HEALTH
SCIENCES
STUDY GUIDE
Practice Questions for Human Body & Life Science, Physical Science, & Scientific Reasoning

1. In anatomical position, the elbow is proximal to the wrist but distal to
   a. the fingers
   b. the shoulder
   c. the carpals
   d. the radius

2. The mouth is ________ to the nose.
   a. superior
   b. lateral
   c. distal
   d. medial
   e. inferior

3. The _________ plane divides the body into superior and inferior sections.
   a. frontal
   b. sagittal
   c. oblique
   d. transverse

4. The maintenance of a relatively stable internal environment by the body is called:
   a. physiology
   b. homeostasis
   c. a feedback mechanism
   d. metabolism
   e. isotonic

5. The stomach and intestines are covered by what serous membrane?
   a. Parietal pleura
   b. Visceral pleura
   c. Parietal pericardium
   d. Visceral peritoneum
   e. Parietal peritoneum

6. In ____________ there is an equal sharing of electrons resulting in a molecule that is electrically neutral.
   a. Ionic bonding
   b. Nonpolar covalent bonding
   c. Polar covalent bonding
   d. Hydrogen bonding

7. If the pH of urine is determined to be 4.8, the urine is ____________.
   a. acidic
   b. basic
   c. neutral
8. _________ are complex molecules that consist of chains of amino acids which have folded or twisted forming a fibrous or globular structure.
   a. Lipids
   b. Proteins
   c. Carbohydrates
   d. Nucleic acids

9. Phospholipids have a(n) _________ or “water-loving” group and have long hydrocarbon tails that are _________.
   a. hydrophilic, hydrophobic
   b. basic, acidic
   c. hydrophobic, hydrophilic
   d. acidic, basic

10. Which of the following bases would you NOT find in a DNA molecule?
    a. Adenine
    b. Cytosine
    c. Guanine
    d. Thymine
    e. Uracil

11. The movement of substances across the membrane following their concentration gradient with the aid of a protein carrier molecule is called:
    a. Simple diffusion
    b. Carrier-mediated or facilitated diffusion
    c. Phagocytosis
    d. Active transport
    e. Solute pumping

12. These organelles have a double membrane and are responsible for the production of ATP in the presence of oxygen.
    a. Ribosomes
    b. Mitochondria
    c. Lysosomes
    d. Centrioles
    e. Peroxisomes

13. These organelles are the site of protein synthesis and are often found associated with endoplasmic reticulum.
    a. Ribosomes
    b. Mitochondria
    c. Lysosomes
    d. Centrioles
    e. Peroxisomes

14. The process by which DNA information is copied in preparation for cell division (mitosis) is:
    a. Replication
    b. Transcription
    c. Translation
    d. Mitosis
15. Mitosis is for ____________ and results in cells which are ____________.
   a. growth and repair; genetically different.
   b. growth and repair; genetically identical.
   c. production of sperm and eggs; genetically identical
   d. production of mitochondria; genetically identical
   e. differentiation and specialization of cells; genetically different.

16. Tissue comprised of many layer of cells with the surface cells being thin and flat would be classified as:
   a. Simple squamous
   b. Pseudostratified columnar
   c. Simple cuboidal
   d. Stratified squamous
   e. Simple columnar

17. Tissue which protects, supports and stores most of the body’s calcium would be classified as:
   a. Dense regular connective tissue
   b. Adipose
   c. Blood
   d. Bone

18. Irregular dense connective tissue and blood vessels are found in which layer(s) of the skin?
   a. Epidermis
   b. Dermis
   c. Subcutaneous layer (hypodermis)
   d. All of the above

19. Which layer of the epidermis is the innermost and contains cells which are mitotically active?
   a. Stratum basale (germinativum)
   b. Stratum spinosum
   c. Stratum granulosum
   d. Stratum lucidum
   e. Stratum corneum

20. The dark pigment in skin cells which protects against harmful UV irradiation in sunlight is:
   a. melanin
   b. collagen
   c. keratin
   d. elastin

21. Which of the following bone cells digests or breakdowns bone matrix?
   a. Osteoblasts
   b. Osteoclasts
   c. Osteocytes
   d. Osteoprogenitor cells
22. The function of the epiphyseal plate in long bones is to
   a. Allow bones to increase in length
   b. Provide nourishment to the osteocytes
   c. Allow more flexibility in a long bone
   d. Allow bones to increase in width

