Spec	Youtube links
B1.1a describe how light microscopes and staining can be used to view cells	https://www.youtube.com/watch?v=-DlKMeBDkwc
B1.1b explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions	https://www.youtube.com/watch?v=8IlzKri08kk
B1.1c explain how electron microscopy has increased our understanding of sub-cellular structures	https://www.youtube.com/watch?v=SUo2fHZaZCU
B1.2a describe DNA as a polymer	https://www.youtube.com/watch?v=zwibgNGe4aY
B1.2b describe DNA as being made up of two strands forming a double helix	https://www.youtube.com/watch?v=zwibgNGe4aY
B1.2c describe that DNA is made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar	https://www.youtube.com/watch?v=zwibgNGe4aY
B1.2d recall a simple description of protein synthesis	https://www.youtube.com/watch?v=zwibgNGe4aY
B1.2e explain simply how the structure of DNA affects the proteins made in protein synthesis	https://www.youtube.com/watch?v=zwibgNGe4aY
B1.2f describe experiments that can be used to investigate enzymatic reactions	https://www.youtube.com/watch?v=rABpkD42Ap4 https://www.youtube.com/watch?v=A8Ts4V_osvo https://www.youtube.com/watch?v=sjeoww57h6A https://www.youtube.com/watch?v=kLaZgd6eXKY
B1.2g explain the mechanism of enzyme action	https://www.youtube.com/watch?v=smtCH5HX44o
B1.3a describe cellular respiration as a universal chemical process, continuously occurring that supplies ATP in all living cells	https://www.youtube.com/watch?v=00jbG_cfGuQ
B1.3b describe cellular respiration as an exothermic reaction	https://www.youtube.com/watch?v=Xp0o19gWX7E
B1.3c compare the processes of aerobic respiration and anaerobic respiration	https://www.youtube.com/watch?v=uy30twXyqRk
B1.3d explain the importance of sugars in the synthesis and breakdown of carbohydrates	https://www.youtube.com/watch?v=YO244P1e9QM
B1.3e explain the importance of amino acids in the synthesis and breakdown of proteins	https://www.youtube.com/watch?v=Xiiou51ySXM
B1.3f explain the importance of fatty acids and glycerol in the synthesis and breakdown of lipids	https://www.youtube.com/watch?v=Xiiou51ySXM
B1.4a describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth	https://www.youtube.com/watch?v=68b1HAIfX08
B1.4b describe the process of photosynthesis	https://www.youtube.com/watch?v=-rsYk4eCKnA
B1.4c describe photosynthesis as an endothermic reaction	https://www.youtube.com/watch?v=-rsYk4eCKnA
B1.4d describe experiments to investigate photosynthesis	https://www.youtube.com/watch?v=2YABZiYkEuQ

B1.4e explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis	https://www.youtube.com/watch?v=1curtzL8rUM
B1.4f explain the interaction of these factors in limiting the rate of photosynthesis	https://www.youtube.com/watch?v=PQ1zZ9G5d7M
B2.1a explain how substances are transported into and out of cells through diffusion, osmosis and active transport	https://www.youtube.com/watch?v=zuNMVzTeCtw&t=58s
B2.1b describe the process of mitosis in growth, including the cell cycle	https://www.youtube.com/watch?v=f-ldPgEfAHI
B2.1c explain the importance of cell differentiation	https://www.youtube.com/watch?v=chTptrvKbfg
B2.1d recall that stem cells are present in embryonic and adult animals and meristems in plants	https://www.youtube.com/watch?v=K7D6iA7bZG0
B2.1e describe the functions of stem cells	https://www.youtube.com/watch?v=cEB8656TCIE
B2.1f describe the difference between embryonic and adult stem cells in animals	https://www.youtube.com/watch?v=cEB8656TCIE
B2.2a explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area : volume ratio	https://www.youtube.com/watch?v=JA2qip8zquQ
B2.2b describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms	https://www.youtube.com/watch?v=JA2qip8zquQ
B2.2c describe the human circulatory system	https://www.youtube.com/watch?v=_qmNCJxpsr0
B2.2d explain how the structure of the heart and the blood vessels are adapted to their functions	https://www.youtube.com/watch?v=SJiXnnnI60g
B2.2e explain how red blood cells and plasma are adapted to their transport functions in the blood	https://www.youtube.com/watch?v=aFFLKlk1x04
B2.2g describe the processes of transpiration and translocation	https://www.youtube.com/watch?v=tAf7kV9GHDw https://www.youtube.com/watch?v=QXdujo4PZ7c
B2.2h explain how the structure of the xylem and phloem are adapted to their functions in the plant	https://www.youtube.com/watch?v=jtuX7H05tmQ
B2.2i explain the effect of a variety of environmental factors on the rate of water uptake by a plant	https://www.youtube.com/watch?v=JgPxb4Hot7k https://www.youtube.com/watch?v=zt9ja6p8q6U
B2.2j describe how a simple potometer can be used to investigate factors that affect the rate of water uptake	https://www.youtube.com/watch?v=pa1pydCqz9o
B3.1a describe the structure of the nervous system	https://www.youtube.com/watch?v=mI_kwteBOF4
B3.1b explain how the components of the nervous system can produce a coordinated response	https://www.youtube.com/watch?v=Nn2RHLWST-k
B3.1d ▯ explain how the main structures of the eye are related to their functions	https://www.youtube.com/watch?v=WR14fqEnfhU
B3.1e ▯ describe common defects of the eye and explain how some of these problems may be overcome	https://www.youtube.com/watch?v=6YxffFmi4Eo

