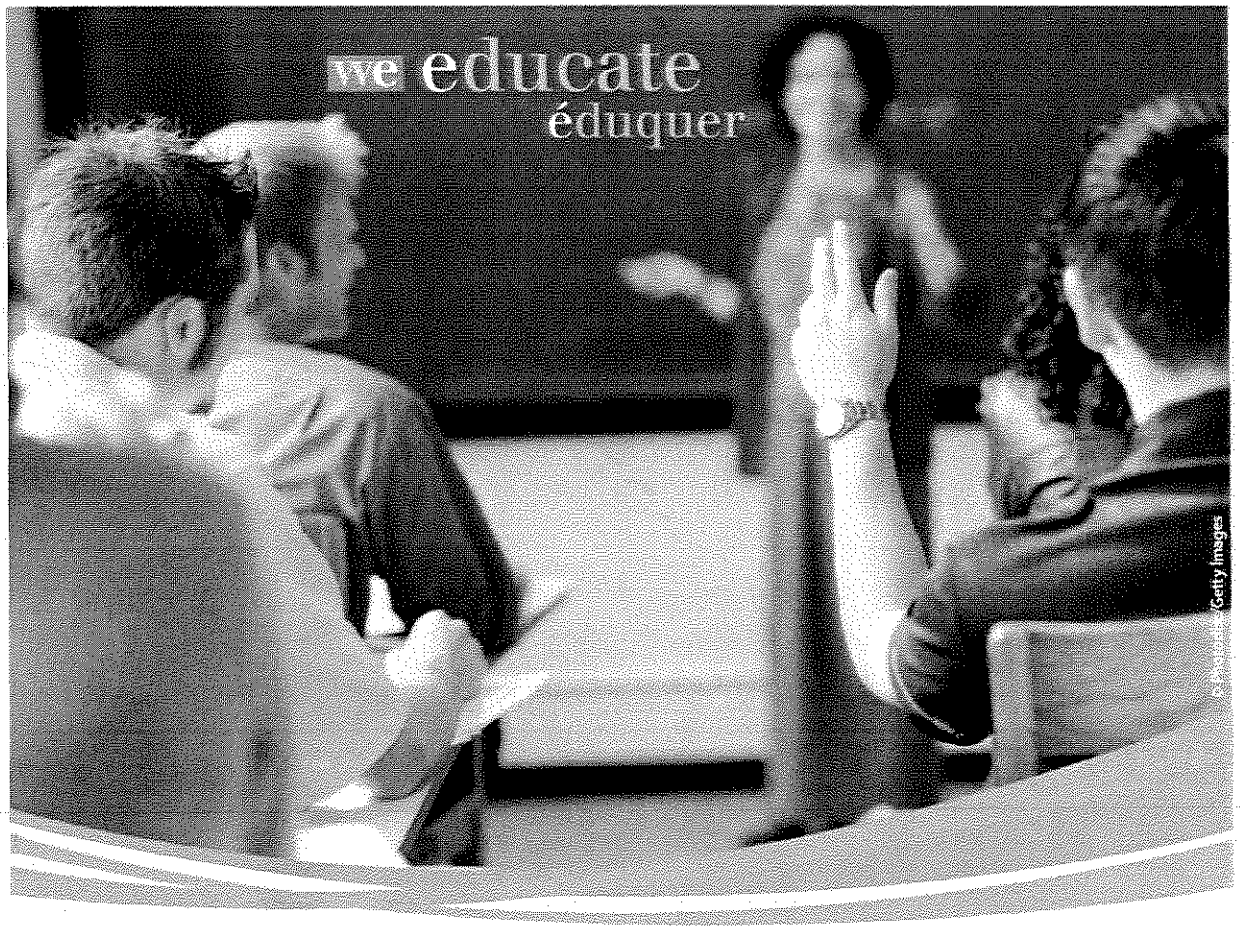
Biology 30

Practice Exam



Alberta
Education

Use the following information to answer the next two questions.

The four primary tastes are sweet, sour, salty, and bitter. A fifth taste called "umami" is gaining recognition. Umami describes the taste of the amino acid glutamate, which is found in many proteins. Glutamate attaches to receptors that are present in taste buds.

1. The attachment of glutamate to receptors in a taste bud causes the sensation of taste through

○	**A.** a resting potential
⊗	**B.** an action potential
○	**C.** a threshold potential
○	**D.** a refractory potential

2. The division of the nervous system that transmits nerve impulses when glutamate attaches to a receptor is the

○	**A.** motor division of the central nervous system
○	**B.** somatic division of the central nervous system
⊗	**C.** motor division of the peripheral nervous system
○	**D.** somatic division of the peripheral nervous system

Use the following information to answer the next two questions.

The hippopotamus is a large African herbivore that spends much of its day submerged in rivers or lakes. It has several adaptations for life underwater. For example, when a hippopotamus feeds underwater, bristle-like hairs that protrude from around the mouth help the hippopotamus to detect food and other hippopotamuses. An adaptation that allows the hippopotamus to communicate under murky water is its specialized jawbone. Underwater sounds cause the specialized jawbone to vibrate, and these vibrations travel from the jawbone to the middle ear.

3. When a hippopotamus is underwater, its jawbone conducts vibrations first to the hippopotamus's

○	**A.** cochlea
⊗	**B.** ossicles
○	**C.** organ of Corti
○	**D.** semicircular canals

4. When the hairs that protrude from around the mouth of a hippopotamus are stimulated by contact with another hippopotamus, the sensory neurons

○	**A.** repolarize because sodium ions move into the neurons
⊗	**B.** depolarize because sodium ions move into the neurons
○	**C.** repolarize because potassium ions move into the neurons
○	**D.** depolarize because potassium ions move into the neurons

Use the following information to answer the next three questions.

