Welsh - Progression 2 Step

Mathematics and Numeracy

a Curriculum For Circular Economy Curriculum Complementing the Welsh Framework

This outline, grounded in the Welsh curriculum, provides a foundation for planning teaching, learning, and experiences that promote Circular Economy . It is designed to be flexible, allowing teachers to adapt the learning to meet the needs of their specific cohort. Co-creating learning experiences is encouraged, fostering collaboration between educators and students. This progression pathway aims to support teachers in their planning and implementation of Circular Economy -focused education.

Overarching Objectives for Progression Step 2:

- Encourage curiosity and engagement with the world.
- Develop critical thinking and problem-solving skills.
- Promote personal, social, and cultural development.
- Foster a sense of responsibility for personal health, well-being, and the environment.

The Curriculum of Wales

Expressive Arts	Health and Wellbeing	Humanities (including History, Geography, Religion, Values, and Ethics)	Languages, Literacy, and Communication (including Welsh and International Languages)	Mathematics and Numeracy	Science and Technology

Expressive Arts	Health and Well-being	Humanities	Languages, Literacy and Communication	Mathematics and Numeracy	Science and Technology
Subject Areas: Music, Drama, Art, Dance, Film and Digital Media. **Objectives**: Develop creativity and imagination. Explore a range of media, techniques, and materials. Express ideas and feelings through different artistic forms. Begin to reflect on their own work and that of others.	**Subject Areas**: Physical Health, Mental and Emotional Well-being, Relationships, Healthy Eating, Personal Safety. **Objectives**: Understand physical health and its connection to well-being. Develop emotional literacy and manage feelings. Learn about making healthy choices (diet, exercise). Build interpersonal skills to foster	**Subject Areas**: History, Geography, Religious Education, Business Studies, and Social Studies. **Objectives**: Understand past and present human experiences, locally and globally. Develop a sense of belonging and identity. Learn about sustainability and the impact of human actions on the planet. Begin to explore ethical questions and different belief systems.	**Subject Areas**: English, Welsh, Modern Foreign Languages, Literature, Oracy. **Objectives**: Develop competence in both Welsh and English. Explore the use of language for different purposes (e.g., storytelling, explaining, persuading). Learn to communicate effectively through speech and writing. Engage with a range of literary texts, including Welsh literature.	**Subject Areas**: Number, Geometry, Algebra, Measurement, Data Handling. **Objectives**: Develop understanding of numbers, patterns, and shapes. Solve practical problems using basic mathematical techniques. Begin to understand and apply mathematical reasoning. Learn to use data to interpret the world around them.	**Subject Areas**: Biology, Chemistry, Physics, Computer Science, Design and Technology. **Objectives**: Begin to explore the natural world and understand simple scientific concepts. Engage with technology and develop basic computational thinking. Design, make, and evaluate simple products and systems. Explore sustainability through understanding energy and material use.

	positive relationships.				

The Sustainability Curriculum Headings

Understanding the Circular Economy **(CIRC1)**	Waste Reduction and Recycling **(CIRC 2)**	Sustainable Consumption **(CIRC 3)**	Product Lifecycle and Design. **(CIRC4)**	Repair and Upcycling **(CIRC5)**	Circular Business Practices and innovation **(CIRC6)**
Local Economies and Community Engagement **(CIRC 7)**	Environmental Impact and Resource Conservation **(CIRC8)**	Citizenship and Global Responsibility **(CIRC 9)**	Food Systems (**Circ 10)**	Circular Technologies and Innovation **(CIRC11)**	Outdoor Learning **(CIRC12)**

The Sustainability Curriculum Model linked to the Curriculum of Wales - Progression Step 2

Understanding
Circular Economy

(SUS1)

Mathematics and Numeracy

Objective:

Learners will begin to understand the concept of the **circular economy**—where resources are reused, repaired, and recycled instead of wasted—by using numbers, patterns, measurement, and data to solve real-world sustainability problems. They will apply mathematical reasoning to everyday materials, design solutions that reduce waste, and interpret data related to environmental impact, helping them to see how mathematics supports responsible decision-making in a resource-conscious society.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by recognising patterns in resource use and identifying repeated cycles (e.g., reusing materials).
- **Solve practical problems using basic mathematical techniques** – such as calculating how many items can be reused or how much waste is avoided.
- **Begin to understand and apply mathematical reasoning** – by comparing linear vs circular systems and working out which is more efficient.
- **Learn to use data to interpret the world around them** – through collecting and analysing information on recycling, reusing, or consumption in their school or community.