B3.1f describe the structure and function of the brain	https://www.youtube.com/watch?v=o6JVMmkBF-I
B3.2a describe the principles of hormonal coordination and control by the human endocrine system	https://www.youtube.com/watch?v=Pk__h1O1n2s
B3.2b explain the roles of thyroxine and adrenaline in the body	https://www.youtube.com/watch?v=iNrUpBwU3q0
B3.2b explain the roles of thyroxine and adrenaline in the body	https://www.youtube.com/watch?v=iNrUpBwU3q0
B3.2c describe the role of hormones in human reproduction including the control of the menstrual cycle	https://www.youtube.com/watch?v=GilWRuk81tk
B3.2c describe the role of hormones in human reproduction including the control of the menstrual cycle	https://www.youtube.com/watch?v=GilWRuk81tk
B3.2d explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle	https://www.youtube.com/watch?v=CyT6IJb6Wbk
B3.2d explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle	https://www.youtube.com/watch?v=CyT6IJb6Wbk
B3.2g explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms	https://www.youtube.com/watch?v=IFRruUN-WCk
B3.2g explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms	https://www.youtube.com/watch?v=IFRruUN-WCk
B3.2h describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethene**	https://www.youtube.com/watch?v=qMHLOCCeAKE
B3.2h describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethene**	https://www.youtube.com/watch?v=qMHLOCCeAKE
B3.3a explain the importance of maintaining a constant internal environment in response to internal and external change	https://www.youtube.com/watch?v=-W7kAyUQT0E
B3.3b describe the function of the skin in the control of body temperature	https://www.youtube.com/watch?v=KJZCOjdG8eA
B3.3c explain how insulin controls blood sugar levels in the body	https://www.youtube.com/watch?v=CuQMpN7rM-4
B3.3d explain how glucagon interacts with insulin to control blood sugar levels in the body	https://www.youtube.com/watch?v=1c6a0BNsyek
B3.3e compare type 1 and type 2 diabetes and explain how they can be treated	https://www.youtube.com/watch?v=RpME9FyxRzM
B3.3f explain the effect on cells of osmotic changes in body fluids	https://www.youtube.com/watch?v=qv91V_qkUHk
B3.3g describe the function of the kidneys in maintaining the water balance of the body	https://www.youtube.com/watch?v=ZvjRtmbTPCo

B3.3i describe the effect of ADH on the permeability of the kidney tubules	https://www.youtube.com/watch?v=X8JcwLUzg9A
B4.1e describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem	https://www.youtube.com/watch?v=-80Z5d6wkDQ
B4.1f explain how abiotic and biotic factors can affect communities	https://www.youtube.com/watch?v=E1pp_7-yTN4
B4.1h describe the differences between the trophic levels of organisms within an ecosystem	https://www.youtube.com/watch?v=mCHdhXMFhcU
B4.1i describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels	https://www.youtube.com/watch?v=wGfOoRrICto
B4.1i describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels	https://www.youtube.com/watch?v=wGfOoRrICto
B4.1j calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain	https://www.youtube.com/watch?v=0glkXIj1DgE
B4.1j calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain	https://www.youtube.com/watch?v=0glkXIj1DgE
B5.1a explain the following terms: gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype	https://www.youtube.com/watch?v=W_RLIS9bumM
B5.1c describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism	https://www.youtube.com/watch?v=3nDjl_V7clk
B5.1d Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype	https://www.youtube.com/watch?v=BBI7GoIyoog
B5.1e describe how genetic variants may influence phenotype: • in coding DNA by altering the activity of a protein • in non-coding DNA by altering how genes are expressed	https://www.youtube.com/watch?v=W_RLIS9bumM
B5.1f explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms	https://www.youtube.com/watch?v=w1U2--x7PJQ
B5.1g explain the terms haploid and diploid	https://www.youtube.com/watch?v=1yu1Zuy_uEQ
B5.1h explain the role of meiotic cell division in halving the chromosome number to form gametes	https://www.youtube.com/watch?v=VzDMG7ke69g
B5.1j predict the results of single gene crosses	https://www.youtube.com/watch?v=prkHKjfUmMs
B5.1k describe sex determination in humans using a genetic cross	https://www.youtube.com/watch?v=prkHKjfUmMs
B5.2a state that there is usually extensive genetic variation within a population of a species	https://www.youtube.com/watch?v=11iYk0Yrx3g

B5.2c explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment	https://www.youtube.com/watch?v=0SCjhI86grU
B5.2d describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species	https://www.youtube.com/watch?v=hOfRN0KihOU
B5.2e describe the evidence for evolution	https://www.youtube.com/watch?v=Q-aGAX27SIo
B5.2f describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology	https://www.youtube.com/watch?v=WJpZLwMIgk4
B6.1a explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area	https://www.youtube.com/watch?v=HLX76gdXgTA
B6.1b describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity	https://www.youtube.com/watch?v=5eTCZ9L834s
B6.1c explain some of the benefits and challenges of maintaining local and global biodiversity	https://www.youtube.com/watch?v=GK_vRtHJZu4
B6.1d evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases	https://www.youtube.com/watch?v=y6gic1HRh-s
B6.2c explain the impact of the selective breeding of food plants and domesticated animals	https://www.youtube.com/watch?v=fHS-OY9XDZc
B6.2c explain the impact of the selective breeding of food plants and domesticated animals	https://www.youtube.com/watch?v=fHS-OY9XDZc
B6.3a describe the relationship between health and disease	https://www.youtube.com/watch?v=3gb902qwR8Y
B6.3b describe different types of diseases	https://www.youtube.com/watch?v=vpEAos0blyw
B6.3d explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants	https://www.youtube.com/watch?v=vO51sFre6fg
B6.3e explain how the spread of communicable diseases may be reduced or prevented in animals and plants	https://www.youtube.com/watch?v=EjwV3hTzjeg
B6.3g describe physical plant defence responses to disease	https://www.youtube.com/watch?v=jaVcyxBRCcs
B6.3i describe different ways plant diseases can be detected and identified, in the lab and in the field	https://www.youtube.com/watch?v=gE-JOlfwIeo
B6.3j explain how white blood cells and platelets are adapted to their defence functions in the blood	https://www.youtube.com/watch?v=qWSWWPZYGHU
B6.3k describe the non-specific defence systems of the human body against pathogens	https://www.youtube.com/watch?v=aq-F4rNuj3Y