A hockey player in the National Hockey League was hit in the eye by a hockey stick. The damage to the player's eye included a 20 mm long cut through the sclera and cornea. A large section of the retina became detached. Some internal contents of the eye were forced out through the cut.

—based on *National Post*, 2000

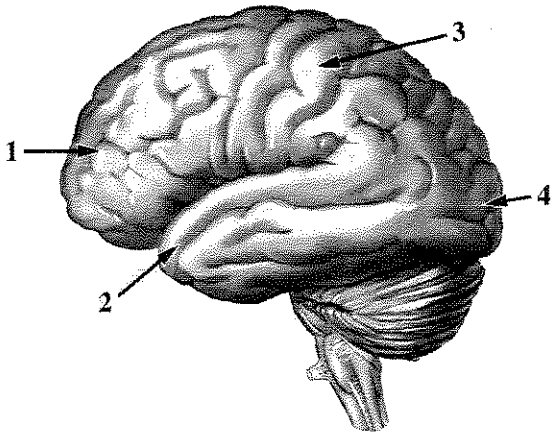
5. Surgeons discovered that although the injured player's peripheral retina was damaged, the fovea was not. Which of the following rows gives the main cell type found in an undamaged fovea and a visual property associated with this region of the retina?

	Row	Cell Type	Visual Property
○	**A.**	Rod	Fine-detail vision
○	**B.**	Rod	Vision in low light
⊗	**C.**	Cone	Fine-detail vision
○	**D.**	Cone	Vision in low light

Use the following additional information to answer the next question.

The hockey player's injury resulted in a temporary loss of vision in his damaged eye. The light receptors in the eye could not be stimulated by light, and therefore nerve impulses were not being transmitted to the brain.

The Human Brain



6. In the diagram above, the area of the brain that initially receives the nerve impulses produced by light stimulation is numbered

○	**A.** 1
○	**B.** 2
○	**C.** 3
⊗	**D.** 4

Use the following additional information to answer the next question.

Functions of Some Eye Structures

1 Translates light stimuli into nerve impulses
2 Bends light as it first passes into the eye
3 Regulates the amount of light entering the eye
4 Protects the eye and maintains its shape

Numerical Response

1. Match three of the functions listed above with the eye structures given below.

Function:	4	2	1
Structure:	**Sclera**	**Cornea**	**Retina**

(Record all **three digits** of your answer in the numerical-response section below.)

Use the following information to answer the next two questions.

In a research study, the pancreas was removed from six rhesus monkeys. Pancreatic cells from unrelated donors were then transplanted into the livers of these monkeys. Four of the monkeys received injections of a drug that blocks immune system rejection of foreign cells.

The transplanted pancreatic cells in the monkeys that received the injections were not rejected by the monkeys' immune systems, and the cells began secreting insulin. The transplanted pancreatic cells in the two monkeys that were not given the injections were rejected.

—based on Kenyon et al., 1999

7. The manipulated variable in the study above is the

○	**A.** group of monkeys that did not receive the drug
⊗	**B.** administration of the drug to the monkeys
○	**C.** species of monkey used in the experiment
○	**D.** rejection of the transplanted cells

8. Besides affecting insulin secretion, removal of the pancreas directly affects the secretion of

○	**A.** aldosterone
⊗	**B.** glucagon
○	**C.** glycogen
○	**D.** cortisol

Use the following information to answer the next question.

Functions of Some Hormones

1. Raises the blood glucose level
2. Lowers the blood glucose level
3. Causes excess glucose to be converted into fat
4. Causes fat to be converted into fatty acids and glycerol
5. Increases permeability of cell membranes to glucose
6. Decreases permeability of cell membranes to glucose
7. Results in the conversion of glycogen to glucose in the liver
8. Results in the conversion of glucose to glycogen in the liver

Numerical Response

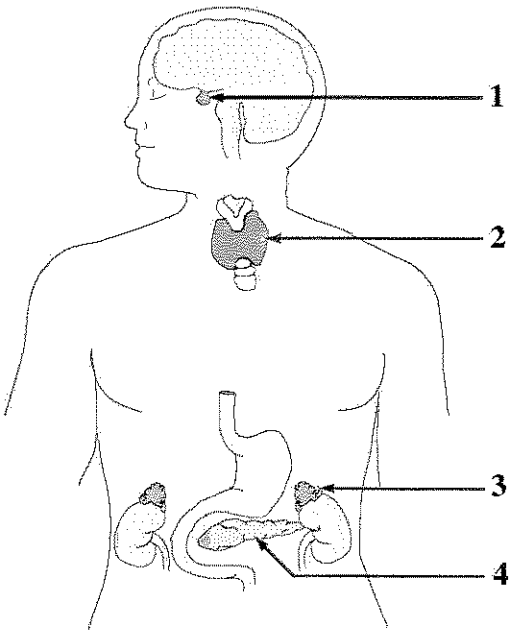
2. Four functions of insulin that are listed above are 2, 3, 5, and 8.

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

Use the following information to answer the next two questions.

Addison disease and Cushing syndrome are disorders of the adrenal gland. Addison disease results from less-than-normal secretion of cortisol and aldosterone, whereas Cushing syndrome results from greater-than-normal secretion of cortisol. Abnormal levels of ACTH also occur in both disorders.