Global Framework Links:

- **SDG 12: Responsible Consumption and Production** – using maths to understand and reduce material waste.
- **SDG 13: Climate Action** – understanding how reducing waste contributes to reducing carbon emissions.
- **UNCRC Article 29** – learning that develops respect for the environment.
- **UNCRC Article 12** – giving learners a voice in sustainability matters using evidence and reasoning.
- **UNRMS Principles** – applying systems thinking and sustainable resource management through data, logic, and

problem-solving.

Teaching Examples by Strand:

Number:

- Calculate the number of plastic bottles saved by using a reusable bottle over one month.
- Estimate and count how many times a lunchbox can be reused over a school year.
- Use subtraction and multiplication to model material use before and after a repair initiative.

Geometry:

- Use 2D and 3D shapes to design reusable packaging or circular products (e.g. stacking boxes, refill containers).
- Create tessellation patterns or models inspired by natural closed-loop systems.

Algebra (early pattern recognition):

- Identify and extend number patterns that represent cycles (e.g., 5-day reuse cycle, 3-week composting cycle).
- Create "If this, then that" rules for sustainable choices (e.g., "If we reuse 2 containers per week, then in x weeks...").

Measurement:

- Measure and compare the weight of different types of waste collected during a week.
- Measure the volume of water saved using a refillable system compared to single-use.
- Convert measurements to show the reduction in material used when choosing reusable items.

Data Handling:

- Collect and record class data on lunchbox waste, reusable vs single-use packaging, or recycling habits.
- Represent this data in bar graphs or pictograms and interpret trends to draw conclusions.
- Create "before and after" comparison charts showing the impact of a waste-reduction challenge.

Suggested Project:

"Maths for a Circular School" – Learners conduct a waste audit, measure changes in resource use, and design simple mathematical models to reduce material waste and promote reuse across the school.

Waste Reduction and Recycling

(CIRC 2)

Mathematics and Numeracy

Objective:

Learners will use mathematical thinking to explore how reducing, reusing, and recycling materials can help protect natural resources and minimise waste. They will apply number operations, measurement, and data-handling skills to assess the impact of their everyday choices and use mathematical reasoning to suggest practical improvements to reduce waste in their school or home environment.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by exploring regular patterns of material use or types of recyclable waste.

- **Solve practical problems using basic mathematical techniques** – such as calculating how much waste can be saved by switching to reusable alternatives.
- **Begin to understand and apply mathematical reasoning** – to compare outcomes and argue for the most sustainable choices.
- **Learn to use data to interpret the world around them** – by recording and analysing waste or recycling data.

Global Framework Links:

- **SDG 12: Responsible Consumption and Production** – understanding and reducing waste through practical maths.
- **SDG 13: Climate Action** – showing how reducing waste supports climate action.
- **UNCRC Article 29** – learning should foster respect for the environment.
- **UNCRC Article 12** – learners are empowered to express their views and suggest actions based on evidence.
- **UNRMS Principles** – supports development of skills in sustainable resource use, efficiency, and waste minimisation.

Teaching Examples by Strand:

Number:

- Add up the number of recyclable vs non-recyclable items in a classroom bin and express them as totals or simple fractions.
- Multiply to find out how many items could be saved per week, month, or year if every learner reused a bottle or lunch container.

Geometry:

- Create shapes from reused packaging to explore properties of 3D solids.
- Design a recycling bin layout using shapes to maximise space or visual clarity.

Algebra (pattern and simple function rules):

- Identify patterns in waste (e.g., paper use per day). Use rules such as "If each person uses 3 sheets a day..." to project weekly use.
- Use basic function machines to show inputs and outputs of recycling systems (e.g., plastic bottles → fleece jumpers).

Measurement:

- Weigh classroom waste before and after a recycling drive.
- Compare volumes of waste in different bins (e.g., food, paper, plastic).
- Measure and compare dimensions of reusable vs disposable packaging.

Data Handling:

- Conduct a class or school-wide waste audit. Use tally charts, bar graphs, or pictograms to represent findings.
- Sort and classify types of waste. Interpret graphs to identify the most common waste type.
- Create a weekly recycling report and suggest actions based on collected data.

Suggested Activity:

"Maths Mission: Zero Waste" – learners act as eco-auditors in their classroom or school. They collect data, make calculations, propose changes, and present mathematical findings to improve sustainability.

