



Year 3

YEAR 3 — DESIGN TECHNOLOGY CAREERS

Career language becomes more specialised as technical knowledge develops.

SHELL STRUCTURES

WE COULD BE...

Packaging Designers • Packaging Engineers

Explore how packaging protects, contains and presents products. Consider graphics, materials, CAD and sustainable choices such as reuse and recycling.

CAREER ENCOUNTER

Packaging or manufacturing company; sustainable packaging examples.

LEVERS & LINKAGES

WE COULD BE...

Mechanical Engineers • Product Designers

Explore how engineers use levers, linkages, pivots and different types of movement to solve problems and make products work.

CAREER ENCOUNTER

Engineer, manufacturing professional or virtual workplace encounter.

HEALTHY & VARIED DIET

WE COULD BE...

Chefs • Nutritionists • Food Technologists

Explore nutrition, ingredients, sensory qualities, food origins and customer preferences when developing food products.

CAREER ENCOUNTER

Supermarket, bakery, chef or food producer.

YEAR 3 — DESIGN TECHNOLOGY KNOWLEDGE

Substantive knowledge • Disciplinary knowledge and skills

SHELL STRUCTURES

SUBSTANTIVE KNOWLEDGE

- Shell structures are 3D forms made from nets; key terms include face, edge, vertex, tab, cube/cuboid/prism.
- Shell structures protect, contain and present products.
- Folding, corrugating, ribbing and laminating can stiffen/strengthen materials.
- Graphics, recyclability/reuse and CAD can influence packaging design.

DISCIPLINARY KNOWLEDGE & SKILLS

- Investigate/deconstruct packaging and judge suitability for user/purpose.
- Construct nets; measure, mark, score, cut, assemble and join accurately.
- Test strengthening methods and use CAD for nets/text/graphics where appropriate.
- Develop a brief/criteria, use annotated sketches/prototypes, make accurately and refine after testing.

LEVERS & LINKAGES

SUBSTANTIVE KNOWLEDGE

- Levers, linkages and pivots work together as a mechanical system.
- Systems can be described as input → process → output.
- Movement types include linear, rotary, oscillating and reciprocating.
- Fixed and loose pivots affect how linkages transfer movement.

DISCIPLINARY KNOWLEDGE & SKILLS

- Analyse products and identify components, movement and effectiveness.
- Replicate lever/linkage mechanisms with accurate measuring, marking, cutting and joining.
- Use annotated sketches and prototypes to select a desired movement for user/purpose.
- Construct a functioning mechanism and evaluate/refine how well the output meets the brief.

HEALTHY & VARIED DIET

SUBSTANTIVE KNOWLEDGE

- Food groups provide nutrients, water and fibre; ingredients contribute differently to a healthy, varied diet.
- Food provenance includes ingredients that are grown, reared, caught and processed.
- Sensory qualities include taste, smell, texture and appearance.
- Preparation techniques include bridge/claw grip, chopping, mixing, spreading, kneading and baking.

DISCIPLINARY KNOWLEDGE & SKILLS

- Research existing products and ingredient origins; carry out and record sensory evaluations.
- Select utensils/techniques and prepare food safely and hygienically.
- Plan a sequence/recipe for a specified user and purpose using annotated sketches and design criteria.
- Make, taste and evaluate a food product, adapting choices in response to sensory/user feedback.

Prior learning being retrieved

Year 1 strength, stiffness and stability from freestanding structures, plus measuring, cutting, joining and material choice. Link to 3D shapes in the maths curriculum.

New knowledge / skill introduced

Pupils learn shell structures, nets, tabs, faces, edges and vertices. They strengthen through folding, corrugating, ribbing and laminating and use CAD for nets/graphics.

Why this? Why now?

Pupils can now apply structural understanding to 2D materials that are transformed into accurate, functional 3D packaging.

What does this prepare pupils for?

Prepares for Year 6 frame structures through accurate construction, material properties, strengthening and prototype-led improvement.

