***Human Biology ATAR – Task 8:* Test**

***DNA and Cell division (6%)***

|  |  |  |  |
| --- | --- | --- | --- |
| Name: | | | |
| Time allowed: 60 Minutes | | | |
| **Section** | Your Mark | Marks available | Percentage of Investigation |
| **Multiple Choice (A)** |  | 20 | 40% |
| **Short Answer (B)** |  | 40 | 60% |
|  |  | **60** | **100%** |

**Declaration of Authenticity**

I (Student Name) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ declare that this work is my own and I have not plagiarised from any source.

Signature:  
  
Date:

***Section A – Multiple Choice (20 marks)***

*Answer all questions by clearly circling the letter ONLY. Use only a BLUE or BLACK pen. If you make a mistake, place a CROSS through the letter; do not erase or use correction fluid, and circle your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.*

1. During mitosis, there are several clearly visible stages. During which stage do the spindle fibres pull the new chromosomes to opposite poles of the cell?
2. Interphase
3. Prophase
4. Metaphase
5. Anaphase
6. How many haploid cells are produced in the first meiotic division of meiosis?
7. 1
8. 2
9. 3
10. 4
11. Differentiation is best described as:
12. Different characteristics appearing in organisms
13. A permanent change in the genome of individuals
14. The process by which u specialised cells develop special characteristics
15. The process by which organs become specialised for specific functions
16. Which of the following is the start codon?
17. AUC
18. ATG
19. AGU
20. AUG
21. Which of the following is correct for DNA replication?
22. DNA polymerase creates a new strand in a 5’ to 3’ direction
23. DNA ligase creates a new strand in a 5’ to 3’ direction
24. DNA polymerase creates a new strand in a 3’ to 5’ direction
25. DNA primase creates a new strand in a 5’ to 3’ direction
26. During cell division, the DNA molecule replicates itself. The reason for this is so:
27. If the cell makes a mistake there is enough DNA to go around
28. The daughter cells end up with the same genetic information as the parent cell
29. The DNA can move out of the nucleus into the cytoplasm
30. There are enough chromosomes for each cell produced

**Question 7 – 8 refers to the following diagram:**



1. This process is called:
2. Non-disjunction
3. Crossing Over
4. Random Assortment
5. Random Fertilisation
6. If this occurs in the first meiotic division of meiosis. How many chromosomes are found in each daughter cell?
7. Two daughter cells with 4 chromosomes, two daughter cells with 2 chromosomes
8. Two daughter cells with 2 chromosomes, two daughter cells with no chromosomes
9. Four daughter cells with 1 chromosomes in each
10. Two daughter cells with 1 chromosomes, two daughter cells with 2 chromosomes
11. Which of the following is NOT a property of cancer cells?
12. Can metastasise
13. Cannot differentiate
14. Undergo Apoptosis
15. Do not communicate with other cells
16. Where does transcription take place:
17. Mitochondria
18. Cytoplasm
19. Nucleus
20. Endoplasmic reticulum
21. If an individual has trisomy 21 this means:
22. They have one less chromosome 21
23. They have one extra chromosome 21
24. They have no chromosome 21
25. They are missing part of chromosome 21
26. Which of the following statements about epigenetics is correct?
27. Acetylation is when acetyl groups are added to histone proteins, enhancing gene expression.
28. Acetylation is when acetyl groups are added to histone proteins, inhibiting gene expression.
29. Methylation is when methyl groups are added to the CpG sites on the DNA molecule to enhance gene expression.
30. Methylation is when methyl groups are added to CpG sites on the histones to inhibit gene expression.
31. During which of the following stages of the mitotic cycle can the arrangement of chromosomes at the equator of the spindle be observed at a cell?
32. Prophase
33. Telophase
34. Anaphase
35. Metaphase
36. Where in human cells is DNA located?
37. In the nucleus
38. In the nucleus and in the mitochondria
39. In the nucleus and in the ribosomes
40. In the nucleus and in the Golgi body
41. A DNA molecule is bound to special proteins that assist them coil into a smaller area. These proteins
42. Nucleotides
43. Chromatin
44. Genes
45. Histones
46. Messenger RNA leaves the nucleus and attaches to a
47. Ribosome
48. Golgi apparatus
49. Mitochondrion
50. Cell membrane
51. Which of the following is in the correct order for the main stages of mitosis?
52. prophase, metaphase, anaphase then telophase.
53. metaphase, prophase, anaphase then telophase
54. prophase, anaphase, metaphase then telophase
55. prophase, metaphase, telophase then anaphase
56. In a DNA molecule, adenine pairs with
57. adenine.
58. guanine.
59. thymine.
60. uracil.
61. Which structure is responsible for moving the chromosomes during mitosis:

1. nucleus
2. nucleolus
3. spindle fibres
4. cytoplasm
5. Anticodons pair with
6. amino acids.
7. mRNA codons.
8. DNA codons.
9. ribosomes.

