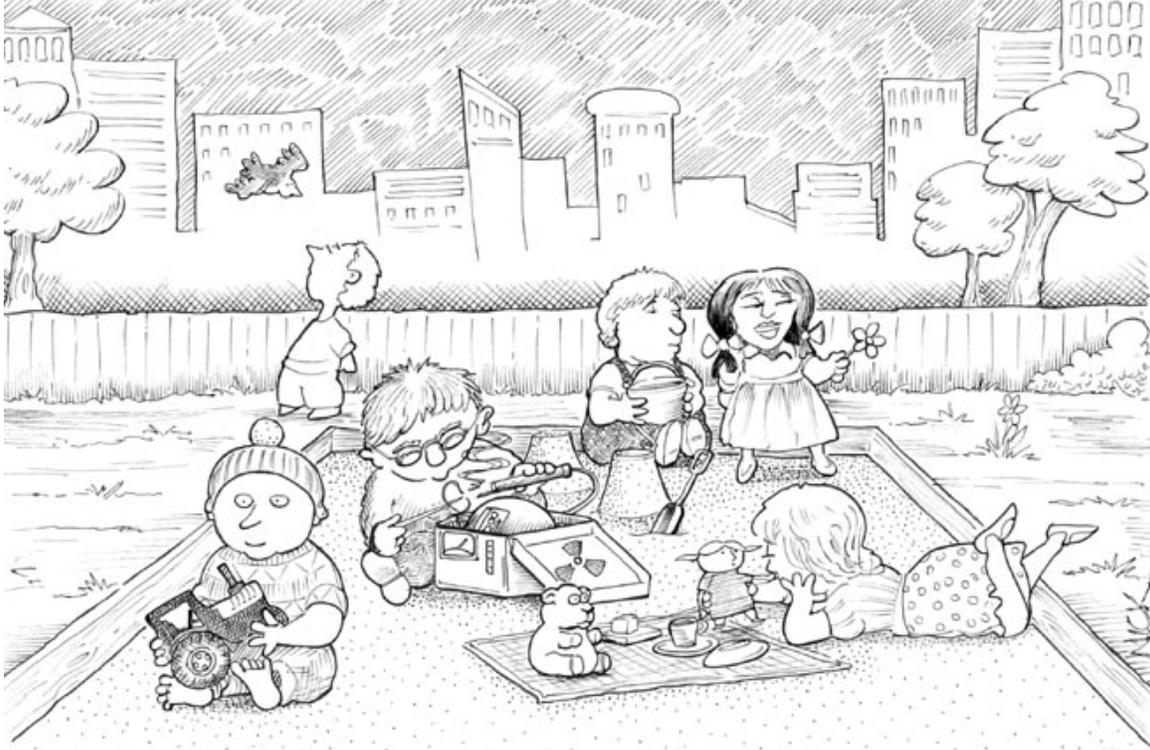


BIOLOGY 30
Review Assignment Part I



If all children are natural-born scientists, society might be wise to at least quarantine the subset of these scientist-infants who are the atomic weapons specialists, before they kill us all with their crazy little lunchbox nukes.

Nervous System Answer Sheet

Question #1	
<i>Numeric Response #1</i>	
Question #2	
Question #3	
Question #4	
Question #5	
<i>Numeric Response #2</i>	
<i>Numeric Response #3</i>	
<i>Numeric Response #4</i>	

Use the following information to answer the next two questions.

Multiple sclerosis (MS), a disease of the nervous system, typically has symptoms of uncontrolled muscle responses, weakness, paralysis, and vision difficulties. Researchers believe that MS occurs as a result of the body's immune system destroying the myelin sheath that surrounds the axon of a nerve cell. The result is a scarring of brain tissue or of spinal cord tissue.

1. Damage to the myelin sheath of an optic neuron affects the speed of neural transmission to the visual centre, which is found in which lobe of the cerebrum?
 - A. Frontal lobe
 - B. Parietal lobe
 - C. Occipital lobe
 - D. Temporal lobe

Use the following additional information to answer the next question.

Another symptom of MS is an exaggerated pupillary light reflex. Some of the events that occur during this reflex are listed below.

- 1 Motor neuron depolarizes
- 2 Sensory neuron depolarizes
- 3 Interneuron depolarizes
- 4 Light receptors stimulated

NUMERIC RESPONSE #1

The order in which the events listed above occur during a pupillary light reflex is ____, ____, ____, and ____.

