

DT Y3/4 Cycle A Mechanical Systems: Pneumatics	Concept	Enquiry Objective	Activities	Vocabulary	Resources
Week 1 & 2	Research	<p>Can I understand how pneumatic systems work?</p> <p>I know that mechanisms are a system of parts that work together to create motion</p> <p>I know that a pneumatic system can be used as part of a mechanism</p> <p>I know that pneumatic systems are used in a range of everyday objects</p> <p>I know that a pneumatic system can force air over a distance to create movement</p>	<p>Attention grabber</p> <p>Demonstrate the following two experiments:</p> <p>Book experiment Place a plastic bag or balloon underneath a book. Ask the children what they think will happen if air is blown into the bag or balloon. Show the children what happens when the bag or balloon is inflated and then deflated (see Teacher video: Exploring pneumatics for more information).</p> <p>Teabox experiment Referring to Teacher video: Exploring pneumatics, create a simple pneumatic system. Use the hinged box, a balloon and some tape. The children discuss how they could make the toy/lid move in a controlled way using the balloon. The children show how to attach the tube to the balloon. The children place the toy on top of the balloon (or lid) of the box and blow air into it to make the toy rise and fall. Introduce pneumatic systems- which force air over a distance to create movement as a type of mechanism. The children think of words that begin with 'pneu' and guess what this means. Answers might include pneumonia, pneumatic tyres or a pneumatic drill. 'Pneu' is connected with air, pneumonia means inflamed lungs which affects the breathing of air.</p> <p>Ask:</p> <ul style="list-style-type: none"> When a car or bike tyres are pumped up, what is happening? Air is pushed into the tyres and is compressed so that it can hold up your weight. Why are most car tyres called 'pneumatic'? Car tyres are filled with compressed air. What is compressed air? Air squeezed together into a small space. What is holding the car up? Air. What happens when the air escapes a tyre? It becomes flat. <p>Main event</p> <p>Ask the children:</p> <ul style="list-style-type: none"> Is electricity needed to make all machines work? No, as human energy or the energy from wind and water can also make machines work. How did machines work before electricity was discovered? Wind, water or humans. Do you think air has power? Ask the children to consider things blown by the wind, for 	<ul style="list-style-type: none"> Mechanism Lever Pivot Linkage system Pneumatic system Input Output Component 	<p>Watch</p> <ul style="list-style-type: none"> Teacher video: Exploring pneumatics <p>Have ready</p> <ul style="list-style-type: none"> Equipment for experiment: <ul style="list-style-type: none"> Balloon Tape Small, lightweight, toy Syringes: two the same size and one of a different size Tubing to connect the syringes (40-50cm lengths of plastic tubing, approximately 5mm diameter) Mild disinfectant Pre-made linkage systems Masking tape A few books Some sandwich bags A box with a hinged lid <p>Print</p> <ul style="list-style-type: none"> Activity: Pneumatic systems (see Classroom resources) – one per child

example, windmills and wind turbines that make electricity.

Ask the following questions about hydraulics:

- Does water have power? Waves in the sea, waterfalls, currents in rivers and coastal erosion demonstrate that water has power.
- What causes waves? The wind blowing over the ocean and changes in tides.
- How is most electricity made? From something moving – for example, water, wind, steam which moves turbines. Turbines are big drums that water, wind or steam turn to make electricity.

The children record three examples of pneumatic systems and explain how they work using the Activity: Pneumatic systems.

Demonstrate pneumatics
Demonstrate two different ways in which syringes and tubing can create motion and transmit force (as demonstrated in the Teacher video: Exploring pneumatics):

1. Attach the ends of two syringes of equal volume with a tube. When one syringe is pressed all the way in, the other will move all the way out as the air transfers from one syringe to the other.
2. Attach the ends of two syringes of different volumes with a tube. When you press the smaller syringe all the way in, the large one will move out slightly. When you push the large syringe in all the way, the small end will pop straight out of the syringe (sometimes with quite some force). This is because there is insufficient space for all the air from the large syringe in the small one.

Pupils complete this experiment and answer the questions from the Activity: Pneumatic systems.

