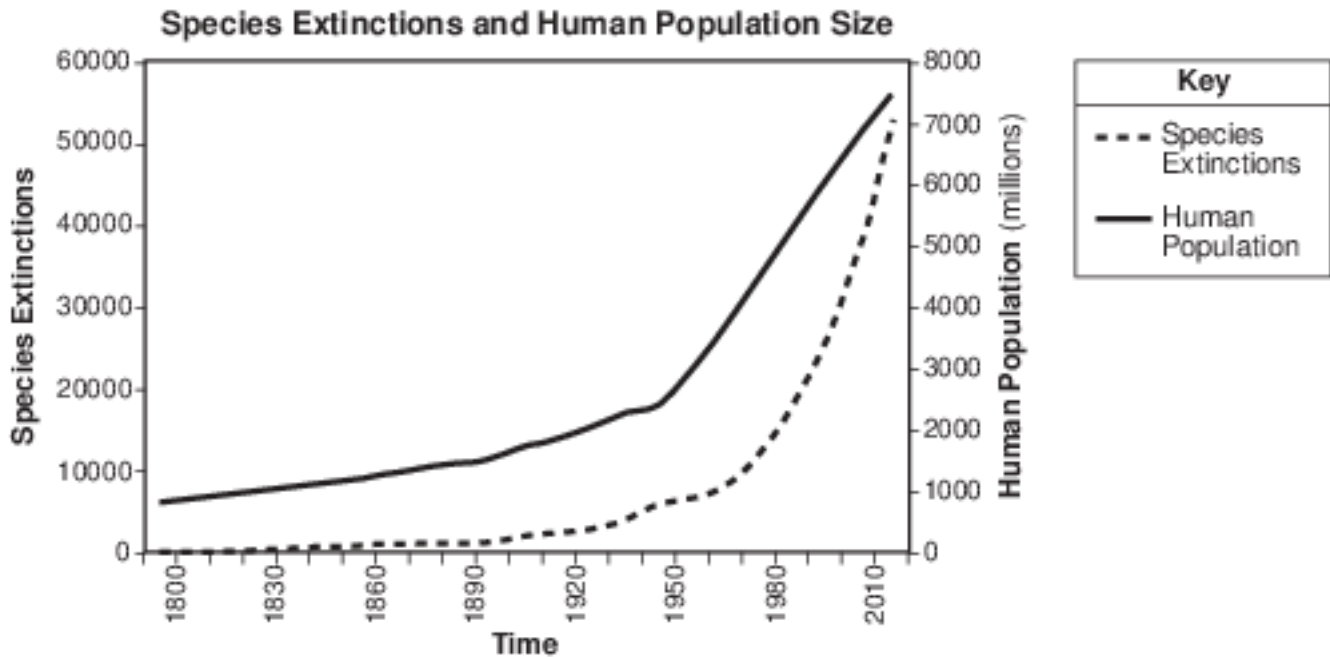


## (Nysed) Factors Influencing The Continuity Of Life

- 1 The reproductive cycle in females is regulated primarily by
- (1) estrogen and testosterone
  - (2) estrogen and progesterone
  - (3) progesterone and insulin
  - (4) progesterone and testosterone

Base your answers to questions 2 on the graph below and on your knowledge of biology. The graph shows the number of species that have become extinct since 1800. It also shows the change in the size of the human population for the same period of time.

