Unit B1 - Revision Lesson 1 Classification and variation				
Specification learning outcomes	**HSW statements**	**Exemplar teaching activities**	**Main differentiation**	**Resource sheets**
1.1 Demonstrate an understanding of how biologists classify organisms according to how closely they are related to one another including: a) Species - groups of organisms that have many features in common, b) Genus - contains several species with similar characteristics, c) Family - comprising several genera,d) Order - comprising several families, e) Class - comprising several orders, f) Phylum - comprising several classes, g) The Five Kingdoms - animalia, plantae, fungi, protoctista and prokaryotae. **1.2** Describe the main characteristics of the five kingdoms including: a) Animalia - multicellular, do not have cell walls, do not have chlorophyll, feed heterotrophically, b) Plantae - multicellular, have cell walls, have chlorophyll, feed autotrophically, c) Fungi - multicellular, have cell walls, do not have chlorophyll, feed saprophytically, d) Protoctista - unicellular, have a nucleus, e) Prokaryotae - unicellular, have no nucleus. **1.3** Explain why scientists do not classify viruses in any of the five kingdoms, and regard them as non-living. **1.4** Describe the main characteristics of the phylum Chordata as animals with a supporting rod running the length of the body, an example of this being the backbone in vertebrates. **1.5** Explain how scientists place vertebrates into groups based on: a) oxygen absorption methods - lungs, gills and skin, b) reproduction - internal or external fertilisation, oviparous or	HSW 1, 2, 3, 4, 6, 8, 11, 12, 14	<u>The theme of this lesson is classification.</u> **Starter**: *Groups of organisms:* Ask students to name some organisms and write them on the board. (Try to get a wide spread). Then ask students to group them. Ask students what features they would look for to be sure about putting an organism in a certain group. Then look for connections between the suggested groups to see which groups could be grouped with other groups to form subgroups inside a larger group. Ask students if they can remember the different groups that we use i.e. kingdom, phylum, class etc. This would be a good time to introduce a virus and discuss the problems with classifying viruses. **Main**: *Further classification.* Students use Worksheet B1.1c to revise classification and the five kingdoms. *New discoveries.* Students use worksheet B1.2d to revise vertebrate groups and the difficulties of classification. Use the discussion following this worksheet to revise the ways that scientists communicate new ideas. *Ladybird species.* Students use worksheet B1.3e to revise defining species and hybrids. *Adaptations* Show students a photo from the Internet of a snowshoe hare in its winter (white) coat and ask them to suggest ways in which it is adapted to its surroundings. Adaptations include: thick hair for insulation, smaller ears than most hares to prevent heat loss, white fur for camouflage, strong hind legs for fast running from predators, compact body shape to prevent heat loss, big feet to stop it sinking into the snow, the soles of its feet are covered in fur for insulation and grip on the ice. **Plenary**: *Agreeing definitions.*Write these words on the board: key, classification, species and adaptation. Split students into four (or five) groups to write definitions of each word on cards. Then one group is given all the definitions and asked to choose the best. Choices are read out to the class. You will need to correct any misunderstandings. **Homework:** WorksheetB1.4d *Variation* (for students requiring extra support) and B1.3d *Reviewing names* (for those working at a higher level).	**Stretch:** Students could use *Mythical Classification* B1.2e instead of B1.2d. Students use worksheet this alternative worksheet to create and use keys. They could use *Species and their names* B1.3f to revise to revise the difficulties with defining species and hybrids instead of B1.3e. **Support:** Pupils may need to be reminded of the difference between a virus and a bacterium.	Worksheet B1.1c Worksheet B1.2d Worksheet B1.3e Worksheet B1.4d Stretch: Worksheet B1.2e Worksheet B1.3f Worksheet B1.3d [Also photo of snowshoe hare]

viviparous, c) thermoregulation – homeotherms and poikilotherms.				
1.6 Demonstrate an understanding of the problems associated with assigning vertebrates to a specific group based on their anatomy and reproduction methods, and why many vertebrates are difficult to classify.				
1.7 Discuss why the definition of a species as organisms that produce fertile offspring may have limitations: some organisms do not always reproduce sexually and some hybrids are fertile.				
H 1.8 Explain why binomial classification is needed to identify, study and conserve species, and can be used to target conservation efforts.				
1.9 Explain how accurate classification may be complicated by: a) variation within a species **H**, b) hybridisation in ducks c) ring species.				
1.10 Construct and use keys to show how species can be identified.				
1.11 Explain how organisms are adapted to their environment, and how some organisms have characteristics that enable them to survive in extreme environments, including deep-sea hydrothermal vents and polar regions.				