- What happens when the plunger is lifted on the syringe? The syringe fills with air.
- What happens when you cover the end of the syringe then push down on the plunger? You can push in a little bit, but it is harder to push as the air gets more compressed.
- What happens when you let the plunger go? The plunger shoots back up and then stops.
- Why do you think this happens? The compressed air pushes harder against the walls of the syringe so that when you let the plunger go the air expands back to its original state.
- What do you think will happen to the first syringe when you push the plunger back in on the second one?
- Can you compare the distance that each syringe moves?
- What will happen if the size of one of those syringes is changed?
- Do you think that they will move the same distance this time?

			<ul style="list-style-type: none"> Do you think there is a connection between the sizes of the syringes and the distances they move? <p>The children measure the distances the syringes move and record this on Activity: Pneumatic systems.</p> <p>Finally, give children the opportunity to play with and observe the different examples of pneumatic systems looked at today, even if it is just a set of syringes and tubing to help them consider how they could be used to make moving parts.</p> <p>Safety tip: Be careful with the sizes of syringes – large syringes can pop smaller syringes out with force. Ensure that no one and nothing is in the firing line. Wear safety glasses if you have them. If you're using plastic tubing, make sure you disinfect it with Milton solution (or equivalent) after each child. Always use sterile syringes that have not been used for medical purposes.</p> <p>Key questions</p> <ul style="list-style-type: none"> What is a mechanism? A system of parts that work together to create motion and transfer forces Can you identify products that are/use pneumatics? What does 'pneu' mean? What is a pneumatic system? What products use pneumatic systems? <p>Wrapping up</p> <p>Ask pupils to work in pairs to discuss and match up the following key terms with their correct definitions at the bottom of the Activity: Pneumatics systems. Mechanism, lever, pivot, linkage system, pneumatic system, input, output, component. Alternatively, you could display the keywords on your board and ask children to discuss and come up with their own definitions.</p>		
<p>Week 3 & 4</p>	<p>Research</p> <p>Make</p>	<p>Can I design a toy which uses a pneumatic system?</p> <p>I know that there are three different types of pneumatic systems that I can use to design my toy and I can use recycled household objects to make it. I can develop design criteria from a design brief. I can generate suitable ideas using thumbnail sketches and exploded diagrams.</p>	<p>Watch</p> <ul style="list-style-type: none"> Teacher video: Designing a pneumatic toy <p>Attention grabber</p> <p>The challenge for the children is to design and make a toy for Year 1 pupils to help them understand that pneumatic systems can be used to create movement. As an example, show them this video on link: 'STEM Inventions- Pneumatic design'.</p> <p>The children discuss how they could adapt one of the pneumatic mechanisms explored in the previous lesson, to make it their own. Encourage the children to consider the materials that they would need to make it: cardboard boxes or containers for the main body, balloons, colouring pens/pencils, coloured card/paper, tape, split pins, etc. The children think of a character to base their</p>	<ul style="list-style-type: none"> Mechanism Lever Pivot Linkage system Pneumatic system Input Output Component Thumbnail sketch 	<p>Have ready</p> <ul style="list-style-type: none"> Presentation: Sketches and diagrams Activity: Example sketches and diagrams (see Classroom resources) Pencils Colouring pencils Check links: <ul style="list-style-type: none"> 'STEM Inventions- Pneumatic design' on Videolink Ikea design examples on link: 'IKEA- Mammut

