Name: _____ Group: _____ Date: _____

Support activities – Second Year of Secondary Cycle Two

EST
STUDENT BOOK: Chapter 11, pages 350–354
RELATED HANDOUT: Concept review 43

ACTIVITY 43 **ANSWER KEY**

HANDOUT FOR EST ONLY

DNA and genes

1. Complete the following sentences, using the words or groups of words in the box below. You may use some words more than once.

• C	• division	• nucleotides	• same size
• chance	• double	• pairs	• sex
• character traits	• eukaryotic	• particular	• sides
• chromatin	• gene	• phosphate group(s)	• size
• chromosomes	• genome	• proteins	• smaller
• complementarity	• homologous	• psychological	• thymine
• complementary	• identical twins	• rods	• twisting ladder
• contraction	• karyotype	• rungs	
• DNA	• making	• same	

a) Individuals of a same species are very similar, but they also differ from one another, except in the case of _____*identical twins*_____. Thus, within the same species, physical, _____*psychological*_____ or physiological attributes may vary from one individual to another. These differences are called "_____*character traits*_____."

b) To understand the differences between individuals of a species, we must explore their cells. In a _____*eukaryotic*_____ cell, the nucleus contains an individual's genetic information. _____*Chromatin*_____ is the main component of the nucleus when the cell is not undergoing _____*division*_____. This component is made up of a molecule of _____*DNA*_____ (deoxyribonucleic acid), combined with _____*proteins*_____. When cell division begins, there is a _____*contraction*_____ of the _____*chromatin*_____. Visible _____*rods*_____ called "chromosomes" form. A single cell contains 46 _____*chromosomes*_____ in humans, and 78 _____*chromosomes*_____ in dogs.

c) Chromosomes can be classified according to _____*size*_____ and their distinctive features. In a cell, each chromosome has a _____*homologous*_____ chromosome—a partner of the same _____*size*_____. A human cell therefore contains 23 _____*pairs*_____ of chromosomes.

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d) When an individual's chromosomes are represented in an ordered way, by pairs and according to size, the result is the individual's _karyotype_.

e) Two chromosomes in one of the pairs cannot be the _same size_. This is the pair of chromosomes that determines the individual's _sex_. In the female, these chromosomes, represented by the XX pair, are the _same_ in humans and in most animals. In the male, one of the two sex chromosomes is _smaller_; they are represented by the XY pair.

f) The DNA molecule contained in each chromosome is shaped like a long _twisting ladder_ that looks like a _double_ helix. It is composed of a series of chemical units called "_nucleotides_." Each of the _nucleotides_ has three chemical components: a sugar called deoxyribose, a _phosphate group_ and a nitrogenous base composed of adenine, _thymine_, guanine or cytosine. The _nucleotides_ form a sequence of pairs in a DNA molecule. Alternating sugars and _phosphate groups_ make up the _sides_ of the ladder, and the nitrogenous base pairs make up the _rungs_.

g) The pairing of nitrogenous bases is not a matter of _chance_. It depends on their _complementarity_. Thus, adenine (A) and thymine (T) are _complementary_, as are cytosine (_C_) and guanine (G). The following combinations result: A–T or T–A, C–G or G–C. A _particular_ sequence of these bases forms a _gene_, which is a segment of DNA containing information for _making_ proteins.

h) The genes an individual receives from its parents constitute its _genome_. In a sense, it is an instruction manual for making proteins, which determine the individual's _character traits_, such as freckles or complexion.

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