

Knowledge Faculty 2022/2023

Key Stage 4



The knowledge faculty consists of mathematics, science, science, technology, engineering and mathematics (STEM) and humanities (history and geography) departments. Each department has a specialist lead teacher, who oversees the teaching, learning and assessment within each subject. The subject specialists are supported by a key stage 2 link teacher who is responsible for the implementation of the subjects in their phase.

All departments within the faculty offer students the opportunity to achieve a range of qualifications:

Mathematics	Science	STEM	Humanities
Entry Level 1-3	ASDAN science (informal)	BCS Robotics Level 1	ASDAN geography (informal)
Functional Skills Level 1 and 2	Entry Level Certificate in science (level 1-3)		BTEC level 1 Introduction to travel and tourism
Edexcel GCSE	GCSE Combined science (Double award)		

When achieving these qualifications, students are encouraged to develop skills in reasoning, problem solving, analysing, social, literacy, numeracy and ICT. These skills will equip students with the ability to succeed across all subjects and within the world around them.

The faculty offers opportunities to students to participate in major national projects, such as the First Tech Robotics Challenge. This is delivered through lunchtime and after-school STEM clubs.

Due to the wide range of needs across the school, classroom learning is also supplemented by consideration of Individual Education Plans (IEPs), Educational Health Care Plans (EHCPs) and multi-agency reports. We encourage a love of learning through extracurricular activities. These include field trips, field work and practical learning opportunities. During these experiences, students apply the skills they have learned in the classroom within a practical setting, this enables the students to make links with different subjects and encourages independence.

The knowledge faculty work closely with the other faculties, ensuring we make best use of all available assessment data. Reading assessment data will inform teaching to ensure the curriculum is accessible to all learners.

The faculty strives to ensure that the learning is relevant to the students and to the world around them. This is achieved through planning current affairs, new discoveries, practical applications and localised studies into the lessons.

Key Stage 4 Maths and Numeracy Curriculum Map

PROGRESSION

Pupils use the skills built throughout Key Stage 2 and 3 to enable them to be placed on the most suited pathway. Pupils on the academic pathway focus on GCSE qualification and those on the vocational pathway complete Functional Skills, Entry Level and Asdan qualifications.



Class	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Key Stage 4						
<p>In key stage 4 on the academic pathway we use The Pearson Edexcel Level 1/Level 2 GCSE (9 to 1) in Mathematics which is designed for use in schools and colleges. It is part of a suite of GCSE qualifications offered by Pearson</p> <p>The aims and objectives of the Pearson Edexcel Level 1/Level 2 GCSE (9–1) in Mathematics are to enable students to:</p> <ul style="list-style-type: none"> ● develop fluent knowledge, skills and understanding of mathematical methods and concepts ● acquire, select and apply mathematical techniques to solve problems ● reason mathematically, make deductions and inferences, and draw conclusions ● comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context. <p>On the vocational pathway we use Functional Skills Level 1 and 2. We also offer Entry Level certificates for those on a bespoke curriculum.</p> <p>Functional Skills qualifications provide reliable evidence of a learner's achievements against demanding content that is relevant to the workplace. The qualifications assess learners' underpinning subject knowledge and their ability to apply this knowledge to different contexts. They provide a</p>						

foundation for progression to employment and further technical education, and they help learners to develop skills for everyday life. In some contexts, Functional Skills qualifications will also play a part in the government's accountability systems.

The Pearson Edexcel Functional Skills Qualifications in Mathematics at **Entry Levels 1 to 3** is for learners to develop understanding and skills in mathematics.

The entry level qualifications give learners the opportunity to:

demonstrate a sound grasp of the underpinning skills and basics of mathematical problem-solving skills appropriate to the level, and the ability to apply mathematical thinking to solve problems in familiar situations

- achieve the skills for further study at Levels 1 and 2
- achieve a foundation for progression into employment.