Sustainable Consumption

(CIRC 3)

Mathematics and Numeracy

Learners will explore the concept of sustainable consumption by using mathematical tools to compare everyday choices, such as food packaging, transport, water use, and energy consumption. They will apply basic operations, measurement, and data-handling skills to investigate how individual and collective actions can reduce environmental impact. Through reasoning and pattern recognition, learners will begin to make evidence-based decisions that support sustainability in their own lives.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by exploring quantities and patterns of consumption and waste.
- **Solve practical problems using basic mathematical techniques** – such as budgeting for sustainable purchases or comparing environmental impact.
- **Begin to understand and apply mathematical reasoning** – by justifying which choices are more sustainable or cost-effective.
- **Learn to use data to interpret the world around them** – by collecting and analysing real-life data about resource use and sustainable alternatives.

Global Framework Links:

- **SDG 12: Responsible Consumption and Production** – using maths to make informed consumption choices and reduce waste.
- **SDG 13: Climate Action** – understanding how better consumption decisions reduce carbon footprints.
- **UNCRC Article 24** – Right to a healthy environment and learning how to protect it.
- **UNCRC Article 29** – Education must develop respect for the environment and promote informed decision-making.
- **UNRMS Principles** – fostering sustainable and efficient resource use through informed analysis and critical thinking.

Examples by Strand:

Number:

- Compare prices and quantities of single-use vs reusable products (e.g. water bottles, lunch wraps).
- Use subtraction and division to work out how much food is wasted per person and how it could be reduced.
- Calculate the cost difference over time between high-consumption and low-consumption options (e.g. incandescent vs LED bulbs).

Geometry:

- Investigate the surface area and volume of packaging materials—e.g., which shape uses less material for the same contents.
- Design a low-waste product package using 2D and 3D shapes.

Algebra (early rules and patterns):

- Create and use simple rules or "if... then..." logic (e.g., "If I walk to school 3 days a week instead of getting a lift...").
- Explore repeating patterns in food purchases or energy bills that could be made more sustainable.

Measurement:

- Measure and compare energy use in devices left on standby vs switched off.
- Use standard units to measure how much water is used when brushing teeth with the tap on vs off.
- Calculate weight of recyclable vs non-recyclable lunch items.

Data Handling:

- Conduct a class survey on shopping habits or transport choices. Create bar graphs or pie charts to show sustainable vs unsustainable behaviours.
- Track how switching to packed lunches with no plastic wrap changes weekly waste totals.

- Interpret charts or infographics about consumption and make simple comparisons.

Suggested Learning Activity:

"Consumption Detectives" – Learners investigate real-life scenarios (e.g., school snack choices, home energy use, or clothing purchases). They apply number, measurement, and data skills to suggest more sustainable alternatives, supported by calculations and visual data.

Product Lifecycle and Design.

(CIRC4)

Mathematics and Numeracy

Learners will use mathematical skills to explore how everyday products are made, used, and disposed of, and how their design affects sustainability. They will solve practical problems using number, measurement, and data to evaluate different stages in a product's lifecycle—from raw materials to recycling. Learners will apply patterns, shapes, and reasoning to suggest ways to improve designs for reduced environmental impact.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by analysing how different product features affect use and waste.

- **Solve practical problems using basic mathematical techniques** – such as comparing materials, calculating waste reduction, or estimating life expectancy.
- **Begin to understand and apply mathematical reasoning** – when evaluating the efficiency and sustainability of design choices.
- **Learn to use data to interpret the world around them** – by collecting and analysing information about products and their impacts.

Global Framework Links:

- **SDG 9: Industry, Innovation and Infrastructure** – supporting sustainable product innovation through mathematical thinking.
- **SDG 12: Responsible Consumption and Production** – evaluating how design affects material use and environmental outcomes.
- **UNCRC Article 29** – promoting learning that develops environmental responsibility and informed decision-making.
- **UNRMS Principles** – encouraging understanding of resource value, life cycle management, and sustainable design.

Examples by Strand:

Number:

- Use multiplication and division to calculate the total material needed to produce multiple units of a product (e.g. water bottles or paper notebooks).
- Estimate how long a product lasts and how often it needs replacing.
- Add and compare costs of reusable vs single-use versions of products.

Geometry:

- Explore how packaging shape affects material use—e.g., compare cube and cylinder packaging to determine which uses less surface area.
- Create or analyse 3D models of a product to understand its design features.

- Use symmetry and spatial awareness to evaluate the efficiency of design layouts.

Algebra (early rules and patterns):

- Identify simple patterns in product usage and durability (e.g., "If one pen lasts 3 weeks, how many are needed for a term?").
- Explore input/output relationships in materials used vs waste generated.