23. By definition, a diarthrosis is a joint which is
   a. Immovable
   b. Slightly movable
   c. Freely movable
   d. Triaxial

24. A suture is a joint in which the articulating bones fit closely together and the joint space is filled with fibrous connective tissue. A suture is an example of a(n) ________________ joint.
   a. synarthrotic
   b. amphiarthrotic
   c. diarthrotic
   d. None of the above

25. The type(s) of muscle tissue that is both striated and involuntary is
   a. Skeletal
   b. Smooth
   c. Cardiac
   d. Both smooth and cardiac

26. The thin filament of the sarcomere consists mostly of:
   a. myosin
   b. tropomyosin
   c. troponin
   d. actin

27. Calcium can be thought of as the “go” signal for muscle contraction. It is stored in which organelle of muscle fibers?
   a. Mitochondria
   b. Sarcoplasmic reticulum
   c. Golgi apparatus
   d. T tubules

28. In muscles, the sarcomere refers to what structure?
   a. A motor neuron and all of the muscle fibers it innervates
   b. A group of muscle fibers surrounded by the perimysium
   c. The functional or contractile unit of the muscle fiber
   d. The striations of muscle fibers

29. The sliding filament theory of muscle contraction states that the sarcomere _______ as ________ slides past the thick filaments.
   a. shortens; myosin
   b. lengthens; myosin
   c. shortens; actin
   d. lengthens; actin
30. At the neuromuscular junction, acetylcholine is released by what structure?
   a. Sarcomere
   b. Mitochondria
   c. Motor neuron
   d. Muscle fiber

31. During strenuous exercise, there may not be enough oxygen available to completely break down sugars leading to anaerobic conditions. As a result, what accumulates in the muscle?
   a. ATP
   b. Glucose
   c. Oxygen
   d. Lactic acid

32. What part of a neuron conducts the action potential away from the cell body?
   a. Dendrites
   b. Axons
   c. Axon terminals
   d. Nodes of Ranvier

33. Which glial cell is responsible for the formation of myelin sheaths in the central nervous system (CNS)?
   a. Astrocytes
   b. Schwann cells
   c. Oligodendrocytes
   d. Satellite cells

34. Which glial cell can be referred to as a “feeder cell” because it monitors exchanges between the blood and the neurons of the central nervous system (CNS)?
   a. Astrocytes
   b. Schwann cells
   c. Ependymal cells
   d. Microglia

35. In neurons, a graded potential that results in an increase in the positivity of the resting membrane potential (going from -70 mV to -30 mV, for example) is called
   a. an action potential
   b. a hyperpolarization
   c. a depolarization
   d. a repolarization

36. Which of the following channels open resulting in depolarization and the generation of the action potential?
   a. The voltage-gated sodium channel
   b. The voltage-gated potassium channel
   c. The sodium-potassium pump
   d. Potassium leakage channel
   e. Chemically gated ion channel
37. Although the spinal cord ends near the L1-L2 vertebrae, the spinal nerve roots continue down the spine to exit at their appropriate level. This bundle of long fibers found in the lumbar and sacral region is referred to as the
   a. Filum terminale
   b. Cauda equina
   c. Ganglia
   d. Plexus

38. The spinal cord has two enlargements located in the cervical and lumbar levels where there is more gray matter than other levels of the spinal cord. Why?
   a. To supply nerves to the upper and lower limbs
   b. To control the heart and blood vessels
   c. To allow the integration of sensory information with memories
   d. The spinal cord is compressed by other structures at thoracic and sacral levels

39. Which of the following structures contains only sensory (afferent) fibers?
   a. Dorsal root
   b. Ventral root
   c. Dorsal ramus
   d. Ventral ramus

40. Which of the meninges is the innermost and is characterized as being “delicate”?
   a. Pia mater
   b. Arachnoid layer
   c. Dura mater

41. What part of the brain is responsible for muscle tone, muscle coordination and controlling postural muscles?
   a. Brainstem
   b. Cerebellum
   c. Diencephalon
   d. Cerebrum

42. Which of the following hormones are secreted by the pituitary and stimulate the gonads?
   a. Follicle stimulating hormone and luteinizing hormone
   b. Glucagon and insulin
   c. Calcitonin and parathyroid hormone
   d. Oxytocin and antidiuretic hormone
   e. Epinephrine and norepinephrine

