MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The brain neurotransmitter that is an important stimulus for food intake is
   A) ghrelin.
   B) leptin.
   C) neuropeptide Y.
   D) orexin.
   E) insulin.

2) Adipocytes secrete the hormone
   A) ghrelin.
   B) leptin.
   C) neuropeptide Y.
   D) orexin.
   E) insulin.

3) The synthesis of glucose from a noncarbohydrate precursor is referred to as
   A) glycogenesis.
   B) glycogenolysis.
   C) glycolysis.
   D) gluconeogenesis.
   E) glycogen.

4) During the fasting state, the energy stores of the __________ become the major source of glucose for the whole body.
   A) brain
   B) liver
   C) muscles
   D) pancreas
   E) adipose tissues

5) Lipoproteins that carry mostly cholesterol and phospholipids from peripheral tissues to the liver are called
   A) very low-density lipoproteins (VLDLs).
   B) low-density lipoproteins (LDLs).
   C) intermediate-density lipoproteins (IDLs).
   D) high-density lipoproteins (HDLs).
   E) very high-density lipoproteins (VHDLs).

6) The alpha cells of the pancreas produce
   A) insulin.
   B) glucagon.
   C) renin.
   D) cortisol.
   E) digestive enzymes.
7) When blood glucose levels rise, as in the "fed" state,
   A) insulin is released.
   B) glucagon is released.
   C) peripheral cells take up less glucose.
   D) protein synthesis decreases.
   E) all of the above

8) Which of the following factors increases basal metabolic rate?
   A) thyroid hormones
   B) acetylcholine
   C) insulin
   D) epinephrine
   E) A and D

9) Glucagon
   A) stimulates gluconeogenesis.
   B) primarily targets the liver.
   C) primarily targets skeletal muscle.
   D) A and B
   E) A and C

10) Dehydration can result from
   A) heat exhaustion.
   B) CCK.
   C) diabetes.
   D) gluconeogenesis.
   E) A and C

11) When blood glucose levels fall,
    A) insulin is released.
    B) glucagon is released.
    C) peripheral cells take up less glucose.
    D) protein synthesis decreases.
    E) all of the above

12) During starvation,
    A) carbohydrate utilization increases.
    B) gluconeogenesis accelerates.
    C) there is a decline in circulating ketone bodies.
    D) structural proteins cannot be used as a potential energy source.
    E) all of the above

13) The brain can use only _________ for energy.
    A) glucose    B) fats    C) ketones    D) lactate    E) A and C
14) The feeding and satiety centers are located in the
   A) medulla oblongata.
   B) pons.
   C) hypothalamus.
   D) cerebrum.
   E) cerebellum.

15) The beta cells of the pancreas produce
   A) insulin.
   B) glucagon.
   C) renin.
   D) cortisol.
   E) digestive enzymes.

16) The level of ketone bodies in the blood increases when high levels of __________ are being metabolized.
   A) fatty acids
   B) glucose
   C) proteins
   D) amino acids
   E) carbohydrates

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

**Match the nutrient to its primary fate.**

A. carbohydrate
B. protein
C. fat

17) storage

18) synthesis of tissues

19) used immediately for energy

**Match the term to its definition.**

A. metabolism
B. catabolism
C. anabolism

20) large molecules broken into smaller ones

21) large molecules synthesized from smaller ones

22) the sum of all the body’s chemical reactions

23) The __________ represents the minimum resting energy expenditures of an awake, alert individual.
24) ________ are lipoproteins that are formed in the intestine to carry lipids into circulation.

25) Lipoproteins that contain large amounts of cholesterol for transport to peripheral tissues are called ________.

26) Chemicals known as ________ are fever-producing cytokines that are part of the normal immune response.

27) The pancreatic hormone that raises blood glucose concentration is ________.

28) ________ is a condition of insulin deficiency from beta cell destruction.

29) ________ is known as insulin-resistant diabetes.

30) The process of synthesizing glucose from lipids, amino acids, or other carbohydrates is called ________.

31) The process of glycogen formation is known as ________.