Some Endocrine Glands



9. In the diagram above, the glands that are associated with Addison disease and Cushing syndrome are numbered

○	**A.** 1 and 2
⊗	**B.** 1 and 3
○	**C.** 2 and 4
○	**D.** 3 and 4

10. Which of the following rows indicates the blood ACTH level and the blood glucose level that would be found in a person with untreated Cushing syndrome?

	Row	Blood ACTH Level	Blood Glucose Level
○	**A.**	Lower than normal	Lower than normal
⊗	**B.**	Lower than normal	Higher than normal
○	**C.**	Higher than normal	Lower than normal
○	**D.**	Higher than normal	Higher than normal

Use the following information to answer the next question.

In the human body, cells of glands secrete hormones that regulate metabolism. The secretion of hormones is regulated through a feedback mechanism.

Cells in a Feedback Loop

1 Muscle cells
2 Thyroid cells
3 Pituitary cells
4 Hypothalamus cells

Numerical Response

3. Match each of the cells in the feedback loop listed above with the letter given below that represents the cell in the diagram.

	A	B	C	D
Cell Number:	4	3	2	1
Letter:				

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

Use the following information to answer the next two questions.

> Some men have a defect of the Y chromosome called an AZFc deletion, which results in low sperm production. Intracytoplasmic sperm injection (ICSI) is a reproductive technology that enables men with this genetic defect to father children. In ICSI, a sperm is injected directly into an egg.

11. The male reproductive structure that is affected by the AZFc deletion is the

○	**A.** epididymis
○	**B.** vas deferens
○	**C.** seminal vesicle
⊗	**D.** seminiferous tubule

12. Men who have the AZFc deletion and who father children through the ICSI procedure will pass on the infertility trait to

⊗	**A.** their sons only
○	**B.** all their children
○	**C.** their daughters only
○	**D.** none of their children

Use the following information to answer the next question.

A contraceptive method being tested for males is a weekly injection of testosterone. When testosterone is injected into a male's bloodstream, it inhibits the release of two pituitary hormones that stimulate sperm and testosterone production.

13. The pituitary hormone that stimulates the production of sperm and the pituitary hormone that stimulates the production of testosterone are, respectively,

○	**A.** LH and FSH
⊗	**B.** FSH and LH
○	**C.** testosterone and LH
○	**D.** testosterone and FSH

Use the following information to answer the next two questions.

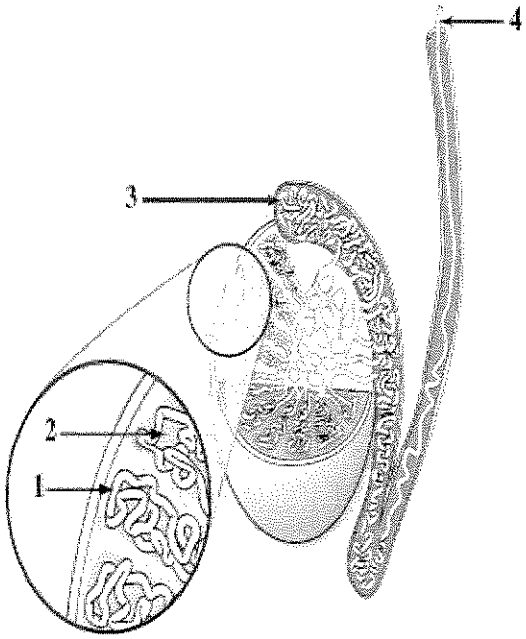
A new, non-surgical vasectomy procedure has been developed. A plastic clip is attached to the scrotum over the vas deferens and an ultrasound pulse is focused on the clip. The ultrasound pulse scars tissue in the wall of the vas deferens. The resulting scar tissue forms a barrier through which sperm cannot pass.

14. If this vasectomy procedure is successful, sperm will **not** be found in the

○	**A.** seminiferous tubules
○	**B.** epididymis
⊗	**C.** urethra
○	**D.** testes

Use the following additional information to answer the next question.

Illustration of a Testicle



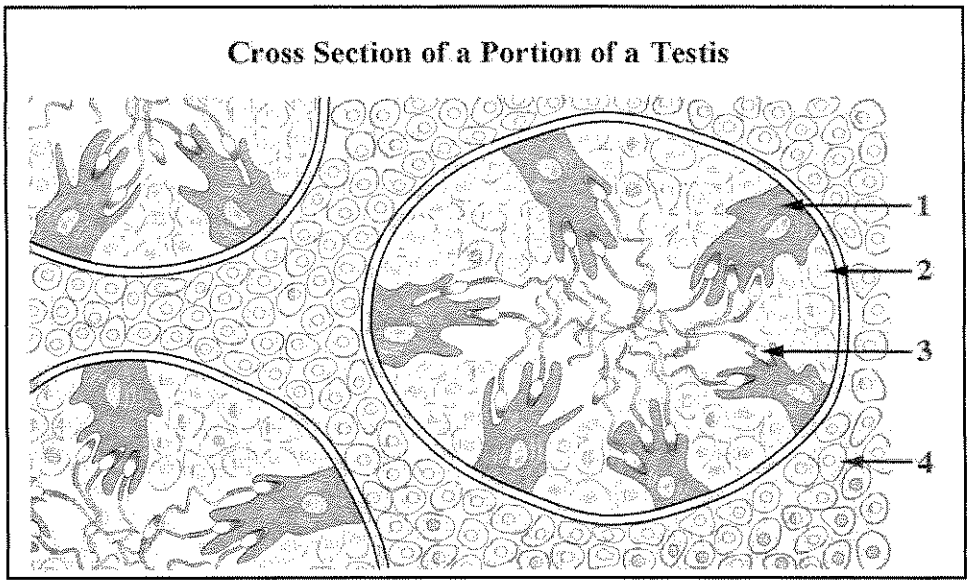
Numerical Response

4. Match each of the structures numbered above with its description given below.

Structure:	4	1	3	2
Description:	**Site of blockage following a vasectomy**	**Site of sperm production**	**Site of final sperm maturation**	**Site of testosterone secretion**

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

Use the following diagram to answer the next question.