B6.3m describe how monoclonal antibodies are produced	https://www.youtube.com/watch?v=5AXApBbj1ps
B6.3m describe how monoclonal antibodies are produced	https://www.youtube.com/watch?v=5AXApBbj1ps
B6.3p explain the aseptic techniques used in culturing organisms	http://vlab.amrita.edu/?sub=3&brch=73&sim=212&cnt=1
B6.3q describe the processes of discovery and development of potential new medicines	https://www.youtube.com/watch?v=0bmftXTdBbY
B6.3q describe the processes of discovery and development of potential new medicines	https://www.youtube.com/watch?v=0bmftXTdBbY
B6.3u describe cancer as the result of changes in cells that lead to uncontrolled growth and division	https://www.youtube.com/watch?v=OcigJn8UJNQ
B6.3u describe cancer as the result of changes in cells that lead to uncontrolled growth and division	https://www.youtube.com/watch?v=OcigJn8UJNQ
B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine	https://www.youtube.com/watch?v=8JTw2RpDo9o
B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine	https://www.youtube.com/watch?v=8JTw2RpDo9o

Spec	Youtube links
C1.1a describe the main features of the particle model in terms of states of matter and change of state	https://www.youtube.com/watch?v=bMbmQzV-Ezs
C1.1b explain in terms of the particle model the distinction between physical changes and chemical changes	https://www.youtube.com/watch?v=4ZGULLWEy1c
C1.1c explain the limitations of the particle model in relation to changes of state when particles are represented by inelastic spheres (e.g. like bowling balls)	https://www.youtube.com/watch?v=U2KmnCXVtS8
C1.2a describe how and why the atomic model has changed over time	https://www.youtube.com/watch?v=thnDxFdkzZs
C1.2b describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with most of the mass in the nucleus	https://www.youtube.com/watch?v=03iWCjxjCdA
C1.2c recall the typical size (order of magnitude) of atoms and small molecules	https://www.youtube.com/watch?v=yQP4UJhNn0I
C1.2d recall relative charges and approximate relative masses of protons, neutrons and electrons	https://www.youtube.com/watch?v=SggCE0kCJOY
C1.2e calculate numbers of protons, neutrons and electrons in atoms and ions, given atomic number and mass number of isotopes	https://www.youtube.com/watch?v=n4WZ0-fItt8
C2.1a explain what is meant by the purity of a substance, distinguishing between the scientific and everyday use of the term 'pure'	https://www.youtube.com/watch?v=Ze0kG4yeFS0
C2.1b use melting point data to distinguish pure from impure substances	https://www.youtube.com/watch?v=C9PuRMzEWQY
C2.1c calculate relative formula masses of species separately and in a balanced chemical equation	https://www.youtube.com/watch?v=q49NwIrjaFw
C2.1d deduce the empirical formula of a compound from the relative numbers of atoms present or from a model or diagram and vice versa	https://www.youtube.com/watch?v=k_GTEtK01Wg
C2.1f describe, explain and exemplify the processes of filtration, crystallisation, simple distillation, and fractional distillation	https://www.youtube.com/watch?v=3pL2X-8-eVk
C2.1f describe, explain and exemplify the processes of filtration, crystallisation, simple distillation, and fractional distillation	https://www.youtube.com/watch?v=ttsAmaNu4ao
C2.1g describe the techniques of paper and thin layer chromatography	https://www.youtube.com/watch?v=J8r8hN05xXk
C2.1h recall that chromatography involves a stationary and a mobile phase and that separation depends on the distribution between the phases	https://www.youtube.com/watch?v=J8r8hN05xXk
C2.1k suggest chromatographic methods for distinguishing pure from impure substances	https://www.youtube.com/watch?v=ok4WVjL9o50