Measurement:

- Measure the weight or volume of materials used in a product and compare with recyclable alternatives.
- Use standard units to estimate how much energy or water is used in each stage of a product's life (e.g., manufacturing, transport, disposal).
- Calculate how much material could be saved through design changes (e.g. reducing packaging size by 10%).

Data Handling:

- Survey product preferences in the class and compare which designs are more durable or recyclable.
- Collect and represent data on the lifecycle impacts of different materials (e.g. paper vs plastic vs metal).
- Create charts to compare lifespan, cost, and waste of competing products.

Suggested Classroom Activity:

"Maths Behind the Product" – Learners choose a common classroom item (e.g. pencil case, water bottle, snack wrapper), break down its life cycle, and use maths to propose a more sustainable design. They calculate materials used, measure dimensions, create graphs of alternatives, and justify improvements with simple reasoning.

(CIRC5)

Mathematics and Numeracy

.Learners will apply mathematical knowledge to explore the value of repairing and upcycling materials and objects, rather than throwing them away. They will use number operations, measurement, shape, and data-handling skills to solve practical problems, calculate savings, and compare environmental impacts. Learners will begin to reason mathematically about the benefits of giving items a longer life, contributing to sustainability and resource conservation.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by applying numeracy to redesign and improve existing items.
- **Solve practical problems using basic mathematical techniques** – such as estimating savings and comparing costs or quantities of reused vs new items.
- **Begin to understand and apply mathematical reasoning** – to evaluate whether repairing/upcycling is a better choice.
- **Learn to use data to interpret the world around them** – by collecting and interpreting data about waste reduction, material savings, or community reuse habits.

Global Framework Links:

- **SDG 12: Responsible Consumption and Production** – learners investigate how maths supports circular economy actions like repair and reuse.
- **SDG 13: Climate Action** – calculating how upcycling reduces resource use and waste.
- **UNCRC Article 29** – encouraging education that supports care for the environment.
- **UNCRC Article 12** – allowing children to express views and make decisions using evidence.

- **UNRMS Principles** – promotes conservation through responsible resource use, including through repair and creative transformation.

Examples by Strand:

Number:

- Add and subtract to calculate cost savings from repairing vs buying new (e.g., cost of patching a jacket vs buying a new one).
- Multiply reused materials to see how many new items can be made from old materials (e.g., 4 t-shirts = 1 patchwork bag).
- Estimate or count how many items were saved from landfill through a class repair/upcycle challenge.

Geometry:

- Use 2D shapes to plan an upcycled product design (e.g., cushion covers from old clothes).
- Explore rotational symmetry and pattern in repaired/upcycled crafts (e.g., geometric arrangements of reused fabric).
- Reconfigure packaging shapes to design new storage items or containers.

Algebra (basic patterns and functions):

- Use patterns to design repeated upcycling features (e.g., bead patterns for jewellery made from reused materials).
- Predict quantities needed over time: "If one person upcycles 2 items per week, how many in a term?"

Measurement:

- Measure and compare the length/weight/volume of old vs re-used or repaired items.
- Use standard units to plan how much material is needed to patch, sew, or glue an item.
- Estimate material saved through reuse (e.g., weight of reused denim in bags).

Data Handling:

- Survey the class on items repaired or reused in the last month. Create a bar chart to show trends.

- Compare types of waste before and after an upcycling project.
- Record data during a repair workshop: what was fixed, what materials were used, and how much waste was avoided.

Suggested Activity:

"Fix It, Don't Bin It!" – Learners work on a practical repair or upcycling challenge. They collect data on items saved, use measurement to cut and shape reused materials, and calculate the cost and material savings. They present their findings through charts and written reasoning.

Circular Business Practices and innovation
(CIRC6)

Mathematics and Numeracy

Learners will explore how mathematics supports innovative circular business practices—such as designing for reuse, offering services instead of products, or reducing waste through local loops. They will apply number, data, and reasoning skills to investigate and model how businesses can be profitable while caring for people and the planet. Learners will use basic calculations, pattern recognition, measurement, and data interpretation to solve real-world sustainability problems within an entrepreneurial context.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – through modelling how products and services can flow in

loops rather than lines.
- **Solve practical problems using basic mathematical techniques** – such as budgeting, comparing costs, and evaluating product use.
- **Begin to understand and apply mathematical reasoning** – when making decisions about more sustainable and fairer business ideas.
- **Learn to use data to interpret the world around them** – by collecting and presenting information related to resource use, customer choices, or impact reduction.