		<p>I know that different types of drawings are used in design to explain ideas clearly.</p>	<p>design on which will make their toy more interesting.</p> <p>Develop the tea box experiment from 'Lesson 1: Exploring pneumatics' further by considering what other materials could be used – e.g. materials, balloons, colouring pens and pencils, colour paper. Design a simple character.</p> <p>The children discuss the task in small groups. The children identify five design criteria that a successful toy should meet, which should cover aesthetics, safety and function:</p> <ul style="list-style-type: none"> • It should be colourful and appealing to a child • It should not include any small pieces that could be choking hazards • It should be well made and not easily broken • It should operate with a pneumatic system <p>Once the children have agreed upon their criteria they write these on their Activity: Pneumatic toy design sheets.</p> <p>Main event</p> <p>Have ready Presentation: Sketches and diagrams and ask the pupils why they think drawing is important for designers and makers. Listen to their thoughts, and clarify the answers using slide 2.</p> <p>Presentation: Sketches and diagrams Show on your interactive whiteboard.</p> <p>The children will use thumbnail sketches and exploded diagrams to communicate their design ideas.</p> <p>Share slide 3. Compare examples of simple thumbnail sketches to the detailed drawing on slide 4. Discuss how thumbnail sketches are good for making sense of your ideas quickly with rough sketches. Explain that detailed drawings are neatly illustrated and help communicate exactly what the product should look like and suggest how it could work and, or be made.</p> <p>Thumbnail sketches</p> <p>Ask pupils to sketch three ideas for a pneumatic toy on their Pneumatic toy design sheet. The sketch involves either a backwards and forwards or up and down movement such as a jack-in-the-box, moving scenery in a puppet theatre or Santa coming out the top of a chimney.</p> <p>Emphasise that the sketches should be thumbnails rather than detailed drawings. Give the children a time limit such as one minute of thinking time to two minutes of drawing time per idea.</p> <p>Exploded drawing</p> <p>Show slide 5. Explain that an exploded-diagram can be used to illustrate how different parts of a product fit together, giving a clear idea of exactly how to make it. You could show the children these real-world examples from link: 'IKEA- Mammut</p>	<ul style="list-style-type: none"> • Research • Adapt 	<p>children's table assembly' and 'IKEA- Anilinare stationary holder assembly'</p> <ul style="list-style-type: none"> • Optional: Examples of thumbnail sketches and exploded diagrams Print • Activity: Pneumatic toy design (differentiated) one per pupil (see Classroom resources)
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			<p>children's table assembly' and 'IKEA- Anilinare stationary holder assembly'.</p> <p>The children discuss the purpose of exploded drawings. Ask the children to choose the best idea from their thumbnail sketches. The children draw an exploded diagram, emphasise that the diagram does not need to be neat or to scale. The diagram must communicate where the parts belong in relation to others.</p> <p>The children could add arrows and label the parts with the materials they will use, or begin drawing a detailed version of their idea use slide 6 to support.</p> <p>Wrapping up</p> <p>The children share their diagrams and ideas with the rest of the class and explain how it works – See if the children can provide each other with feedback including something they could improve or an alternative idea. Remind the children of the input and output arrows they drew on their diagrams in the previous lesson.</p>		
<p>Week 5 & 6</p>	<p>Plan Design</p> <p>Make</p>	<p>Can I create a pneumatic system?</p> <p>I can build secure housing for a pneumatic system</p> <p>I know how to use these components to make a functional and appealing pneumatic toy</p> <p>I can create a pneumatic system to create a desired motion</p> <p>I know that syringes and balloons can be used to create different types of pneumatic systems</p>	<p>Attention grabber</p> <p>Recap the different types of pneumatic system from 'Lesson 1: Exploring pneumatics'. Reinforce safety points regarding little and large syringe systems popping out with force.</p> <p>Show the children a range of boxes or other materials to use for the housing of their pneumatic toy. Suggest how the children modify the boxes.</p> <p>Demonstrate how to create linkages using pivots, use 'Year 2, Making a moving monster, Lesson 3: Making linkages' for guidance. Pupils working at greater depth can be challenged to create their own nets for the housing, rather than using ready-made objects.</p> <p>Show the children the materials available to help bring their toys to life, eg: eyes, limbs (curl the paper with scissors or pipe cleaners etc, encourage the children to experiment creatively with the resources available and select according to their taste).</p> <p>Pupils review their design sheets from the previous lesson and run through exactly how their design will work and what the movement would look like. The children should consider the practicality of their design and chosen materials before making their toys.</p> <p>Discuss an example such as a clam where pneumatics could be used to simulate the movement: a slow, smooth opening and snapping shut. The clam could be made from papier-mâché or card shell, card hinges and built by placing the balloon inside and securing one end with a card hinge before placing the tube and balloon inside. Encourage children to think about other natural movements that pneumatics could simulate, e.g. breathing or bending down.</p> <p>Main event</p>	<ul style="list-style-type: none"> •Mechanism •Lever •Pivot •Linkage system •Pneumatic system •Input •Output •Component •Thumbnail sketch •Research •Adapt •Properties •Reinforce •Motion 	<p>Watch</p> <ul style="list-style-type: none"> • Teacher video: Making pneumatic toys <p>Have ready</p> <ul style="list-style-type: none"> • Pupils' Activity: Pneumatic systems and Activity: Pneumatic toy design sheet from 'Lesson 2: Designing a pneumatic toy' • Equipment: <ul style="list-style-type: none"> o Syringes o Tubes o Connectors o Balloons o Bottles o Tape o Elastic bands o Glue o Scissors o Pencils o Paper fasteners or split pins o Packaging and recycled materials: egg cartons, tissue/shoe boxes o Materials to make the pneumatic toys: card, straws,