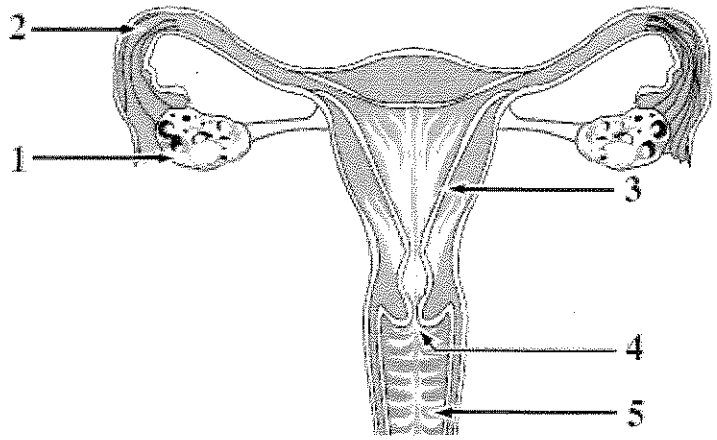


15. In the diagram above, a cell that undergoes meiosis is numbered

○	**A.** 1
⊗	**B.** 2
○	**C.** 3
○	**D.** 4

Use the following information to answer the next three questions.

Female Reproductive System



Some Events Associated with the Female Reproductive System

- A Pap smear of the cervix is conducted to detect cancer cells.
- A tubal ligation is performed to prevent fertilization.
- Use of fertility drugs causes the maturation of more than one follicle.
- Gonorrheal infection scars the lining of the uterus, preventing implantation.

Numerical Response

5. Match four of the structures of the female reproductive system numbered above with the events associated with them given below.

Structure:	4	2	1	3
Event:	**Pap smear**	**Tubal ligation**	**Use of fertility drugs**	**Gonorrheal infections**

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

16. In the diagram above, the structure of the female reproductive system that produces an acidic pH to protect against bacterial infection is numbered

○	**A.** 2
○	**B.** 3
○	**C.** 4
⊗	**D.** 5

Use the following additional information to answer the next question.

Some human pregnancies continue longer than the normal nine months. Doctors can administer drugs that mimic the action of a female hormone to induce labour in these circumstances.

17. Which of the following rows identifies the hormone that induces labour and the structure in the diagram of the female reproductive system that this hormone acts upon?

	Row	**Hormone**	**Structure**
○	**A.**	Oxytocin	1
○	**B.**	Progesterone	1
⊗	**C.**	Oxytocin	3
○	**D.**	Progesterone	3

Use the following information to answer the next question.

Some Events on the Development of the Uterine Lining

1 FSH secretion increases.
2 Estrogen secretion increases.
3 Follicle development is stimulated.
4 Uterine lining growth is stimulated.

Numerical Response

6. The sequence of the above events that results in the thickening of the uterine lining after menstruation is 1, 3, 2, and 4.

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

1324

Use the following information to answer the next question.

A young woman's first two pregnancies ended in miscarriages in the second trimester. She is now pregnant for a third time and is seeking help to avoid another second-trimester miscarriage. Three causes of reproductive problems in females, three procedures used in diagnosing reproductive problems, and three possible treatments for reproductive problems are randomly listed below.

Cause	Procedure	Treatment
1 Low levels of estrogen and progesterone	**1** Amniocentesis	**1** *In vitro* fertilization
2 Failure of the blastocyst to implant	**2** Ultrasound imaging	**2** Hormone therapy
3 Blocked Fallopian tubes	**3** Blood analysis	**3** Caesarean section

Numerical Response

7. Using the numbers given above, identify a possible cause of this woman's previous miscarriages, a procedure that could be used to detect the cause, and a treatment that could be used to help avoid another second-trimester miscarriage.

Answer: 1 (**Cause**) 3 (**Procedure**) 2 (**Treatment**)

(Record all **three digits** of your answer in the numerical-response section below.)

1 3 2

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18. The primary development of the nervous system occurs during

○	**A.** implantation
⊗	**B.** the first trimester
○	**C.** the second trimester
○	**D.** the third trimester