Year 10 GCSE	Graphs, tables and charts Algebra Probability	Graphs, tables and charts Fractions and percentages Equations, inequalities and sequences	Angles Averages and range Perimeter, area and volume 1	Graphs (further analysis) Transformations	Ratio and proportion Right-angled triangles Probability 2	Multiplicative reasoning Constructions, loci and bearings
Year 11 GCSE	Graphs, tables and charts Working in 2D Perimeter, area and volume	Fractions, indices and standard form Congruence, similarity and vectors More algebra (balancing method, rearranging the subject, simplifying)	Ratio and proportion Right-angled triangles Probability	Angles (rules, solving missing angles and using algebraic notation) Graphs (line, scatter and time series)	Quadratic equations and graphs Revision Mock Exams	Revision

Functional Skills Level 1	<p>L1.1 Read, write, order and compare large numbers (up to one million)</p> <p>L1.2 Recognise and use positive and negative numbers</p> <p>L1.3 Multiply and divide whole numbers and decimals by 10, 100, 1000</p> <p>L1.4 Use multiplication facts and make connections with division facts</p> <p>L1.5 Use simple formulae expressed in words for one or two-step operations</p> <p>L1.6 Calculate the squares of one-digit and two-digit numbers</p>	<p>L1.11 Add, subtract, multiply and divide decimals up to two decimal places</p> <p>L1.12 Approximate by rounding to a whole number or to one or two decimal places</p>	<p>L1.13 Read, write, order and compare percentages in whole numbers</p> <p>L1.14 Calculate percentages of quantities, including simple percentage increases and decreases by 5% and multiples thereof</p> <p>L1.15 Estimate answers to calculations using fractions and decimals</p> <p>L1.16 Recognise and calculate equivalences between common fractions, percentages and decimals</p> <p>L1.17 Work with simple ratio and direct proportions</p>	<p>L1.21 Recognise and make use of simple scales on maps and drawings</p> <p>L1.22 Calculate the area and perimeter of simple shapes including those that are made up of a combination of rectangles</p> <p>L1.23 Calculate the volumes of cubes and cuboids</p> <p>L1.24 Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles</p>	<p>L1.25 Interpret plans, elevations and nets of simple 3-D shapes</p> <p>L1.26 Use angles when describing position and direction, and measure angles in degrees</p> <p>L1.27 Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs</p> <p>L1.28 Group discrete data and represent grouped data graphically</p> <p>L1.29 Find the mean and range of a set of quantities</p> <p>L1.30 Understand probability on a scale from 0 (impossible) to 1</p>	Revision

			L1.18 Calculate simple interest in multiples of 5% on amounts of money		(certain) and use probabilities to compare the likelihood of events L1.31 Use equally likely outcomes to find the probabilities of simple events and express them as fractions	
Functional Skills Level 2	<p>1. Read, write, order and compare positive and negative numbers of any size</p> <p>2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation</p> <p>3. Evaluate expressions and make substitutions in given formulae</p>	<p>7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers</p> <p>8. Express one number as a fraction of another</p> <p>9. Order, approximate and compare decimals</p> <p>10. Add, subtract, multiply and divide decimals up to three</p>	<p>13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting</p> <p>14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph</p> <p>15. Calculate using compound</p>	<p>17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)</p> <p>18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements</p> <p>19. Use coordinates in 2-D, positive and negative, to specify the</p>	<p>21. Draw 3-D shapes to include plans and elevations</p> <p>22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes</p> <p>23. Calculate the median and mode of a set of quantities</p> <p>24. Estimate the mean of a grouped frequency distribution from discrete data</p>	<p>25. Use the mean, median, mode and range to compare two sets of data</p> <p>26. Work out the probability of combined events including the use of diagrams and tables, including two-way tables</p> <p>27. Express probabilities as fractions, decimals and percentages</p>

	<p>in words and symbols</p> <p>4. Identify and know the equivalence between fractions, decimals and percentages</p> <p>5. Work out percentages of amounts and express one amount as a percentage of another</p> <p>6. Calculate percentage change (any size increase and decrease), and original value after percentage change</p>	<p>decimal places</p> <p>11. Understand and calculate using ratios, direct proportion and inverse proportion</p> <p>12. Follow the order of precedence of operators, including indices</p>	<p>measures including speed, density and rates of pay angles and/or coordinates with 2-D and 3-D shapes</p> <p>16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non rectangular shapes (formulae given except for triangles and circles)</p>	<p>positions of points</p> <p>20. Understand and use common 2-D representations of 3-D objects</p> <p>21. Draw 3-D shapes to include plans and elevations</p> <p>22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes</p>		
Entry Level 2	<p>Using numbers and the number system – whole numbers, fractions and decimals</p> <p>Count reliably up to 100 items</p> <p>Read, write, order</p>	<p>Using numbers and the number system – whole numbers, fractions and decimals</p> <p>Know the number of hours in a day and weeks in a year; be able to</p>	<p>Using common measures, shape and space</p> <p>Calculate money with pence up to one pound and in whole pounds of multiple items and</p>	<p>Using common measures, shape and space</p> <p>Read and compare positive temperatures</p> <p>Read and use</p>	<p>Handling information and data</p> <p>Extract information from lists, tables, diagrams and bar charts</p> <p>Make numerical</p>	<p>Revision and Exam Technique</p> <p>Revise all subjects covered.</p> <p>Complete past papers</p> <p>Exam techniques taught.</p>