Global Framework Links:

- **SDG 8: Decent Work and Economic Growth** – understanding how circular economy models create sustainable business opportunities.
- **SDG 12: Responsible Consumption and Production** – evaluating how maths helps reduce waste and manage resources effectively.
- **UNCRC Article 29** – supporting learning that develops entrepreneurship, sustainability, and global awareness.
- **UNCRC Article 12** – empowering learners to express views and decisions based on evidence.
- **UNRMS Principles** – emphasising the responsible use of natural resources through innovative, data-informed systems.

Examples by Strand:

Number:

- Use addition and subtraction to compare the cost of producing new vs refurbished products.
- Multiply weekly savings from using a rental or refill service to show yearly impacts.
- Estimate profits/losses from circular business models like clothing swaps or upcycled crafts.

Geometry:

- Design packaging or products using shapes that minimise waste or allow for reuse (e.g., modular or stackable designs).

- Explore symmetry and tessellation in circular product design that reduces offcuts or unused space.

Algebra (early patterns and function rules):

- Identify simple "if–then" rules in product reuse models (e.g., "If each bottle is refilled 10 times, how many new bottles are avoided?").
- Create simple charts or sequences that show return rates in reuse systems or shared ownership models.

Measurement:

- Measure quantities of material used or saved in a circular product redesign.
- Convert units (e.g., grams to kilograms) to calculate waste diverted in repair or reuse businesses.
- Use time and cost estimation for circular business processes (e.g., delivery loops or shared item rotation).

Data Handling:

- Survey peers on product use habits (e.g., single-use vs refillable) and represent findings in bar charts or pictograms.
- Collect and analyse data from a mini classroom business offering repaired or reused items.
- Compare the environmental impact of different business models using provided infographics or classroom data.

Suggested Activity:

"Maths for a Greener Business" – Learners design a small circular business idea (e.g. a toy swap, refill station, repair café) and apply number and data skills to estimate cost, savings, and environmental impact. They present findings using visual data and logical reasoning.

Local Economies and Community Engagement

(CIRC 7)

Expressive Arts

Learners will explore the role of local economies and community projects in building sustainable futures by using mathematics to investigate local trade, shared services, and community needs. Through real-world contexts, learners will apply number operations, patterns, measurement, and data-handling skills to understand how money, goods, and services flow within a community. They will begin to reason mathematically about fair exchange, resource use, and the value of supporting local people and businesses.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by exploring local trading and sharing systems.
- **Solve practical problems using basic mathematical techniques** – such as calculating costs, comparing options, and tracking spending or savings.
- **Begin to understand and apply mathematical reasoning** – when discussing value, fairness, or efficiency in community projects.
- **Learn to use data to interpret the world around them** – by collecting and analysing local information and creating visual representations.

Global Framework Links:

- **SDG 11: Sustainable Cities and Communities** – promoting local economies as a pathway to sustainable development.
- **SDG 8: Decent Work and Economic Growth** – fostering understanding of how communities can support local employment and trade.
- **UNCRC Article 29** – encouraging education that supports understanding of economic participation and responsibility.
- **UNCRC Article 12** – supporting children's voices in community decision-making based on evidence and reasoning.

- **UNRMS Principles** – emphasising efficient, inclusive local systems that manage resources fairly and sustainably.

Examples by Strand:

Number:

- Use addition and subtraction to calculate total earnings from a school or community fundraising event.
- Work out costs and change for local shopping trips using classroom shop simulations.
- Multiply prices of local produce vs imported alternatives to compare value and support for local growers.

Geometry:

- Map out a local market or shop layout using 2D shapes.
- Design stall or shop signs using symmetry and space planning.
- Plan community spaces (e.g., garden plots, repair hubs) using grid-based or scale layouts.

Algebra (patterns and early functions):

- Explore spending patterns (e.g., "If I spend £2 each week on local goods, how much do I spend in a month?").
- Create simple rules such as "If one fruit box feeds 3 families, how many for 12 families?"

Measurement:

- Measure and compare food miles using maps and standard units to track distances between local and global supply chains.
- Weigh local produce in comparison to pre-packaged goods to explore packaging waste.
- Estimate time and effort saved through shared transport or cooperative deliveries.

Data Handling:

- Survey class or families on where goods are bought (local vs national/international). Represent results in bar graphs or pie charts.

- Record data on local volunteering or community service hours and interpret totals or averages.
- Analyse costs and benefits of a fictional local business using simple tables or pictograms.

Suggested Activity:

"My Maths Market" – Learners plan a mini local marketplace using local or reused items. They use number and data skills to set prices, calculate profits, compare packaging waste, and reflect on how buying locally helps the environment and community. They create graphs to present findings and share reflections using reasoning statements.