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

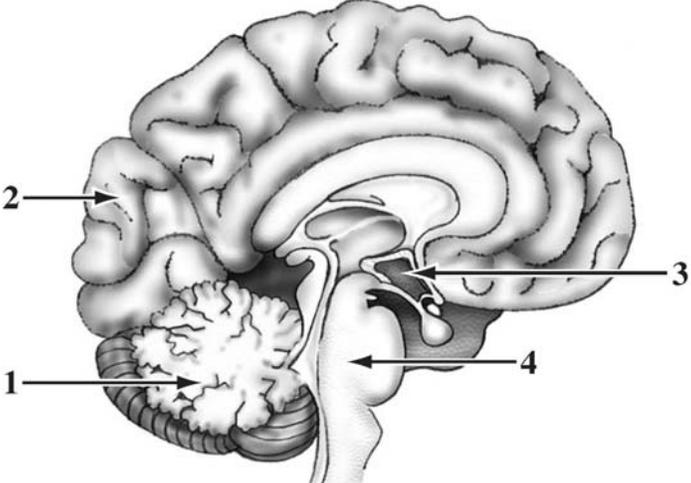
2. Which of the following rows indicates events that would result from stimulation of sympathetic motor neurons in the heart, skin, and liver?

Row	Heart	Skin	Liver
A.	Increased heart rate	Decreased blood flow	Conversion of glycogen to glucose
B.	Increased heart rate	Increased blood flow	Conversion of glucose to glycogen
C.	Decreased heart rate	Decreased blood flow	Conversion of glycogen to glucose
D.	Decreased heart rate	Increased blood flow	Conversion of glucose to glycogen

Use the following information to answer the next two questions.

Individuals with Refsum disease cannot metabolize phytanic acid, which results in a buildup of phytanic acid in body tissues and impairs the development of the myelin sheath on neurons. Symptoms of Refsum disease include hearing and vision loss, decreased muscle coordination, and a reduced sense of smell.

Human Brain



The diagram shows a sagittal view of the human brain. Four numbered arrows point to specific regions: 1 points to the cerebellum, 2 points to the olfactory bulb, 3 points to the optic chiasm, and 4 points to the brainstem.

3. In the diagram above, two areas of the brain whose function can be affected in a person with Refsum disease are numbered
- 1 and 2
 - 1 and 4
 - 2 and 3
 - 3 and 4

4. Symptoms of vision loss in individuals with Refsum disease include cataracts and impaired night vision. Which of the following rows identifies the structure of the eye that is affected by cataracts and the cells that, when damaged, result in night vision loss?

Row	Cataracts	Night Vision Loss
A.	Retina	Rod cells
B.	Lens	Rod cells
C.	Lens	Cone cells
D.	Retina	Cone cells

Use the following information to answer the next question.

Individuals know that touching a hot stove can be painful. When an individual accidentally touches a hot stove, a reflex arc is initiated, which causes the person to withdraw his or her hand before he or she senses the pain.

5. Which of the following lists identifies the neural pathway in a reflex arc?
- A. Receptor, sensory neuron, effector, motor neuron
 - B. Motor neuron, interneuron, sensory neuron, effector
 - C. Sensory neuron, receptor, interneuron, motor neuron
 - D. Receptor, sensory neuron, interneuron, motor neuron

Use the following information to answer the next question.

Structures of Sensory Perception

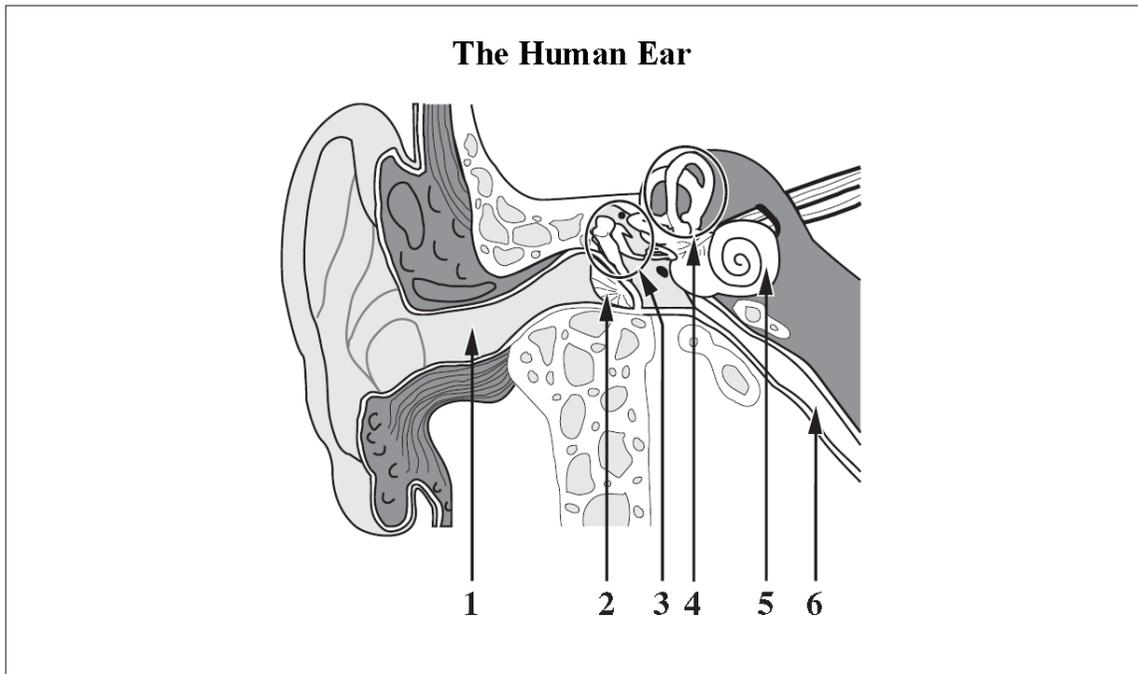
- 1 Optic nerve
- 2 Proprioceptor
- 3 Photoreceptor
- 4 Occipital lobe
- 5 Temporal lobe
- 6 Auditory nerve