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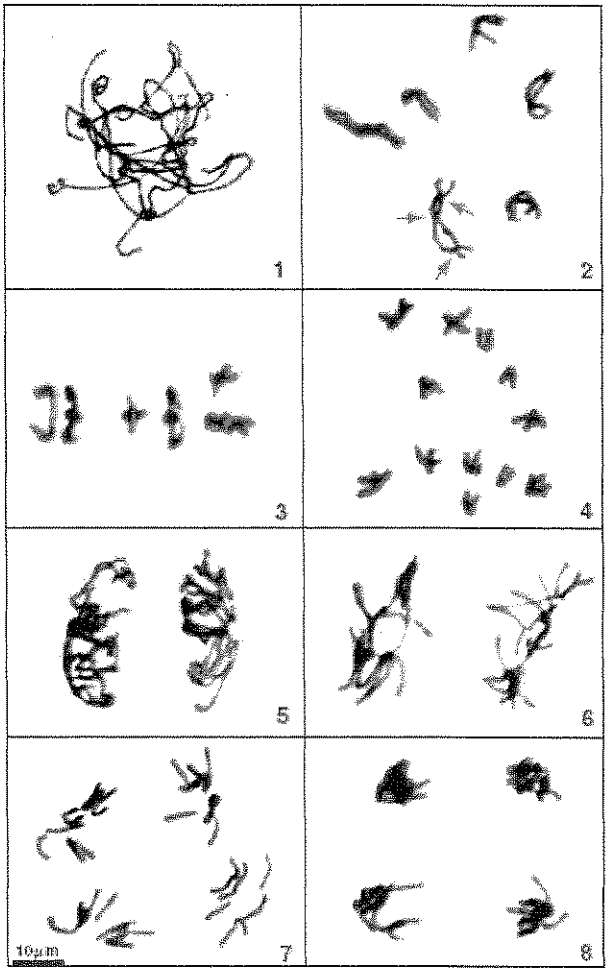
19. The process by which the germ layers of an embryo are formed is called

⊗	**A.** gastrulation
○	**B.** differentiation
○	**C.** tissue development
○	**D.** blastocyst formation

Use the following photographs to answer the next two questions.

Photographs of a Sequence of Processes That Occur in Mayapple Cells



—adapted from Braselton, 1997

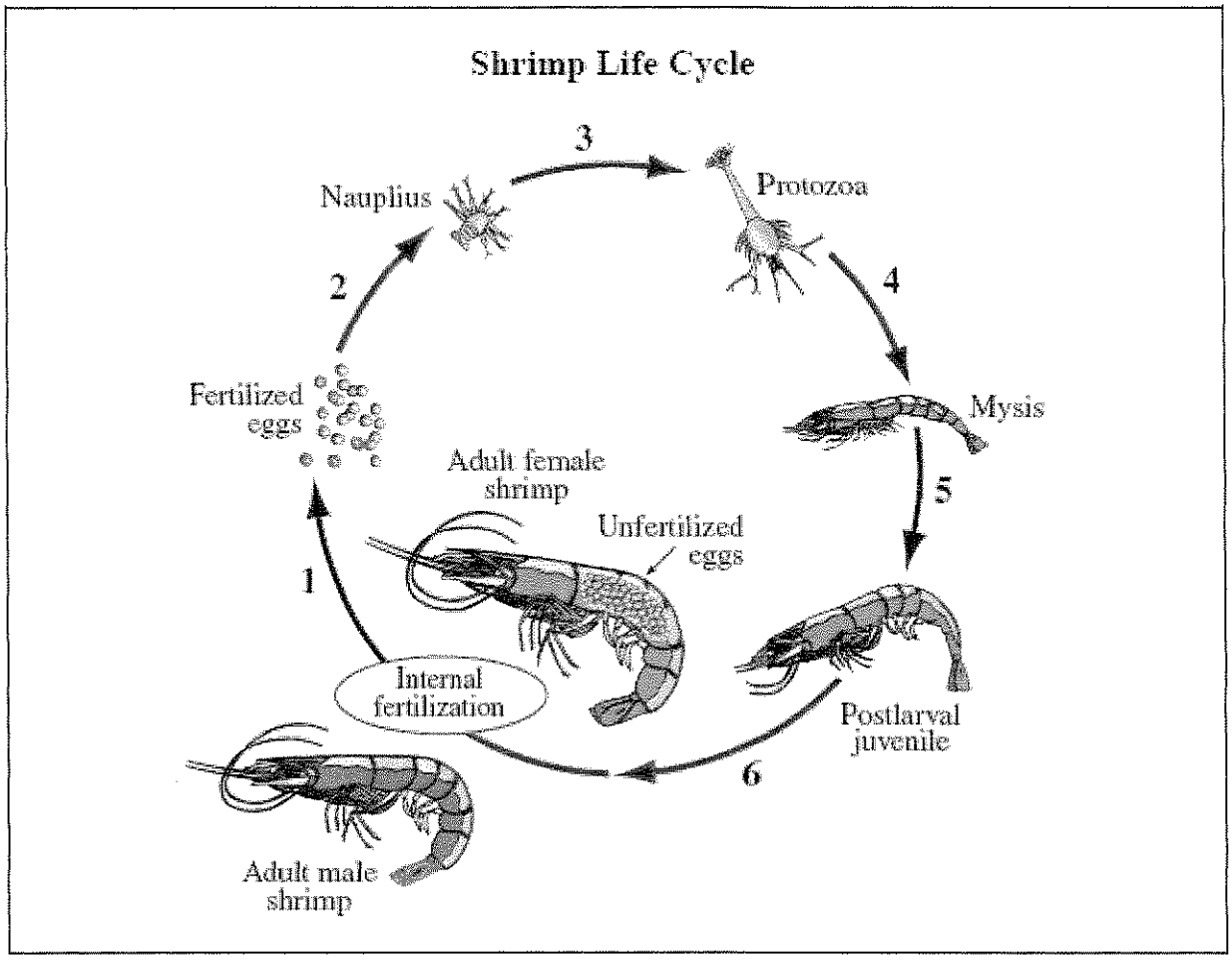
20. The sequence of processes shown in the photographs above is known as

◯	**A.** mitosis
◯	**B.** meiosis I
◯	**C.** meiosis II
⊗	**D.** meiosis I and meiosis II

21. The three arrows in photograph 2 indicate where

○	**A.** nondisjunction has occurred
⊗	**B.** crossing over is taking place
○	**C.** chromosomes have just separated
○	**D.** chromosomes are about to pair up

Use the following diagram to answer the next two questions.