Environmental Impact and Resource Conservation

(CIRC8)

Mathematics and Numeracy

Learners will use mathematical techniques to investigate the environmental impact of human activity and identify ways to conserve resources such as water, energy, and raw materials. They will apply number operations, measurement, and data analysis to solve real-world problems, build awareness of resource limits, and develop strategies for conservation. Learners will begin to use reasoning to make informed choices about reducing waste, saving energy, and protecting ecosystems.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – to explore consumption trends and environmental cycles.
- **Solve practical problems using basic mathematical techniques** – e.g., comparing usage before and after conservation actions.

- **Begin to understand and apply mathematical reasoning** – to evaluate impact and suggest improvements.
- **Learn to use data to interpret the world around them** – using graphs, tables, and surveys about energy, water, and material use.

Global Framework Links:

- **SDG 12: Responsible Consumption and Production** – promoting sustainable use of natural resources.
- **SDG 13: Climate Action** – encouraging learners to understand and reduce their environmental impact.
- **SDG 6: Clean Water and Sanitation** – applying maths to manage and conserve water.
- **UNCRC Article 24** – right to a healthy environment and education that supports sustainability.
- **UNRMS Principles** – promoting balanced, data-driven decisions about natural resource use.

Examples by Strand:

Number:

- Use addition and subtraction to calculate total resource use over a day or week (e.g., litres of water or kWh of electricity).
- Multiply to estimate how much could be saved if a resource-conserving habit (e.g., switching off lights) is repeated daily.
- Compare waste totals before and after a school-wide conservation effort.

Geometry:

- Use grid paper to design efficient layouts for community gardens or renewable energy placements (e.g., solar panel arrays).
- Explore shapes that conserve materials in packaging (e.g., hexagons vs circles vs squares).
- Investigate area and perimeter of containers used to collect rainwater or sort waste.

Algebra (early pattern recognition and rules):

- Create simple rules like “If one tap drips once every second, how much water is wasted in a day/week?”
- Use patterns to predict environmental impacts or savings (e.g., regular vs reduced car journeys).

Measurement:

- Measure water used in various tasks (e.g., brushing teeth with tap on vs off).
- Estimate waste volume or material weights from different bins (recycling, compost, general waste).
- Compare amounts of food wasted before and after awareness campaigns using standard units (grams, litres).

Data Handling:

- Conduct surveys on home/school habits (e.g., water use, heating, lights left on) and graph results.
- Track and record class energy or paper use and show how conservation actions affect it.
- Interpret real-world data (e.g., from Eco-Schools or WWF) to compare regional or global resource use.

Suggested Activity:

“Resource Detectives” – Learners track the use of a resource in their home or classroom (e.g., paper, water, electricity) over a week. They collect data, use maths to estimate savings from conservation actions, and present their findings in bar graphs and written reasoning.

Citizenship and Global Responsibility

(CIRC 9)

Learners will apply mathematical understanding to explore fairness, equity, and global responsibility. They will use numbers, data, and reasoning to compare global and local issues—such as access to clean water, food distribution, and climate impact—and explore how mathematical thinking can support more just and sustainable communities. Learners will begin to apply critical thinking to real-world data and use mathematical tools to consider ethical questions.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by investigating numerical inequalities in global and local communities.
- **Solve practical problems using basic mathematical techniques** – such as calculating how resources could be more fairly shared.
- **Begin to understand and apply mathematical reasoning** – to make decisions about responsible actions.
- **Learn to use data to interpret the world around them** – using tables, charts, and maps to explore global patterns and challenges.

Global Framework Links:

- **SDG 1: No Poverty**, **SDG 10: Reduced Inequalities**, and **SDG 13: Climate Action** – supporting learners to analyse and respond to global disparities.
- **UNCRC Article 12** – children's right to be heard in matters that affect them, supported through data literacy.
- **UNCRC Article 29** – education must support human rights and respect for others.
- **UNRMS Principles** – promoting informed, equitable decisions about how resources are used and shared.

Examples by Strand:

Number:

- Compare and calculate differences in daily income, access to clean water, or food between countries or communities.
- Use multiplication and division to estimate impact of small actions (e.g., "If 100 people donate £1 each...").
- Tackle word problems around global aid distribution or environmental impact.

Geometry:

- Use world maps and globes to plot distances or identify regions impacted by global challenges.
- Explore shapes and spatial planning in equitable design (e.g., shared community gardens or housing).
- Create infographics using geometric layout principles to represent global data clearly.