NUMERIC RESPONSE #2

After light enters the eye, the structures of sensory perception listed above that are stimulated are ____, ____, and ____.

(Record all **three digits** of your answer **in lowest-to-highest numerical order** in the numerical response section on the answer sheet.)

Use the following additional information to answer the next question.



NUMERIC RESPONSE #3

In the diagram above, the four structures of the ear through which sound vibrations pass as they travel from the pinnae to the sensory nerve are ____, ____, ____, and ____.

*(Record all **four digits** of your answer in **lowest-to-highest numerical order** in the numerical response section on the answer sheet.)*

Use the following information to answer the next question.

Using various mixtures of nutrients and other growth factors, scientists can encourage stem cells to differentiate into any type of cell. Neuroreceptor disorders could potentially be treated with cells produced from stem cells. Listed below are some cell types and some neuroreceptor disorders.

Some Cell Types

- 1 Rod cells
- 2 Cone cells
- 3 Olfactory cells
- 4 Taste receptor cells
- 5 Basilar membrane cells
- 6 Semi-circular canal hair cells

Neuroreceptor Disorders and Descriptions

- Anosmia**—the inability to detect odours as a result of injury to the nasal cavity
- Colourblindness**—a genetic disorder that results in the inability to detect certain colours of light
- Neural Deafness**—the inability to detect sound as a result of damage to sensory structures in the inner ear
- Permanent vertigo**—a severe balance disorder that usually results from physical trauma to the ear

NUMERIC RESPONSE #4

Match four of the cell types numbered above with the disorder that the cell could treat, as given below.

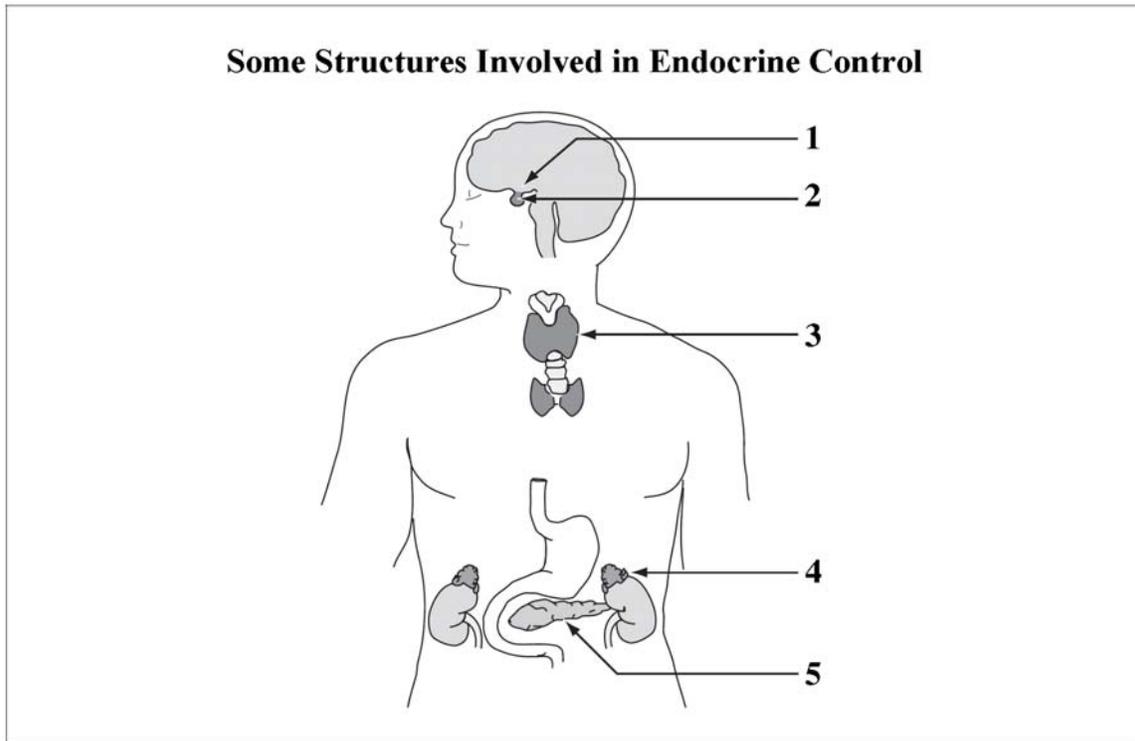
Cell Type:	_____	_____	_____	_____
Neuroreceptor Disorder:	Anosmia	Colourblindness	Neural deafness	Permanent vertigo

