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| Sub project | **Lesson title** | **Resources** |
| Biological Sciences | How does DNA control our characteristics? | Powerpoint  Student booklets  Lesson plan  Coloured/ numbered beads or plasticine for building proteins (optional) |
| Learning objectives  Be able to describe the structure of DNA  Be able to explain how the structure of DNA controls the production of proteins.  Be able to describe genetic engineering in simple terms. | | |
| Differentiation?  Lower ability groups to watch first video clip on slide 2. (if time this could also be used to illustrate to higher ability groups that melanism occurs in other species too).  Lower ability groups could be given the correct sequence of RNA instead of writing it for themselves (slide 7)  Lower ability groups could build melanin together as a class using coloured beads or plasticine and ignore the rest of the options on slide 7. | | |
| Activity | | **Timing** |
| Starter:  Show pupils the pictures of the ‘panther’ and the leopard. Explore what the main differences between them are and establish whether the pupils think they are different species or not.  Show the video(s) on slide 2. If watching the second video, the first 90 secs or so contain all the info they need.  Main:  Explain to the pupils that they are going to find out what is happening to create the melanistic leopard. Split the class into groups of 4. 2 pupils from each group will spend 10 mins researching proteins and 2 will look at DNA. They can use the information in their booklets to fill out the table on slide 3 (this is in their booklets).  The groups can then come back together and share what they have found out to complete their tables. You can use slides 4 and 5 to help with this process if needed.  Ask them to clarify to you how the two things are linked (they should have worked out that DNA is a code that is read by the cells to make proteins and that the different proteins created give us our different features e.g blue or brown eyes. They can record this in their table too. Discussions with lower ability groups may need more teacher facilitation to reach this conclusion.  Use slide 6 to describe the mechanism by which DNA codes for proteins, then show them the strand of DNA on slide 7. Ask them to write down the sequence of letters that they would see on the corresponding strand of RNA on page 16 of their booklet (remind them that U replaces T). Low ability groups could be shown the strand of RNA to copy into their booklets.  Use the table on slide 7 of the powerpoint to work out which amino acids are coded for (these have been given numbers to make it less confusing). The pupils can use the tables on page 16 of their booklets to work out which protein their RNA codes for.  Lower ability groups could use numbered beads or plasticine to help them visualise what is happening.  Once they have worked out which one it is, for higher ability groups, you can clarify that each gene ends with ine of the ‘stop’ codons and that in reality proteins are thousands of amino acids long. Also that each gene has as many codons as the protein it codes for has amino acids so each varies in length.  You can then ask them to discuss or write an explanation as to how melanistic individuals occur within a species.  Key points   * A mutation occurs (higher) and the gene that codes for excess melanin production is passed from a parent to its offspring. * The cells in the leopard’s skin and hair read the DNA and produce the extra melanin that it codes for. This means that they are much darker than usual.   Plenary:  Show pupils the video on slide 9. Discuss the problems with insulin production. Talk through the questions on slide 10 with the pupils (or ask them to discuss it in small groups). They should be able to work out that because insulin is a protein it is coded for by genes. Ask them how we could use this knowledge to produce insulin on an industrial scale. They may or may not come up with bacteria/ genetic engineering.  Talk them through the diagram on slide 11 and show them the video (first 2 mins contain the info they need) | | 5 mins  10 mins  5mins  5mins  5 mins  10 mins  5 mins  6 mins |