Pilgrim Federation Curriculum Coverage Ideas and Resources for the Learning Theme: Robots & Machines

Art & Design	Computing
Robot artist Eric Joyner. Appraise key paintings. (Art/ICT) Recreate robot painting in style of Eric Joyner (Art/ICT) Robot artist Egenberger talking about 1950s influences in his art (Art/History) Be a graphic artist! Make own computer-generated robot art (Art/ICT) Workshop & gallery of Clayton Bailey. Research, respond, plan (Art/ICT) Direct control child. Fun remote controls (English/Art) Collaborative class robot sculpture, in style of Bailey's work. Photo (Art/D&T) Fictional robots / Robots movie Cartoon storyboards (English/Art) The Iron Man description, similes. Sketching images (English/Art) Famous robots from Star Wars & Dr Who Make Dalek or other Robot! (English/Art)	What is a robot? Exploring key themes and vocabulary (English/ICT) Instructions - key language robot movements (Maths/ English) Robots to the rescue! Newspaper articles - rescue exploring robots (English/ICT) AI - ChatGPT Our new robotic pet! Learning to direct a Roamer/ Floor Turtle/ Bee Bots (ICT/Maths) Roamer routes. Directing Roamer Pet (ICT/Maths) The language of LOGO. Directions 'from floor to screen' (ICT/Maths) Direct screen turtle through a maze (ICT/Maths)

Design & Technology	Geography
What things did Leonardo da Vinci invent? As an engineer, Leonardo conceived ideas vastly ahead of his own time, conceptually inventing the parachute, the helicopter, an armoured fighting vehicle, the use of concentrated solar power, the car and a gun, a rudimentary theory of plate tectonics and the double hull. **Ornithopters** Among his numerous scientific interests, Leonardo had an obsession with flight. By studying the anatomy of birds, he hoped to build a machine that would one day allow humans to join them in the skies. Towards the end of his life, he gathered his thoughts on the topic in a text known as the Codice sul volo degli uccelli ('Codex on the Flight of Birds'), written around 1505–06. However, concepts for so-called flying machines were sketched throughout Leonardo's career. Typically, the contraptions he drew were 'ornithopters', with membrane-covered wings designed to flap up and down. Whether lying horizontally or standing in an upright position, the pilot would have operated the machines using pedals and levers – very much relying on their physical strength to get off the ground and stay airborne. **Helical air screw** Another flying machine design can be found in a collection of Leonardo's papers known today as Manuscript B. Sketched during the 1480s, the device – sometimes dubbed the 'helical air screw' – bears more than a passing resemblance to a modern helicopter. Instead of individual rotor blades, however, Leonardo's invention features a single, screw-shaped blade, designed to 'bore' into the air and allow the machine to ascend vertically.	Co-ordinates Compass points Latitude and Longitude Where are robots being developed? Technological advances and where they have happened (Geog & ICT) Locate areas around the world where technology has been developed: Research where different brands are made: Amazon Apple Dell Google IBM LG Electronics Meta Microsoft Samsung Panasonic Sony etc… Counties that have the most technological expertise: Japan. South Korea China United States Germany Singapore United Kingdom. Russia

Unfortunately, none of Leonardo's flying machines would have actually worked. Not only would the materials have been too heavy, but human muscle power alone simply isn't sufficient for such devices to take flight. **Parachute** As well as building machines that would enable humans to soar up into the clouds, Leonardo was also interested in creating devices that would allow people to descend from great heights. In a drawing found in the Codex Atlanticus, Leonardo depicts a contraption resembling a parachute, constructed from reinforced cloth and wooden poles. Designed to be "12 arms wide and 12 tall", the device, Leonardo writes, would enable a man to leap off a tall structure "without hurting himself". **Self-supporting bridge** Leonardo was employed by a number of powerful people throughout his life. Of the many things Leonardo invented for his patrons, one of the simplest – but most effective – is a portable wooden bridge that appears in the Codex Atlanticus It was designed to help armies cross bodies of water, the bridge is made up of several notched wooden poles, erected without the need for any screws or other fastenings. The pressure created by the interlocking beams keeps the whole structure firmly in place. **Giant crossbow** A more famous military invention, sketched c1490, is also found in the Codex Atlanticus. Commonly named the 'giant crossbow', the ludicrously large contraption) was designed to launch projectiles such as boulders. While there is no evidence to suggest a working prototype was ever built, Leonardo believed that the sheer sight of such weapons would strike fear into the hearts of the enemy. Overall, the crossbow was one of a number of siege weapons that Leonardo drew after studying the works of an earlier military engineer named Roberto Valturio, who published a paper named De re militari ('On the Military Arts') in 1472.	South Korea is seen as the most technologically advanced: Followed by: United States (look at 'Silicon Valley') Taiwan Denmark Switzerland Israel Finland Netherlands Sweden Norway (UK are ranked 12th!) Where are cars made? Look at UK car plants as well as abroad. BMW Citroen Ford Hyundai Seat Volvo VW…etc…