C2.2a describe metals and non-metals and explain the differences between them on the basis of their characteristic physical and chemical properties	https://www.youtube.com/watch?v=Oz8GpDVz5ag
C2.2d describe and compare the nature and arrangement of chemical bonds in: i. ionic compounds ii. simple molecules iii. giant covalent structures iv. polymers v. metals	https://www.youtube.com/watch?v=OQ-pcxo-Q5c
C2.2d describe and compare the nature and arrangement of chemical bonds in: i. ionic compounds ii. simple molecules iii. giant covalent structures iv. polymers v. metals	https://www.youtube.com/watch?v=TxHi5FtMYKk
C2.2d describe and compare the nature and arrangement of chemical bonds in: i. ionic compounds ii. simple molecules iii. giant covalent structures iv. polymers v. metals	https://www.youtube.com/watch?v=A-wTpLPICd0
C2.2e explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons	https://www.youtube.com/watch?v=QXT4OVM4vXI
C2.2f construct dot and cross diagrams for simple covalent and binary ionic substances	https://www.youtube.com/watch?v=_v8C1W0ChVM
C2.2i explain in terms of atomic number how Mendeleev's arrangement was refined into the modern periodic table	https://www.youtube.com/watch?v=fPnwBITSmgU
C2.3c explain the properties of diamond, graphite, fullerenes and graphene in terms of their structures and bonding	https://www.youtube.com/watch?v=hom11_tbQ-Q
C2.3f explain how the bulk properties of materials (ionic compounds; simple molecules; giant covalent structures; polymers and metals) are related to the different types of bonds they contain, their bond strengths in relation to intermolecular forces and the ways in which their bonds are arranged	https://www.youtube.com/watch?v=kfhZuNIf5hc
C2.3g þ compare 'nano' dimensions to typical dimensions of atoms and molecules	https://www.youtube.com/watch?v=NnoQW7uJur8
C3.1a use chemical symbols to write the formulae of elements and simple covalent and ionic compounds	https://www.youtube.com/watch?v=URc75hoKGLY
C3.1b use the names and symbols of common elements and compounds and the principle of conservation of mass to write formulae and balanced chemical equations **and half equations**	https://www.youtube.com/watch?v=8xuNffjUrJU
C3.1c use the names and symbols of common elements from a supplied Periodic Table to write formulae and balanced chemical equations where appropriate	https://www.youtube.com/watch?v=2Juem0lcifE
C3.1d use the formula of common ions to deduce the formula of a compound	https://www.youtube.com/watch?v=URc75hoKGLY
C3.1e construct balanced ionic equations	https://www.youtube.com/watch?v=ZNuKLpxcpjk

C3.1g recall and use the definitions of the Avogadro constant (in standard form) and of the mole	https://www.youtube.com/watch?v=wI56mHUDJgQ
C3.1h explain how the mass of a given substance is related to the amount of that substance in moles and vice versa	https://www.youtube.com/watch?v=CMnkSb2YsXI
C3.1i recall and use the law of conservation of mass	https://www.youtube.com/watch?v=2S6e11NBwiw
C3.1k deduce the stoichiometry of an equation from the masses of reactants and products and explain the effect of a limiting quantity of a reactant	https://www.youtube.com/watch?v=SjQG3rKSZUQ
C3.1l use a balanced equation to calculate masses of reactants or products	https://www.youtube.com/watch?v=TV6n5MFH6IU
C3.2a distinguish between endothermic and exothermic reactions on the basis of the temperature change of the surroundings	https://www.youtube.com/watch?v=eJXL0IrbtqE
C3.2b draw and label a reaction profile for an exothermic and an endothermic reaction	https://www.youtube.com/watch?v=48sLH9P8QK0
C3.2c explain activation energy as the energy needed for a reaction to occur	https://www.youtube.com/watch?v=48sLH9P8QK0
C3.2d calculate energy changes in a chemical reaction by considering bond making and bond breaking energies	https://www.youtube.com/watch?v=sW0R-QU6AVw
C3.3a explain reduction and oxidation in terms of loss or gain of oxygen, identifying which species are oxidised and which are reduced	https://www.youtube.com/watch?v=5rtJdjas-mY
C3.3b explain reduction and oxidation in terms of gain or loss of electrons, identifying which species are oxidised and which are reduced	https://www.youtube.com/watch?v=5rtJdjas-mY
C3.3c recall that acids form hydrogen ions when they dissolve in water and solutions of alkalis contain hydroxide ions	https://www.youtube.com/watch?v=RnyB2qbQtHk
C3.3d describe neutralisation as acid reacting with alkali or a base to form a salt plus water	https://www.youtube.com/watch?v=LFQdD0e3L9I
C3.3f recall that carbonates and some metals react with acids and write balanced equations predicting products from given reactants	https://www.youtube.com/watch?v=QlSsle_jSQ8
C3.3g use and explain the terms dilute and concentrated (amount of substance) and weak and strong (degree of ionisation) in relation to acids	https://www.youtube.com/watch?v=RE3CKkkMljo
C3.3i describe neutrality and relative acidity and alkalinity in terms of the effect of the concentration of hydrogen ions on the numerical value of pH (whole numbers only)	https://www.youtube.com/watch?v=9NK2ZQnhoCI
C3.4a recall that metals (or hydrogen) are formed at the cathode and non-metals are formed at the anode in electrolysis using inert electrodes	https://www.youtube.com/watch?v=W9ngXNxSyoo
C3.4e describe the technique of electrolysis using inert and non-inert electrodes	https://www.youtube.com/watch?v=T-OwWOYHhMI