**END OF MULTIPLE CHOICE**

***Section B – Short Answer***

Answer all questions in the spaces provided. Use only BLUE or BLACK pen.

1. One in every two Australians will be diagnosed with cancer before the age of 85 **(7 marks)**
2. What is the difference between a malignant and a benign tumour? *(2 mark)*

1. State three common carcinogens: *(2 marks)*  
     
   (i) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State three lifestyle changes that reduces risk of cancer: *(3 marks)*

(i) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(iii) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The coding strand of a DNA molecule has the following sequence of bases: **(5 marks)**

DNA: T-A-C-T-T-A-G-C-T-C-G-G-C-A-T-A-C-C

1. State the sequence of codons for the messenger RNA molecule transcribed from this part of the DNA: *(1 mark)*

mRNA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State the sequence of anticodons of the transfer RNA molecules that match each of the codons in part (a).  *(1 mark)*

tRNA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Using the chart below to state the sequence of amino acids that the DNA strand codes for. *(1 mark)*

Protein: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. Explain the difference between the coding and template strand of the DNA molecule. *(2 marks)*

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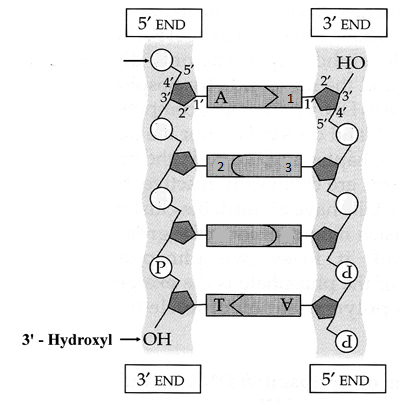
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1. Below is a diagram of a small section of DNA **(9 marks)**



4

4

1. Structure A is a nitrogenous base called adenine. Name the nitrogenous bases labelled 1, 2 & 3

*(3 marks)*

1:

2:

3: \_\_\_\_\_\_

1. Name the term used to describe structure 4 (indicated parts in the box) and identify the two other molecules (besides the nitrogenous base) that make up this structure. *(3 marks)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain how the process of DNA replication allows daughter cells to receive DNA copies that are exactly the same as the parent cell’s DNA. *(3 marks)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Describe two differences between DNA and mtDNA: *(2 marks)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Meiosis is an important type of cell division for the human body. **(12 marks)**
2. What type of cells does meiosis produce? *(1 mark)*
3. Identify the stages of meiosis shown below then describe what happens at that stage. The parent cell that is undergoing division has four chromosomes.

*(6 marks)*

|  |  |  |
| --- | --- | --- |
| **Image** | **Stage of Meiosis** | **Description** |
|  |  |  |
| mage result for meiosis |  |  |
| mage result for meiosis |  |  |

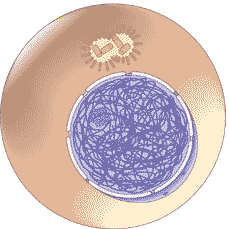
1. For the parent cell that divided above how many daughter cells were produced?

*(1 mark)*

1. Were the daughter cells haploid or diploid?

*(1 mark)*

(e) The following diagram shows a cell in the period between cell division. Use the diagram to answer the questions below.



1. What is this period called? (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name 2 important processes that occur during this period. (2 marks)

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1. Complete the table below to contrast RNA with DNA.

**(3 marks)**

|  |  |  |
| --- | --- | --- |
| Characteristic | DNA | RNA |
| Bases |  |  |
| Location in cell |  |  |
| Types of |  |  |

1. Explain why the process of mitosis is essential to growth in organisms (e.g. Humans) ***(2 marks)***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**END OF TEST**