43. The final relay center which sends sensory impulses to the cortical areas of cerebrum is the:
   a. Thalamus
   b. Hypothalamus
   c. Epithalamus
   d. Amygdala
44. The cerebral cortex has shallow depressions in the gray matter called the:
   a. Gyri
   b. Sulci
   c. Fissures
   d. Chiasma

45. The largest band of commissural fibers which connect the left and right hemispheres of the brain and are easily seen in a sagittal section is the:
   a. corpus callosum
   b. basal nuclei
   c. limbic system
   d. cerebral aqueduct
   e. hypothalamus

46. The primary (somato)sensory cortex is located on the postcentral gyrus in which lobe of the brain?
   a. Frontal
   b. Parietal
   c. Occipital
   d. Temporal
   e. Insula

47. The ______________ is sometimes called the fight and flight system and is the part of the autonomic nervous system which increases the heart rate and inhibits the digestive system.
   a. sympathetic division
   b. parasympathetic division
   c. sensory division
   d. somatic motor division

48. In the autonomic nervous system, most parasympathetic postganglionic fibers release the neurotransmitter
   a. Acetylcholine
   b. Norepinephrine
   c. Serotonin
   d. Glutamate

49. Hormones act on certain cells in the body because those cells have:
   a. Blood vessels which deliver the hormone to them
   b. Ducts which carry the hormone to them
   c. Cellular activities which control the hormone
   d. Receptors which bind to the hormone
   e. A resting membrane potential

50. The hormones responsible for the regulation of calcium levels in the blood are:
   a. Follicle stimulating hormone and luteinizing hormone
   b. Glucagon and insulin
   c. Calcitonin and parathyroid hormone
   d. Oxytocin and antidiuretic hormone
   e. Epinephrine and norepinephrine
51. The function of hemoglobin is to:
   a. protect the DNA of erythrocytes.
   b. produce red blood cells.
   c. produce antibodies.
   d. carry oxygen.
   e. trigger the cascade of clotting reactions.

52. A person's ABO blood type is determined by antigens present on the:
   a. red blood cells
   b. platelets.
   c. white blood cells
   d. gamma globulins.
   e. blood vessels walls

53. In the negative feedback loop that controls the rate of erythropoiesis, the trigger for increasing RBC production is:
   a. decreased number of erythrocytes.
   b. increased levels of carbon dioxide in the red bone marrow.
   c. increased levels of carbon dioxide in the cerebrospinal fluid.
   d. decreased levels of oxygen in the kidney.
   e. decreased solute concentration of blood circulating in the hypothalamus.

54. The substance that forms the network of threads in a blood clot is:
   a. fibrinogen
   b. thrombin
   c. prothrombin
   d. fibrin
   e. prothrombin activator (prothrombinase)

55. The most numerous white blood cell which is characterized by a nucleus with 3-5 lobes and functions as a phagocyte is a(n):
   a. neutrophil
   b. eosinophil
   c. basophil
   d. monocyte
   e. lymphocyte

56. The blood cell which contains a nucleus nearly as large as the cell and is involved with antibody production and mediates the immune response is a(n):
   a. neutrophil
   b. eosinophil
   c. basophil
   d. monocyte
   e. lymphocyte

57. The bicuspid (mitral) valve is located between the:
   a. right ventricle and the aorta.
   b. right ventricle and the pulmonary trunk.
   c. left atrium and the left ventricle.
   d. right and left atria.
   e. right and left ventricles.
58. The layer of the heart wall responsible for its pumping action is the:
   a. fibrous pericardium.
   b. serous pericardium.
   c. epicardium.
   d. myocardium.
   e. endocardium.

59. All deoxygenated blood returning from the body flows into the:
   a. right atrium.
   b. right ventricle.
   c. coronary sinus.
   d. left atrium.
   e. left ventricle.