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

Endocrine System Answer Sheet

<i>Numeric Response #5</i>	
Question #6	
Question #7	
Question #8	
Question 9	
Question #10	
Question #11	
<i>Numeric Response #6</i>	
Question #12	

Use the following diagram to answer the next question.



NUMERIC RESPONSE #5

The three structures in the diagram above involved in the normal feedback control of cortisol secretion are numbered ____, ____, and ____.

(Record all **three digits** of your answer in **lowest-to-highest numerical order** in the numerical response section on the answer sheet.)

Use the following information to answer the next two questions.

Thyroid cancer can develop slowly over many months or even years. Because the symptoms are frequently overlooked, diagnosis is often delayed. However, thyroid cancer is usually treated successfully with a combination of surgery, radioactive iodine, and thyroid medication.

6. Surgical removal of the thyroid gland results in
 - A. a decrease in thyroxine levels and TSH levels
 - B. an increase in thyroxine levels and TSH levels
 - C. an increase in thyroxine levels and a decrease in TSH levels
 - D. a decrease in thyroxine levels and an increase in TSH levels

7. Following the removal of the thyroid gland, thyroid medication is prescribed in order to
 - A. increase sodium reabsorption and water retention
 - B. decrease sodium reabsorption and water retention
 - C. increase the rate of metabolism and the rate of heat production
 - D. decrease the rate of metabolism and the rate of heat production

8. The short-term response to stress occurs faster than the long-term response to stress because the
 - A. blood from the adrenal medulla travels faster than does the blood from the adrenal cortex
 - B. adrenal medulla responds to nervous stimulation, which is faster than hormonal stimulation
 - C. adrenal medulla is controlled by the hypothalamus whereas the adrenal cortex is controlled by the pituitary
 - D. hormone from the adrenal medulla acts on cells more quickly than the hormones from the adrenal cortex

9. Which of the following hormones plays a role in returning the salt concentration in the blood to homeostatic levels following heavy exercise?

- A. Cortisol
- B. Thyroxine
- C. Aldosterone
- D. Epinephrine

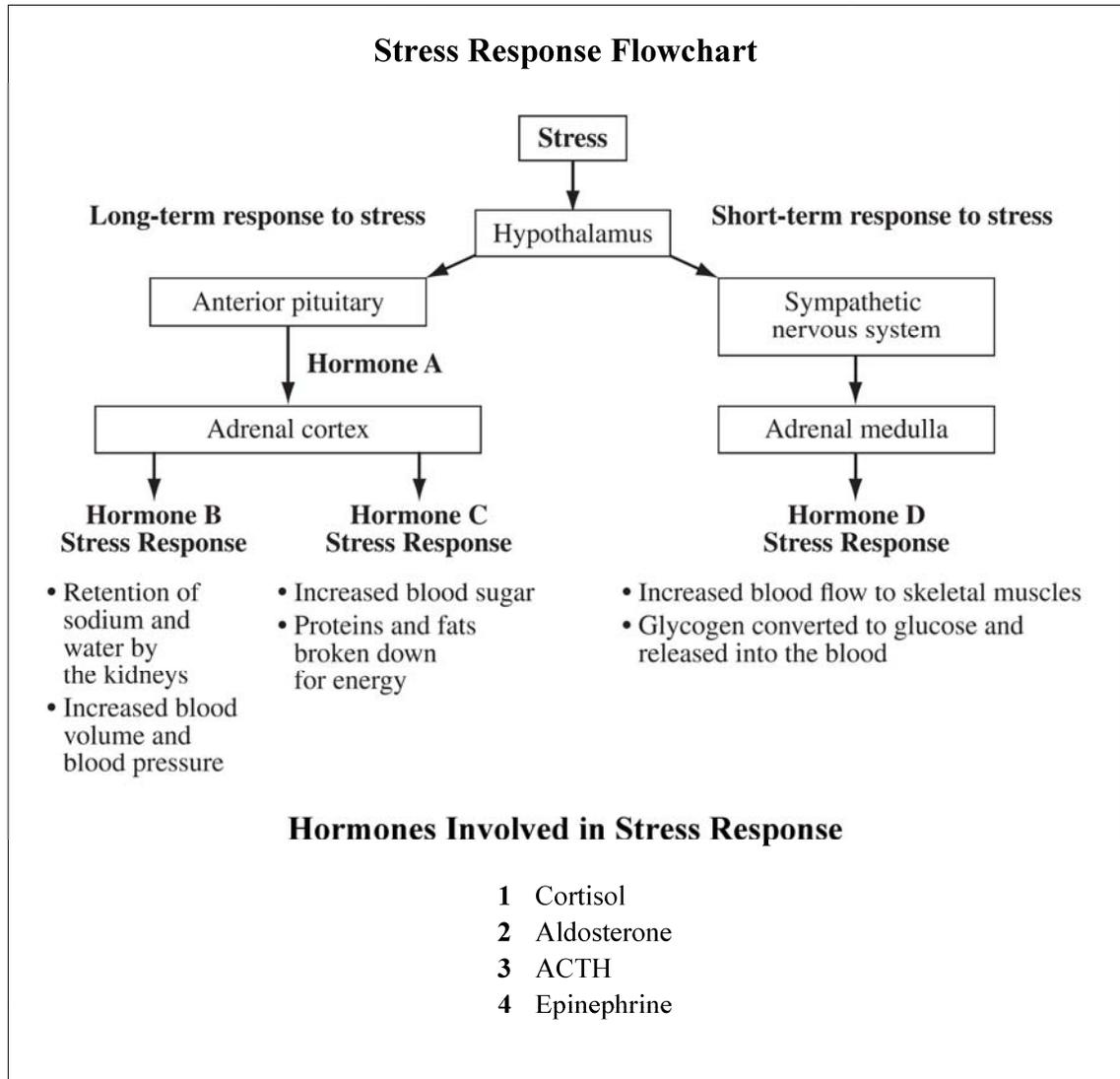
10. Low levels of calcium ions in the blood cause