Algebra (patterns and simple rules):

- Identify and predict patterns in climate change data (e.g., rising temperatures or sea levels).
- Use formulas to model resource use per person and project future needs.
- Explore patterns in fair trade pricing or carbon footprints.

Measurement:

- Measure water usage and compare with global averages using litres and millilitres.
- Use weight and volume to understand food waste or packaging differences in different systems.
- Estimate materials needed for community improvement projects (e.g., recycled material benches).

Data Handling:

- Collect and compare classroom data on responsible actions (e.g., how many bring reusable bottles, walk to school).
- Interpret bar charts or line graphs showing access to education, clean energy, or digital tools around the world.
- Work with real-life datasets from UNICEF, WWF, or local councils to explore global and community challenges.

Suggested Activity:

"Maths for a Fairer World" – Learners investigate one issue (e.g., water access, carbon footprint, or food waste) through

real-world numbers. They create data tables, graphs, and reasoning statements to compare communities, suggest changes, and reflect on how maths can support global responsibility.

Food Systems (**Circ 10)**

Mathematics and Numeracy

Learners will use mathematics to explore how food can be produced, consumed, reused, and managed within a circular system that reduces waste and supports sustainability. They will apply number operations, patterns, measurement, and data handling to understand food journeys, local food production, composting, and community sharing models. Learners will begin to reason mathematically about how to reduce food waste, reuse nutrients, and contribute to sustainable systems.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – by exploring cycles and sequences in food systems.
- **Solve practical problems using basic mathematical techniques** – such as calculating food quantities, compost ratios, and distribution.
- **Begin to understand and apply mathematical reasoning** – to reflect on food waste and sustainable alternatives.
- **Learn to use data to interpret the world around them** – using charts and graphs to analyse food use and waste.

Global Framework Links:

- **SDG 2: Zero Hunger, SDG 12: Responsible Consumption and Production, SDG 13: Climate Action** – understanding how food systems can support both people and the planet.

- **UNCRC Article 24** – children's right to nutritious food and a healthy environment.
- **UNCRC Article 29** – supporting education that builds respect for the natural world and human dignity.
- **UNRMS Principles** – promoting efficient and regenerative use of natural resources through circular food systems.

Examples by Strand:

Number:

- Add or subtract to calculate classroom food waste over a week and estimate monthly or yearly totals.
- Multiply to calculate how much compost can be made from food waste.
- Compare local vs imported food costs using basic operations.

Geometry:

- Design circular farm or garden layouts using symmetry, pattern, and shape.
- Map out food supply chains and create flow charts using directional planning.
- Explore efficient packaging shapes to minimise food waste and material use.

Algebra (patterns and function rules):

- Create simple rules for composting cycles (e.g., "If each day 200g of waste is added...").
- Explore input-output models showing resources used vs nutrients returned in circular systems.
- Develop early function-based reasoning for resource rotation (e.g., crop rotation models).

Measurement:

- Measure weights of food waste before and after a composting initiative.
- Estimate volumes needed for food sharing or redistribution projects.
- Compare food portion sizes to discuss equity and nutrition.

Data Handling:

- Conduct surveys on favourite foods, composting habits, or food sources.
- Create bar charts showing the results of school-wide food waste audits.
- Use pictograms to show the journey of a food item in a circular system (e.g., grown → eaten → composted → regrown).

Suggested Activity:

"Food Loop Investigators" – Learners track the journey of one food item (e.g., a carrot or apple) and use maths to measure how much is used, wasted, composted, and reused. They graph the data, propose improvements, and use reasoning to explain how a circular system helps people and the planet.

Circular Technologies and Innovation

(CIRC11)

Mathematics and Numeracy

Learners will explore how mathematical thinking supports the design and evaluation of circular technologies—products and systems created to minimise waste and maximise reuse. They will use numbers, patterns, measurement, and data to investigate innovative ideas such as renewable energy, modular design, and smart recycling. Learners will apply reasoning and problem-solving to understand how innovation can reduce environmental impact and support sustainable futures.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – to support design and systems thinking.
- **Solve practical problems using basic mathematical techniques** – related to quantities, resources, and sustainable outputs.
- **Begin to understand and apply mathematical reasoning** – in evaluating technological systems and their circularity.
- **Learn to use data to interpret the world around them** – by measuring impact and tracking performance of circular innovations.

Global Framework Links:

- **SDG 9: Industry, Innovation, and Infrastructure** – promoting sustainable innovation.
- **SDG 12: Responsible Consumption and Production** – designing technologies that support circularity.
- **UNCRC Article 29** – enabling learners to be active, informed global citizens with knowledge and values that support sustainability.
- **UNRMS Principles** – fostering sustainable use of resources through innovative, regenerative design.