60. The thickest wall chamber of the heart which pumps blood to the body is the:
   a. right atrium
   b. left atrium
   c. right ventricle
   d. left ventricle

61. The "pacemaker" of the heart which is located in the right atrial wall near the opening of the superior vena cava is the:
   a. AV (atrioventricular) node
   b. SA (sinoatrial) node
   c. Purkinje fibers
   d. AV (atrioventricular) bundle (bundle of His)
   e. gap junction of the atrial cells

62. The chamber that receives blood from the lungs by way of the pulmonary veins is the:
   a. right ventricle
   b. left ventricle
   c. right atrium
   d. left atrium

63. Which of the following correctly describes the usual pathway for blood leaving the left ventricle?
   a. aorta, artery, arteriole, capillary, venule, vein, vena cava
   b. aorta, arteriole, artery, venule, capillary, vein, vena cava
   c. arteriole, aorta, artery, capillary, vein, venule, vena cava
   d. vena cava, vein, venule, capillary, arteriole, artery, aorta
   e. vena cava, venule, vein, cappilary, artery, arteriole, aorta

64. The force exerted by blood on the blood vessel wall which is measured relative to the force needed to hold up a column of mercury is commonly referred to as the:
   a. blood pressure
   b. pulse pressure
   c. resistance
   d. autoregulatory mechanism
   e. pulse
65. Which of the following correctly describes the blood found in the hepatic portal vein? The blood:
   a. is oxygenated, low in nutrients and is traveling away from the liver
   b. is deoxygenated but high in nutrients and is traveling to the liver
   c. is deoxygentated, low in nutrients and is traveling away from the liver
   d. has been filtered by the Kupffer cells in the sinusoids
   e. is oxygenated, high in nutrients and is traveling to the liver.

66. The tunica media of a blood vessel is made of:
   a. smooth muscle.
   b. cardiac muscle.
   c. skeletal muscle.
   d. endothelium.
   e. dense connective tissue.

67. What blood vessels have one way valves?
   a. arteries.
   b. arterioles.
   c. veins.
   d. capillaries.
   e. All of these except capillaries.

68. Blood pressure would be highest in which of the following vessels?
   a. internal jugular vein.
   b. common carotid artery
   c. inferior vena cava.
   d. right subclavian vein.
   e. blood pressure is the same in all vessels.

69. Lymph is __________ that has been collected by lymphatic capillaries:
   a. plasma.
   b. serum.
   c. cytosol.
   d. interstitial fluid.
   e. intestinal juice.

70. T cells are involved in __________ as B cells are involved in __________:
   a. nonspecific cellular defenses; immunity
   b. anti-body mediated (humoral) immunity; cell -mediated immunity
   c. the inflammatory response; anti-body mediated (humoral) immunity
   d. cell mediated immunity; anti-body mediated (humoral) immunity
   e. homeostatic imbalances; cellular defenses
71. Which of the following correctly lists the structures according to the sequence of fluid (lymph) flow?
   a. lymphatic capillaries, interstitial spaces, blood capillaries, lymphatic vessels, lymphatic ducts, subclavian veins
   b. blood capillaries, lymphatic vessels, interstitial spaces, lymphatic capillaries, lymphatic ducts, subclavian veins
   c. blood capillaries, interstitial spaces, lymphatic capillaries, lymphatic vessels, lymphatic ducts, subclavian veins
   d. blood capillaries, interstitial spaces, lymphatic vessels, lymphatic ducts, lymphatic capillaries, subclavian veins
   e. blood capillaries, interstitial spaces, lymphatic capillaries, lymphatic vessels, lymphatic ducts, subclavian veins

72. A substance capable of triggering the immune system and provoking an immune response is called a(n):
   a. antibody
   b. major histocompatibility complex
   c. hapten
   d. plasma cell
   e. antigen

73. The immune cells which play a central role by directing the immune response by releasing cytokines which stimulate the cell-mediated immunity, antibody mediated immunity as well as non-specific defenses.
   a. Helper T cells
   b. Cytotoxic T cells
   c. Plasma cells
   d. Antigen presenting cells
   e. Memory cells

74. During a secondary (immune) response, which of the following would not likely occur?
   a. the release of antibodies by plasma cells
   b. a quick response to the presence of a non-self antigen
   c. a high fever and muscle aches as the immune system struggles to respond to the presence of the antigen for the second time
   d. involvement of cell mediated immunity
   e. enhanced activity of helper T cells

75. Which of the following lists the structures in the correct order of air flow?
   a. trachea, laryngopharynx, nasopharynx, oropharynx, larynx
   b. nasopharynx, oropharynx, laryngopharynx, trachea, larynx
   c. nasopharynx, oropharynx, laryngopharynx, larynx, trachea
   d. oropharynx, laryngopharynx, nasopharynx, larynx, trachea
   e. nasopharynx, laryngopharynx, oropharynx, larynx, trachea