C4.1a recall the simple properties of Groups 1, 7 and 0	https://www.youtube.com/watch?v=-0EBqRvH33Y
C4.1a recall the simple properties of Groups 1, 7 and 0	https://www.youtube.com/watch?v=qNaBMvJXdJ4
C4.1a recall the simple properties of Groups 1, 7 and 0	https://www.youtube.com/watch?v=yW_C10cEzMk
C4.1b explain how observed simple properties of Groups 1, 7 and 0 depend on the outer shell of electrons of the atoms and predict properties from given trends down the groups	https://www.youtube.com/watch?v=09TBqReaR5c
C4.1b explain how observed simple properties of Groups 1, 7 and 0 depend on the outer shell of electrons of the atoms and predict properties from given trends down the groups	https://www.youtube.com/watch?v=ltZcKvxvu0A
C4.1c þ recall the general properties of transition metals and their compounds and exemplify these by reference to a small number of transition metals	https://www.youtube.com/watch?v=Ms54GV7_kGs
C4.1f deduce an order of reactivity of metals based on experimental results	https://www.youtube.com/watch?v=-R2eNZRzg7Q
C4.2a describe tests to identify selected gases	https://www.youtube.com/watch?v=_GqBl83Koig
C4.2b þ describe tests to identify aqueous cations and aqueous anions	https://www.youtube.com/watch?v=iuPP_spXc6Y
	https://www.youtube.com/watch?v=jNZvEthORRM
C4.2c þ describe how to perform a flame test	https://www.youtube.com/watch?v=1EXr_L7Ojqg
C5.1b þ describe the technique of titration	https://www.youtube.com/watch?v=rLc148UCT2w
C5.1c þ explain the relationship between the volume of a solution of known concentration of a substance and the volume or concentration of another substance that react completely together	https://www.youtube.com/watch?v=tDxnuVXeqLI
C5.1d þ describe the relationship between molar amounts of gases and their volumes and vice versa	https://www.youtube.com/watch?v=UCmYSIjOnUA
C5.1f explain how the mass of a solute and the volume of the solution is related to the concentration of the solution	https://www.youtube.com/watch?v=3G3KQIyoZDI
C5.1g þ calculate the theoretical amount of a product from a given amount of reactant	https://www.youtube.com/watch?v=jtAj0s203CI
C5.1h þ calculate the percentage yield of a reaction product from the actual yield of a reaction	https://www.youtube.com/watch?v=mmsKDK9WXdE
C5.1i þ define the atom economy of a reaction	https://www.youtube.com/watch?v=Zuyk4hfbjSA
C5.1j þ calculate the atom economy of a reaction to form a desired product from the balanced equation	https://www.youtube.com/watch?v=Bp4MjfyMBRU

C5.2a suggest practical methods for determining the rate of a given reaction	https://www.youtube.com/watch?v=UkLEnD6Seto https://www.youtube.com/watch?v=HIHc5gkfAko
	https://www.youtube.com/watch?v=vHCegsRGWNk
	https://www.youtube.com/watch?v=izqJkdj1d4U
C5.2b interpret rate of reaction graphs	https://www.youtube.com/watch?v=GLL1tTL9g9g
C5.2f describe the characteristics of catalysts and their effect on rates of reaction	https://www.youtube.com/watch?v=m_9bpZep1QM
C5.2h explain catalytic action in terms of activation energy	https://www.youtube.com/watch?v=PNyvtcu5-EU
C5.3a recall that some reactions may be reversed by altering the reaction conditions	https://www.youtube.com/watch?v=br8lKynV1Hc
C5.3c predict the effect of changing reaction conditions on equilibrium position and suggest appropriate conditions to produce as much of a particular product as possible	https://www.youtube.com/watch?v=g5wNg_dKsYY
C6.1a explain, using the position of carbon in the reactivity series, the principles of industrial processes used to extract metals, including extraction of a non-ferrous metal	https://www.youtube.com/watch?v=fZM_NF93gWo
C6.1b explain why and how electrolysis is used to extract some metals from their ores	https://www.youtube.com/watch?v=7uIIq_Ofzgw
C6.1c evaluate alternative biological methods of metal extraction	https://www.youtube.com/watch?v=6mVoiaTRdmk
C6.1g þ explain the importance of the Haber process in agricultural production	https://www.youtube.com/watch?v=NWhZ77Qm5y4
C6.1h þ compare the industrial production of fertilisers with laboratory syntheses of the same products	https://www.youtube.com/watch?v=c4eKNFOfO2M
C6.1i þ recall the importance of nitrogen, phosphorus and potassium compounds in agricultural production	https://www.youtube.com/watch?v=RlPr5UC5QP4
C6.1k describe the basic principles in carrying out a life-cycle assessment of a material or product	https://www.youtube.com/watch?v=KrJUpSiCOoU
C6.1o þ describe the composition of some important alloys in relation to their properties and uses	https://www.youtube.com/watch?v=9LHDSB1n11k
C6.1p þ describe the process of corrosion and the conditions which cause corrosion	https://www.youtube.com/watch?v=jQoE_9x37mQ
C6.1s þ explain how the properties of materials are related to their uses and select appropriate materials given details of the usage required	https://www.youtube.com/watch?v=KgUmNQD6m5Q
C6.2a þ recognise functional groups and identify members of the same homologous series	https://www.youtube.com/watch?v=nMTQKBn2Iss
C6.2b þ name and draw the structural formulae, using fully displayed formulae, of the first four members of the straight chain alkanes, alkenes, alcohols and carboxylic acids	https://www.youtube.com/watch?v=BulW2otK854

C6.2d þ recall the basic principles of addition polymerisation by reference to the functional group in the monomer and the repeating units in the polymer	https://www.youtube.com/watch?v=WnPZpKdnMT0
C6.2e þ explain the basic principles of condensation polymerisation	https://www.youtube.com/watch?v=QBuSFPOtcJ4
C6.2h þ recall that DNA is a polymer made from four different monomers called nucleotides and that other important naturally-occurring polymers are based on sugars and amino-acids	https://www.youtube.com/watch?v=JYiUvB_GafM
C6.2j describe the separation of crude oil by fractional distillation	https://www.youtube.com/watch?v=KCs1F_44dy4
C6.2m recall that crude oil is a main source of hydrocarbons and is a feedstock for the petrochemical industry	https://www.youtube.com/watch?v=-j4lN3s8lBg
C6.2o describe the production of materials that are more useful by cracking	https://www.youtube.com/watch?v=Xsqlv4rWnEg
C6.2p þ recall that a chemical cell produces a potential difference until the reactants are used up	https://www.youtube.com/watch?v=riikUBLFBJs
C6.2q þ evaluate the advantages and disadvantages of hydrogen/oxygen and other fuel cells for given uses	https://www.youtube.com/watch?v=5_lDGna9MBM
C6.3a interpret evidence for how it is thought the atmosphere was originally formed	https://www.youtube.com/watch?v=6Db2WAG-VVs
C6.3c describe the greenhouse effect in terms of the interaction of radiation with matter within the atmosphere	https://www.youtube.com/watch?v=bpa0aFY--pE
C6.3d evaluate the evidence for additional anthropogenic (human activity) causes of climate change and describe the uncertainties in the evidence base	https://www.youtube.com/watch?v=EtW2rrLHs08
C6.3e describe the potential effects of increased levels of carbon dioxide and methane on the Earth's climate and how these effects may be mitigated	https://www.youtube.com/watch?v=sTvqIijqvTg