			<p>Ask the children to collect all of the necessary materials for their pneumatic system and check that it works smoothly. Arrange the children on tables according to the type of pneumatic system that they are using, they can share materials and support each other.</p> <p>Once the children have created the mechanism, they find materials for their housing: cardboard packaging, card. Remind pupils that they can draw their own nets for bespoke shapes.</p> <p>The children must mark clearly where to attach the different parts of their mechanism: they must fit the balloon or syringes before they attach the moving parts of their toy.</p> <p>Once the children have finalised how the parts attach, they cut out the necessary pieces of card for hinges or moving parts. Hold the mechanism in place to test that it still works in the housing. Support the children in tweaking their mechanism to ensure that it runs smoothly. Discuss common problems and how to fix them with the class.</p> <p>Key questions</p> <ul style="list-style-type: none"> •What is a pneumatic system? A system that forces air over a distance to create movement. •Can you remember the three different ways to create a pneumatic system? •How can you use pneumatic systems with linkage systems to create motion? A creature’s mouth – opening and closing •What products use pneumatic systems? •How should you use scissors safely? Cutting away from your body slowly •How can you use pivots to create motion? Using split pins •What do we mean by ‘housing’? <p>Wrapping up</p> <p>Ask pupils to review their work against their exploded drawing. To challenge them further, ask them to add input and output arrows to show the direction of the forces at play.</p> <p>Ask pupils if their systems are operating as planned and get them to identify their next steps for the final lesson.</p>		<p>pipe cleaners, cotton wool, buttons, bottles, socks, plastic bags, stuffing, etc</p>
<p>Week 7</p>	<p>Make Evaluate</p>	<p>Can I test and finalise ideas against design criteria?</p> <p>I know how to manipulate materials to create different effects by cutting, creasing, folding, weaving, etc</p> <p>I can remember that materials are selected due to their functional and aesthetic characteristics.</p>	<p>Watch</p> <ul style="list-style-type: none"> •Teacher video: Making pneumatic toys <p>Attention grabber</p> <p>Explain to pupils that in this lesson, the children will complete their pneumatic toys, adding decoration and detail to make it look like their design.</p> <p>Demonstrate suggestions for using materials to create features and effects for the children’s toys and how to attach them to their housing and/or pneumatic systems:</p> <ul style="list-style-type: none"> •Use split pins to attach small card shapes to create moving parts 	<ul style="list-style-type: none"> •Mechanism •Lever •Pivot •Linkage system •Pneumatic system •Input •Output •Component 	<p>Have ready</p> <ul style="list-style-type: none"> • Pupils’ Activity: Pneumatic systems and Activity: Designing pneumatic systems sheets • Pupils’ pneumatic toys from the previous lesson • Syringes, tubes and connectors • Balloons, bottles, tape or elastic bands, glue, scissors,

