**GENERAL HUMAN BIOLOGY – YEAR 11**

**TASK 7 – DNA Model Investigation**

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

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

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

**Method: (6 marks)**

Write your method on the paper provided, include a labelled diagram.

* Remember to be specific as it will be swapped with another student.

|  |  |
| --- | --- |
| 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 (24 marks)**

* Swap methods with another student and make their DNA model
* When you have finished you are to hand it in to your teacher. (6 marks)

|  |  |
| --- | --- |
| Behaviours | Mark |
| * Used time efficiently * Kept to procedure | 6 |
| * Slight deviation from the method * Used time efficiently | 4 |
| * Incomplete model * Slight deviation from the method- INEFFICIENT time use | 2 |

**Evaluation:**

Evaluate the model you created using the prompts below (4 marks)

* Was it clear? Explain why/why not.
* Was the equipment suitable?
  + If not, what should have been used instead?
  + If yes, explain why

|  |  |
| --- | --- |
| * Explain clarity (2 marks) * No: at least 2 suggestions * Yes: at least 2 explanations | 4 marks |
| * States if clear * No: at least 2 suggestions * Yes: at least 2 explanations | 3 marks |
| States if clear  No or yes | 2 marks |
| States if clear  OR  No or Yes | 1 mark |
| Not attempted | 0 marks |

Collect the model made using your method, analyse the model using the prompts below

(4 marks)

|  |  |
| --- | --- |
| Explain how/how doesn’t match  2 improvements | 4 marks |
| State matching & 2 improvements  OR  Explain how/how doesn’t match  1 improvement | 3 marks |
| State matching AND 1 improvement | 2 marks |
| State matching OR 1 improvement | 1 mark |
| Not attempted | 0 marks |

Complete the following questions **(10 marks)**

1. State how many bases are found in DNA? (2 marks)

Four (1 mark)

Or

Adenine, thymine, guanine, cytosine (2 marks)

1. State which bases form pairs? (2 marks)

Adenine and Thymine

Guanine and Cytosine

A-T & C-G; acceptable if named in question 1

1. Explain the structure of the DNA. (3 marks)

DNA double helix

Nucleotides

Sugar-phosphate backbone

1. State where is DNA found in a cell? (1 marks)

Nucleus

1. Describe how can such a large molecule fit into the small nucleus of a cell?

(2 marks)

Super-coiled

Histones/ proteins

**Part C – DNA Comprehension (18 marks)**

**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 |

|  |  |
| --- | --- |
| 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? (2 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. 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)