22. During which of the developmental processes numbered in this diagram of the shrimp life cycle does mitosis occur?

○	**A.** 1 only
○	**B.** 1 and 2 only
⊗	**C.** 2 through 6 only
○	**D.** 3 through 6 only

23. Shrimp have 92 chromosomes. When a shrimp changes from a mysis into a postlarval juvenile, its cells during metaphase contain

○	**A.** 23 chromatids
○	**B.** 46 chromatids
○	**C.** 92 chromatids
⊗	**D.** 184 chromatids

Use the following information to answer the next two questions.

The fertilized eggs of wild grass carp can be shocked to produce triploid grass carp ($3n = 72$). Triploid grass carp are used to control aquatic vegetation because they are sterile and cannot disrupt the natural ecology of an aquatic system by reproducing.

24. The diploid chromosome number of wild grass carp is

○	**A.** 24
○	**B.** 36
⊗	**C.** 48
○	**D.** 60

25. The technology that can **best** distinguish between wild grass carp and triploid grass carp is

○	**A.** gene recombination
○	**B.** gel electrophoresis
○	**C.** gene sequencing
⊗	**D.** karyotyping

Use the following information to answer the next question.

A diet rich in lycopene, a nutrient found in tomatoes, can reduce the risk of cancer by preventing genetic damage and abnormal cell growth. Lycopene has been shown to reduce the size of tumours and slow the spread of the cancerous tissue.

26. Lycopene slows the spread of cancerous growth by decreasing the rate of

⊗	**A.** mitosis, which produces diploid cells
○	**B.** mitosis, which produces haploid cells
○	**C.** meiosis, which produces diploid cells
○	**D.** meiosis, which produces haploid cells

Use the following additional information to answer the next question.

Colour pattern in domestic pigeons is determined by autosomal alleles. The dominant pattern is barred, with two black bars across the wings and a black bar near the end of the tail. Barless, the pattern with no black bars, results from the inheritance of two recessive alleles.

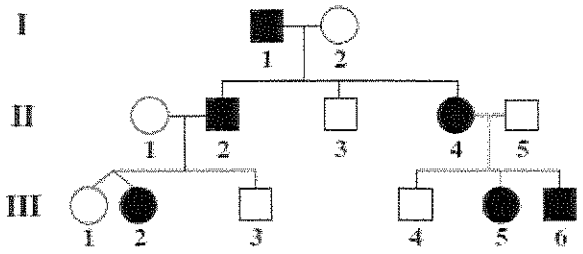
28. If a breeder wanted to determine the genotype of an ash-red, barred male pigeon, the breeder should mate it with a female pigeon that is

○	**A.** blue-black and barless
○	**B.** ash-red and barred
⊗	**C.** brown and barless
○	**D.** brown and barred

Use the following information to answer the next three questions.

Polydactyly is a condition characterized by extra fingers and/or extra toes. It is caused by the presence of an autosomal dominant gene. The pedigree below illustrates the inheritance of polydactylism.

Pedigree Illustrating the Inheritance Pattern of Polydactylism



29. Individuals **III-1** and **III-2** have genotypes that are, respectively,

○	**A.** unaffected and affected
○	**B.** homozygous recessive and heterozygous
○	**C.** heterozygous and homozygous recessive
⊗	**D.** homozygous unaffected and heterozygous affected

30. Individuals **III-1** and **III-2** developed from

○	**A.** one egg fertilized by one sperm
○	**B.** one egg fertilized by two sperm
○	**C.** two eggs fertilized by one sperm
⊗	**D.** two eggs fertilized by two sperm

31. If individuals **II-4** and **II-5** have another child, the probability of this child having the polydactyly trait is

○	**A.** 25%
○	**B.** 33%
⊗	**C.** 50%
○	**D.** 75%

Use the following information to answer the next three questions.

In chickens, the female (hen) has ZW sex chromosomes and the male (rooster) has ZZ sex chromosomes. A sex-linked trait in white leghorn chickens is dwarfism. The allele for dwarfism (Z^{dw}) is recessive to the allele for normal size (Z^{Dw}).

Numerical Response

8. A rooster with the genotype $Z^{Dw}Z^{dw}$ is bred with a hen with a genotype $Z^{Dw}W$. For chicks produced from this cross, the expected ratio of phenotypes is

Ratio:	2 :	1 :	0 :	1
Phenotype:	**Normal male**	**Normal female**	**Dwarf male**	**Dwarf female**

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

2 1 0 1

Use the following additional information to answer the next question.

A lethal mutation called "limbless" also occurs in white leghorn chickens. Limbless is inherited in an autosomal recessive mode.

A hen and rooster are bred, and the hen lays 64 eggs over a period of time. Sixteen of the eggs do not hatch, and inspection of the embryos reveals that they are limbless.

32. The number of the hatched chicks predicted to be heterozygous for the limbless trait is

○	**A.** 8
○	**B.** 16
⊗	**C.** 32
○	**D.** 48

Use the following additional information to answer the next question.