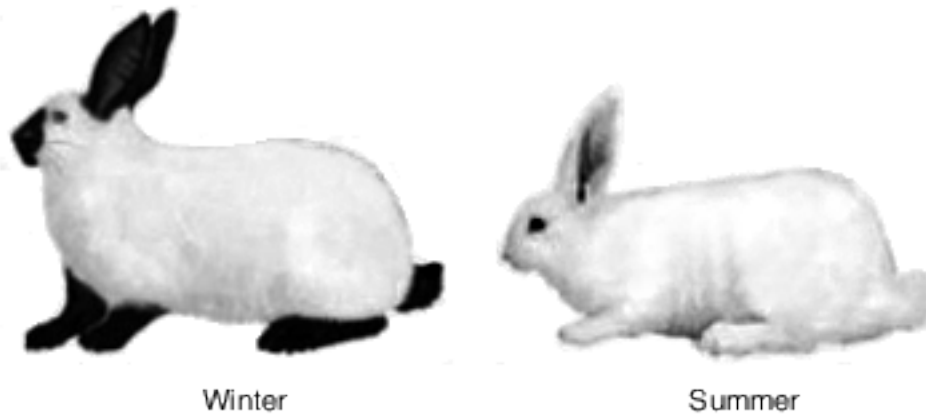


Source: modified from USGS

- 2 The rapid increase in human population between 1960 and 2010 is most likely the direct result of advances in
- (1) medical technology
  - (2) space exploration
  - (3) communication technology
  - (4) marine exploration
- 3 Which factor is a major cause of the changes that occur during puberty, the years when the rate of human physical growth increases and reproductive maturity occurs?
- (1) changes in some hormone levels
  - (2) an increase in meiosis in body cells
  - (3) a decrease in the rate of metabolism
  - (4) change in the gene sequences in reproductive cells

- 4 The photograph below shows two color variations of Himalayan rabbits. In the winter, the rabbits resemble the one on the left. In the summer, the rabbits resemble the one on the right.

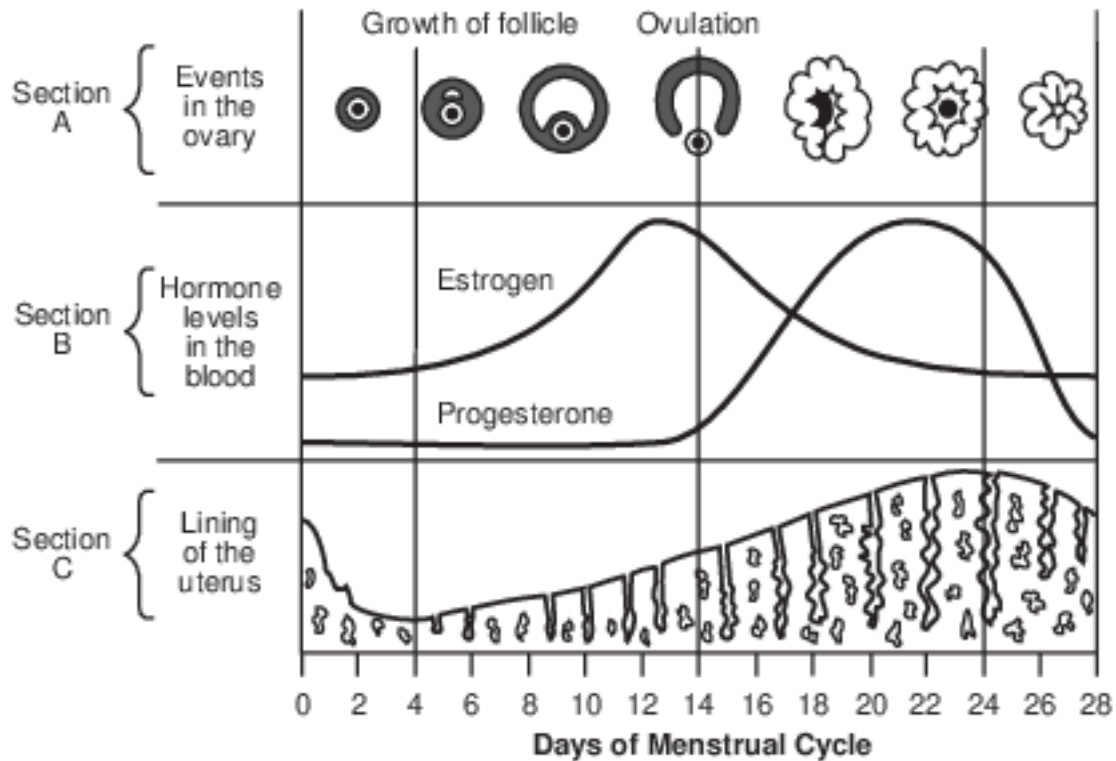
**Himalayan Rabbits**



The changes in fur color are most likely due to

- (1) a virus that affected genes in specific areas of the body
  - (2) the sorting and recombination of genes
  - (3) gene expression due to the differences in abiotic conditions
  - (4) the molecular arrangement of sugars
- 5 Exposure to certain environmental toxins, such as pesticides, may reduce fertility in males by interfering with their ability to produce gametes. These toxins are most likely having an effect on the
- (1) testes and progesterone
  - (2) ovaries and testosterone
  - (3) ovaries and estrogen
  - (4) testes and testosterone
- 6 The human female reproductive cycle is regulated primarily by the
- (1) white blood cells of the circulatory system
  - (2) muscle cells of the skeletal system
  - (3) enzymes of the digestive system
  - (4) hormones of the endocrine system
- 7 Testosterone directly affects the
- (1) formation of a zygote
  - (2) changes within an ovary
  - (3) production of sperm cells
  - (4) development of a placenta

Base your answers to questions 8 on the graph below and on your knowledge of biology. The graph shows some events associated with the reproductive cycle of human females.