Design Technology Shell Structures



Investigative and Evaluative Activities	Topic Hook (Rainforest) Discuss the foods which are produced in the rainforest. Why might they grow here? Children to have the opportunity to taste a range of juices made from fruits of the rainforest (passion fruit, papaya, coconut water, lemon, grapefruit, mango, orange, pineapple) The analysis grid is to be completed as they taste and select the juices they would use in their tropical drink (groups) L.O. to research products (similar to the one to be made to give starting point for a design) Children investigate a collection of different shell structures including packaging. Use questions to develop children's understanding e.g. What is the purpose of the shell structure – protecting, containing, presenting? What material is it made from? How has it been constructed? Are the materials recyclable or reusable? How has it been stiffened i.e. folded, corrugated, ribbed, laminated? What size/shape/colour is it? What information does it show and why? How attractive is the design? Children take a small package apart identifying and discussing parts of a net including the tabs e.g. How are different faces of the package arranged? How are the tabs used to join the 'free' edges of the net? Evaluate existing products to determine which designs children think are the most effective. Provide opportunities for the children to judge the suitability of the shell structures for their intended users and purposes. Discuss graphics including colours/impact of style/logo/size of font e.g. What do you prefer and why? What style of graphics and lettering might we want to include in our product to meet users' preferences and its intended purpose? Which packaging might be the best for...?
Focused Tasks	Children use kit parts with flat faces to construct nets. Practise making nets out of card, joining flat faces with masking tape to create 3-D shapes. Experiment with assembling in nets in numerous ways. Demonstrate skills and techniques of scoring, cutting out and assembling using pre-drawn nets. Then allow children to practise by constructing a simple box. Show how a window could be cut out and acetate sheet added. Demonstrate how to use different ways of stiffening and strengthening their shell structures e.g. folding and shaping, corrugating, ribbing, laminating. Provide opportunities for the children to practise these and to carry out tests to find out where their structures might need to be strengthened or stiffened. Children discuss and explore the graphics techniques and media that could be used to achieve the desired appearance of their products. Practise using (CAD) software to design the net, text and graphics for their products according to purposes.
Design	L.O. to discuss and plan what product we will make, identifying its intended user and purpose L.O. to use annotated sketches to show what our product will look like and to identify what materials and tools are needed for our design Develop a design brief with the children within a context which is authentic and meaningful. Discuss with the children the uses and purposes of their shell structures e.g. What does the product need to do? Who is it aimed at? How will the purpose and user affect your design decisions? Agree on design criteria that can be used to guide the development and evaluation of children's products e.g. How will we know that we have designed and made successful products? Ask the children to use annotated sketches and prototypes to develop, model and communicate their ideas for the product e.g. What will you need to include in your design? How can you improve it? What materials will you use? How will you make sure your product works well and has the right appearance?
Make	L.O. to select and use appropriate materials, tools and skills learnt through focused tasks to create our final product L.O. to follow safety rules Ask children to identify and order the main stages of making. Select and use appropriate tools to measure, mark out, cut, score, shape and assemble with some accuracy. Explain their choice of materials according to functional properties and aesthetic qualities. Use finishing techniques suitable for the product they are creating (Encourage the children to work with accuracy, using computer-aided design (CAD) where appropriate).
Evaluate	L.O. to discuss and evaluate our finished product Evaluate throughout and the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed i.e. recognising what has gone well, suggest which elements they could improve in the future, discuss how well the product meets the design criteria Evaluate food by taste, flavour, texture etc. Children have the opportunity to mix their tropical drinks. Have a taste test – Taste each groups juice and write a comment on their feedback sheet.

Vocabulary:

shell structure,
three-dimensional
(3-D)
shape, net, cube,
cuboid, prism,
vertex,
edge, face,
length, width,
breadth, capacity

marking out,
scoring,
shaping, tabs,
adhesives,
joining,
assemble,
accuracy,
material, stiff,
strong, reduce,
reuse,
recycle,
corrugating,
ribbing,
laminating

font, lettering,
text,
graphics,
decision,
evaluating,
design brief
design criteria,
innovative,
prototype

Prior learning being retrieved

Year 2 sliders, levers and pivots, plus understanding that mechanisms create controlled movement for a purpose.

New knowledge / skill introduced

Pupils add linkages, fixed/loose pivots and system language: input, process, output. They learn linear, rotary, oscillating and reciprocating movement.

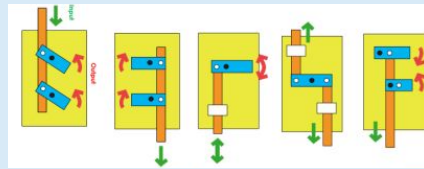
Why this? Why now?

Children are ready to see how several components work together and how input movement can be transformed into output movement.

What does this prepare pupils for?

Prepares directly for Year 5 cams, where pupils use cams and followers to transform rotary movement into different outputs.