- A. decreased secretion of PTH and increased deposition of calcium in the bones
- B. decreased secretion of calcitonin and increased deposition of calcium in the bones
- C. increased secretion of PTH and movement of calcium from the bones to the blood
- D. increased secretion of calcitonin and movement of calcium from the bones to the blood

11. Parathormone and calitonin are hormones that work antagonistically. Two other hormones that work antagonistically are

- A. TSH and thyroxine
- B. insulin and glucagon
- C. ADH and aldosterone
- D. prolactin and oxytocin

Use the following information to answer the next two questions.



NUMERIC RESPONSE #6

Match each of the hormones involved in the stress response with the hormones represented in the flowchart above.

Hormone Number: _____
 Flowchart Letter: Hormone A Hormone B Hormone C Hormone D

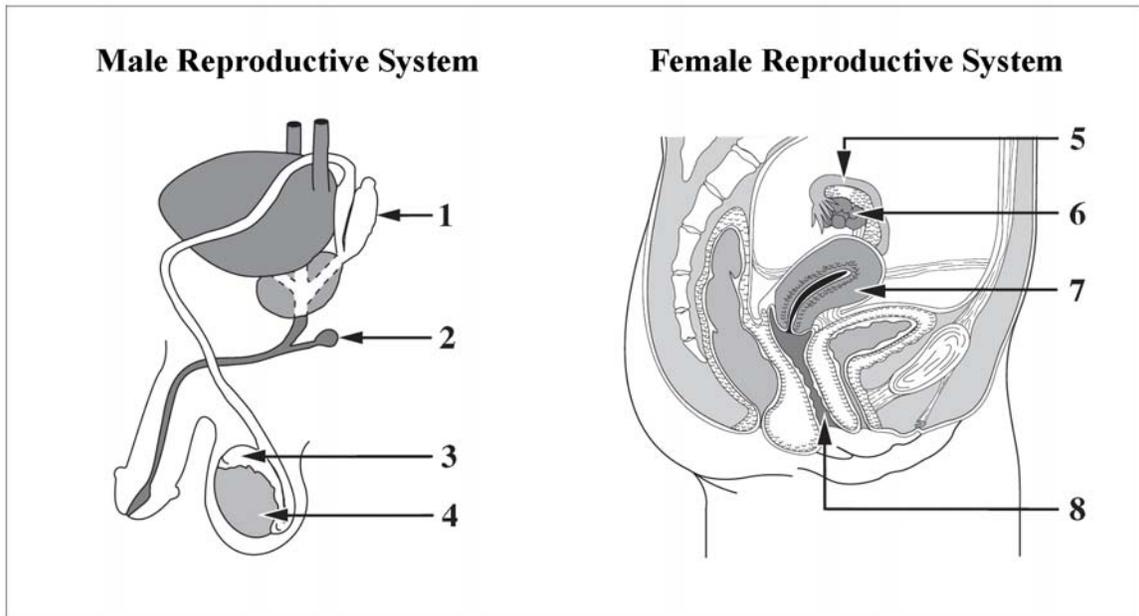
12. The short-term response to stress occurs faster than the long-term response to stress because the

- A. blood from the adrenal medulla travels faster than does the blood from the adrenal cortex
- B. adrenal medulla responds to nervous stimulation, which is faster than hormonal stimulation
- C. adrenal medulla is controlled by the hypothalamus whereas the adrenal cortex is controlled by the pituitary
- D. hormone from the adrenal medulla acts on cells more quickly than the hormones from the adrenal cortex

Reproductive System Answer Sheet

<i>Numeric Response #7</i>	
<i>Numeric Response #8</i>	
Question #13	
Question #14	
Question #15	
Question #16	
Question #17	
Question #18	
Question #19	
Question #20	

Use the following information to answer the next question.