Spec	Youtube links
P1.1a describe how and why the atomic model has changed over time	https://www.youtube.com/watch?v=NSAgLvKOPLQ https://www.youtube.com/watch?v=thnDxFdkzZs
P1.1b describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with almost all of the mass in the nucleus	https://www.youtube.com/watch?v=h6LPAwAmnCQ
P1.1d define density	https://www.youtube.com/watch?v=kE8I_M2pyg8
P1.1e explain the differences in density between the different states of matter in terms of the arrangements of the atoms and molecules	https://www.youtube.com/watch?v=QXoQbWoIiRE
P1.1f apply the relationship between density, mass and volume to changes where mass is conserved (M1a, M1b, M1c, M3c)	https://www.youtube.com/watch?v=kE8I_M2pyg8
P1.2a describe how mass is conserved when substances melt, freeze, evaporate, condense or sublimate	https://www.youtube.com/watch?v=2S6e11NBwiw
P1.2b describe that these physical changes differ from chemical changes because the material recovers its original properties if the change is reversed	https://www.youtube.com/watch?v=4ZGULLWEy1c
P1.2d define the term specific heat capacity and distinguish between it and the term specific latent heat	https://www.youtube.com/watch?v=x7GZ2DXef84
P1.2e apply the relationship between change in internal energy of a material and its mass, specific heat capacity and temperature change to calculate the energy change involved (M1a, M3c, M3d)	https://www.youtube.com/watch?v=6lAxBTLgYfU
P1.2f apply the relationship between specific latent heat and mass to calculate the energy change involved in a change of state (M1a, M3c, M3d)	https://www.youtube.com/watch?v=jwvZb0cjLls
P1.3a explain how the motion of the molecules in a gas is related both to its temperature and its pressure	https://www.youtube.com/watch?v=_zsJ9eFVMdA
P1.3b explain the relationship between the temperature of a gas and its pressure at constant volume (qualitative only)	https://www.youtube.com/watch?v=_zsJ9eFVMdA
P1.3c þ recall that gases can be compressed or expanded by pressure changes and that the pressure produces a net force at right angles to any surface	https://www.youtube.com/watch?v=6iRqBwrNtFg
P1.3d þ explain how increasing the volume in which a gas is contained, at constant temperature can lead to a decrease in pressure	https://www.youtube.com/watch?v=FehRTC9ViVQ
P1.3e þ explain how doing work on a gas can increase its temperature	https://www.youtube.com/watch?v=FehRTC9ViVQ
P1.3f þ describe a simple model of the Earth's atmosphere and of atmospheric pressure	https://www.youtube.com/watch?v=7_yf-iRf8Vc
P1.3g þ explain why atmospheric pressure varies with height above the surface of the planet	https://www.youtube.com/watch?v=7_yf-iRf8Vc
P1.3h þ describe the factors which influence floating and sinking	https://www.youtube.com/watch?v=2RefIvqaYg8
P1.3i þ explain why pressure in a liquid varies with depth and density and how this leads to an upwards force on a partially submerged object	https://www.youtube.com/watch?v=Pn5YEMwQb4Y
P1.3j þ calculate the differences in pressure at different depths in a liquid (M1c, M3c)	https://www.youtube.com/watch?v=7m7J5T7c6ig
P2.1a describe how to measure distance and time in a range of scenarios	https://www.youtube.com/watch?v=o8DSb6D-0fw
P2.1b describe how to measure distance and time and use these to calculate speed	https://www.youtube.com/watch?v=lvekW79pJjk
P2.1c make calculations using ratios and proportional reasoning to convert units and to compute rates (M1c, M3c)	https://www.youtube.com/watch?v=8glfUANjBbY
P2.1d explain the vector-scalar distinction as it applies to displacement and distance, velocity and speed	https://www.youtube.com/watch?v=_QC42w0npwQ