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

32) Cholesterol is a precursor for the synthesis of
   A) progesterone.
   B) aldosterone.
   C) estradiol.
   D) two of the above
   E) all of the above

33) The adrenal medulla produces
   A) androgens.
   B) glucocorticoids.
   C) mineralocorticoids.
   D) catecholamines.
   E) corticosteroids.

34) Thyroid hormone contains the mineral

35) The pituitary hormone that triggers the release of thyroid hormone from the thyroid gland is
   A) TSH.    B) ACTH.    C) FSH.    D) TRH.    E) CRH.

36) Excess secretion of growth hormone during adulthood will cause
   A) goiter.
   B) exophthalmus.
   C) giantism.
   D) acromegaly.
   E) diabetes.
37) Elevated levels of calcium ion in the blood stimulate the secretion of the hormone
   A) calcitonin.
   B) thyroid hormone.
   C) parathyroid hormone.
   D) growth hormone.
   E) testosterone.

38) Parathyroid hormone
   A) stimulates osteoclast activity.
   B) increases the rate of calcium absorption.
   C) decreases the rate of calcium excretion.
   D) raises the level of calcium ion in the blood.
   E) all of the above

39) Excess growth hormone prior to puberty would result in
   A) osteoporosis.
   B) cretinism.
   C) rickets.
   D) giantism.
   E) dwarfism.

40) A condition that produces a reduction in bone mass or density sufficient to compromise normal function is
   A) cretinism.
   B) osteoporosis.
   C) osteomyelitis.
   D) osteitis.
   E) acromegaly.

41) The parathyroid glands produce a hormone that
   A) stimulates the formation of white blood cells.
   B) increases the level of calcium ions in the blood.
   C) increases the level of sodium ions in the blood.
   D) increases the level of potassium ions in the blood.
   E) increases the level of glucose in the blood.

42) CRH stimulates the release of
   A) ACTH.
   B) cortisol.
   C) DHEA.
   D) MSH.
   E) none of the above

43) Cortisol
   A) suppresses the immune system.
   B) causes positive calcium balance.
   C) influences brain function.
   D) A and B
   E) A and C
44) Calcium reabsorption at the kidneys is promoted by the hormone
   A) calcitonin.
   B) calcitriol.
   C) aldosterone.
   D) cortisol.
   E) ADH.

45) Vitamin D (calcitriol)
   A) is formed by sunlight.
   B) is bound to plasma protein for transport.
   C) synthesis is stimulated by high calcium levels.
   D) A and B
   E) A and C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Match the disease with the description.

A. Addison’s disease
   B. Cushing’s disease
   C. Graves’ disease
   D. Paget’s disease

46) may result from a pituitary tumor

47) may result from adrenal tumor

48) may be an autoimmune disease

49) Calcitonin may be an appropriate treatment.

50) associated with overactive osteoclasts

51) Some symptoms mimic diabetes mellitus.

52) involves endocrine stimulation by antibodies

53) hyperthyroidism

54) hypercortisolism
Match the condition with the description.

A. acromegaly
B. adrenogenital syndrome
C. cretinism
D. dwarfism
E. exophthalmus

55) This condition results from excess androgens in females.

56) mental retardation associated with infantile hypothyroidism

57) caused by growth hormone excess in adulthood

58) caused by growth hormone deficiency in childhood

59) associated with Graves’ disease

Match the condition with its description.

A. giantism
B. kyphosis
C. moon face
D. myxedema
E. goiter

60) caused by elevation of TSH

61) easily observable symptom of hypercortisolism

62) puffy appearance associated with hypothyroidism

63) hunchback appearance associated with osteoporosis

64) caused by growth hormone excess in childhood

65) List four factors that affect normal body growth.

66) Name four physiological functions of calcium.