A population of white leghorn chickens has the following dominant mutations:

- crested head, the condition of having elongated feathers on the crown of the head, is dominant to normal-feathered head
- naked neck, the condition of having no neck feathers, is dominant to normal-feathered neck

33. A rooster that has a crested head and a naked neck is heterozygous for both of these traits. It mates with a hen that is also heterozygous for both traits. The percentage of their offspring that are predicted to have a normal-feathered head and a naked neck is

○	**A.** 6.25%
⊗	**B.** 18.8%
○	**C.** 25.0%
○	**D.** 56.3%

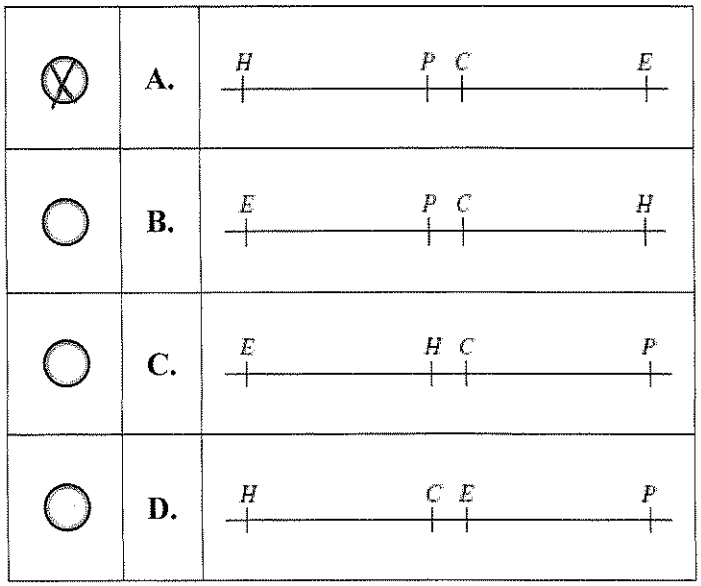
Use the following information to answer the next question.

The genome of *Drosophila* has been studied extensively using the technique of gene mapping.

In *Drosophila*, pink eyes (*P*), curled wings (*C*),hairy body (*H*), and ebony body (*E*) are determined by alleles of genes located on the same chromosome.

Gene Combination	Frequency of Recombination
E/H	44%
C/H	23%
E/P	23%
H/P	21%

34. Which of the following gene maps shows the sequence of these genes?



Use the following information to answer the next two questions.

One method of gene mapping uses a process called marker-assisted selection. This method tracks DNA sequences called markers, which are located on the same chromosome as the gene that a scientist wants to study. These markers are not always reliable for use in gene mapping because they can change position during cell division.

35. Which of the following statements explains why there can be a high frequency of separation of a DNA marker sequence from the gene with which it is usually associated?

○	**A.** The marker is X linked.
○	**B.** The marker is a recessive allele.
⊗	**C.** The marker and the gene are located relatively far apart on the chromosome.
○	**D.** The marker and the gene are located relatively close together on the chromosome.

36. If the nucleotide code of a marker sequence is TAC CTT GAC AAT, then the sequence of the amino acids in the protein produced will be

○	**A.** tyrosine—valine—glutamine—leucine
○	**B.** tyrosine—valine—aspartate—asparagine
⊗	**C.** methionine—glutamate—leucine—leucine
○	**D.** methionine—glutamate—glutamine—asparagine

Use the following information to answer the next question.

Scientists are able to genetically engineer food crops. For example, scientists are able to delete sections of DNA located between two genes that code for a protein. The "stop" signal can be removed from the end of the first gene, which results in the production of an elongated strand of mRNA containing codons from both genes. The mRNA folds onto itself and becomes double-stranded mRNA when its bases are complementary.

—based on *Nature*, 2003

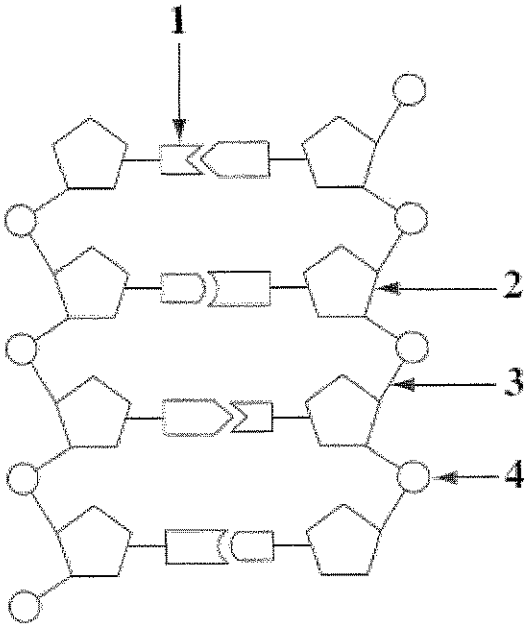
37. The double-stranded mRNA does not function normally because the

○	**A.** mRNA cannot unzip to allow replication to occur
⊗	**B.** tRNA anticodons cannot attach to the mRNA codons
○	**C.** mRNA cannot attach to the DNA during transcription
○	**D.** amino acids cannot attach to the mRNA during transcription

Use the following information to answer the next two questions.

Individuals who have severe sunburn during their first 15 years of life have twice the normal risk of developing melanoma, a deadly form of skin cancer. The ultraviolet (UV) radiation that causes sunburn can damage DNA in cells. Thymine bases are particularly prone to UV damage.

A Section of a DNA Molecule



38. In the diagram above, the part of the DNA molecule that is particularly prone to UV damage is numbered

⊗	**A.** 1
○	**B.** 2
○	**C.** 3
○	**D.** 4

39. Severe sunburn can result in skin cancer because UV radiation damages

⊗	**A.** genes that control cell division
○	**B.** proteins that control cell division
○	**C.** thymine nucleotides that control cell division
○	**D.** DNA polymerase enzymes that control cell division

Use the following information to answer the next two questions.