P2.1e relate changes and differences in motion to appropriate distance-time, and velocity-time graphs; interpret lines and slopes (M4a, M4b, M4c, M4d)	https://www.youtube.com/watch?v=lTE83sP7lQg
P2.1g calculate average speed for non-uniform motion (M1a, M1c, M2b, M3c)	https://www.youtube.com/watch?v=lvekW79pJjk&t=8s
P2.1h apply formulae relating distance, time and speed, for uniform motion, and for motion with uniform acceleration (M1a, M1c, M2b, M3c)	https://www.youtube.com/watch?v=ZvuCfyem9vs
P2.2a recall examples of ways in which objects interact	https://www.youtube.com/watch?v=O_jXMVhVoMQ
P2.2b describe how such examples involve interactions between pairs of objects which produce a force on each object	https://www.youtube.com/watch?v=GPiw8jtfmCQ
P2.2c represent such forces as vectors	https://www.youtube.com/watch?v=ppEReQH1Wws
P2.2d apply Newton's First Law to explain the motion of an object moving with uniform velocity and also an object where the speed and/or direction change	https://www.youtube.com/watch?v=LEHR8YQNm_Q
P2.2e use vector diagrams to illustrate resolution of forces, a net force (resultant force), and equilibrium situations (M4a, M5a, M5b)	https://www.youtube.com/watch?v=ppEReQH1Wws
P2.2f describe examples of the forces acting on an isolated solid object or system	https://www.youtube.com/watch?v=OijJ4EtTBi0
P2.2g describe, using free body diagrams, examples where two or more forces lead to a resultant force on an object	https://www.youtube.com/watch?v=4Bwwq1munB0
P2.2h describe using free body force diagrams the special case of balanced forces when the resultant force is zero (qualitative only)	https://www.youtube.com/watch?v=bGTAeG5pLdo
P2.2i apply Newton's Second Law in calculations relating forces, masses and accelerations	https://www.youtube.com/watch?v=8YhYqN9BwB4
P2.2j explain that inertia is a measure of how difficult it is to change the velocity of an object and that the mass is defined as the ratio of force over acceleration	https://www.youtube.com/watch?v=YbWjx3LUc0U
P2.2k define momentum and describe examples of momentum in collisions	https://www.youtube.com/watch?v=_rhoXFKiCQw
P2.2l þ apply formulae relating force, mass, velocity and acceleration to explain how the changes involved are inter-related (M3b, M3c, M3d)	https://www.youtube.com/watch?v=3FQ58lVtbCg
P2.2m use the relationship between work done, force, and distance moved along the line of action of the force and describe the energy transfer involved	https://www.youtube.com/watch?v=3FQ58lVtbCg
P2.2n calculate relevant values of stored energy and energy transfers; convert between newton-metres and joules (M1c, M3c)	https://www.youtube.com/watch?v=OyGG1Lm6L2Y
P2.2p recall and apply Newton's Third Law	https://www.youtube.com/watch?v=EgqcGrB3re8
P2.2q explain why an object moving in a circle with a constant speed has a changing velocity (qualitative only)	https://www.youtube.com/watch?v=sxI-OeQf6N0
P2.3b describe the difference between elastic and plastic deformation (distortions) caused by stretching forces	https://www.youtube.com/watch?v=frGL1jTnDsg
P2.3c describe the relationship between force and extension for a spring and other simple systems	https://www.youtube.com/watch?v=K67y1FxcR1M
P2.3d describe the difference between linear and non-linear relationships between force and extension	https://www.youtube.com/watch?v=JGHcnYmRX30
P2.3e calculate a spring constant in linear cases	https://www.youtube.com/watch?v=dnebaW-a338
P2.3f calculate the work done in stretching	https://www.youtube.com/watch?v=dnebaW-a338
P2.3g describe that all matter has a gravitational field that causes attraction, and the field strength is much greater for massive objects	https://www.youtube.com/watch?v=p_o4aY7xkXg
P2.3h define weight, describe how it is measured and describe the relationship between the weight of an object and the gravitational field strength (g)	https://www.youtube.com/watch?v=zXQuzEJ3n0A
P2.3k þ describe examples in which forces cause rotation	https://www.youtube.com/watch?v=jUTQ5ADBd5s
P2.3l þ define and calculate the moment of the force in such examples	https://www.youtube.com/watch?v=Z6zWTotGY5A

P2.3m þ explain how levers and gears transmit the rotational effects of forces	https://www.youtube.com/watch?v=nC_J3gRQHi8
P2.3o þ use the relationship between the force, the pressure and the area in contact	https://www.youtube.com/watch?v=SYjogSDYRHo
P3.1a þ describe that charge is a property of all matter and that there are positive and negative charges. The effects of the charges are not normally seen on bodies containing equal amounts of positive and negative charge, as their effects cancel each other out	https://www.youtube.com/watch?v=yc2-363MIQs&t=68s
P3.1b describe the production of static electricity, and sparking, by rubbing surfaces, and evidence that charged objects exert forces of attraction or repulsion on one another when not in contact	https://www.youtube.com/watch?v=W1KEgBdatN8
P3.1c explain how transfer of electrons between objects can explain the phenomena of static electricity	https://www.youtube.com/watch?v=W1KEgBdatN8
P3.1d þ explain the concept of an electric field and how it helps to explain the phenomena of static electricity	https://www.youtube.com/watch?v=2UWrIpcPZRk
P3.1e recall that current is a rate of flow of charge (electrons) and the conditions needed for charge to flow	https://www.youtube.com/watch?v=QnDnTNSGH9E
P3.2a describe the differences between series and parallel circuits	https://www.youtube.com/watch?v=Az7VRuTA8dQ
P3.2b represent d.c. circuits with the conventions of positive and negative terminals, and the symbols that represent common circuit elements	https://www.youtube.com/watch?v=uZ9D164Y94A&t=96s
P3.2b represent d.c. circuits with the conventions of positive and negative terminals, and the symbols that represent common circuit elements	https://www.youtube.com/watch?v=sFUmuuJjAcw
P4.1a describe the attraction and repulsion between unlike and like poles for permanent magnets	https://www.youtube.com/watch?v=cHuU6Lz4Amw
P4.1b describe the difference between permanent and induced magnets	https://www.youtube.com/watch?v=ZHCVI1F67-s
P4.2j þ explain the action of the microphone in converting the pressure variations in sound waves into variations in current in electrical circuits, and the reverse effect as used in loudspeakers and headphones	https://www.youtube.com/watch?v=k8fsyW6huLg
P5.1a describe wave motion in terms of amplitude, wavelength, frequency and period	https://www.youtube.com/watch?v=ZCfDHLznkM0
P5.1b define wavelength and frequency	https://www.youtube.com/watch?v=CHnKkPVhCcE
P5.1d apply formulae relating velocity, frequency and wavelength (M1c, M3c)	https://www.youtube.com/watch?v=FvRxODI7vXo
P5.1e describe differences between transverse and longitudinal waves	https://www.youtube.com/watch?v=ZCfDHLznkM0
P5.1f þ show how changes, in velocity, frequency and wavelength, in transmission of sound waves from one medium to another, are inter-related (M1c, M3c)	https://www.youtube.com/watch?v=yF4cvbAYjwI
P5.1h þ describe, with examples, processes which convert wave disturbances between sound waves and vibrations in solids	https://www.youtube.com/watch?v=yHJ_X_lXtB8
P5.1i þ explain why such processes only work over a limited frequency range, and the relevance of this to human hearing	https://www.youtube.com/watch?v=WOgI5lAR_bQ
P5.1j describe how ripples on water surfaces are used to model transverse waves whilst sound waves in air are longitudinal waves, and how the speed of each may be measured	https://www.youtube.com/watch?v=LyxLxx3xifo
P5.2d describe the main groupings of the electromagnetic spectrum and that these groupings range from long to short wavelengths and from low to high frequencies	https://www.youtube.com/watch?v=cfXzwh3KadE
P5.2g give examples of some practical uses of electromagnetic waves in the radio, microwave, infra-red, visible, ultra-violet, X-ray and gamma-ray regions	https://www.youtube.com/watch?v=7BC6UU16fP4