76. Boyle’s law states that as gas volume:
   a. increases, gas pressure increases
   b. decreases, gas pressure decreases
   c. increases, gas pressure decreases
   d. decreases, gas pressure does not change
77. The movement of the air in and out of the lungs is:
   a. pulmonary ventilation
   b. external respiration
   c. internal respiration
   d. gas transport

78. The function of the epiglottis is to:
   a. hold the pharynx open during speech.
   b. produce surfactant.
   c. close off the nasal cavity during swallowing.
   d. cover the larynx when swallowing.
   e. vibrate to produce sound as air passes over it

79. The function of surfactant is to:
   a. prevent the walls of the alveoli from sticking together
   b. act as phagocytes
   c. trap small particles and pathogens
   d. allow the diffusion of oxygen and carbon dioxide
   e. transport carbon dioxide.

80. The most important chemical regulator of respiration is:
   a. oxygen.
   b. carbon dioxide.
   c. bicarbonate ion.
   d. sodium ion.
   e. Hemoglobin

81. During inhalation the size of the thoracic cavity _________; during exhalation the size of the thoracic cavity _________.
   a. increases, decreases
   b. decreases, increases
   c. increases, increases
   d. decreases, decreases

82. Chewing and mixing food with digestive juices are examples of which of the following processes?
   a. ingestion
   b. mechanical processing
   c. chemical digestion
   d. absorption
   e. excretion (defecation)

83. Chemical enzymes such as salivary amylase break chemical bonds in ingested molecules so that smaller molecules;
   a. can move comfortably through the GI tract.
   b. can easily be swallowed.
   c. can be suspended in the digestive juices for easy hydrolysis
   d. can be absorbed into the body and can be used for fuel or raw materials.
   e. can be excreted from the body during defecation
84. The rhythmic wave of contraction that pushes food through the GI tract is known as:
   a. segmentation
   b. haustral churning
   c. peristalsis
   d. deglutition
   e. defecation

85. The portion of the small intestine which receives the acidic chyme from the stomach and secretions from the liver and gallbladder is the:
   a. pylorus
   b. cecum
   c. ileum
   d. jejunum
   e. duodenum

86. Mass peristalsis results in feces moving into the:
   a. ascending colon and activating the defecation reflex
   b. cecum and activating the defecation reflex
   c. sigmoid colon and rectum and activating the defecation reflex
   d. ileum and activating the gastroileal reflex
   e. duodenum and activating the enterogastric reflex

87. The structure which carries the bolus of food from the pharynx to the stomach is the:
   a. larynx
   b. esophagus
   c. ileum
   d. jejunum
   e. duodenum

88. Digestion of which of the following would be affected the most if liver secretions were prevented from entering the GI tract?
   a. carbohydrates
   b. nucleic acids
   c. proteins
   d. lipids
   e. all of these would be unaffected

89. The functional units of the kidney are:
   a. renal pyramids
   b. renal papillae
   c. nephrons
   d. villi
   e. acini
90. Which of the following lists the nephron regions in the correct order of fluid flow?
   a. glomerular capsule, distal convoluted tubule, nephron loop, proximal convoluted tubule
   b. proximal convoluted tubule, nephron loop, distal convoluted tubule, glomerular capsule
   c. glomerular capsule, proximal convoluted tubule, nephron loop, distal convoluted tubule
   d. nephron loop, glomerular capsule, proximal convoluted tubule, distal convoluted tubule

91. The movement of a filtrate from a high pressure capillary bed into the renal tubule:
   a. glomerular filtration
   b. tubular reabsorption
   c. renal autoregulation mechanisms
   d. tubular secretion
   e. excretion

92. Which of the following correctly describes the pathway urine follows exiting the body:
   a. renal calyx, ureter, renal pelvis, urethra and bladder
   b. renal pelvis, renal calyx, ureter, urethra, bladder
   c. renal pelvis, ureter, renal calyx, urethra, bladder
   d. renal calyx, renal pelvis, ureter, bladder, urethra
   e. renal pelvis, renal calyx, ureter, bladder, urethra

93. The structure which carries the urine from the kidney to the bladder is the:
   a. ureter
   b. urethra
   c. renal pelvis
   d. renal pyramid
   e. rena calyx

94. Typically, the glomerular filtrate:
   a. and urine do not contain glucose
   b. contains glucose but the urine does not
   c. does not contain glucose but the urine does
   d. contains glucose, red blood cells and white blood cells

95. The tightly coiled tube hugging the testes that stores sperm is the:
   a. epididymis
   b. sustentacular cells
   c. vas deferens
   d. bulbourethral gland
   e. intestinal cells
96. Which of the following structures allow spermatogenesis to occur at a temperature cooler than the body:
   a. epididymis
   b. interstitial cells
   c. vas deferens
   d. scrotum
   e. prostate glands.