Armoured fighting vehicle
Alongside his so-called 'helicopter' and 'parachute', Leonardo designed several other things. Among them is the armoured car that appears in the Codex Arundel, which has often been likened to a modern tank. Conceived in c1487, the conical vehicle is depicted with cannons around its full circumference, allowing it to attack from 360 degrees. Crucially, the soldiers inside the tank would have been protected from enemy fire thanks to metal plates reinforcing its wooden shell. Unusually for a man of his engineering ability, the gears in Leonardo's supporting drawings are configured in such a way that renders the vehicle immobile. This may have been a genuine mistake, but some historians have suggested that Leonardo incorporated the error on purpose, just in case in his notes were ever stolen and someone else tried to copy the design.

Diving suits
Following the invasion of Milan, Leonardo fled the city state and spent a brief stint in Venice. As his temporary new home was also under threat from foreign powers (this time by the Ottoman empire), he again offered his services as a military engineer. In the Codex Arundel, Leonardo depicts designs for diving suits made from leather, complete with glass goggles and cane tubing.
In theory, the suits would have allowed Venetian soldiers to walk on the seabed and sabotage enemy ships from below – their breathing made possible by air tanks floating on the water's surface.

The 'robot'
As well as flying machines, bridges and weapons, Leonardo also made things designed purely for entertainment. Around 1495, he drew up plans for a mechanical knight – an armour-clad 'robot' that could sit up, move its head, and even wave a sword in its hands. Having immersed himself in the study of anatomy, Leonardo knew how to make the knight's complex system of gears and pulleys emulate the movements of the human body as closely as possible. While a complete drawing of the knight doesn't survive,

American robotics expert Mark Rosheim managed to construct a successful working replica in 2002 using Leonardo's notes. **Mechanical lion** Another impressive automaton was designed towards the end of Leonardo's life, when – under the employ of Giuliano de' Medici (brother of Pope Leo X) – he built a mechanical lion as a diplomatic gift for King Francis I of France. According to some reports, the lion could walk, move its head, and open its chest to reveal fleurs-de-lys. Making life easier robots in the home. Designs for new uses (English/ D&T) To the future - What might robots of the future be able to do? (English/ICT) AIBO & RoboSapien collages. Plan for bringing eyes to life! (Art/D&T) How does it work? Pneumatics - explain, and investigate (D&T/ English) Building own junk-model robots with pneumatic mechanism (Art/D&T) Robot Wars Introducing our robots! Test/ demonstrate/ present models (D&T/ English) Storyboarding. Reflect, evaluate, record stages of project (English/D&T) Visit Hethel Engineering	

History	Music
Human history is invention—to help understand and improve our world. And some of those leaps forward have been very big, both in size and historical importance, from the wheel and axle to the quantum computer. Greatest inventions (place on a timeline): The wheel Printing Press Penicillin Compass Light Bulb Telephone Internal Combustion Engine Internet - Computer scientists Vinton Cerf and Robert Kahn can be found on every shortlist of people credited as inventors of the internet. This is because they came up with the Transmission Control Protocol and Internet Protocol (TCP/IP), aka the standard for how information is shared between different networks. Tim Berners-Lee was honoured as the inventor of the World Wide Web. https://www.scienceandmediamuseum.org.uk/objects-and-stories/short-history-internet Compare past. How had technology improved the way things are made and the way things work? Robot beginnings & space race. https://www.nasa.gov/ https://www.nasa.gov/technology/ https://www.nasa.gov/robotics/ Create information page – Martian rovers – Spirit, Opportunity & Perseverance https://www.rmg.co.uk/stories/topics/mars-nasa-rover-perseverance-facts-dates , Moon rovers etc. (History/ English)	**See also Charanga Schemes of work** 'Robots!' Music response Writing commentaries (Music/ Eng) Heavy metal! Iron Man 2D images using metal items. (English/Art/Music) Robot Hip-Hop! Music /film stimulus. Breakdancing! (Music) Robot City! Appraise music & respond in movement (Music)

