely (*SFT)		
Strengthen, stiffen and reinforce	Understand that 2D nets can turn into 3D structures.	Name and identify a jinks' corner	Name and identify a Jinks' corner brace	Name and identify cross braces, guy ropes and diagonal struts
	Name ways to make paper/ card stronger and stiffer	Know that generally, triangle shapes are stronger than a rectangle	Know that you can make a structure more stable by giving it a wide base	Name a variety of ways to reinforce and strengthen a 3D framework
Understand how key events and individuals in design and technology have helped shape the world	*To be confirmed*	*To be confirmed*		
Vocabulary				
	2D nets, three-dimensional (3D) shape, cube, cuboid, prism, vertex, edge, face, packaging, shell structure, stiff, scoring, tabs, adhesives, strengthen, join, assemble, accuracy, hole punch, pierce	scoring, tabs, adhesives, join, assemble, accuracy, hole punch, pierce, cut, reinforce, strengthen, junior hacksaws, G-clamps, bench hooks, jinks' corner, glue gun decoupage	scoring, tabs, adhesives, join, assemble, accuracy, hole punch, pierce, cut, craft knife, reinforce, strengthen, junior hacksaws, G-clamps, bench hooks, jinks' corner, brace, glue gun, sand, decoupage, butt joint	scoring, tabs, adhesives, join, assemble, accuracy, hole punch, pierce, cut, craft knife, hand drill, reinforce, strengthen, junior hacksaws, G-clamps, bench hooks, jinks' corner, brace, cross braces, guy ropes, diagonal struts, glue gun, sand, decoupage, butt join, mitre joint

Mechanisms				
Practical Skills				
	Y3	**Y4**	**Y5**	**Y6**
S (Strengthening)			Understand how the mechanics of a moving vehicle works so that it operates effectively	Understand how the mechanics of a fairground model works so that it operates effectively
M (Measuring)			Measure and position mechanical parts	Measure and position mechanical parts accurately to ensure they operate correctly
I (Incision)			Cut mechanical parts accurately	Cut mechanical parts accurately to ensure they operate correctly
L (Linking)			Use gears and/or pulleys to transfer movement from a motor to a model to create a linear movement	Use gears and/or pulleys to transfer movement from a motor to a model to create a rotational movement
E (Evaluating)			Investigate and evaluate examples of controllable/ moving toy vehicles to identify chassis, wheels, axles and motors	Investigate and evaluate a collection of toy fairground models that create a range of movements using cams, gears, pulleys e.g. chair-o-plane, merry-go-round carousel (horizontal rotation); Ferris wheels (vertical rotation)
S (Substitute/ Style)			Apply a range of finishing techniques with improved precision and skill e.g. Pens, paint, stickers, decoupage	Apply a range of suitable finishing techniques considering aesthetic appearance and functional purposes
Knowledge				
Mechanisms *(Linked to Y5 Science forces)*			Know that a mechanism is a device that allows a small force to be increased to a larger force.	
			Know how mechanical systems, such as cams or pulleys or gears, can create linear movement	Know how mechanical systems, such as cams or pulleys or gears, can also create rotational movement

			Know that a fixed axle is where the axle is fixed securely to the chasis of the vehicle and the wheels spin round freely. Know that fixed wheels are where the wheels are fixed firmly to the axle and the axle can spin freely.	Gears can be used to change the speed of rotation and change the orientation of rotation by 90°
Understand how key events and individuals in design and technology have helped shape the world			To be confirmed Archimedes??	To be confirmed
Vocabulary:				
			pulley, drive belt, gear, rotation, spindle, driver, follower, ratio, transmit, axle, mechanical system, electrical system, input, process, output	Pulley, gear, drive belt, shaft, bearing, driver, follower, mesh, motor spindle

Electrical Systems				
Practical Skills				
	Y3	**Y4**	**Y5**	**Y6**
S (Strengthening)		Twist wires together to strengthen connection point	Use electrical tape to strengthen connecting points	Solder wires together using a soldering iron to strengthen connecting points
M (Measuring)		Using a ruler, measure wires with some accuracy	Using a ruler, measure wires to the nearest cm	Using a ruler, measure wires to the nearest 0.5 cm
I (Incision)		With support, use wire cutters to cut and strip wire connectors	Use wire cutters to cut and strip wire connectors	Use wire cutters to cut and strip wire connectors with greater confidence
L (Linking)		Build a circuit with a bulb, buzzer battery and switch	Use bulbs, buzzers, motors and switches effectively in models	Select bulbs, buzzers, motors and switches considering purpose and aesthetics
E (Evaluating)		Investigate and evaluate a collection of battery-powered lights e.g. torches, miners head lamps, bicycle lights, camping table lamps	Investigate and evaluate examples of controllable toy vehicles for children to investigate e.g. models made from construction kits	Investigate and evaluate a collection of toys and other appliances in which there are electric motors e.g. toy carousels
		Start to consider reasons why a circuit is not working properly	Trouble-shoot a circuit which isn't working (dead battery, blown bulb, poor connections) and rectify any faults that occur	Trouble-shoot a circuit which isn't working (dead battery, blown bulb, poor connections, too many components) and rectify any faults that occur
S (Substitute/ Style)		With growing confidence, apply a range of finishing techniques e.g. Pens, paint, stickers, decoupage	Apply a range of finishing techniques with improved precision and skill	Apply a range of suitable finishing techniques considering aesthetic appearance and functional purposes
Knowledge (Short Focussed Tasks)				
	Y3	**Y4**	**Y5**	**Y6**
(* Linked to science)		Know that energy is required to make bulbs glow, motors spin and buzzers buzz		
		Name & identify bulb, battery, switch & buzzer	Name & identify bulb, switch, buzzer & motor	Name & identify bulb, switch, buzzer, motor & LED
		Know that many household devices and appliances run on electricity.	Know that some household devices plug in to the mains and others run on batteries.	Know that the brightness of a lamp or the volume of a buzzer with the number and

				voltage of cells used in the circuit
Understand how key events and individuals in design and technology have helped shape the world		Thomas Edison - Lightbulb Nikola Tesla		
Vocabulary:				
		clip, screw, connect, join, electricity, circuit, battery, battery, holder, bulb, bulb holder, wire, insulation, crocodile connector, aluminium foil, switch	clip, rectify fault, screw, connect, join, electricity, circuit, battery, battery, holder, bulb, bulb holder, wire, insulation, crocodile connector, aluminium foil, switch, series and parallel circuits, reflector, energy, motor, motor mounting clip, buzzer	clip, rectify fault, screw, connect, join, electricity, circuit, battery, battery, holder, bulb, bulb holder, wire, insulation, crocodile connector, aluminium foil, switch, series and parallel circuits, reflector, energy, motor, motor mounting clip, buzzer, LED

Computing to program, monitor and control				
Skills				
	Y3	**Y4**	**Y5**	**Y6**
Apply understanding of computing to program, monitor and control their products				Use Raspberry Pi Crumble to control 'output' devices (such as bulbs, buzzers, electric motors and light emitting diodes (LEDs))
				Use logical reasoning develop algorithms for a desired purpose
				Detect and correct errors in algorithms and programs
Knowledge				
Coding *(Linked to computing)*				Know that an algorithm is a set of instructions used to perform a specific task on a computer
				Know that programs execute by following precise and unambiguous instructions
Understand how key events and individuals in design and technology have helped shape the world				Bill Gates – Microsoft Steve Job – Apple Mark Zuckerberg – Facebook Alan Turing – First 'Modern' computer
Vocabulary				
				Algorithm, program, control, input, output, variables, software, debug, crumble kit, crocodile clips