- 8 Which sections of the graph represent structures affected directly by the hormones shown?
- (1) section A and section B, only
  - (2) section B and section C, only
  - (3) section A and section C, only
  - (4) section A, section B, and section C
- 9 Populations of aspen trees in the western United States are being destroyed by an unexplained illness. The altered landscape is affecting the animals that live there. Populations of deer mice are increasing greatly in these areas. Unfortunately, these mice often carry a virus that is deadly to humans. This scenario best illustrates that
- (1) a change in the environment always results in disease
  - (2) humans are the cause of the breakdown of this ecosystem
  - (3) the stability of this ecosystem is limited by the amount of water available
  - (4) every population in an ecosystem is linked with other populations
- 10 Three human hormones most directly involved in sexual reproduction are
- (1) estrogen, insulin, and progesterone
  - (2) testosterone, estrogen, and insulin
  - (3) progesterone, ATP, and testosterone
  - (4) estrogen, progesterone, and testosterone

Base your answer to question 11-13 on the information below and on your knowledge of biology.

### The Critical Role of the Placenta

The proper functioning of the placenta is critical to the growth and development of a healthy fetus. For example, the placenta appears to act as a nutrient sensor. It regulates the amounts and types of nutrients that are transported from the mother to the fetus.

Improper functioning of the placenta can alter the structure and function of specific cells and organ systems in the developing fetus, putting it at risk for health problems as an adult. For example, in some pregnancies, the placenta develops a resistance to blood flow. This resistance appears to force the heart of the fetus to work harder. This could result in an increased chance of the individual developing heart disease as an adult. A group of hormones known as glucocorticoids affects the development of all the tissues and organ systems. One of the things this group of hormones does is to alter cell function by changing the structure of cell membrane receptors.

11-13 Discuss the importance of the placenta in the development of a healthy fetus. In your answer, be sure to:

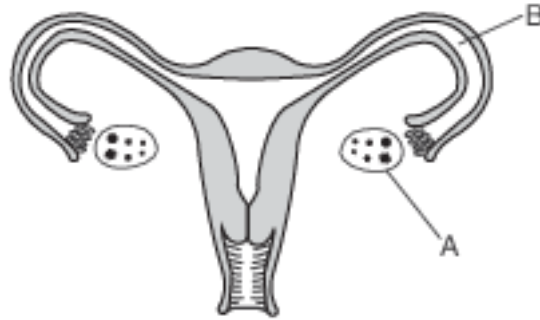
- identify two factors that could influence the nutrients that can pass from the mother to the fetus [1]
- identify the group of hormones that alter cell membrane receptors and explain how this alteration can affect cell function [1]
- state the role of the uterus in the development of the fetus and the placenta [1]

14-17 All organisms need to reproduce for the continuation of their species. Discuss the process of reproduction in humans. In your answer, be sure to:

- identify one hormone present in a female that is involved in regulating the reproductive cycle [1]
- state one way the nucleus of a sex cell is different from the nucleus of a body cell [1]
- state how the normal chromosome number for humans is maintained from one generation to the next [1]
- identify one action by the mother that can influence the development of the embryo and state a result of that influence [1]

Base your answers to questions 18 on the information and diagram below and on your knowledge of biology.

Endometriosis is a condition that occurs in some women, causing multiple cells or layers of cells to grow outside of the uterus. In some cases, these growths can actually cover the entire ovary or cause the tube leading from the ovary to the uterus to be blocked. The diagram below represents the female reproductive system. Two structures, A and B, are labeled.



18 Select either surgical procedure or hormone therapy and explain why it can be an effective treatment for endometriosis. [1]

Effective treatment:

Base your answers to questions 19 on the information below and on your knowledge of biology.