Unit B1 - Revision Lesson 2 Variation and inheritance				
Specification learning outcomes	**HSW statements**	**Exemplar teaching activities**	**Main differentiation**	**Resource sheets**
1.12 Demonstrate an understanding of Darwin's theory of evolution by natural selection including: a) variation, b) over-production, c) struggle for existence, d) survival, e) advantageous characteristics inherited , f) gradual change. **1.13** Describe variation as continuous or discontinuous. **1.14** Investigate the variations within a species to illustrate continuous variation and discontinuous variation. **1.15** Interpret information on variation using normal distribution curves. **1.16** Demonstrate an understanding of the causes of variation, including: a) genetic variation – different characteristics as a result of mutation or reproduction, b) environmental variation – different characteristics caused by an organism's environment (acquired characteristics). **H 1.17** Demonstrate an understanding of how speciation occurs as a result of geographic isolation. **1.18** Explain how new evidence from DNA research and the emergence of resistant organisms support Darwin's theory. **1.19** Explain the role of the scientific community in validating new evidence, including the use of: a) scientific journals, b) the peer review process, c) scientific conferences. **1.20** Describe the structure of the nucleus of the cell as containing chromosomes, on which genes are located **1.21** Demonstrate an understanding that genes exist in alternative forms	HSW 1, 2, 3, 5, 6, 7, 8, 10, 11, 13	<u>The theme of this lesson is inheritance.</u> **Starter:** *Different variations.* Give students two cards, one with the word 'continuous' on it and one with 'discontinuous'. Then give students examples of variation, such as height, blood group, shoe size, gender or eye colour, and ask them to hold up the card that shows what type of variation it is an example of. Draw a continuous distribution curve and ask students to explain what it shows. Then ask them to sort the same variations into ones that have an environmental cause and ones that have a genetic cause (or possibly both). **Main:** *Natural selection and evolution.* Students use worksheet B1.7b to revise natural selection and evolution. This would be a good time to talk about antibiotic resistance and how this supports Darwin's theory. *Genes and chromosomes.* Students complete worksheet B1.8c to help them revise this section of the specification. *Explaining inheritance.* Students use worksheet B1.9a to revise inheritance and Punnett squares. *Genetic disorders.* Use worksheet B1.10b to help students revise genetic disorders and family pedigrees. **Plenary:** *Glossary terms.* Prepare cards with all the key terms and glossary definitions from this lesson. Ask students to match the words with the definitions. **Homework:** Variation Studies. Students use worksheet B1.6d to think about a practical investigating variation.	**Stretch:** Ask students what would happen if there were two populations of hedgehogs (referring to worksheet B1.6d) which were trapped on two different islands – use this to talk about geographic isolation. Use worksheet B1.10b as the basis and ask students to think about what advice Steve and Paula may have been offered as part of genetic counselling. Discuss with students pedigree analysis. **Support:** Draw out the Punnett square from worksheet B1.9a and fill it in as class.	Worksheet B1.7b Worksheet B1.8c Worksheet B1.9a Worksheet B1.10b Homework B1.6d

called alleles which give rise to differences in inherited characteristics.			
1.22 Recall the meaning of, and use appropriately, the terms: dominant, recessive, homozygous, heterozygous, phenotype and genotype.			
1.23 Analyse and interpret patterns of monohybrid inheritance using a genetic diagram, Punnett squares and family pedigrees.			
1.24 Calculate and analyse outcomes (using probabilities, ratios and percentages) from monohybrid crosses.			
1.25 Describe the symptoms of the genetic disorders: a) sickle cell disease b) cystic fibrosis.			
H **1.26** Evaluate the outcomes of pedigree analysis when screening for genetic disorders: a) sickle cell disease, b) cystic fibrosis.			