## PART A

- 1. Why is there variation among organisms on Earth? *DNA and the differences in DNA among organisms*
- 2. If the bases on one strand of DNA are ATGGGCTA, what is the sequence of complementary bases on the other strand of DNA?

## TACCCGAT

3. Think about a time you have seen a flock of Canada geese flying overhead. If you could examine the geese closely, would they look identical? Would they be genetically identical? Explain your answers.

*The geese would not be identical. They might be a different size or have longer wings. The coloration of the feathers would be different (unless identical twins). They would not be genetically identical. There is genetic variation within the population and the species.* 

4. Describe the structure of DNA.

DNA is a molecule made up of two strands of nucleotides linked together. The structure of DNA looks like a twisted ladder, or double helix. The sides of the ladder are made up of the sugar and phosphate groups. Each rung of the ladder is made up of two nitrogenous bases bonded together as a base pair.

- What is the role of DNA in cells?
  DNA stores genetic material that has the instructions for cell function.
- 6. Suppose a section of DNA has 27% thymine (T).
  - a. What percentage of cytosine (C) does it have?
    23% cytosine
  - b. What percentage of adenine (A) does it have?
    27% adenine
  - c. What percentage of guanine (G) does it have?23% guanine
- 7. What is a genome? *The complete DNA sequence in each cell of an organism is called the organism's genome.*

## PART B:

 Define gene: a part of a chromosome that governs the expression of a trait and is passed on to offspring: it has a specific DNA base sequence

Define allele: a different form of the same gene

Remember that A and T are always paired Therefore A = T Therefore C = G And you can only have 100%

- 2. Why is the word homologous used to describe chromosome pairs, rather than the word identical? *Homologous means having the same relation, relative position, or structure, which is how homologous chromosomes are related. They are not identical, which means exactly the same.*
- How are homologous chromosomes are alike? How are they different? Make a diagram to help explain your answer.
   They are similar in length and shape. They have similar banding patterns. They may have different alleles for the same trait.
- 4. Why are the X and Y chromosomes commonly referred to as the sex chromosomes? *X and Y chromosome determines the genetic gender of an organism. XX is a genetic female. XY is a genetic male.*
- 5. How does DNA replication ensure that daughter cells can produce the same proteins? *DNA replication results in identical strands of DNA in daughter cells, which means they can produce the same proteins.*
- Use a graphic organizer to show the relationships among the terms biodiversity, genetic diversity, species diversity, and ecosystem diversity.
  Diagram should show that genetic diversity ultimately leads to species diversity and the ecosystem diversity allows for species diversity because species can adapt to different habitats. All of these types of diversity tie to biodiversity on Earth. Without any of these types of diversity, biodiversity of Earth would be lower than it is.
- 7. What is the difference between a gene and an allele? How is each related to diversity among living things?

*Genes are sections of DNA that contain genetic information for the inheritance of specific traits. Different forms of the same gene are called alleles. Differences in genes and the alleles individuals inherit lead to diversity among living things.* 

8. The image below shows chromosomes in a human cell.

What is this representation called and how is it prepared?
Karyotype
Cell sample is collected and treated to stop cell division during
metaphase of mitosis. Sample is stained which produces a
banding pattern on the chromosome that is clearly visible
<i>under a microscope. The chromosomes are then sorted and</i>
paired
Identify the sex of the individual. <i>Genetic Male</i>
Does this individual have the correct number of
chromosomes? How do vou know?
<i>Yes, 23 pairs of chromosomes (22 pairs of autosomes and one pair of sex chromosomes)</i>