P5.2h describe how ultra-violet waves, X-rays and gamma rays can have hazardous effects, notably on human bodily tissues	https://www.youtube.com/watch?v=zI2vRwFKnHQ
P5.3c þ use ray diagrams to illustrate reflection, refraction and the similarities and differences between convex and concave lenses (qualitative only)	https://www.youtube.com/watch?v=c2GFG6cvPew
P5.3d þ construct two-dimensional ray diagrams to illustrate reflection and refraction (qualitative only –equations not needed) (M5a, M5b)	https://www.youtube.com/watch?v=mfytZxM8lho
P5.3e þ explain how colour is related to differential absorption, transmission and reflection	https://www.youtube.com/watch?v=l8_fZPHasdo
P6.1a recall that atomic nuclei are composed of both protons and neutrons, that the nucleus of each element has a characteristic positive charge	https://www.youtube.com/watch?v=db1GcPkeE40
P6.1b recall that atoms of the same elements can differ in nuclear mass by having different numbers of neutrons	https://www.youtube.com/watch?v=xjY5p-1CDr8
P6.1e relate these emissions to possible changes in the mass or the charge of the nucleus, or both	https://www.youtube.com/watch?v=KWAsz59F8gA
P6.1f use names and symbols of common nuclei and particles to write balanced equations that represent radioactive decay	https://www.youtube.com/watch?v=tgBkzUvUy_U
P6.1g balance equations representing the emission of alpha, beta or gamma radiations in terms of the masses, and charges of the atoms involved (M1b, M1c, M3c)	https://www.youtube.com/watch?v=tgBkzUvUy_U
P6.1h recall that in each atom its electrons are arranged at different distances from the nucleus, that such arrangements may change with absorption or emission of electromagnetic radiation and that atoms can become ions by loss of outer electrons	https://www.youtube.com/watch?v=900dXBWgx3Y
P6.1l recall the differences in the penetration properties of alpha-particles, beta-particles and gamma-rays	https://www.youtube.com/watch?v=VTHQYjkCqV0
P6.2a recall the differences between contamination and irradiation effects and compare the hazards associated with these two	https://www.youtube.com/watch?v=0q8GgJPVc1w
P6.2b þ explain why the hazards associated with radioactive material differ according to the half-life involved	https://www.youtube.com/watch?v=opjJ-3Tkfyg
P6.2c þ describe the different uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue	https://www.youtube.com/watch?v=jm0KBW77itI
P6.2d þ recall that some nuclei are unstable and may split, and relate such effects to radiation which might emerge, to transfer of energy to other particles and to the possibility of chain reactions	https://www.youtube.com/watch?v=MtDeczF0azY
P6.2e þ describe the process of nuclear fusion	https://www.youtube.com/watch?v=LekacMuM12Y
P8.2a describe the main energy sources available for use on Earth, compare the ways in which they are used and distinguish between renewable and non-renewable sources	https://www.youtube.com/watch?v=SCg81A6kwg0
P8.2c recall that, in the national grid, electrical power is transferred at high voltages from power stations, and then transferred at lower voltages in each locality for domestic use	https://www.youtube.com/watch?v=-1SLFzqLU5k
P8.2d recall that step-up and step-down transformers are used to change the potential difference as power is transferred from power stations	https://www.youtube.com/watch?v=w9ugMmrCTg0
P8.2h explain the difference between direct and alternating voltage	https://www.youtube.com/watch?v=BcIDRet787k
P8.2i recall the differences in function between the live, neutral and earth mains wires, and the potential differences between these wires	https://www.youtube.com/watch?v=mZBOpIOVmmA

P8.3i þ explain, in qualitative terms, how the differences in velocity, absorption and reflection between different types of waves in solids and liquids can be used both for detection and for exploration of structures which are hidden from direct observation, notably in the Earth's core and in deep water	https://www.youtube.com/watch?v=uA_OLKfQpYA