	<p>and compare numbers up to 200</p> <p>Recognise and sequence odd and even numbers up to 100</p> <p>Recognise and interpret the symbols +, -, ×, ÷ and = appropriately</p> <p>Add and subtract two-digit numbers</p> <p>Multiply whole numbers in the range 0×0 to 12×12 (times tables)</p>	<p>name and sequence</p> <p>Divide two-digit whole numbers by single-digit whole numbers and express remainders</p> <p>Approximate by rounding to the nearest 10, and use this rounded answer to check results</p> <p>Recognise simple fractions (halves, quarters and tenths) of whole numbers and shapes</p> <p>Read, write and use decimals to one decimal place</p>	<p>write with the correct symbols (£ or p)</p> <p>Read and record time in common date formats, and read time displayed on analogue clocks in hours, half hours and quarter hours, and understand hours from a 24-hour digital clock</p> <p>Use metric measures of length, including millimetres, centimetres, metres and kilometres</p> <p>Use measures of weight, including grams and kilograms</p> <p>Use measures of capacity, including millilitres and litres</p>	<p>simple scales to the nearest labelled division</p> <p>Recognise and name 2-D and 3-D shapes, including pentagons, hexagons, cylinders, cuboids, pyramids and spheres</p> <p>Describe the properties of common 2-D and 3-D shapes, including numbers of sides, corners, edges, faces, angles and base</p> <p>Use appropriate positional vocabulary to describe position and direction, including between, inside, outside, middle, below, on top, forwards and backwards</p>	<p>comparisons from bar charts</p> <p>Sort and classify objects using two criteria</p> <p>Take information from one format and represent the information in another format, including use of bar charts</p>	
Entry Level 3	<p>Using numbers and the number system – whole numbers, fractions and decimals</p> <p>Count, read, write, order and</p>	<p>Handling information and data</p> <p>Extract information from lists, tables, diagrams and charts and create frequency tables</p>	<p>Using common measures, shape and space</p> <p>Calculate with money using decimal notation and express money correctly in writing</p>	<p>Using common measures, shape and space</p> <p>Compare measures of weight, including grams and kilograms</p> <p>Compare measures</p>	<p>Using numbers and the number system – whole numbers, fractions and decimals</p> <p>Approximate by rounding numbers less than 1000 to the nearest 10 or 100 and</p>	<p>Revision and Exam Technique</p> <p>Revise all subjects covered.</p> <p>Complete past papers</p> <p>Exam techniques taught.</p>

	<p>compare numbers up to 1000</p> <p>Add and subtract using three-digit whole numbers</p> <p>Divide three-digit whole numbers by single- and double-digit whole numbers and express remainders</p> <p>Multiply two-digit whole numbers by single- and double-digit whole numbers</p>	<p>Interpret information to make comparisons and record changes, from different formats, including bar charts and simple line graphs</p> <p>Organise and represent information in appropriate ways, including tables, diagrams, simple line graphs and bar charts</p>	<p>in pounds and pence</p> <p>Round amounts of money to the nearest £1 or 10p</p> <p>Read, measure and record time using am and pm</p> <p>Read time from analogue and 24-hour digital clocks in hours and minutes</p> <p>Use and compare measures of length, capacity, weight and temperature using metric or imperial units to the nearest labelled or unlabelled division</p> <p>Compare metric measures of length, including millimetres, centimetres, metres and kilometres</p>	<p>of capacity, including millilitres and litres</p> <p>Use a suitable instrument to measure mass and length</p> <p>Sort 2-D and 3-D shapes using properties, including lines of symmetry, length, right angles, angles, including in rectangles and triangles</p> <p>Using appropriate positional vocabulary to describe position and direction, including eight compass points and full/half/quarter turns</p>	<p>use this rounded answer to check results</p> <p>Recognise and continue linear sequences of numbers up to 100</p> <p>Read, write and understand thirds, quarters, fifths and tenths, including equivalent forms</p> <p>Read, write and</p> <p>Handling information and data</p> <p>Extract information from lists, tables, diagrams and charts and create frequency tables</p> <p>Interpret information to make comparisons and record changes, from different formats, including bar charts and simple line graphs</p> <p>Organise and represent information in</p>	
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					appropriate ways, including tables, diagrams, simple line graphs and bar charts	
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Key Stage 4 Geography Curriculum Map