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

67) List and explain the effects of cortisol.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

68) Which is NOT a pathogen?
   A) cancer
   B) hookworm
   C) athlete's foot fungus
   D) chicken pox virus
   E) meningococcus bacterium

69) Autoimmune diseases are an example of a/an ________ response by the immune system.
   A) lack of
   B) overactive
   C) incorrect
   D) none of the above

70) Antibiotics are drugs that destroy or inhibit the growth of
   A) viruses.
   B) bacteria.
   C) multicellular pathogens such as hookworms.
   D) A and B
   E) A, B, and C

71) Lymphoid tissues include
   A) thymus.
   B) bone marrow.
   C) lymph nodes.
   D) spleen.
   E) all of the above

72) Swelling and soreness of the lymph nodes indicate that
   A) immune cells are fighting infection.
   B) the immune system is incapable of working.
   C) dangerous cancerous changes are occurring in the immune system.
   D) too much or improper exercise has been undertaken.
   E) none of the above

73) ________ are clusters of lymphatic nodules located beneath the epithelial lining of the small intestine.
   A) Tonsils
   B) Adenoids
   C) Peyer's patches
   D) Immune complexes
   E) Lymph nodes

74) ________ have been found to be the precursor cells of macrophages.
   A) Eosinophils
   B) Basophils
   C) Neutrophils
   D) Monocytes
   E) Lymphocytes
75) Leukocytes recognize molecules that are unique to pathogens; thus, the molecules are
   A) pathogen-associated molecular patterns.
   B) pattern recognition receptors.
   C) toll-like receptors.
   D) phagosomes.
   E) antigens.

76) All of the following are characteristics of acquired immunity EXCEPT
   A) cell-mediated immunity.                 B) nonspecific immunity.
   C) humoral immunity.                      D) adaptive immunity.

77) Cytokines function by
   A) acting as messengers for growth and activity of other cells.
   B) poisoning and killing invading cells.
   C) digesting invading cells.
   D) A and B
   E) A, B, and C

78) Chemotaxins function in
   A) digesting invading cells.
   B) attracting additional immune cells.
   C) poisoning and killing invading cells.
   D) A and B
   E) A, B, and C

79) A substance that induces fever is known as a(n)
   A) opsonin.
   B) chemotaxin.
   C) acute phase protein.
   D) pyrogen.
   E) cytokine.

80) Opsonins function by
   A) poisoning and killing invading cells.
   B) marking or tagging pathogens so phagocytes can find and ingest them.
   C) digesting invading cells directly.
   D) A and B
   E) A, B, and C

81) The cells responsible for the production of circulating antibodies are
   A) NK cells.
   B) plasma cells.
   C) helper T cells.
   D) cytotoxic T cells.
   E) suppressor T cells.
82) Passive immunity is a type of _________ immunity.
   A) acquired  B) innate

83) The cells responsible for cell-mediated immunity are the
   A) B lymphocytes.  B) plasma cells.
   C) T lymphocytes.  D) suppressor T lymphocytes.

84) Stem cells that will form B lymphocytes are found in the
   A) bone marrow.
   B) liver.
   C) spleen.
   D) thymus.
   E) kidneys.

85) Lymphocytes that attack foreign cells or body cells infected with viruses are
   A) B lymphocytes.
   B) plasma cells.
   C) helper T cells.
   D) cytotoxic T cells.
   E) suppressor T cells.

86) Cells that help to regulate the immune response are
   A) B lymphocytes.
   B) plasma cells.
   C) helper T cells.
   D) cytotoxic T cells.
   E) NK cells.

87) The cells that are actively involved in immunological surveillance are the
   A) NK cells.
   B) plasma cells.
   C) B lymphocytes.
   D) helper T cells.
   E) suppressor T cells.

88) Stem cells that will form T lymphocytes are modified in the
   A) bone marrow.
   B) liver.
   C) spleen.
   D) thymus.
   E) kidneys.

89) _________ is the immunoglobulin class that comprises 75% of antibodies in adult blood.
   A) IgA  B) IgD  C) IgE  D) IgG  E) IgM
90) Immunoglobulins that are mainly responsible for resistance against viruses, bacteria, and bacterial toxins are
   A) IgA.  B) IgD.  C) IgE.  D) IgG.  E) IgM.

91) Immunoglobulins that attach to mast cells and are involved in allergic reactions are
   A) IgA.  B) IgD.  C) IgE.  D) IgG.  E) IgM.

92) Immunoglobulins that are found on the surface of B lymphocytes and may play a role in regulation of the humoral immune response are
   A) IgA.  B) IgD.  C) IgE.  D) IgG.  E) IgM.

93) Immunoglobulins that are the first antibodies to be produced in response to infection are
   A) IgA.  B) IgD.  C) IgE.  D) IgG.  E) IgM.

