**2021 – Y10 EXTENSION – BIOLOGICAL SCIENCES SEMESTER 2 EXAM REVISION**

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**BOOKLET 1**

YEAR 10 SEMESTER TWO EXAM 2021

BIOLOGICAL SCIENCES – EXTENSION

**FULL NAME:**

**TEACHER:**

**SUGGESTED TIME: 60 minutes**

**SECTION A – MULTIPLE CHOICE QUESTIONS – Total: 20 MARKS**

Answer the 20 questions in the grid on the **multiple-choice answer sheet.**

Use pencil to shade the letter that matches the most correct answer. Erase incorrect answers completely.

**SECTION B – SHORT ANSWER QUESTIONS – Total: 45 MARKS**

Please answer these questions in pen on the lined spaces provided in this booklet.

**SECTION C – EXTENDED ANSWERS – Total: 10 MARKS**

Please answer this question in pen on the lined pages towards the end of the booklet.

|  |  |
| --- | --- |
| SECTION A | /20 |
| SECTION B | /45 |
| SECTION C | /10 |
| TOTAL: BIOLOGICAL SCIENCES | /75 |

**Complete the following worksheets: Answers have been placed on SEQTA**

**Complete:**  **GENETICS GLOSSARY**

|  |  |
| --- | --- |
| DNA |  |
| gene |  |
| allele |  |
| chromosome |  |
| diploid |  |
| haploid |  |
| interphase |  |
| Replication |  |
| centriole |  |
| centrosome |  |
| centromere |  |
| chromatid |  |
| homologous chromosomes |  |
| Autosomal trait |  |
| mitosis |  |
| meiosis |  |
| 2n |  |
| n |  |

|  |  |
| --- | --- |
| crossing over |  |
| karyotype |  |
| karyokinesis |  |
| sex chromosomes |  |
| Cytokinesis |  |
| nucleotide |  |
| interphase |  |
| template |  |
| complement |  |
| Incomplete dominance |  |
| Co dominance |  |
| species |  |
| mutant |  |
| mutagen |  |
| mutation |  |
| epigenetics |  |
| evolution |  |
| heterozygous (hybrid) |  |
| Homozygous (true breeding) |  |

Explain, using diagrams, all the phases that a cell that is dividing by the process of mitosis will go through in its cell cycle**. Chromosome number 2n = 4**

|  |  |
| --- | --- |
| **DIAGRAM** | **EXPLANATION** |
| INTERPHASE |  |
| MITOSIS - PROPHASE |  |
| METAPHASE |  |
| ANAPHASE |  |
| TELOPHASE |  |

1. When will a cell undergo **meiotic cell division?**

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1. List 5 ways in which meiosis differs from mitosis.

|  |  |
| --- | --- |
| **MITOSIS** | **MEIOSIS** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. What does DNA stand for?

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

1. Sketch a labeled diagram of DNA molecule. (Use pencil)
2. Why does a cell need to replicate its DNA?

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1. During which phase of a cell’s life cycle will a cell replicate its DNA?

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

8.. Outline, stating examples, the difference between autosomal inheritance, codominant inheritance, incompletely dominant inheritance and X-linked inheritance.

Autosomal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Codominant inheritance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Incomplete dominance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Sex-linked or X-linked inheritance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

9. Use a Punnett square to explain what happens when red and white flowers are crossed during codominance.

1. . Use a Punnett square to explain what happens when red and white flowers are crossed during incomplete dominance.

11. Determine the possible genotypes and phenotypes of the offspring if two heterozygous bronze turkeys are crossed, given that in turkeys bronze colour is dominant to red colour.

12. In fowls, red plumage is recessive to black plumage. Determine the possible offspring genotypes and phenotypes if a heterozygous black fowl is crossed with a red fowl.

13. In cattle, those with horns are recessive to no-horned cattle. What are the probabilities of offspring genotypes and phenotypes if a homozygous recessive horned bull is crossed with a heterozygous no-horned cow?

14. Determine the possible genotypes and phenotypes of the offspring if two heterozygous red tomatoes are crossed, given that in tomatoes red coloured fruit is dominant to yellow coloured fruit.

15. In guinea pigs, a homozygous dominant yellow crossed with a homozygous white produce cream coloured offspring. Determine the possible genotypes and phenotypes of the offspring if a cream coloured guinea pig is crossed with a yellow coloured.

Dominance type:

16. In pigs, a homozygous black crossed with a homozygous white produce black-and-white coloured piglets. Determine the possible genotypes and phenotypes of the offspring if a black-and-white pig is crossed with a black coloured pig.

Dominance type:

17. In four-o'clock plants, if a homozygous red flowered plant is crossed with a homozygous white flowered plant, the offspring have pink flowers. Determine the genotypes and phenotypes of the offspring if a pink flowered four-o'clock plants is crossed with a red flowered plant.

Dominance type:

18. In short-horned cattle, a homozygous red crossed with a homozygous white produce "roan" offspring. Determine the possible genotypes and phenotypes of the offspring if a pure-breeding, red coated short-horned bull is crossed with a roan coated, shorthorn cow.

Dominance type:

19. In humans muscular dystrophy is a sex-linked disease which is recessive. Determine the possible genotypes and phenotypes of the offspring if a normal man marries a woman who suffers from the disease.

20. In humans muscular dystrophy is a sex-linked disease which is recessive. Determine the possible genotypes and phenotypes of the offspring if a normal man marries a woman carrier.

21. In humans colour blindness is a sex-linked disease which is recessive. Determine the possible genotypes and phenotypes of the offspring if a normal man produces children with a colour blind woman.

***Question 22 refer to the diagrams below***

|  |  |
| --- | --- |
| A | B |
| C | D |

23.

1. Which of the images shows a homologous pair of chromosomes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Which of the images shows a karyotype? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. In a root cell of a pea plant there are 14 chromosomes. How many chromosomes would there be in the nucleus of a pollen grain of a pea plant? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What causes most of the variation between individuals of the same species?

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***24. Use the following information to answer questions (a) to (h).***

*The gene for long eyelashes is dominant to the gene for short eyelashes. A man who is heterozygous for eyelash length marries a woman who is also heterozygous for eyelash length.*

1. What is the woman’s genotype? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the probability that their child will have long eyelashes? Show working.

1. The couple has two children with short eyelashes. What is the probability that their third child will also have short eyelashes?

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1. Who determines the gender of a child? Explain with reasons.

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1. If a person has two identical genes for a particular trait, what are the genes referred to as?

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1. What is the main difference between autosomal and sex chromosomes?

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

1. Name the smallest piece of genetic material which has the instructions for one

characteristic, like wide nostrils. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What causes differences between identical twins? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is a mutation?

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1. What is a mutagen?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Give examples of mutagens \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain the difference between a mutation and epigenetics.

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1. Define Evolution

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1. Give definitions for a gene, genepool, an allele and a chromosome showing the differences between these 3 terms.

Gene : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Allele : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Chromosome\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Genepool: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

1. Name and explain **five** mechanisms that can contribute to the process of evolution.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Explain how the process of natural selection can contribute to a bacterium becoming resistant to antibiotics.

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1. Explain the steps in speciation.

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