1. Which sequence represents the order of some events in human development?
   (1) zygote -> sperm -> tissues -> egg
   (2) fetus -> tissues -> zygote -> egg
   (3) zygote -> tissues -> organs -> fetus
   (4) sperm -> zygote -> organs -> tissues

2. A variety of plant produces small white fruit. A stem was removed from this organism and planted in a garden. If this stem grows into a new plant, it would most likely produce
   (1) large red fruit, only
   (2) large pink fruit, only
   (3) small white fruit, only
   (4) small red and small white fruit on the same plant

3. The puppies shown in the photograph below are all from the same litter.
   The differences seen within this group of puppies are most likely due to
   (1) overproduction and selective breeding
   (2) mutations and elimination of genes
   (3) evolution and asexual reproduction
   (4) sorting and recombination of genes

4. A mutation that can be inherited by offspring would result from
   (1) random breakage of chromosomes in the nucleus of liver cells
   (2) base substitution in gametes during meiosis
   (3) abnormal lung cells produced by toxins in smoke
   (4) ultraviolet radiation damage to skin cells

5. Which hormone does not directly regulate human reproductive cycles?
   (1) testosterone
   (2) estrogen
   (3) progesterone
   (4) insulin

6. The human female reproductive system is represented in the diagram below.

   ![Diagram of the human female reproductive system]

   Complete boxes 1 through 4 in the chart below using the information from the diagram. [4]

<table>
<thead>
<tr>
<th>Name of Structure</th>
<th>Letter on Diagram</th>
<th>Function of Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ovary</td>
<td>C</td>
<td>produces gametes</td>
</tr>
<tr>
<td>uterus</td>
<td>D</td>
<td>growth and development</td>
</tr>
<tr>
<td>placenta</td>
<td>B</td>
<td>transports oxygen directly to the embryo</td>
</tr>
</tbody>
</table>

7. The sorting and recombining of genes during meiosis and fertilization usually leads to the production of
   (1) gametes with many copies of the same chromosome
   (2) embryos with traits identical to those of all other members of the species
   (3) zygotes with the genetic information to produce only females
   (4) offspring with some traits that did not appear in their parents

8. Which statement best describes the relationship between the blood of a human fetus and the blood of the mother?
   (1) Their blood systems are separate only at certain times in development and connected at other times.
   (2) The blood flows directly from the mother into the fetus.
   (3) Their blood systems are separate and no materials are exchanged.
   (4) Their blood systems are separate, but certain materials pass from one to the other.
9. Thousands of genetically identical trees have been discovered growing in a remote, undisturbed mountain area in Colorado. These trees are most likely the result of
(1) genetic engineering
(2) asexual reproduction
(3) meiotic cell division
(4) biotechnology

10. A large number of sperm cells are produced by males every day. This large number of sperm cells increases the chance that
(1) at least one sperm cell will be reached when the eggs swim toward the sperm cells in the ovary
(2) several sperm cells will unite with an egg so the fertilized egg will develop properly
(3) some of the sperm cells will survive to reach the egg
(4) enough sperm cells will be present to transport the egg from where it is produced to where it develops into a fetus

11. The graph below shows the relative concentrations of certain hormones in the blood during the human female reproductive cycle.

Which hormone has the lowest concentration on which day?
(1) hormone A on day 4
(2) hormone B on day 2
(3) hormone C on day 12
(4) hormone D on day 20

12. Identify one activity of a mother that can disrupt fetal development and explain how this activity might affect the development of her fetus. [1] 
\[ \text{drugs} \rightarrow \text{brain damage, alcohol} \rightarrow \text{low birth weight} \]

13. The list includes two processes involved in the development of a human fetus.

Processes
mitosis
differentiation

Select one process from the list and describe its role in the development of a human fetus. In your answer be sure to:
- identify the process you selected
- state the role of this process in fetal development [1]
- identify the organ in the mother where this process occurs [1]

Process: \[ \text{differentiation} \]

14. The diagram below illustrates asexual reproduction in yeast.

15. If a chemical that interrupts cell division is added to a culture of human liver tissue, which process would stop?
(1) meiosis
(2) mitosis
(3) breakdown of glucose
(4) diffusion of nutrients

16. Sexual reproduction involves the processes listed below.

Processes
A. Differentiation
B. Fertilization
C. Gamete production
D. Mitosis

Which sequence represents the order in which these processes occur?
(1) A \( \rightarrow \) B \( \rightarrow \) C \( \rightarrow \) D
(2) B \( \rightarrow \) A \( \rightarrow \) C \( \rightarrow \) D
(3) C \( \rightarrow \) B \( \rightarrow \) D \( \rightarrow \) A
(4) D \( \rightarrow \) B \( \rightarrow \) C \( \rightarrow \) A

17. A dogfish shark contains 24 chromosomes in each of its muscle cells. How many chromosomes are normally found in each of its gametes?
(1) 6
(2) 12
(3) 24
(4) 48

18. Which structure is correctly paired with its function?
(1) testis — produces nutrients for the offspring
(2) placenta — allows nutrients to diffuse from the mother to the embryo
(3) uterus — produces testosterone used in egg production
(4) ovary — provides a place for the internal development of the embryo