2. Which process has occurred in this flower?
   (1) pollen germination  (2) seed formation
   (3) zygote formation  (4) fruit production

3. Where would fertilization occur?
   (1) 1  (2) 2
   (3) 3  (4) 4

4. The diagram below represents a section of undisturbed rock and the general location of fossils of several closely related species. According to currently accepted evolutionary theory, which is the most probable correct assumption to be made concerning species A, B, C, and D?

   (1) A is the ancestor of B, C, and D.
   (2) B was already extinct when C evolved.
   (3) C evolved more recently than A, B, and D.
   (4) D is the ancestor of A, B, and C.
Base your answers to questions 5 through 9 on the passage below and on your knowledge of biology.

Polychlorinated biphenyls (PCB's) are microcontaminants which are found in some water. Microcontaminants do not change the appearance, smell, or taste of water, yet they affect parts of the surrounding ecosystem. After PCB's get into water, they are absorbed by some algae, which concentrate them. Then fish, which feed on the algae, concentrate the PCB's many more times. PCB's are usually thousands of times more concentrated in fish than they are in the water in which the fish live. At this level of contamination, the survival of some species in the food web is endangered. The health of other species, including humans who may consume some predator fish such as salmon, is also endangered.

Identifying microcontaminants in huge bodies of water is a painstaking and time-consuming procedure. The procedure involves a long chain of activities which include filtering, extracting with solvents, and analyzing by chromatographic techniques. Although detecting microcontaminants is a difficult process, it is essential that humans continuously monitor the environment for their presence to help preserve our food webs.

5. In which of the following are PCB's usually most concentrated?
   (1) dissolved oxygen  (2) water molecules
   (3) algae  (4) fish

6. Which is a harmful effect of microcontaminants on an aquatic ecosystem?
   (1) They decrease the density of water.
   (2) They cause water for human consumption to have an unpleasant taste.
   (3) They accumulate in certain organisms, making them toxic to other organisms.
   (4) They cause water to appear cloudy.

7. The producer organisms in the aquatic food web described in the passage are
   (1) bacteria  (2) fish
   (3) humans  (4) algae

8. The presence of microcontaminants such as PCB's in a water supply is an example of a negative way in which humans have modified their environment by
   (1) pollution controls  (2) technological oversight
   (3) importation  (4) overcropping

9. Based on the passage above, which is a laboratory procedure used to identify microcontaminants such as PCB's?
   (1) tissue staining
   (2) chromatographic separation
   (3) use of a compound light microscope
   (4) preparation of wet mounts
Base your answers to questions 10 and 11 on your knowledge of laboratory procedures used in biology and on the information below. Diagrams A through E show the general appearance of five tree fruits which were used by a biology class in an experiment to determine the length of time necessary for each type of fruit to fall from a second-floor balcony to the lobby floor of their building. One hundred fruits of each type were selected by the students and the average time of fall for each type of fruit is shown in the chart below.

![Fruits Diagram](image)

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Average Fall Time of 100 Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Maple</td>
<td>3.2 sec</td>
</tr>
<tr>
<td>Norway Maple</td>
<td>4.9 sec</td>
</tr>
<tr>
<td>White Ash</td>
<td>1.3 sec</td>
</tr>
<tr>
<td>Red Oak</td>
<td>0.9 sec</td>
</tr>
<tr>
<td>Shagbark Hickory</td>
<td>0.8 sec</td>
</tr>
</tbody>
</table>

10. Based on this experimental evidence, what inference seems most likely to be true concerning the distribution of these fruits during windstorms in nature?

   (1) Silver maple fruits would land closer to the base of the parent tree than would shagbark hickory fruits.
   (2) White ash fruits would land farther from the base of their parent tree than would silver maple fruits.
   (3) White ash fruits would land closer to the base of their parent tree than would shagbark hickory fruits.
   (4) Norway maple fruits would land farther from the base of their parent tree than would silver maple fruits.

11. Which graph best shows the average fall time for each fruit type tested during the experiment.

   ![Graphs](image)
Base your answers to questions 12 through 14 on the representation below of a change in a portion of the base sequence in a DNA molecule.

$$\text{A T C G A} \xrightarrow{\text{x-ray}} \text{A T C G A}$$

12. The change that is represented may best be interpreted as a
(1) gene mutation (2) nucleic acid replication
(3) nucleotide synthesis (4) gene replication

13. In humans, a change similar to the one shown may cause an individual to be afflicted with
(1) Down's syndrome (2) polyploidy
(3) phagocytosis (4) sickle-cell anemia

14. An important characteristic of this type of change is that it most often
(1) involves many chromosomes at once
(2) is an advantage to an organism
(3) may be passed on to offspring
(4) requires a change in the environment

15. A pair of black (B) mice produce some offspring which are black and some which are white (b). The genotypes of the parents are most probably
(1) BB and bb (2) BB and Bb
(3) Bb and Bb (4) bb and bb

For each description in questions 16 through 20, select the biome, chosen from the list below, that is most closely associated with that description. A number may be used more than once or not at all.

<table>
<thead>
<tr>
<th>Biomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Grassland</td>
</tr>
<tr>
<td>(2) Tundra</td>
</tr>
<tr>
<td>(3) Temperate deciduous forest</td>
</tr>
<tr>
<td>(4) Tropical rain forest</td>
</tr>
<tr>
<td>(5) Taiga</td>
</tr>
<tr>
<td>(6) Desert</td>
</tr>
</tbody>
</table>

16. This biome is found in the mountains of northern New Jersey, the foothills of the Catskills and the Adirondacks of New York and supports the growth of dominant vegetation including maples, oaks and beeches.

17. The characteristic climax vegetation in this biome consists of coniferous trees composed mainly of spruce and fir.

18. This biome receives less than 10 inches of rainfall per year. Extreme temperature variations exist throughout the area over a 24-hour period. Water conserving plants such as cacti, sagebrush, and mesquite are found.

19. This biome receives the least amount of solar energy. The ground is permanently frozen (permafrost) throughout the year. During the summer season, plants quickly grow, reproduce, and form seeds during their short life cycle. Lichens and mosses grow abundantly on the surface of rocks.

20. A moderate, well-distributed supply of rain in this biome supports the growth of broad-leaved trees, which shed their leaves as winter approaches.