			<ul style="list-style-type: none"> •Curl up the coloured paper with scissors or by wrapping it around a pencil •Cut pipe cleaners or straws to the correct size and bend into shape •Use cotton wool for soft parts of the design •Apply colour with felt pens <p>Emphasise the importance of working with equipment safely as you model these.</p> <p>Main event</p> <p>The children finish making the pneumatic system and housing for their toys before assembling and decorating them.</p> <p>Explain to the children that they need to refer to their designs to decorate the housing, using paint, fabrics, colouring pens/pencils or coloured card and paper. Encourage the children to think carefully about which decorations should be added before the toys have been assembled and which should be added afterwards.</p> <p>Once their toys are assembled and decorated, suggest adding details to help bring their toys to life:</p> <ul style="list-style-type: none"> •Attach googly eyes or cut out circles of white and black paper to make eyes •Curl up coloured paper for eyelashes •Use sandpaper or other textured paper to add texture to their creature's skin •Use pipe cleaners for making curly hair •Use tissue paper to make wings •Add feathers, pom poms or sequins, depending on the design <p>Key questions</p> <ul style="list-style-type: none"> •What is a pneumatic system? A system that forces air over a distance to create movement. •How might you decide which materials to select for surface decoration? Suitable shape, opening box for the mechanism •How could you assemble different parts? Hot glue gun, glue stick, PVA glue, tape <p>Wrapping up</p> <p>The children demonstrate their toys to a partner. Both pupils identify what worked well about their projects and what could be improved.</p> <p>If possible, organise for a KS1 class to look at their toys, with them explaining to them how their toys work.</p> <p>If time allows, ask children how else they could use their pneumatic system.</p>	<ul style="list-style-type: none"> •Thumbnail sketch •Research •Adapt •Properties •Reinforce •Motion 	<p>pencils, paper fasteners or split pins, packaging and recycled materials: egg cartons, tissue/shoe boxes, etc</p> <ul style="list-style-type: none"> • Materials to make the pneumatic toy: <ul style="list-style-type: none"> o card o straws o pipe cleaners o cotton wool o buttons o bottles o old socks o tights o plastic bags o stuffing o materials for details: tissue paper, textures paper/sandpaper, feathers, pom poms, googly eyes, sequins
<p>DT Y3/4 Cycle A Cooking & Nutrition: Tasty Biscuits.</p>	<p>Concept</p>	<p>Enquiry Objective</p>	<p>Activities</p>	<p>Vocabulary</p>	<p>Resources</p>

<p>Week 1 & 2 N.B. The purpose of this lesson is to raise awareness of hidden sugars in food and not to suggest that sugary foods are always unhealthy. Teachers will want to be sensitive if a pupil in their class lives with type 1 diabetes for whom quick access to sugary drinks and food can be a lifesaver.</p>	<p>Research</p>	<p>Follow a recipe to bake a biscuit. I can evaluate a product and consider:</p> <ul style="list-style-type: none"> • taste • smell • texture • appearance • packaging • target audience • I can follow a recipe to make a biscuit. 	<p>Watch</p> <ul style="list-style-type: none"> • Teacher video: Following a recipe • Pupil video: Following a recipe <p>Attention grabber</p> <p>Explain that over the next four lessons, the children will work in groups, to carry out research to design a recipe and packaging for a pack of biscuits costing £1.99. The final designs will go before a panel of experts (maybe the headteacher, deputy head, school secretary, school council members) who will decide who has created a biscuit worthy of being on the shelves. Main event</p> <p>Research (15 minutes) Provide a range of biscuits for children to taste, include a variety of flavours, shapes and styles, from digestives to chocolate bourbons and pink wafers as well as biscuits with bits -chocolate chips and currants. Have the packaging for each of the biscuits on display. *Make sure that you check each packet of biscuits for any ingredients that could induce allergies. Children trial each biscuit, noting its taste, smell, texture, appearance, packaging and target audience using the Activity: Biscuit taste testing template. Discuss the need when working in groups to ensure that everyone is involved and has a fair chance at doing something – not just the washing up! Divide the children into groups or hand out roles to tables for them to divide amongst themselves.</p> <p>Make (20 minutes) Ask children to tell their partner one piece of good practice regarding food and hygiene. Recap these as a class and scribe them on the board. For example:</p> <ul style="list-style-type: none"> •What do the children need to do before they start to cook? (Wash surfaces, equipment and hands, ensure sleeves and hair are pulled back). •What should the children be careful of when cooking? (The use of knives, cross-contamination of chopping boards, using electrical equipment with adult supervision). <p>Ask each group to ensure that they are familiar with the scales – understanding the units of measurement and the intervals. Provide children with a 'BBC Good Food- Basic biscuit recipe' that they will use to base their own biscuit recipe on. The children work in their groups to follow the recipe and make a batch of the biscuits – you may want each group to make half a batch, this will also save room in the oven! *Write the group's name on the baking paper next to their biscuits.</p>	<ul style="list-style-type: none"> •Design Criteria •Research •Texture •Innovative •Aesthetic •Measure •Cross-contamination 	<p>Have ready</p> <ul style="list-style-type: none"> • Six different types of biscuits for children to taste (roughly a third of each biscuit per child) • Plates for each table for the biscuit tasting • Link: 'BBC Good Food- Basic biscuit recipe' • Recipe ingredients (dependent on your chosen recipe), for the 'Good Food' recipe you will need: <ul style="list-style-type: none"> o 250g butter o 140g caster sugar o 1 egg yolk o 2 tsp vanilla extract o 300g plain flour • Equipment: <ul style="list-style-type: none"> o Butter knives o Bowls o Wooden spoons o Scales o Baking trays o Baking parchment/paper o Oven <p>Print</p> <ul style="list-style-type: none"> •Activity: Biscuit taste testing template (see Classroom resources) – one per pupil
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Explain the following techniques through each step of the recipe.