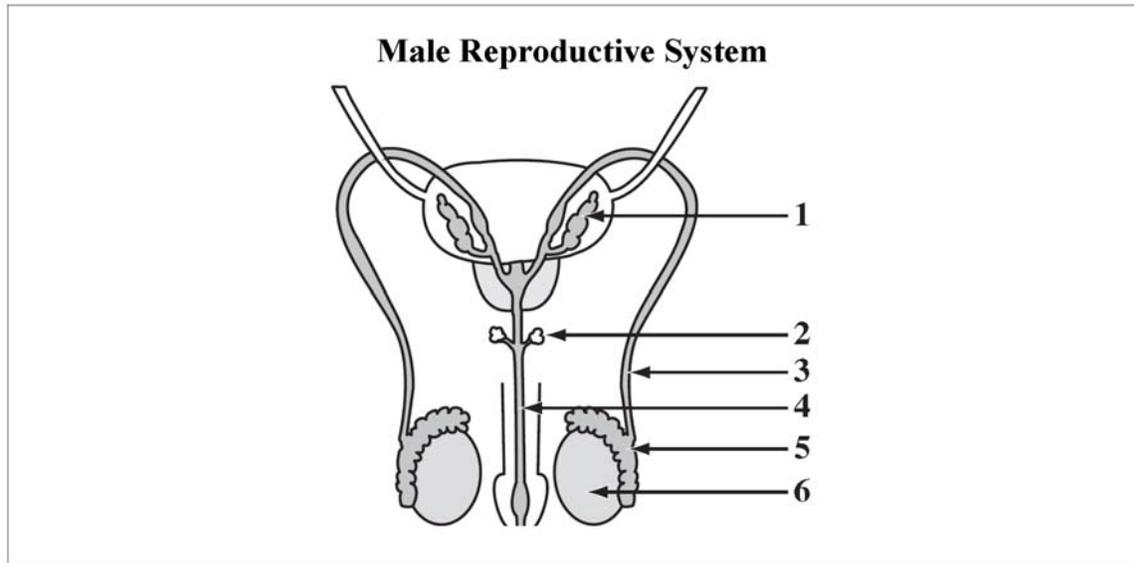
NUMERIC RESPONSE #7

Match four of the structures of the male and female reproductive systems numbered above with the appropriate descriptions, as given below.

Structure:				
Description:	Site of spermatogenesis	Site of oogenesis	Site of production of fructose fluid, which makes up a portion of the semen	Usual site of mitotic division after fertilization

*(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)*

Use the following information to answer the next question.



