

Design and Technology (Technical Knowledge)

Design and Technology - Technical Knowledge			
By the end of KS5 pupils should know how to:	Redway Pre-Formal Pathway Encounter → Foundation	Redway Semi-formal Pathway Core → Development	Redway Formal Pathway Enrichment → Enhancement
	The pupil can:	The pupil can:	The pupil can:
Build structures, exploring how they can be made stronger, stiffer and more stable. [KS1]	a. Explore or co-explore different shapes, sizes and/or textures of objects b. Explore/co-explore different building materials e.g. exploring straw, sticks and bricks as mentioned in the story 'The Three Little Pigs.' c. Explore/co-explore construction toys such as building blocks. d. Explore/co-explore soft materials e.g. soft sponges, using the senses. e. Explore/co-explore hard materials e.g. wooden spoons and metal pans, using the senses. f. Participate in knocking down structures e.g. a tower of blocks. g. Investigate how objects can fit together through play. h. Stack at least one object on top of another e.g. a building block.	a. Create a tower of three or more blocks. b. Create a simple structure through play using construction toys such as Mega Bloks, Stickle Bricks, magnetic tiles etc. c. Explore properties of materials with an obvious difference e.g. hard and soft materials. d. Create a simple structure through play whilst exploring different materials used for building e.g. exploring straw, sticks and bricks as mentioned in the story 'The Three Little Pigs.' e. Create a simple structure e.g. a tower or wall, using soft materials e.g. cotton wool balls. f. Create a simple structure e.g. a tower or wall, using hard materials such as wood or reinforced cardboard.	a. Understand that different materials are weaker or stronger than each other b. Recognise the difference in strength between 3D shapes eg square compared to triangle. c. Recognise how multiple 2D and 3D shapes are combined to form a strong and stable structure. d. Investigate using different 2D shapes (e.g. magnetic shapes) in a structure to see which ones are stronger and which are weaker. e. Construct a variety of 3D shapes using their nets. f. Build a castle or simple structure using different 3D shapes. g. Explore the strength of a structure through trial and error e.g. creating a bag from paper, material or string, that can withstand items of assorted weight placed in them. h. Identify at least one component that made their structure stronger. i. Explore the stiffness of a structure through trial and error, creating a bridge using: - paper straws - spaghetti - Meccano j. Explore the stiffness of a structure through trial and error, creating a bridge that can hold increasing weight using: - paper straws - spaghetti

			- Meccano k. Identify at least one component that made their structure stiffer. l. Explore the stability of a structure through trial and error by creating Baby Bear's chair using paper or pipe cleaners and tape. m. Identify at least one component that made their structure more stable.
Explore and use mechanisms (for example, levers, sliders, wheels and axles), in their products. [KS1]	a. Explore/co-explore cause and effect toys e.g. a toy that makes noises when a button is pressed. b. Anticipate what will happen when a button is pressed, through repetition. c. Explore/co-explore toys with levers through play e.g. a pop-up toy. d. Anticipate what will happen when a lever is pushed/pulled, through repetition. e. Explore/co-explore toys featuring at least one wheel e.g. a wooden rolling wheel with bells inside. f. Anticipate what will happen when a wheel is turned, through repetition. g. Explore/co-explore interactive books, toys and/or objects with a slider feature e.g. Usborne 'Slide and See' book series or automatic sliding doors in a shop. h. Anticipate what will happen when a slider is operated, through repetition.	a. Explore and operate cause and effect toys with buttons. b. Explore and operate objects with levers, with support e.g. pegs or on the remote of a remote controlled car. c. Push a toy car along a surface. d. Move a toy vehicle around a track e.g. a train. e. Create tracks by pushing a wheeled object through a medium e.g. a trundle wheel in sand or paint. f. Operate interactive books, toys and/or objects with a slider feature e.g. Usborne 'Slide and See' book series. g. Investigate a range of mechanisms through play, with support e.g. taking apart a pre-made Lego or K'NEX model which includes an axle. h. Use wheeled equipment including a bicycle, wheelbarrow, trolleys. i. Use and explore games involving wheels and levers - Spirograph - Mousetrap - Hungry Caterpillar - Water wheels	a. Investigate how a lever is a simple machine which helps us to lift objects by exploring a range of levers used in everyday life e.g. hammer claws, weight bearing wheelbarrows, seasaws, scissors and shears. b. Explore the mechanisms of levers and the different ways they work, to include class 1 levers (e.g. hammer claw), class 2 levers (e.g. wheelbarrow) and class 3 levers (e.g. tweezers). c. Create a lever e.g. a simple catapult using lollipop sticks and elastic bands. d. Investigate how a slider can create movement in a picture by exploring a range of moving books e.g. 'Slide and See' books. e. Explore the mechanisms of sliders and how they work e.g. moving side to side, up and down or in and out. f. Create a simple slider model e.g. a fish swimming along the sea. g. Investigate a range of different wheels e.g. exploring/riding different types of bikes. h. Investigate how an axle is a bar that goes through the wheels, keeping them in place and allowing them to turn, by exploring a range of wheeled items/vehicles e.g. cars, trains, unicycles. i. Explore the mechanisms of axles by investigating how changing the weight and size of the axle impacts on how well a vehicle moves.

			j. Create an axle and attach wheels e.g. using wooden doweling, straws and bottle lids to make a simple car.
Apply their understanding of how to strengthen, stiffen and reinforce more complex structures. [KS2]	N/A	N/A	a. Use understanding of 2D/3D shapes to reinforce, strengthen and stabilise structures b. Use understanding of properties of materials to reinforce, strengthen and stabilise structures c. Show understanding of rationale over choice of materials
Understand and use mechanical systems in their products (for example, gears, pulleys, cams, levers and linkages). [KS2]	N/A	N/A	a. Describe the function of a mechanical system in the product b. Select appropriate mechanical system to carry out required function c. Construct appropriate mechanical system to carry out required function d. Show understanding of rationale over choice of system
Understand and use electrical systems in their products (for example, series circuits incorporating switches, bulbs, buzzers and motors). [KS2]	Follow Pre-Formal pathway within Science – Electricity (2 nd attainment target).	Follow Semi-Formal pathway within Science – Electricity (2 nd attainment target). a. With support, add electrical circuit and bulb, motor and switch to their simple product (structure).	a. Follow a picture to construct a simple series circuit using an electronics kit b. Can name the different parts of a circuit including cells, wires, bulbs, switches, buzzers and motors. c. Construct a circuit with a switch. d. Construct a circuit with a bulb. e. Construct a circuit with a buzzer. f. Construct a circuit with a motor. g. Construct circuits using more than one of the above components. h. Select appropriate components for purpose to combine with product to perform a desired function
Apply their understanding of	N/A	N/A	N/A

computing to program, monitor and control their products [KS2]			
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The Redway School