Techniques:

- Creaming-When combining sugar and butter together this is called creaming. By combining both ingredients together first, we can make sure that they are evenly distributed across the mixture as the sugar will dissolve into the butter when whisking. It can also help the biscuits (or other food products that use this technique) rise in the oven by locking in air.

- Sieving When using a sieve to sift flour, it removes any lumps that have stuck together in the packaging to loosen or be kept in the sieve. It also allows air to become trapped between the particles and aerates (increases the volume of) the flour.

- Rubbing method (sometimes referred to as the rubbing-in method)The rubbing method is a technique that uses the warmth of your fingertips to combine butter (or other fats) into the flour until it resembles a crumbly texture like breadcrumbs.

- Cooling rack When using a cooling rack after baking food products that contain butter (or other fats), it gives the butter time to set and become hard instead of warm-hot and soft. If the butter (or fat) content is particularly high, the food product may remain softer in texture.

Key questions

- What does it taste like?
- What ingredients/flavours can you taste?
- How does it feel when you put it into your mouth?
- Does it crumble or crack? What is its texture like?
- What does it remind you of?
- What colours are used?

Wrapping up

Show children a list of additional ingredients often used in biscuit recipes (which you have chosen in advance) such as: chocolate chips, sprinkles, spices, food colouring, food flavouring, chocolate chunks, dried fruits, cocoa powder, honey and oats.

Whilst children taste the biscuits they made, ask them to consider what ingredients they would use in their own biscuit recipe.

