**GENERAL HUMAN BIOLOGY – YEAR 11**

**TASK 7 – DNA EXTRACTION PRACTICAL**

**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ WEIGHTING: 10%**

**DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MARK: \_\_\_\_\_ / 48 = \_\_\_\_\_ %**

**This assessment has been broken into multiple sections. To gain full marks, all sections must be completed and in the correct order.**

**Part A – Research and development (6 marks)**

**You are to design a practical for creating a model of DNA. A list of materials will be given to you.**

The research and write-up of the practical will be completed for homework.

\*\*Please note: if you do not complete this homework you will not be able to complete Part B of the assessment\*\*

**Part B – Model Practical (22 marks)**

**Using the practical you developed in Part A, you will create a model of a section of DNA and answer questions on DNA.**

**Part C – DNA Comprehension (20 marks)**

**Complete a series of questions in relation to DNA, models and the use of DNA**

**Part A – Research and development**

**Research:**

You must research and create a method to build a model of DNA. You will use your method to create a model of DNA in your next class.

|  |  |
| --- | --- |
| Behaviours | Mark |
| * Title * Materials (specific, list) * Method (step-by-step, 3rd person, accurate) | 6 |
| * All of the above but some error | 4 |
| * Materials (not specific amounts) * Method (not 3rd person, paragraph not step-by-step) | 2 |
| * Nothing handed in | 0 |

**Part B – Model Practical**

1. Using the method you developed, create a model of DNA. (6 marks)
   * When you have finished you are to hand it in to your teacher.

|  |  |
| --- | --- |
| Behaviours | Mark |
| * Procedure worked * Accurate representation of DNA * Used time efficiently * Kept to procedure | 6 |
| * All of the above but had to alter procedure | 4 |
| * Only met 2 of the areas from above or * only Completed 75% of their model | 2 |

1. Complete the following questions:
2. How many bases are found in DNA? (1 mark)

* Four

1. Which bases form pairs? (2 marks)

* Adenine and Thymine
* Guanine and Cytosine

1. What is a helix? (1 mark)

* Twisted ladder shape

*Any suitable answer*

1. DNA is described as a ‘twisted ladder’. Is this a good analogy? Explain your response. (3 marks)

* Yes (1)
* Because the bases forms bonds like rungs of a ladder (1)
* The outside of the DNA is like the sides of a ladder but are twisted (1)

1. Where is DNA found in a cell? (3 marks)

* A = nucleus and mitochondria of all cells (3)
* B = nucleus of all cells / nucleus and mitochondria (2)
* C = nucleus (1)

1. When is DNA visible in a cell? (3 marks)

* A = During prophase when cells are replicating. This is a stage of mitosis which is a form of cell division (3)
* B = During mitosis / prophase (2)
* C = Cell division (1)

1. How can such a large molecule fit into the small nucleus of a cell? (3 marks)

* A = It fits as it becomes condensed and supercoiled over itself to fit into the nucleus. This allows it to decrease the area/ volume that it takes up (3)
* B = It is wound really tight so it takes up less room (2)
* C = It is wound really tight (1)

**Part C – DNA Extraction and Comprehension**

**Questions**

1. Using your own words, write a brief summary on what each article was about.

|  |  |
| --- | --- |
| ARTICLE 3 Behaviours | Mark |
| * Comprehensive e.g.:   + Women wrongly jailed for 6 nights   + DNA tests proved identity   + Confused with another   + Kidnapped children from father   + Children seized   + Denied accusations   + Authorities mistook   + Did not know location of her own children   + Ex-husband testified that it was his wife   + Was arrested by US Marshalls in front of children   + Occurred in traffic | 3 |
| * All of the above but not as many points / not as comprehensive | 2 |
| * Got main points but not everything | 1 |

* 1. ARTICLE 4

|  |  |
| --- | --- |
| Behaviours | Mark |
| * Comprehensive e.g.:   + Paula Johnson and Carlton Conley had a daughter on 29/6/1995 called Callie Marie   + When they next saw her, thought she was lighter but ignored it.   + Whitney Rogers and Kevin Chittum had a baby girl, Rebecca, hours after Johnson and Carlton.   + Raised the babies the returned home with for 3 years.   + Johnson and Conley break-up, go to court for child support.   + Conley suspicious baby not his – DNA tests performed on both parents = not parents.   + Hospital investigates – assume baby swap.   + Rogers and Chittum died in car accident before hospital can get DNA.   + Families decide to keep raising the children they have taken home but allow visitation rights to biological parents/grandparents.   + However no real decisions have been made but psychologists will be needed. | 3 |
| * All of the above but not as many points / not as comprehensive | 2 |
| * Got main points but not everything | 1 |

1. Who and why would people want DNA testing/profiling to be completed? (3 marks)

*Who*

* **2 marks** = Police/forensics, those studying genetics, those with inherited conditions/diseases  
  OR
* **1 mark** = parents going for paternity testing

*Why*

* **1 mark =** To gather DNA information for comparison to find something out / *or something similar*

1. 1. When creating a new individual (child), what form of cell division do gametes (sex cells) undergo? (1 mark)

* Meiosis (1)  
  1. Why is this important for the survival of the child?

|  |  |
| --- | --- |
| ARTICLE 3 Behaviours | Mark |
| * Comprehensive * Chromosome number change * The effect of too many   + E.g. Because you need to halve the number of chromosomes from each parent (23 / n) so that there is not too many chromosomes going into the cells of the developing child. This would cause there to be too many chromosomes (92) which would cause conditions or death of the developing child. | 3 |
| * Not as detailed * The effect of too many   + E.g. Because you cannot have too much information when creating a new individual which can result in conditions or death of the developing child. | 2 |
| * Main point * Too much info 🡪 problems   + E.g. Too much information can cause problems during development | 1 |

* 1. DNA holds the genetic code to create an individual. Every person has the same sets of genes (traits) in their chromosomes. How is it that most people (except identical twins) have a different genetic code? (4 marks)

*Any four points for 1 mark each = 4 marks*

* DNA is individual / different for every person (1)
* The bases are in different orders (1)
* The bases come together to produce different proteins (1)
* Giving the code different information to make (1)
* Though the genes are the same, each person has different alleles / forms of the gene (1)
* The alleles are coded differently (1)
* The four bases determine which amino acid will be used to make a protein (1)
* The four bases also determine the order in which the amino acids will be joined (1)
* The amino acids can be joined together in many different ways to give rise to different proteins ie. Sugars and carbohydrates added, different protein folding structures (1)

1. In article 3 and 4 parents were tested for paternity of children. In both instances, the people who were thought to be parents were not. How does DNA profiling allow paternity testing to occur? (3 marks)

* Compare the bands of the parents to the bands of the child. (1)
* If the bands of the child match the parents then they are the biological parents (1)
* All of the child’s DNA profile bands must match to the bands between both parents. (1)

1. In article 4, parents (Whitney Rogers and Kevin Chittum) had died before the hospital could perform DNA profiling to determine paternity. Explain how the hospital could determine if they were the biological parents of the child being raised by Paula Johnson and Carlton Conley without digging up their graves? (3 marks)

* They can compare the DNA profile of the child to the DNA profiles of both sets of possible grandparents/ parents of Whitney Rogers and parents of Kevin Chittum (1)
* Because they are the grandparents there should be some matching bands on the profiles as their children (Whitney Rogers and Kevin Chittum) would have received DNA from them (1)
* This would have then been passed down to the grandchild / baby in question (1)