PROGRESSION

Pupils use the skills built through Key Stage 2 and 3 to enable them to be placed on the most suited pathway. Pupils on the academic pathway focus on BTEC qualification and those on the vocational pathway complete Asdan qualifications.

ASDAN Geography Short Course

The course comprises a series of challenges, covering topics such as physical processes; food, energy and waste; and tourism. The topics offered have been chosen on the basis that most will not have been taught at Key Stage 3. It is about real places. Much of it uses the student as a starting point. It is about their place in the world – how they live in it, how it is changing for better and for worse and about their future in it. It will be about broadening students' horizons so they get a sense of seeing the bigger picture through social, economic and environmental lenses.

BTEC Travel and Tourism

A Travel and Tourism BTEC qualification tells potential employers what well-developed skills/attributes you have. For example, research skills, excellent time management, that you are able to work in a team, and that you have the necessary 'people' skills to manage others effectively.

Pupils will develop a range of skills required for a managerial career through a range of varied and interesting projects, tailored to match your interests and ambitions.

Castner (Vocational)	Geography ASDAN course	Geography ASDAN course	Geography ASDAN course	Geography ASDAN course	Geography ASDAN course
	My place	Sport and leisure	Holidays	The BRICS	Why do people move?
	Food, energy and waste	Physical processes	Global interdependence	Big issues	Completing evidence portfolio

Anderson (Academic)		Geography ASDAN course My place Food, energy and waste Option of BTEC Level 1 in Travel and Tourism Travel and Tourism Organisations and Destinations	Geography ASDAN course Sport and leisure Physical processes Option of BTEC Level 1 in Travel and Tourism Travel and Tourism Organisations and Destinations	Geography ASDAN course Holidays Global interdependence Option of BTEC Level 1 in Travel and Tourism Customer needs in Travel and Tourism	Geography ASDAN course The BRICS Big issues Option of BTEC Level 1 in Travel and Tourism Influences on Global Travel and Tourism	Geography ASDAN course Why do people move? Completing evidence portfolio Option of BTEC Level 1 in Travel and Tourism External Assessment
Turing (Vocational)		Geography ASDAN course My place Food, energy and waste	Geography ASDAN course Travel and Tourism Organisations and Destinations	Geography ASDAN course Customer needs in Travel and Tourism	Geography ASDAN course Influences on Global Travel and Tourism	Geography ASDAN course External Assessment

Key Stage 4 Science Curriculum Map



PROGRESSION

Pupils use the skills built through Key Stage 2 and 3 to progress onto the most suited KS4 pathway.

Constant assessment throughout KS3, in the form of; end of topic tests, end of year tests, end of key stage tests, and BSquared assessments, inform the placement of pupils onto one of two pathways.

Pupils on the academic pathway focus on the Pearson double award GCSE combined science qualification and those on the vocational pathway complete the Pearson Entry Level Certificate and Asdan qualifications.

The suitability of placement within said pathways are constantly monitored throughout KS4 using exam style questions and mock examinations.

Pearson recommend that both of the aforementioned Pearson courses are 'co-taught', meaning that the breadth of the topics remain the same across both the academic and vocational pathways.

They differ in their depth and the courses are planned using the [ELC to GCSE map](#).