<p>Week 3 & 4 Consider food allergies before this lesson and adapt as appropriate.</p>	Research	<p>Can I make and test a prototype?</p>	<p>Have ready</p> <ul style="list-style-type: none"> • Link: 'BBC Good Food- 	<ul style="list-style-type: none"> •Design Criteria 	<p>Basic biscuit recipe'</p> <ul style="list-style-type: none"> • Recipe ingredients (dependent on your chosen recipe):
	Make	<p>I know how to cook food safely – following basic hygiene rules.</p> <p>I can cook to a recipe and adapt it to create a new biscuit prototype.</p> <p>I can follow a design brief.</p> <p>I can create a design criteria.</p> <p>I can evaluate and compare a range of biscuit prototype</p>	<p>Attention grabber</p> <p>Remind children of their task from the last lesson. The children will be making their own biscuit by adding additional ingredients to the same basic biscuit dough that they made previously. After baking, each pupil will share their own biscuit with their group. Based on the results of this, each group will decide the ideas that they will take forward for their final biscuit. Remind children that this is about trying out lots of ideas – they shouldn't add the same ingredients as the people in their group, they should be original.</p> <p>Main event</p> <p>Plan (10 minutes)</p> <p>The children prepare themselves, their cooking areas and ingredients. Children should be able to do this with little intervention from you, especially if you discuss the method and any additional ground rules to follow before they start. The groups need to plan so that everybody is involved and has a chance to do something – children should swap roles so that they have a different job to do than in the previous lesson.</p> <p>Make (20 minutes)</p> <p>The children make their basic mixture, following the same recipe as last lesson. The children split the mixture equally between them. Individually, children then add small amounts of additional ingredients to modify the recipe. It is good to have an adult hand out the extra ingredients as if it were a shop so that you can ration them. Biscuits should then be baked.</p> <p>Key questions</p> <ul style="list-style-type: none"> •How will that change the taste/smell/texture/appearance? •Who would that appeal to? •What would you like to change? •How might that alter the biscuit? <p>Wrapping up</p> <p>In their groups, each child should explain how they modified their recipe before letting the rest of their group trial it. Children should use the Activity: Chef's adaptations tasting sheet to evaluate each adaptation in turn. They should then discuss: what they did and didn't like; what would make a great biscuit and what would make a terrible one.</p>	<ul style="list-style-type: none"> •Research •Texture •Innovative •Aesthetic •Measure •Cross-contamination 	<ul style="list-style-type: none"> o 250g butter o 140g caster sugar o 1 egg yolk o 2 tsp vanilla extract o 300g plain flour • Additional ingredients, such as: chocolate chips, sprinkles, spices, food colouring, food flavouring, chocolate chunks, dried fruits, cocoa powder, honey and oats • Equipment: <ul style="list-style-type: none"> o Bowls o Wooden spoons o Scales o Baking trays o Baking parchment/paper o Oven • Activity: Chef's adaptations tasting sheet (see Classroom resources) – one per pupil