94) Immunoglobulins that are primarily found in glandular secretions are
   A) IgA.  B) IgD.  C) IgE.  D) IgG.  E) IgM.

95) The specificity of an antibody is determined by
   A) the fixed segment.
   B) the antigenic determinants.
   C) the variable region.
   D) the size of the antibody.
   E) the antibody class.

96) When an antigen complex is bound to a Class I MHC molecule, it can stimulate a
   A) B cell.
   B) plasma cell.
   C) helper T cell.
   D) cytotoxic T cell.
   E) NK cell.

97) Class II MHC molecules are found
   A) on all cells with a nucleus.
   B) only on red blood cells.
   C) only on granulocytes and macrophages.
   D) only on lymphocytes and macrophages.
   E) only on liver cells and macrophages in the spleen.

98) A person's blood type is determined by
   A) the size of the red blood cells.
   B) the shape of the red blood cells.
   C) the chemical character of the hemoglobin.
   D) the presence or absence of specific glycoprotein molecules on their cell membrane.
   E) the number of specific molecules on the cell membrane.
99) A person with type A blood has
   A) A antibodies on his red blood cells.
   B) A antibodies in his plasma.
   C) B antibodies on his red blood cells.
   D) B antibodies in his plasma.
   E) the ability to receive AB blood cells.

100) Inappropriate or excessive immune responses to antigens are
   A) immunodeficiency diseases.
   B) autoimmune diseases.
   C) allergies.
   D) the result of stress.
   E) common in the elderly.

101) Meghan thinks she has an abscessed tooth. If she does, what type of white blood cell would you expect to see in elevated numbers in a differential count?
   A) neutrophils
   B) eosinophils
   C) basophils
   D) lymphocytes
   E) monocytes

102) Bill wants to determine his blood type, so he takes a few drops of blood from a puncture wound in his finger and mixes it with various antisera. His blood cells agglutinate when mixed with the anti-A serum but not with the anti-B. Therefore this is true:
   A) Bill could receive type B blood in a transfusion.
   B) Bill could donate blood to an individual with type B blood.
   C) Bill is Rh positive.
   D) Bill’s plasma contains B antibodies.
   E) Bill’s plasma would cross-react with type O red blood cells.

103) The human immunodeficiency virus (HIV) that causes the disease known as AIDS selectively infects
   A) B cells.
   B) plasma cells.
   C) cytotoxic T cells.
   D) helper T cells.
   E) suppressor T cells.

104) Milly has just received a kidney transplant and is taking cyclosporin A, a drug that suppresses cytotoxic T cells. What does this medication do?
   A) prevents inflammation from destroying the transplanted kidney
   B) depresses hematopoiesis
   C) prevents rejection
   D) increases the number of antibodies in the blood
   E) none of the above
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Match the cell type with its description.

A. lymphocytes
B. neutrophils
C. monocytes
D. eosinophils
E. basophils

105) Estimated to reach populations of one trillion in normal adults, most of these cells reside in the lymphoid tissues of the body. These cells look quite similar to one another under the microscope, yet function very differently.

106) These cells are related to mast cells, and both release chemical mediators such as histamine and heparin, which aid in the immune response.

107) Precursors of macrophages, these cells are relatively rare in blood because they are actually in transit to some other site.

108) Cytotoxic, these cells are associated with allergic reactions and parasitic infestations. Usually these cells are less than 3% of the leukocyte population, and only live up to 12 hours.

109) These are the most abundant leukocyte; they are formed in the bone marrow.

Match the type of immunity to its description.

A. specific
B. nonspecific

110) Infected cells are killed by perforin and granzymes.

111) Antibodies in breast milk protect a newborn baby from pathogens.

112) NK cells cause apoptosis of viral-infected cells.

113) Secreted lysozyme kills bacteria.

114) present at birth

115) The process by which the surface of a microorganism is covered with antibodies and complement, rendering it more likely to be phagocytized, is called _________.

116) ________ cells enable the immune system to respond more quickly if the same antigen is encountered a second time.

117) ________ exists when the immune system does NOT respond to a particular antigen.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

118) Gametes are produced by
A) internal genitalia.
B) external genitalia.
C) gonads.
D) autosomes.
E) sex chromosomes.