Class	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<h2>Key Stage 4</h2> <p>Pupils on the academic pathway study for a double award (two GCSEs) in combined science and pupils on the vocational pathway study towards an entry level certificate and/or Asdan award.</p> <p>At KS4 pupils extend their knowledge of science and develop their practical and investigative skills.</p> <p>The key ideas specific to the KS4 science content include:</p> <p>BIOLOGY</p>						

- Life processes depend on molecules whose structure is related to their function
- The fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling living processes to be performed effectively
- Living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many different ways
- Living organisms are interdependent and show adaptations to their environment
- Life on Earth is dependent on photosynthesis in which green plants and algae trap light from the Sun to fix carbon dioxide and combine it with hydrogen from water to make organic compounds and oxygen
- Organic compounds are used as fuels in cellular respiration to allow the other chemical reactions necessary for life
- The chemicals in ecosystems are continually cycling through the natural world
- The characteristics of a living organism are influenced by its genome and its interaction with the environment
- Evolution occurs by a process of natural selection and accounts both for biodiversity and how organisms are all related to varying degrees.

CHEMISTRY

- Matter is composed of tiny particles called atoms and there are about 100 different naturally occurring types of atoms called elements
- Elements show periodic relationships in their chemical and physical properties
- These periodic properties can be explained in terms of the atomic structure of the elements
- Atoms bond by either transferring electrons from one atom to another or by sharing electrons
- The shapes of molecules (groups of atoms bonded together) and the way giant structures are arranged is of great importance in terms of the way they behave
- There are barriers to reaction so reactions occur at different rates
- Energy is conserved in chemical reactions so can therefore be neither created nor destroyed.

PHYSICS

- The use of models, as in the particle model of matter or the wave models of light and of sound
- The concept of cause and effect in explaining such links as those between force and acceleration, or between changes in atomic nuclei and

radioactive emissions

- The phenomena of 'action at a distance' and the related concept of the field as the key to analysing electrical, magnetic and gravitational effects
- That differences, for example between pressures or temperatures or electrical potentials, are the drivers of change
- That proportionality, for example between weight and mass of an object or between force and extension in a spring, is an important aspect of many models in science
- That physical laws and models are expressed in mathematical form.

In addition to learning the above theoretical content, pupils will constantly develop their skills, knowledge and understanding of working scientifically. Working scientifically will be assessed through examination and the completion of the eight core practicals.

The ASDAN Science Short Course, developed in association with the Centre for Science Education, accredits up to 60 hours of science studies and activities. It is designed to support learners working towards science GCSEs, while maintaining their curiosity about the subject. Learners develop their personal and employability skills – as well as their science knowledge and understanding.

<p style="text-align: center;">10</p> <p style="text-align: center;">Anderson</p> <p style="text-align: center;">Turing</p>	<p>CC1 States of Matter</p> <p>CC3 Atomic Structure</p> <p>CC4 The Periodic Table</p> <p>CC5 Ionic Bonding</p> <p>CC6 Covalent Bonding</p> <p>CC7 Types of Substance</p> <p>CC8 Acids and Alkalis</p> <p>CC14 Rates of Reaction</p>	<p>CB1 Key Concepts in Biology</p> <p>CB2 Cells and Control</p>	<p>CP1 Motion</p> <p>CP2 Forces and Motion</p> <p>CP3 Conservation of Energy</p> <p>CC9 Calculations Involving Masses</p>	<p>CC2 Methods of Separating and Purifying Substances</p> <p>CC10 Electrolytic Processes</p> <p>CC11 Obtaining and Using Metals</p> <p>CC12 Reversible Reactions and Equilibria</p>	<p>CB3 Genetics</p> <p>CB4 Natural Selection and Genetic Modification</p>	<p>CP4 Waves</p> <p>CP5 Light and the Electromagnetic Spectrum</p> <p>CP6 Radioactivity</p> <p>CP7 Energy - Forces Doing Work</p> <p>CP8 Forces and their Effects</p>
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<p style="text-align: center;">11</p> <p style="text-align: center;">Hamilton</p> <p style="text-align: center;">Storey</p>	<p style="text-align: center;">CB5 Health, Disease and Development of Medicines</p> <p style="text-align: center;">CB6 Plant Structures and their Functions</p> <p style="text-align: center;">CB7 Animal Coordination, Control and Homeostasis</p>	<p style="text-align: center;">Mock exams</p> <p style="text-align: center;">CC13 Groups in the Periodic Table</p> <p style="text-align: center;">CC15 Heat Energy Changes in Chemical Reactions</p> <p style="text-align: center;">CC16 Fuels</p> <p style="text-align: center;">CC17 Earth and Atmospheric Science</p>	<p style="text-align: center;">CB8 Exchange and Transport in Animals</p> <p style="text-align: center;">CB9 Ecosystems and Material Cycles</p> <p style="text-align: center;">CP9 Electricity and Circuits</p>	<p style="text-align: center;">Entry level exams</p> <p style="text-align: center;">CP10 Magnetism and the Motor Effect</p> <p style="text-align: center;">CP11 Electromagnetic Induction</p> <p style="text-align: center;">CP12 Particle Model</p> <p style="text-align: center;">CP13 Forces and Matter</p>	<p style="text-align: center;">Exam preparation and Revision</p>	<p style="text-align: center;">Exam preparation and Revision</p>
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Key Stage 3 STEM Curriculum Map