Design Technology Levers and Linkages



Vocabulary

mechanism, lever,
linkage, pivot, slot,
bridge, guide

system, input, process,
Output

linear, rotary, oscillating,
reciprocating

user, purpose, function

prototype, design criteria,
innovative, appealing,
design brief

Investigative and Evaluative Activities	L.O. to investigate, analyse and evaluate a range of existing products that contain lever and linkage mechanisms Children investigate, analyse and evaluate books and, where available, other products which have a range of lever and linkage mechanisms. Use questions to develop children's understanding e.g. Who might it be for? What is its purpose? What do you think will move? How will you make it move? What part moved and how did it move? How do you think the mechanism works? What materials have been used? How effective do you think it is and why? What else could move? Introduce new learning related to nature of movement: linear, rotary, oscillating, reciprocating
Focused Tasks	L.O. to use the correct tools and materials to replicate lever and linkage mechanisms (following teaching aids) Demonstrate a range of lever and linkage mechanisms to the children using prepared teaching aids. Use questions to develop children's understanding e.g. Which card strip is the lever? Which card strip is acting as the linkage? Which part of the system is the input and which part the output? What does the type of movement remind you of? Which are the fixed pivots and which are the loose pivots? Demonstrate the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques. Children should develop their knowledge and skills by replicating one or more of the teaching aids.
Design	L.O. to discuss and plan what product we will make, identifying its intended user and purpose L.O. to use annotated sketches and prototypes to develop, model and communicate ideas Develop a design brief with the children within a context which is authentic and meaningful. Discuss with children the purpose of the products they will be designing and making and who the products will be for. Ask the children to generate a range of ideas, encouraging creative responses. Agree on design criteria that can be used to guide the development and evaluation of the children's products. Using annotated sketches and prototypes, ask the children to develop, model and communicate their ideas.
Make	L.O. to select and use appropriate tools to accurately cut, shape and join paper and card to create our final product L.O. to select use finishing techniques to enhance our final product Ask the children to consider the main stages in making before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.
Evaluate	L.O. to discuss and evaluate our final product Evaluate the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.

Prior learning being retrieved

KS1 fruit/vegetable preparation, hygiene, balanced diets, sensory evaluation and safe use of utensils. Links to science balanced diet.

New knowledge / skill introduced

Pupils investigate food groups, nutrients, water, fibre and provenance. Techniques include bridge/claw grip, chopping, mixing, spreading, kneading and baking.

Why this? Why now?

Secure basics allow the focus to shift from preparing ingredients to combining them, understanding nutrition and following a sequence.

What does this prepare pupils for?

Prepares for Year 4 food work and Years 5–6 culture and seasonality, including dietary needs, sourcing and sustainability.

Design Technology Healthy and Varied Diet



Vocabulary:

name of products, names of equipment, utensils, techniques and ingredients

texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, Savoury

hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet

planning, design criteria, purpose, user, annotated sketch, sensory evaluations

Investigative and Evaluative Activities	L.O. to investigate similar products to the one to be made to give starting point for a design (Focus on type of breads for design). Children investigate a range of food products e.g. the content of their lunchboxes over a week, a selection of foods provided for them, food from a visit to a local shop. Link to the principles of a varied and healthy diet using The eatwell plate e.g. What ingredients have been used? Which food groups do they belong to? What substances are used in the products e.g. nutrients, water and fibre? Carry out sensory evaluations on the contents of the food from e.g. a variety of bought food products such as a range of wraps or sandwiches. Record results, for example using a table. Use appropriate words to describe the taste/smell/texture/appearance e.g. How do the sensory characteristics affect your liking for the food? Gather information about existing products available relating to your product. Visit a local supermarket and/or use the internet. Find out how a variety of ingredients used in products are grown and harvested, reared, caught and processed e.g. Where and when are the ingredients grown? Where do different meats/fish/cheese/eggs come from? How and why are they processed?
Focused Tasks	L.O. to select and use a range of utensils and techniques to combine and prepare food L.O. to identify and explain ways in which we can work hygienically when handling food Learn to select and use a range of utensils and use a range of techniques as appropriate to prepare ingredients hygienically including the bridge and claw technique, grating, peeling, chopping, slicing, mixing, spreading, kneading and baking. Food preparation and cooking techniques could be practised by making a food product using an existing recipe. Discuss basic food hygiene practices when handling food including the importance of following instructions to control risk e.g. What should we do before we work with food? Why is following instructions important?
Design	L.O. to discuss and plan our final product using the principles of a healthy and varied diet L.O. to plan a sequence of actions to make a product with labelled sketches Discuss the purpose of the products that the children will be designing, making and evaluating and who the products will be for. Develop and agree on design criteria with the children within a context that is authentic and meaningful. This can include criteria relating to healthy eating and a varied diet e.g. What do you need to consider to make it part of a balanced diet? How do we select the ingredients? How could we make it appealing to eat? Ask children to generate a range of ideas encouraging realistic responses. Using discussion, annotated sketches and information and communication technology if appropriate, ask the children to develop and communicate their ideas.
Make	L.O. to select and use a range of tools and equipment which are appropriate for making our healthy sandwich L.O. to work safely and hygienically Plan the main stages of a recipe, listing ingredients, utensils and equipment. Select and use appropriate utensils and equipment to prepare and combine ingredients. Select from a range of ingredients to make appropriate food products, thinking about sensory characteristics.
Evaluate	L.O. to discuss and evaluate our final product Evaluate as the assignment proceeds and the final product against the intended purpose and user, reflecting on the design criteria previously agreed. Consider what others think of the product when considering how the work might be improved.