119) Egg and sperm cells have
A) 46 chromosomes.
B) 23 chromosomes.
C) 22 pairs of autosomes plus one pair of sex chromosomes.
D) A and B
E) A, B, and C

120) A zygote with the genotype XO will
A) develop into a female.
B) have Turner's syndrome.
C) develop into a male.
D) die.
E) A and B

121) X-linked genes are expressed
A) more often in males.
B) more often in females.
C) at equal rates in the two genders.

122) The product of the SRY gene is
A) testosterone.
B) anti-Mullerian hormone.
C) dihydrotestosterone.
D) 5-α reductase.
E) testis-determining factor.

123) Meiosis of one cell results in production of
A) four gametes.
B) one gamete.
C) four gametes if male, one if female.
D) four gametes if female, one if male.

124) In the condition known as cryptorchidism,
A) the testes fail to descend into the scrotum.
B) the testes are surgically removed.
C) the foreskin has been surgically removed.
D) sperm cells are not produced.
E) the prostate gland is enlarged.
125) The small paired glands at the base of the penis that produce a lubricating secretion are the
A) seminal vesicles.
B) prostate glands.
C) preputial glands.
D) Bartholin's glands.
E) bulbourethral glands.

126) Sperm production occurs in
A) the ductus deferens.
B) the seminiferous tubules.
C) the epididymis.
D) the seminal vesicles.
E) the rete testis.

127) Interstitial cells produce
A) sperm.
B) inhibin.
C) nutrients.
D) androgens.
E) androgen-binding protein.

128) The structure that carries sperm from the epididymis to the urethra is the
A) ductus deferens.
B) rete testis.
C) seminal vesicle.
D) ejaculatory duct.
E) corpus cavernosum.

129) The structure that transports the ovum to the uterus is the
A) uterosacral ligament.
B) vagina.
C) fallopian tube.
D) infundibulum.
E) myometrium.

130) The average length of the menstrual cycle is
A) 10 days.  B) 14 days.  C) 21 days.  D) 28 days.  E) 35 days.

131) The surge in LH that occurs during the middle of the ovarian cycle triggers
A) follicle maturation.
B) menstruation.
C) ovulation.
D) menopause.
E) atresia.
132) The principal hormone secreted by the corpus luteum is
   A) LH.
   B) FSH.
   C) progesterone.
   D) estradiol.
   E) estrogen.

133) Which form of contraception allows fertilization but prevents implantation?
   A) IUD
   B) pill
   C) female condom
   D) diaphragm
   E) sponge

134) The chorionic villi
   A) form the umbilical cord.
   B) form the umbilical vein.
   C) form the umbilical arteries.
   D) increase the surface area available for exchange between the placenta and the maternal blood.
   E) form the portion of the placenta called the decidua capsularis.

135) The hormone that is the basis for a pregnancy test is
   A) LH.
   B) progesterone.
   C) human chorionic gonadotropin (hCG).
   D) human placental lactogen (hPL).
   E) relaxin.

136) The hormone primarily responsible for milk synthesis is
   A) progesterone.
   B) oxytocin.
   C) prolactin.
   D) estrogen.
   E) growth hormone.

137) The hormone primarily responsible for the milk let-down reflex is
   A) progesterone.
   B) oxytocin.
   C) prolactin.
   D) estrogen.
   E) growth hormone.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

138) The ________ is the inner lining of the uterus.

139) ________ is the process of sloughing off the old functional layer of the endometrium.
140) ________ is the time when female menstrual cycles stop completely.

141) ________ is the time spent in prenatal development.

142) The fertilized egg is properly referred to as a ________.

143) The male gametes are called ________.

144) The female gonads are called ________.

145) Parturition is the process of ________.

146) Human gametes contain ________ chromosomes.

147) It has been reported that King Henry VIII of England divorced his wives because they were unable to produce a male heir to the throne. Some say the lack of a male heir is also used as justification for marrying additional wives in polygamous societies. From a genetics standpoint, what is wrong with these assumptions?

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

148) Why is the scrotum, the sac that contains the testes, located outside of the body?

149) Diagram a table explaining the feedback of estrogen on the anterior pituitary during the ovarian cycle.