Famous robots/AI (real and fictional). Da Vinci Surgical System KITT (autonomous car from TV/film Knight Rider) Toyota violin-playing robot R2D2 and C3PO (from the Star Wars franchise) Optimus Prime (transformers) WALL-E (film character) Alexa Key fact timelines (History/ICT) Arguably the most famous AI robot is Sophia. Sophia is not just an AI chatbot. She's a highly advanced humanoid robot developed by Hong Kong-based company Hanson Robotics. She gained international attention and recognition in AI news for her human-like appearance and capabilities. Look at the first computers and compare to today. Development of robotic toys. Artefact history (History/D&T) People's memories of having early robotic toys (History/ English)	

Physical Education	Science
See also RealPE Schemes of work. Circuit Training Physical challenges and being systematic in approach to problem solving. E.g. the crate game Large scale Battleships	What is inside a robot? Electrical components & power sources (Science/DT) Circuits Circuit training! Investigate electrical circuits (Science/DT) Flick the switch! Exploring switches. Recording explanations (Science/ English) 'Blue Man Group' Advert/flyer for tour (Music/ English) Percussion workshop! Sound & properties of metals (Music/ Art /Science) Music for metal world! Composition & perform (Music/ Science) Add sensors to circuits. Consider use in robots (Science/D&T) Light it up! Adding bulb eyes/sensor/switch to robots (Science/D&T)

	Pneumatic fanatics! Make own pneumatic systems; forces (D&T/Science) Planning pneumatic feature in junk-model robot. How force works (D&T/Science) Scrap-metal yard Properties of metal - metal meals! (Science/ English) Metals & magnets attract/repel Magnetic North & South (Science/ Geography) How strong magnet? Fair Test investigations use of measures (Science/ Maths) Magnetic robotic arms. Building working arms to lift items (Science/D&T) LIGHT YR3/4 Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.

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Modern Foreign Languages	Other Ideas
Name day to day objects that have technology in them: Washing machine Toaster Computer Laptop Mobile phone Research where different brands are made and find out what language they speak there. E.g. Apple Bosh Braun Hotpoint Indesit LG Maystag Mitsubishi Samsung Smeg Sony Toshiba….	Local visit to factory (Hist/Geog) Visit Hethell Engineering

English	Maths
Fiction: A Series of Unfortunate Events by Lemony Snicket & Brett Helquist Chapter book Chitty Chitty Bang Bang by Ian Fleming Chapter book The Invention of Hugo Cabret by Brian Selznick Chapter book The Imagination Box by Martyn Ford Chapter book Demelza and the Spectre Detectors by Holly Rivers Chapter book Treasure under the Jam Factory by Chrissie Sains & Jenny Taylor Leonora Bolt by Lucy Brandt & Gladys Jose The Iron Man by Ted Hughes The Iron Woman by Ted Hughes The Wild Robot by Peter Brown The Wild Robot Escapes by Peter Brown Ant Clancy: Games Detective by Ruth Morgan Chapter book The Person Controller by David Baddiel & Jim Field Chapter book The Dog Who Saved the World by Ross Welford Chapter book The Stig Plays a Dangerous Game by Jon Claydon & Tim Lawler Chapter book Virtual Kombat: Gamer by Chris Bradford & Andres Frang Chapter book Press Start! Game On, Super Rabbit Boy! By Thomas Flintham Graphic Novel Level Up!: Block and Roll by Tom Nicoll & Anjan Sarkar Chapter book Agent Asha: Mission Shark Bytes by Sophie Deen &Anjan Sarkar Chapter book Hacker by Malorie Blackman Chapter book In the Key of Code by Aimee Lucido Chapter book I Swapped My Brother On The Internet by Jo Simmons & Nathan Reed Chapter book The Accidental Rock Star by Tom McLaughlin Chapter book Troll Stinks! By Jeanne Willis & Tony Ross Picturebook **Non-Fiction:**	Who invented the calculator? Can you use a spreadsheet or database?

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Instructional texts (in the same manner as computer programming) How Things Work – Conrad Mason The Way Things Work – David Macaulay Kay's Incredible Inventions by Adam Kay & Henry Parker Leonardo Da Vinci's Life of Invention by Jake Williams Inventors by Robert Winston & Jessamy Hawke The Extraordinary Book that Invents Itself by Alison Buxton, Helen Bell & Pintachan An Engineer Like me by Dr Shini Somara and Nadja Sarell Why Are There Different Computer Languages? By Kirsty Holmes 100 Things to Know About Numbers, Computers & Coding by Various Ada Lovelace: Poet of Science by Diane Stanley & Jessie Hartland The History of the Computer by Rachel Ignotofsky Steve Jobs by Maria Isabel Sanchez Vegara & Aura Lewis **song**: **Drama**:	

Courageous Advocacy	Developing Spirituality