

Answers from CK-12 Life Science For Middle School Teacher's Edition
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Day 66

1. Gregor Mendel was an Austrian monk who lived during the 1800s. He did many experiments with pea plants. From his experiments, he discovered how parents pass traits to their offspring.
2. Peas were a good choice of plants for Mendel to study for several reasons. They are easy to grow, and they grow quickly. They also have many traits that are easy to observe, and each trait exists in two different forms.
3. Mendel's law of segregation states that the two factors an individual inherits for a trait separate and go to different gametes when the individual reproduces. Mendel's law of independent assortment states that factors controlling different traits go to gametes independently of each other.
4. Plants that reproduce asexually produce offspring that are genetically identical to each other and to the parent. If Mendel had chosen to study these plants instead of peas, there would not have been any variation in traits between or within generations. Therefore, Mendel would not have been able to arrive at his laws of inheritance.
5. Mendel needed to grow two offspring generations to develop his law of segregation because the first generation offspring had just one form of each trait. The reason is that one of the two factors controlling each trait was dominant to the other factor. Only by having this first generation produce offspring could Mendel determine that the two factors separated and went to different gametes. The second generation showed both forms of the trait due to segregation.
6. Mendel's second set of experiments showed that two different traits were inherited by the offspring independently of each other. The second generation of offspring had all possible combinations of the two traits. Mendel inferred from these results that the factors controlling different traits assorted independently in the formation of gametes.

Day 68

1. Genome refers to all the genetic information of a species. For example, the human genome is all the DNA of a human being.
2. The Human Genome Project was an international effort to sequence all 3 billion bases in human DNA. By 2003, it had accomplished this goal. It also identified the more than 20,000 human genes and their locations on chromosomes.
3. Answers may vary. Sample answer: An example of an autosomal recessive genetic disorder is cystic fibrosis. The recessive allele codes for a defective protein involved in mucus production. People with two copies of the recessive allele have the disorder. They have unusually thick mucus that clogs airways in lungs and ducts in other organs.
4. The disorder is an X-linked recessive disorder.

5. Both the polymerase chain reaction and gene cloning are biotechnology methods that make many copies of a gene. The polymerase chain reaction uses high temperatures and an enzyme to make new DNA molecules. The process keeps cycling to make many copies of the gene. Gene cloning inserts the gene into bacteria. The bacteria divide rapidly, making many copies of the gene.
6. Answers may vary. Sample answer: Pros of producing and using genetically modified organisms include more and better food crops and less use of pesticides. Cons include possible health or environmental problems caused by the use of GMOs. For example, plants genetically modified to produce pesticides might kill good as well as bad insects. Genes might also "escape" from the modified plants into wild plants through crosspollination. This could negatively affect other species in the environment. One way of weighing the pros and cons is to think about how many species are likely to benefit or be harmed by the use of GMOs. Only human beings are likely to benefit from their use, whereas many species might be harmed.

Day 69

1. Bacteria are the most numerous living things on Earth. Their total number is estimated to be about 5 million trillion trillion.
2. Two ways of classifying bacteria are by the shape of their cells and by the way they respond to Gram stain. There are three types of bacteria based on shape: bacilli, which are rod shaped; cocci, which are sphere shaped, and spirilli, which are spiral shaped. There are two types of bacteria based on Gram staining: gram-positive bacteria, which stain purple; and gram-negative bacteria, which stain red.
3. Many bacteria benefit ecosystems by decomposing wastes and recycling carbon and nitrogen. Bacteria called cyanobacteria make food by photosynthesis and release oxygen to the atmosphere.
4. Some uses of bacteria to people include helping us digest food and making vitamins inside the human digestive tract. People also use bacteria to create medical products, such as vaccines; transfer genes in gene therapy; make fuels such as ethanol; clean up oil spills; kill plant pests; and ferment foods.
5. Lyme disease is caused by a bacterial pathogen. Ticks are the vectors that spread the disease from wild animals to people when they bite them.
6. Cyanobacteria are photosynthetic bacteria. When they first appeared on early Earth, the atmosphere contained almost no oxygen. Oxygen is a waste product of photosynthesis. After cyanobacteria evolved, they started adding oxygen to the atmosphere. Many organisms that had evolved in the absence of oxygen were poisoned by it. These organisms died out. Other organisms not only survived but were able to evolve a new way of using the oxygen to extract energy from food. This was the process of cellular respiration. These organisms were more efficient and successful. They went on to become the most numerous types of organisms on Earth.
7. Bacteria evolve resistance to antibiotic drugs through the process of natural selection. When an antibiotic is given to a sick patient, bacterial cells that are susceptible to the antibiotic die. If any of the bacterial cells are resistant to the antibiotic, they don't die. Instead, they survive and reproduce. This leads to a population of bacteria that are resistant to the antibiotic drug.