Examples by Strand:

Number:

- Calculate how many items are saved from landfill by a circular design (e.g., refillable water bottles or modular furniture).
- Use division and multiplication to compare costs and savings of traditional vs circular products.
- Estimate total energy or material savings from a reuse technology (e.g., solar-powered devices).

Geometry:

- Design models of circular products (e.g., circular shoes, shared-use items) using 2D and 3D shapes.
- Plan space-efficient layouts for repair hubs or recycling stations using shapes and symmetry.
- Explore geometric forms used in modular or upgradable technology.

Algebra (early patterns and function rules):

- Predict future use or waste reduction by identifying patterns in data over time (e.g., if 5 devices are repaired each week...).
- Create simple function rules based on reuse rates or energy inputs and outputs.
- Explore patterns in circular material flows (e.g., "every 3 uses creates one unit of waste").

Measurement:

- Measure and compare the lifespan of reusable vs disposable items using time and cost units.
- Weigh different materials used in circular technology and compare with single-use alternatives.
- Estimate the total volume or area of a system (e.g., battery reuse station or circular tool library).

Data Handling:

- Collect data on how many people in the class use reusable or circular products.
- Use bar charts or pictograms to show how technology innovations reduce waste over time.
- Interpret data from real-world sources (e.g., local council, environmental groups) to assess circular tech usage.

Suggested Activity:

"Innovator's Maths Challenge" – Learners design a circular invention (e.g., a solar-powered lunchbox or a community fix-it cart) and apply maths to plan, measure, cost, and evaluate it. They present their innovation using charts, drawings, and simple mathematical reasoning to show how it helps reduce waste and resource use.

Mathematics and Numeracy

Learners will engage in outdoor mathematical inquiry to explore natural circular systems (e.g. water cycles, plant growth, decomposition) and human impacts on the environment. They will collect and interpret data, measure resources, identify patterns, and apply mathematical reasoning to understand how circularity supports regeneration in nature and sustainable practices in their communities.

Curriculum for Wales Objectives Addressed:

- **Develop understanding of numbers, patterns, and shapes** – through observations and exploration of natural systems.
- **Solve practical problems using basic mathematical techniques** – in real-world, outdoor contexts.
- **Begin to understand and apply mathematical reasoning** – to questions of sustainability and circular design in nature.
- **Learn to use data to interpret the world around them** – through hands-on investigations in natural environments.

Global Framework Links:

- **SDG 4.7** – Education for sustainable development and global citizenship
- **SDG 12: Responsible Consumption and Production** – understanding the circularity of materials and food in natural systems
- **SDG 15: Life on Land** – conserving ecosystems and understanding regenerative cycles
- **UNCRC Article 29** – education should develop respect for the natural environment
- **UNRMS Principle 1 & 4** – promoting the sustainable use of ecosystems and life-cycle approaches to resource use

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Examples by Strand:

Number:

- Count the number of leaves composted and predict how many will decompose in a month.
- Use multiplication to explore how much waste is diverted from landfill through composting or reuse.
- Compare numbers of reused vs single-use items found during a litter pick.

Geometry:

- Identify natural shapes in the outdoor environment (e.g. spirals in shells, hexagons in beehives).
- Use symmetry and tessellation to create circular economy-themed art installations with natural materials.
- Design geometric patterns using found items, such as seeds or sticks, to illustrate cycles or systems.

Algebra (early function and pattern recognition):

- Create and extend simple patterns using leaves, petals, or stones to explore repetition and cycles.
- Model natural growth patterns (e.g., plant height over time) and create simple rules or sequences.
- Predict outcomes from composting or planting using input/output pattern rules.

Measurement:

- Measure growth of plants or amount of compost produced in a circular garden project.
- Use standard and non-standard units to measure distances during an eco-trail or mapping activity.
- Compare weights of collected natural materials (e.g., food waste before and after decomposition).

Data Handling:

- Conduct a biodiversity tally (e.g. birds, insects, plants) and display results using bar charts or pictograms.
- Collect data on school-wide or community-wide outdoor reuse (e.g., reused wood, recycled materials in planters).
- Survey classmates on how they use outdoor spaces sustainably and graph the responses.

Suggested Activity:

"Nature's Number Trail" – Learners go on a circular economy-themed maths trail around the school grounds or local park, solving tasks such as estimating compost volume, identifying shapes in natural forms, collecting litter data, and drawing diagrams to represent circular systems like food and nutrient loops.