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Support Pack | Grade 12

CAPS

Life Sciences

Practice exercises: Life at a molecular, cellular and tissue level

This support pack for the **Life at a molecular, cellular and tissue level** strand in the **Life Sciences Grade 12 CAPS curriculum** provides practice exercises. All exercises have the answers provided. Learners can work through these individually at home or these could form the basis of a catch-up class or online lesson. You have permission to print or photocopy this document or distribute it electronically via email or WhatsApp.

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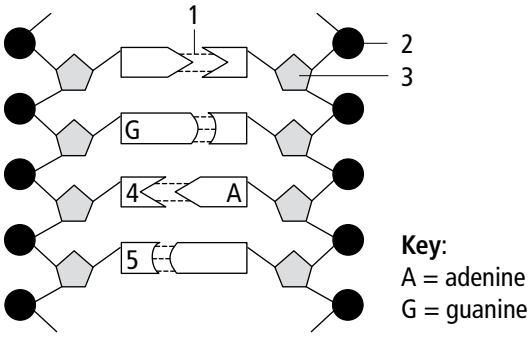
We are all in this together!

WORKSHEET 1: LIFE AT MOLECULAR, CELLULAR AND TISSUE LEVEL

DNA: THE CODE OF LIFE

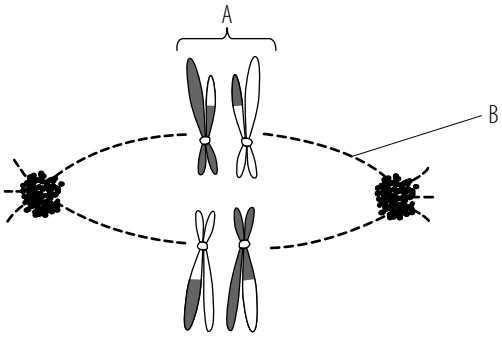
1. The following diagram represents a portion of a molecule. Study the diagram and answer the questions that follow.



   1.1 Identify the molecule referred to above.
   1.2 Provide labels for the parts numbered 1 and 5.
   1.3 What is the collective name for the parts numbered 2, 3 and 4?
   1.4 What is the significance of this molecule being able to replicate itself?

MEIOSIS

2. The following diagram represents a phase of meiosis. Study the diagram and answer the questions that follow.



   2.1 Write down the term that describes the paired chromosomes labelled as A.
   2.2 Identify the structure labelled B.
   2.3 What phase of meiosis is represented in the diagram?
   2.4 How many chromosomes are shown in the diagram?
   2.5 How many chromosomes would there be in each cell at the end of meiosis?
   2.6 State one place in the body of a human female where meiosis would take place.
   2.7 Could the cell represented in the diagram be that of a human?
   2.8 Explain your answer to question 2.7.
   2.9 Give two reasons why meiosis is biologically important.

GENETICS AND INHERITANCE

3. Using the symbols W for normal wings, and w for vestigial wings, write down the following:
   3.1 the genotype of a fly that is heterozygous for this characteristic
   3.2 the possible genotypes of its gametes
   3.3 the type/s of offspring that will be produced if the heterozygous fly mated with one that was homozygous for normal wings (show all working).
4. Explain the following:
   4.1 Mendel's law of segregation
   4.2 the principle of dominance.
5. Learners want to investigate eye colour in fruit flies (*Drosophila melanogaster*). Fruit flies can have red (R) eyes or white (r) eyes. Red eye colour is dominant and white eye colour is recessive. Male fruit flies, homozygous for red eye colour, were bred with female fruit flies, homozygous for white eye colour. Show how the possible phenotypes and the genotypes of the F_1 generation for eye colour may be obtained.

MEMORANDUM FOR WORKSHEET 1

1.1 DNA

1.2 1: hydrogen bond; 5: cytosine

1.3 Nucleotide

1.4 DNA produces two exact copies of itself; during interphase/ before cell division; two identical chromatids are formed; the two chromatids are identical to that of the parent.

2.1 Homologous

2.2 Spindle thread/spindle fibre

2.3 Metaphase I

2.4 4

2.5 2/half

2.6 Ovary

2.7 No

2.8 Humans have 23 pairs of chromosomes – this diagram shows only 4.

2.9 Reduction/halving of chromosome number to keep chromosome number constant from generation to generation; contributes to genetic variation; leads to the formation of gametes.

3.1 Ww

3.2 W and w

3.3 Ww × WW
Meiosis:
Gametes: W w W W Fertilisation: WW WW Ww Ww
100% with normal wings

4.1 Each characteristic is regulated by two alleles/factors, which separate during meiosis so that each gamete contains only one of the alleles/factors.

4.2 In a heterozygous condition, the dominant allele expresses itself in the phenotype, masking the effect of the recessive allele.
OR When two individuals with pure breeding and contrasting characteristics are crossed, the F1 generation all display the dominant characteristic.

5.

P_1 phenotype Red × white
genotype RR × rr
Meiosis
G R × r
Fertilisation
F_1 genotype Rr
phenotype red

OR

gametes	R	R
r	Rr	Rr
r	Rr	Rr