The testes of a human male produce gametes. The process that produces these gametes differs from the process that produces new skin cells in the same individual.

19 Identify the type of cell division involved in each process. [1]

Skin cells:

Gametes:

Base your answers to questions 20 on the information below and on your knowledge of biology.

Placental mammals – as opposed to the kind that lay eggs, such as the platypus, or carry young in pouches, such as the kangaroo – are an extraordinarily diverse group of animals with more than 5000 species today. They [placental mammals] include examples that fly, swim, and run, and range in weight from a couple of grams to hundreds of tons. ...

Source: “Earliest Placental Mammal Ancestor Pinpointed,” BBC News, February 7, 2013.

20 Describe one advantage for an offspring to develop internally as opposed to developing externally. [1]

## Answer Keys

1 2

2 1

3 1

4 3

5 4

6 4

7 3

8 3

9 4

10 4

11-13 The student's response to the bulleted items in the question need not appear in the following order.

- 11. Allow 1 credit for identifying two factors that could influence the nutrients that can pass from the mother to the fetus. Acceptable responses include, but are not limited to:
  - — diet of the mother
  - — hormones
  - — blood supply to the placenta
  - — the ability of the placenta to sense nutrients
  - — concentration of nutrients in the blood/blood vessels
  - — permeability of the placenta
  - — improper functioning of the placenta
  - — illness/disease
  - — size of molecules
- 12. Allow 1 credit for identifying the group of hormones that alter cell membrane receptors and for explaining how this alteration can affect cell function. Acceptable responses include, but are not limited to:
  - — Glucocorticoids—Receptors have a specific shape that determines their function. If the shape of a receptor is altered, it might not be able to perform its job appropriately.
  - — Glucocorticoids—They alter cell function by changing the structure of the cell membrane receptors.
  - — Glucocorticoids—They alter receptors to help them function.
- 13. Allow 1 credit for stating the role of the uterus in the development of the fetus and the placenta. Acceptable responses include, but are not limited to:
  - — The uterus is where the placenta forms and the fetus develops.
  - — provides protection

- 14-17 The student's response to the bulleted items in the question need not appear in the following order.
- 14. Allow 1 credit for identifying one hormone present in a female that is involved in regulating the reproductive cycle. Acceptable responses include, but are not limited to:
    - — progesterone
    - — estrogen
    - — LH
  - 15. Allow 1 credit for stating one way the nucleus of a sex cell is different from the nucleus of a body cell. Acceptable responses include, but are not limited to:
    - — It has half the normal chromosome number/half of the genes.
    - — Sex cells are haploid/monoploid.
    - — 23 chromosomes in sex cells, 46 in body cell
  - 16. Allow 1 credit for stating how the normal chromosome number for humans is maintained from one generation to the next. Acceptable responses include, but are not limited to:
    - — The egg and sperm each have half the normal chromosome number, and when they join, it restores the normal number for the species.
    - — through the process of gamete production and fertilization
    - — Each parent contributes half of the chromosomes.
  - 17. Allow 1 credit for identifying one action by the mother that can influence the development of the embryo and stating a result of that influence. Acceptable responses include, but are not limited to:
    - — Alcohol use can lead to Fetal Alcohol Syndrome.
    - — Smoking can lead to low birth weight.
    - — Poor nutrition can lead to underweight babies.
    - — Drug use can lead to birth defects.
    - — Good nutrition can lead to a healthy baby.
    - — Drinking alcohol puts the embryo at risk.
    - — Proper prenatal care might detect potential problems early so they can be treated.
- 18 Allow 1 credit. Acceptable responses include, but are not limited to:
- Effective treatment: surgical procedure
    - — surgical procedure because the growths physically block reproductive structures and need to be removed
  - Effective treatment: hormone therapy
    - — The hormones might lessen or shrink the growths.
    - — These hormones might block the influence of estrogen, which sometimes stimulates the growths.
- 19 Allow 1 credit for identifying the type of cell division involved in each process. Acceptable responses include, but are not limited to:
- — skin cells: produced by mitosis/mitotic cell division
  - — gametes: produced by meiosis/meiotic cell division
- 20 Allow 1 credit. Acceptable responses include, but are not limited to:
- — The developing offspring has a greater chance of survival because it is inside the mother.
  - — The offspring is more protected and therefore is more likely to survive.
  - — Internal environmental conditions are more constant/controlled than with external development.