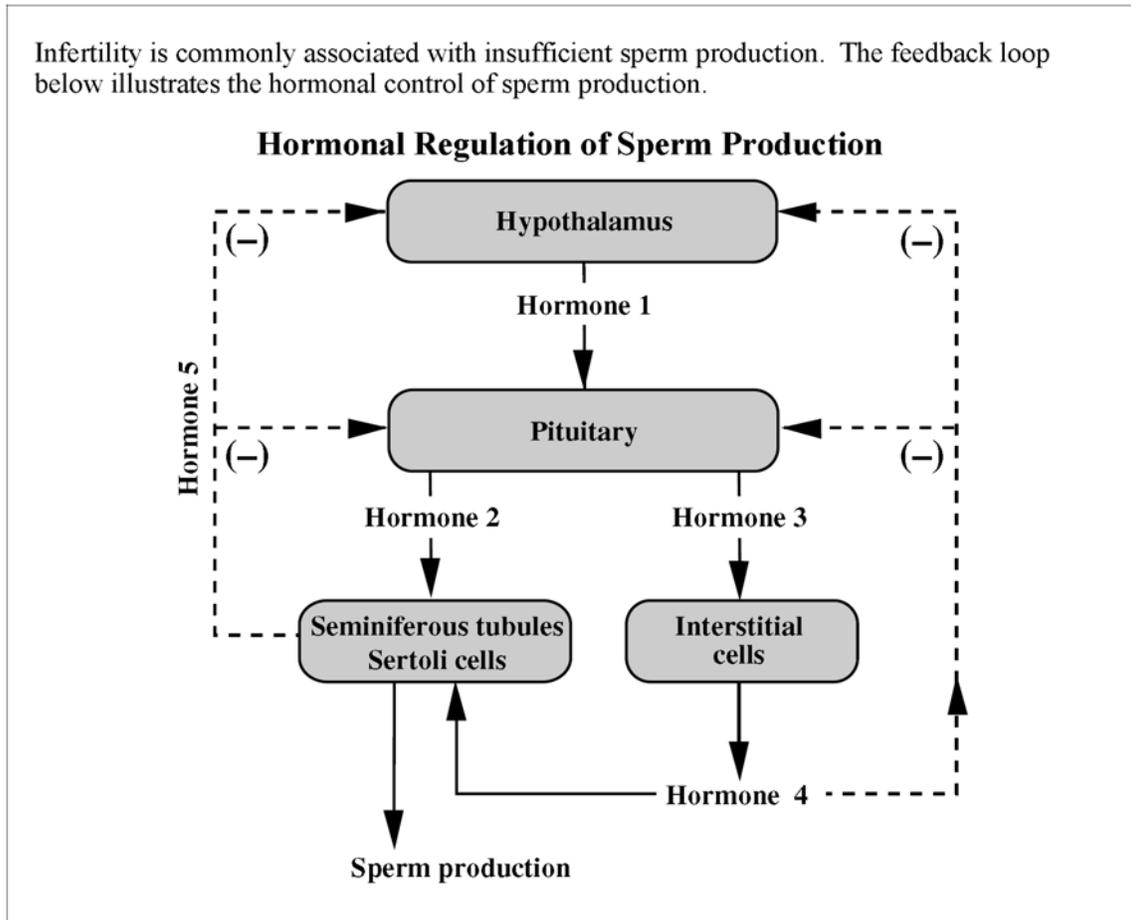
NUMERIC RESPONSE #8

In a normal male, the sequence of the structures numbered above through which sperm cells travel from the time when spermatogenesis occurs to the time when ejaculation occurs is ____, ____, ____, and ____.

*(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)*

Use the following additional information to answer the next two questions.

Infertility is commonly associated with insufficient sperm production. The feedback loop below illustrates the hormonal control of sperm production.



13. In the diagram above, the hormones FSH, LH, and testosterone are labelled, respectively,

- A. 2, 3, 4
- B. 2, 3, 5
- C. 3, 2, 4
- D. 3, 2, 5

14. If infertility were due to decreased production of hormone 1 by the hypothalamus, then fewer sperm would be produced because there would be

- A. low levels of hormone 2
- B. high levels of hormone 3
- C. high levels of hormone 4
- D. low levels of hormone 5

Use the following information to answer the next question.

Research on the effect of cocaine on blood flow in the brain revealed that males and females react differently to the drug. Men who use cocaine have a 20% decrease in blood flow in the brain. Women who use cocaine have no change in blood flow in the brain at the beginning of their menstrual cycle.

—Kaufman, Marc J., Jonathan M. Levin, Luis C. Maas, Thelma J. Kukes, Rosemond A. Villafuerte, Kerstin Dostal, Scott E. Lukas, Jack H. Mendelson, Bruce M. Cohen, and Perry F. Renshaw. 2001. Cocaine-induced cerebral vasoconstriction differs as a function of sex and menstrual cycle phase. *Biological Psychiatry* 49: 774–781.

15. Which of the following hormones **most likely** play a role in reducing the effects of cocaine on blood flow in a woman's brain at the beginning of the woman's menstrual cycle?
- A. FSH and progesterone
 - B. LH and progesterone
 - C. FSH and estrogen
 - D. LH and estrogen

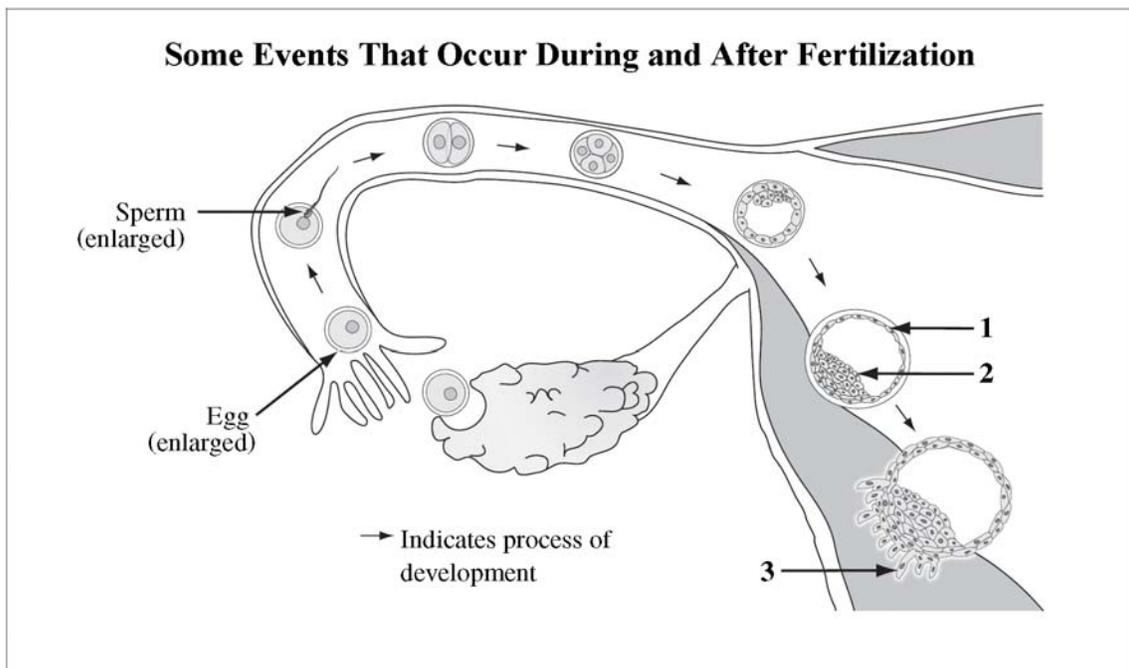
Use the following information to answer the next two questions.