PROGRESSION


Pupils use the skills built through Key Stage 3 to enable them to be placed on the ICDL qualification.

ICDL Robotics - Level 1

The Robotics module covers the main concepts and skills needed to assemble, programme, and control a simple robot.

Successful students will gain foundational skills and knowledge in robotics. After passing this module, students will feel confident building and programming a robot using widely available robotics kits and visual programming language. These skills can be further extended with modules such as ICDL Computing. They will be able to:

- understand key concepts relating to robots and robotics systems
- identify examples of robots and the main parts of a robot and their function, including microcontrollers, actuators, sensors, and power sources
- understand the elements of a simple control system and how to test it
- understand basic programming concepts and visual programming language
- set up a robot, implement robotic motion, and control a robot in an environment

<p style="text-align: center;">9</p> <p>ICDL Robotics</p>	<p>Complete robot revolution before starting BCS:</p> <p> EducatorGuide_RobotRevolu...</p> <p>1 Robotic Concepts</p> <p>1.1 Robots and Automated Systems</p> <p>1.1.1 Define robots, robotics systems.</p> <p>1.1.2 Understand that robots can be teleoperated, semi-autonomous, autonomous.</p> <p>1.1.3 Understand that robots can be fixed or mobile.</p> <p>1.2 The Use of Robots</p> <p>1.2.1 Identify common uses of robots in different environments like: home, school, manufacturing, healthcare.</p> <p>1.2.2 Identify advanced uses of robots like: driverless cars, robot-assisted surgery.</p> <p>1.2.3 Identify ethical issues in the use of robots like: harming humans.</p>	<p>2 Robotics Parts</p> <p>2.1 Basic Parts and Components</p> <p>2.1.1 Identify the basic parts of a robot like: actuator, microcontroller, sensor, power source.</p> <p>2.1.2 Identify components in a robot kit like: chassis, electronics parts, cables, tools and parts for assembly.</p> <p>2.2 Microcontroller</p> <p>2.2.1 Recognise that the microcontroller collects information from input devices like sensors, executes a program, controls output devices like LED lights, sound device.</p> <p>2.2.2 Identify common microcontroller ports like: power, USB, wireless, input, output.</p> <p>2.3 Actuator System</p> <p>2.3.1 Identify main parts of the actuator system like: switch, motor.</p> <p>2.3.2 Understand that the actuator transforms electrical power into mechanical power, enabling the robot to function.</p> <p>2.4 Sensor</p> <p>2.4.1 Understand that a sensor detects changes in its environment like: light intensity, distance, angle.</p> <p>2.4.2 Recognise the function of different types of sensors like: light, sound, gyroscope.</p>	<p>Dyson Engineering kit</p> <p>3 Simple Control System</p> <p>3.1 Control System Overview</p> <p>3.1.1 Identify the elements of a control system. Understand the basic types of control: open loop, closed loop.</p> <p>3.1.2 Recognise connections to a microcontroller like: button, power, motor, USB input, wireless technology, sensors, output devices.</p> <p>3.1.3 Identify connections to the microcontroller represented in a block diagram.</p> <p>3.1.4 Set up a simple control system using elements like: power, motor, sensors.</p> <p>3.2 Test a Simple Control System</p> <p>3.2.1 Run predefined programs to provide output values like: light intensity, sound, distance, angle.</p> <p>3.2.2 Recognise that there is a response time between inputs and outputs.</p> <p>3.2.3 Recognise that changing variables in a program affects outputs.</p>
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		<p>2.5 Locomotion, Power</p> <p>2.5.1 Identify the parts of a robot that support motion like: arm, wheels.</p> <p>2.5.2 Identify power sources like: batteries, solar power</p>	
<p>10</p> <p>ICDL Robotics</p>	<p>4 Visual Programming</p> <p>4.1 Programming Basics</p> <p>4.1.1 Define the terms program, programming language.</p> <p>4.1.2 Recognise blocks as a basic element in a visual programming language. Recognise common block categories like: Events, Control.</p> <p>4.1.3 Recognise typical activities in the creation of a program like: analyse a task, design a solution, write a program, test and improve the program.</p> <p>4.1.4 Understand the basic elements of a program like: sequence, decision, loop.</p> <p>4.1.5 Understand how a flowchart can be used to present the steps in a solution.</p> <p>4.2 Constant, Variable</p> <p>4.2.1 Distinguish between the terms variable and constant used in a program.</p> <p>4.2.2 Create new variables and assign suitable input in a program.</p> <p>4.3 Events, Controls</p> <p>4.3.1 Use an Events block in a program like: when.</p> <p>4.3.2 Use a Control block in a program like: wait, wait until.</p> <p>4.3.3 Apply a loop or continuous action using controls in a program like: forever, repeat.</p>	<p>5 Working with Robots</p> <p>5.1 Setup</p> <p>5.1.1 Understand and implement safety guidelines like: safe handling of electrical items and tools, awareness of safety of self and others.</p> <p>5.1.2 Assemble a robot using available tools.</p> <p>5.2 Implementing Robotic Motion</p> <p>5.2.1 Implement simple robotic motion like: stop, move forward or backward, turn.</p> <p>5.2.2 Understand the relationships between power, distance, speed, time in robotic motion.</p> <p>5.2.3 Apply concepts of power, distance, speed, time to control motions like: move forward, backward. Recognise that momentum and friction can affect robotic motion.</p> <p>5.2.4 Understand the relationship between power, rotational speed, angle of rotation in robotic motion.</p> <p>5.3 Implementing Robotic Controls</p> <p>5.3.1 Use a robot to collect sensor data like: distance, sound, angle, light.</p> <p>5.3.2 Build, test and refine a program to control the robot using an input sensor like: light, sound, gyroscope.</p> <p>5.3.3 Understand the importance of testing</p>	<p>Completion of course</p> <p>Assessment</p>