<p>Week 5 & 6</p>	<p>Plan Design</p> <p>Make</p>	<p>Can I design & make a biscuit that meets a given design brief?</p> <p>I can design a biscuit to a given budget.</p> <p>I can create branding for my group's final product.</p>	<p>Attention grabber</p> <p>Remind the children of their task – to create a biscuit that will sell in shops for £1.99. Explain that, as in any business, nothing is free and the children will need to pay for all of their ingredients and a contribution to the building and utility costs.</p> <p>As a group, they will need to decide if they want to:</p> <ul style="list-style-type: none"> • Make a biscuit for the lowest amount possible so they can make a lot of profit on each pack (you may need to explain profit – use the bar model) and take the risk that the biscuits may not sell because of the low quality. • Spend more on their biscuit – making it more attractive but reducing their profit margin. <p>Tell children that a panel of judges will decide how many packs of biscuits they would buy from you to stock their supermarket.</p> <p>Give the children their Activity: Chef's adaptations tasting sheet from last lesson and the Activity: Biscuit Taste Testing Template from 'Lesson 1: Following a recipe'. Explain that the children must use all this information to design their final biscuit.</p> <p>Main event</p> <p>Budgeting (15 minutes)</p> <p>In groups the children plan their biscuit recipe, ensuring it comes within the £1.99 budget. To do this they should work together to complete the Activity: Budget sheet provided – which sets out the costs the children will incur while making their biscuits:</p> <ul style="list-style-type: none"> • Building hire and utilities at 60p • Packaging materials at 10p • 'Basic Biscuit Dough' recipe ingredients at 57p <p>This totals £1.27. The children have 72p to buy additional ingredients. You should price the extra ingredients appropriately.</p> <p>Share the additional ingredients available to buy (either as a list or lay them out like a shop for children to view portion sizes).</p> <p>You could determine their prices based on how much you want to encourage children to use them. For example, the healthier options could be cheaper.</p> <p>The children could work out their budget on paper or using a spreadsheet program, ensuring that their total costs come in at £1.99. Remind them that when noting down the additional ingredients they buy, they will need to multiply the amount by the quantity required. For example, mini marshmallows may be 10p for a teaspoon and one group might want three teaspoonfuls so they would enter 'Three teaspoons of Marshmallow and 30p into the 'Cost' column'.</p> <p>Designing (15 minutes)</p>	<ul style="list-style-type: none"> • Design Criteria • Research • Texture • Innovative • Aesthetic • Measure • Cross-contamination • Diet • Processed • Packaging 	<p>Have ready</p> <ul style="list-style-type: none"> • Basic biscuit dough recipe from the link: BBC Good Food- Basic biscuit recipe • Activity: Biscuit taste testing template from 'Lesson 1: Following a recipe' • Activity: Chef's adaptations tasting sheet from 'Lesson 2: Testing ingredients' • Cost of additional ingredients children will have access to (displayed), ie: chocolate chips, sprinkles, spices, food colouring, food flavouring, chocolate chunks, dried fruits, cocoa powder, honey • Optional: access to computers for the use of Excel Print • Activity: Budget Sheet (one per group of children) enlarged to A3 • Activity: Final Design (one per pupil) enlarged to A3
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<p>Week 7</p>	<p>Make Evaluate</p>	<p>How do we keep the biscuits fresh? I can make suitable packaging for my product</p>	<p>Attention grabber</p> <p>Give children their Activity: Budget sheet from ‘Lesson 3: Final design and budget’ that specifies the ingredients and the quantities they intend to use. Check that everyone is clear as to the units of measurement on the scales and the quantities of both the basic and the additional ingredients of their final recipe.</p> <p>Arrange your food preparation area so that the base ingredients are mixed in a different area to the biscuit rolling, shaping or cutting space. Making the biscuits in these steps means that you can easily divide the groups into those mixing and those shaping.</p> <p>When children know their role, they can be given the rest of this time to prepare themselves, their cooking space and their ingredients.</p> <p>Main event</p> <p>Baking (15 minutes) In groups, children will make one batch of their final recipe using a basic biscuit dough and any additional ingredients they decided on. Whilst as many groups as you can manage are making their biscuits (given space limitations and adult help) the other groups can be working on their ‘Packaging’ (see below). Children will also need time to wash up and make the food preparation area clean for the next group to use.</p> <p>Packaging (15 minutes)</p>	<ul style="list-style-type: none"> •Design Criteria •Research •Texture •Innovative •Aesthetic •Measure •Cross-contamination •Diet •Processed •Packaging 	<p>Have ready</p> <ul style="list-style-type: none"> • ‘Basic Biscuit Dough’ recipe from link: 'BBC Good Food- Basic biscuit recipe' • Children’s Activity: Final design and Activity: Budget sheet from ‘Lesson 3: Final design and budget’ • Recipe ingredients (dependent on your chosen recipe) for the ‘Good Food’ recipe you will need: <ul style="list-style-type: none"> o 250g butter o 140g caster sugar o 1 egg yolk o 2 tsp vanilla extract o 300g plain flour • Equipment: <ul style="list-style-type: none"> o Bowls o Wooden spoons o Scales o Baking Trays

In order for their biscuits to be sold in the shops, children will need to make some packaging, referring to their Activity: Final design from 'Lesson 3: Final design and budget' to complete this.

It is obviously tricky to replicate some cellophane packets, but boxes are perfect for designing onto. Give children either:

- The Activity: Cuboid net printed onto A3 and a piece of A3 card to stick this onto, to then decorate, cut out and construct.
- A biscuit box. They should draw around each face of the box so that they have panels that they can then decorate and finally glue onto the box.

When all children in a group have completed their own packaging designs, they should confer and decide which they want to put forward to the judges.

When the biscuits and package are ready they should be displayed as a final project ready for the judging panel, including their chosen Activity: Final design and Activity: Budget sheet from 'Lesson 3: Final design and budget' and, of course, the biscuits!

Wrapping up

Pre-pitch: Each group will present their plan to the class, explaining (very briefly) what they plan to do, what its cost will be and whom it is targeted at.

- o Baking parchment/paper
 - o Oven
 - Additional ingredients such as: chocolate chips, sprinkles, spices, food colouring, food flavouring, chocolate chunks, dried fruits, cocoa powder, honey and oats
 - Optional:
 - o Empty biscuit boxes
 - o A3 card to stick the Activity: Cuboid net template onto to strengthen it
- Print
- Activity: Cuboid net, printed and enlarged to A3