Researchers found that the timing of breast cancer surgery in a woman's menstrual cycle affects the outcome of the surgery. Surgery to remove a cancerous tumour is most successful during a woman's luteal phase, partly because the hormone that has the highest concentration in the luteal phase seems to cause the tissue surrounding the tumour to compress the tumour.

16. According to the findings, on which day or days of a woman's menstrual cycle would it be **best** to perform surgery to remove a cancerous breast tumour?
- A. Days 1 to 5
 - B. Days 6 to 13
 - C. Day 14
 - D. Days 15 to 28

17. The hormone that has a high concentration **only** during the luteal phase and, therefore, that probably contributes to the success of breast cancer tumour removal at this stage is
- LH
 - FSH
 - Estrogen
 - Progesterone

Use the following diagram to answer the next question.



18. Which of the following rows identifies structure **3** and the structure it becomes part of?

Row	Structure 3	Structure It Becomes Part of
A.	Chorion	Placenta
B.	Amnion	Chorion
C.	Placenta	Amnion
D.	Placenta	Chorion

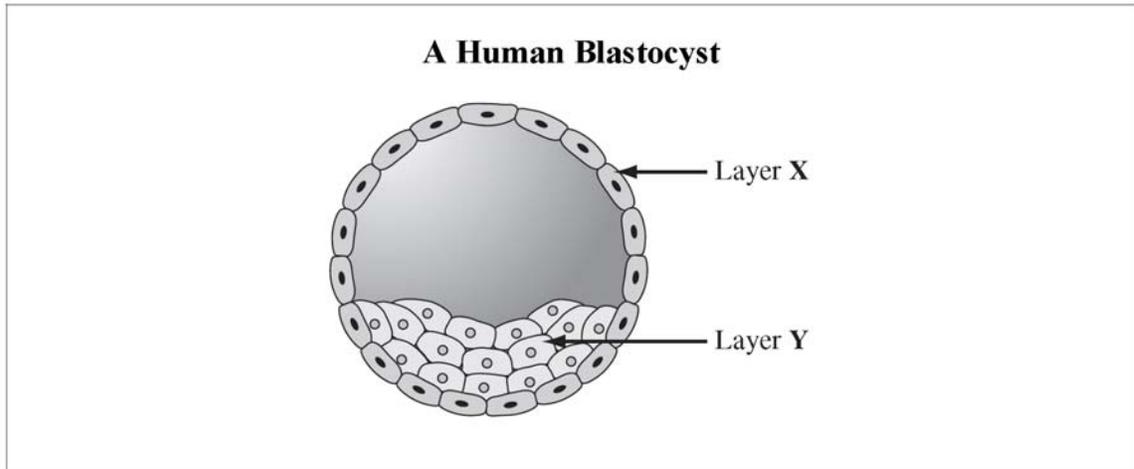
Use the following information to answer the next question.

Scientists in Japan have created an artificial womb. In it, they placed goat fetuses, which developed for up to three weeks. The device is composed of a clear plastic box that is filled with fluid at 37°C and connected to various machines that maintain vital functions. Inside the clear plastic box, the fetus is connected to a dialysis machine that removes wastes and provides nutrients to the fetus.

In the future, scientists hope to use this device to study the process of human development.

19. The structure in the human female that the clear plastic box functions as and a structure that normally surrounds the fetus are, respectively,
- A. a uterus and the allantois
 - B. a placenta and the allantois
 - C. a uterus and the amniotic sac
 - D. a placenta and the amniotic sac

Use the following information to answer the next question.



20. In the diagram above, the structure that develops from layer X and the structure that develops from layer Y are, respectively, the
- A. embryo and the amnion
 - B. chorion and the amnion
 - C. chorion and the embryo
 - D. embryo and the chorion