Normal pigs generate phosphorus-rich waste that can pollute lakes and streams. Scientists at the University of Guelph have reported the successful birth and growth of three transgenic pigs, called "Enviropigs," which produce fecal waste that is low in phosphorus. A composite gene was made from a bacterial gene and a mouse gene. The composite gene was inserted into each pig when each was a single-celled zygote. The bacterial gene coded for the enzyme phytase, and the mouse gene coded for a protein secreted in saliva. The combination of these two genes allows the pigs to produce phytase in their saliva. Phytase is an enzyme that digests the organic phosphorus found in their food.

—based on Golovan et al., 2001

40. DNA cut from bacteria and DNA cut from mouse cells were fused to form a composite gene that was inserted into the pig cells. The enzymes used in the process of producing a composite gene are

⊗	**A.** restriction and ligase enzymes
○	**B.** polymerase and ligase enzymes
○	**C.** phytase and restriction enzymes
○	**D.** polymerase and phytase enzymes

41. The composite gene that was inserted into the single-celled zygote is present in the salivary glands and other cells of the pig because, as the embryo grew, the DNA

⊗	**A.** replicated in interphase and the chromatids separated in mitosis
○	**B.** replicated in interphase and the chromatids separated in meiosis
○	**C.** was transcribed in interphase and the chromatids separated in mitosis
○	**D.** was transcribed in interphase and the chromosomes separated in meiosis

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Use the following information to answer the next three questions.

Hereditary hemochromatosis (HHC) is an autosomal recessive disorder characterized by elevated levels of iron in the blood. This disorder causes increased absorption of iron from the diet, which is then deposited in the liver, heart, pancreas, joints, and endocrine glands.

42. The HHC mutation in DNA is encoded in mRNA by the process of

○	**A.** translation in the nucleus
○	**B.** translation on the ribosome
⊗	**C.** transcription in the nucleus
○	**D.** transcription on the ribosome

Use the following additional information to answer the next question.

HHC is one of the most common genetic disorders. In the Caucasian population in the United States, approximately 5 in 1 000 people carry two copies of the mutated hemochromatosis allele.

—based on *DOEgenomes.org*, 2002

43. The frequency of the dominant allele associated with HHC in the Caucasian population of the United States is

○	**A.** 0.005
○	**B.** 0.071
○	**C.** 0.864
⊗	**D.** 0.929

Use the following additional information to answer the next question.

In people of Northern European descent, 1 in 400 individuals has HHC.

—based on Feder et al., 1996

44. The frequency of carriers of HHC in people of Northern European descent is

○	**A.** 0.003
○	**B.** 0.050
⊗	**C.** 0.095
○	**D.** 0.950

Use the following information to answer the next question.

The hemoglobin molecule contains iron. A portion of the DNA template that codes for the hemoglobin molecule is shown below.

CAT GCC ATA GAG

45. The anticodon of the tRNA molecule that transports the first amino acid coded by this portion of the DNA molecule is

⊗	**A.** CAU
○	**B.** CUA
○	**C.** GAU
○	**D.** GUA

Use the following information to answer the next question.

Farmers continually battle weeds growing in their crops.

46. The relationship between weeds and crop plants growing side by side in a field is

○	**A.** mutualism
○	**B.** commensalism
⊗	**C.** interspecific competition
○	**D.** intraspecific competition

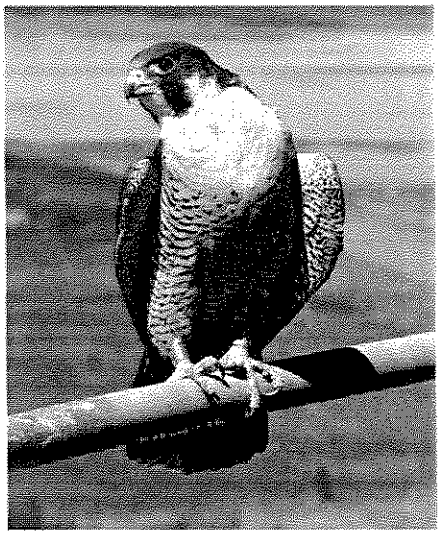
Use the following information to answer the next two questions.

Peregrine falcons are swift-flying birds of prey. The peregrine falcon population in Alberta decreased from approximately 80 breeding pairs in the 1950s to a single breeding pair in 1970.

DDT is an insecticide that accumulates in the tissues of living creatures and causes reproductive problems such as eggshell thinning in falcons. In the 1960s and 1970s, DDT residues built up through the food chain, thereby causing reproductive problems in the falcons.

A ban on the use of DDT, captive breeding programs, and the subsequent release of young falcons into the wild have resulted in the peregrine falcon being removed from the endangered species list. In 2004, approximately 50 to 60 pairs (over 100 individuals) were estimated to reside in Alberta.

—based on Court, 2004



—Gordon Court, 2004

47. The decline in the peregrine falcon population in Alberta was the result of a

○	**A.** density-dependent biotic factor
○	**B.** density-dependent abiotic factor
○	**C.** density-independent biotic factor
⊗	**D.** density-independent abiotic factor

48. Which of the following rows indicates the type of reproductive strategy used by the peregrine falcon, in comparison with insects, and two characteristics of this reproductive strategy?

	Row	Reproductive Strategy	Characteristics of Reproductive Strategy
⊗	**A.**	*K* selection	Low reproductive rate and long lifespan
○	**B.**	*K* selection	Low reproductive rate and short lifespan
○	**C.**	*r* selection	High reproductive rate and long lifespan
○	**D.**	*r* selection	High reproductive rate and short lifespan

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