	<p>4.3.4 Apply conditions using controls in a program like: if, then, else.</p> <p>4.3.5 Apply logic operators in a program like: and, not,</p> <p>4.4 Program Creation and Execution</p> <p>4.4.1 Outline a plan to describe and solve a problem like: control an output, complete a series of actions.</p> <p>4.4.2 Draw a flowchart to present the steps in a solution.</p> <p>4.4.3 Build a program in a visual programming language to solve a problem like: control an output, complete a series of actions.</p> <p>4.4.4 Recognise that there may be more than one way of writing a program to solve the same problem.</p> <p>4.4.5 Run a program. Identify and fix errors in a program.</p>	<p>in order to eliminate errors.</p> <p>5.3.4 Understand that some causes of errors are random like: dust, unknown variables.</p> <p>5.4 Control in an Environment</p> <p>5.4.1 Navigate a robot in an environment to complete tasks using functionality like: following or avoiding a line; following or avoiding an object, a barrier;</p> <p>moving up, down a slope.</p> <p>5.4.2 Navigate a robot in an environment to complete a scenario using an appropriate combination of motions and functionalities.</p> <p>5.4.3 Recognise the importance of teamwork when collaborating on a robot. Understand skills like: planning, communication, allocation of tasks.</p> <p>5.4 Control in an Environment</p> <p>5.4.1 Navigate a robot in an environment to complete tasks using functionality like: following or avoiding a line; following or avoiding an object, a barrier; moving up, down a slope.</p> <p>5.4.2 Navigate a robot in an environment to complete a scenario using an appropriate combination of motions and functionalities.</p> <p>5.4.3 Recognise the importance of teamwork when collaborating on a robot. Understand skills like: planning, communication, allocation of tasks.</p>	
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