97. Which of the following is a pathway sperm would take leaving the body.
   a. testis, seminal vesicles, vas deferens, ejaculatory duct, urethra
   b. seminal vesicles, vas deferens, ejaculatory duct, testis, prostate gland
   c. prostate glands, seminal vesicles, vas deferens, testis, epididymis
   d. testis, epididymis, vas deferens, seminal vesicle, prostate gland
   e. testis, epididymis, vas deferens, ejaculatory duct, urethra

98. The part of the female reproductive system that is shed during menstruation is the:
   a. myometrium.
   b. mucosa of the vagina.
   c. tunica albuginea.
   d. endometrium.
   e. germinal epithelium.

99. The site of fertilization is the __________, and the site of implantation is the __________.
   a. uterus, uterine tubes
   b. uterine tubes, uterus
   c. uterus, uterus
   d. uterine tubes, vagina
   e. uterus, vagina

100. Which of the following is the pathway an unfertilized oocyte (egg) would follow?
    a. uterus, uterine tubes, ovary, vagina
    b. vagina, uterus, uterine tubes, ovary
    c. ovary, uterus, uterine tubes, vagina
    d. uterus, ovary, vagina, uterine tubes
    e. ovary, uterine tubes, uterus, vagina

101. Enzymes are known as biological _________.
    a. organelles
    b. codons
    c. catalysts
    d. hormones

102. In which of the following directions is DNA read?
    a. left to right
    b. top to bottom
    c. 5’ to 3’
    d. 3’ to 5’
103. A segment of DNA that encodes for a particular protein is known as a(n) _________.
   a. gene
   b. codon
   c. intron
   d. chromatid

104. A chromosome is a collection of __________.
   a. chromatids
   b. proteins
   c. histones
   d. genes

105. Mendel’s first Law, the Law of Segregation, refers to the inheritance of a single trait and can be predicted using a(n) ________ cross.
   a. monohybrid
   b. dihybrid
   c. unihybrid
   d. polyhybrid

106. Phenotype refers to ___________.
   a. pattern of alleles
   b. physical appearance
   c. gene arrangement
   d. dominant

107. Having 2 recessive alleles would be called ____________.
   a. heterozygous recessive
   b. heterozygous dominant
   c. homozygous recessive
   d. homozygous dominant

108. A Tt pea plant is crossed to a Tt plant. What is the expected ratio of phenotypes for offspring from this cross?
   a. 3 tall: 1 dwarf
   b. 1 tall: 1 dwarf
   c. 1 tall: 3 dwarf
   d. 2 tall: 1 dwarf

109. A cross is made between a pea plant that is RrYy and one that is rrYy. What is the predicted outcome of the seed phenotypes?
   a. 9 round, yellow: 3 round, green: 3 wrinkled, yellow: 1 wrinkled, green
   b. 3 round, yellow: 3 round, green: 1 wrinkled, yellow: 1 wrinkled, green
   c. 3 round, yellow: 1 round, green: 3 wrinkled, yellow: 1 wrinkled, green
   d. 1 round, yellow: 1 round, green: 1 wrinkled, yellow: 1 wrinkled, green
110. The F2 phenotypes of a dihybrid cross show a repeated outcome of 9:3:4 dominant to recessive phenotypes across several experiments. This ratio should be considered which of the following?
   a. Expected monohybrid ratio
   b. Expected dihybrid ratio
   c. Non-inheritable trait being observed
   d. Non-Mendelian ratio being observed

111. Non-Mendelian inheritance includes which of the following?
   a. multiple alleles
   b. co-dominance
   c. dominance-recessive relationship between 2 alleles
   d. A and B
   e. All of the above

112. The nucleus of an atom contains which of the following?
   a. protons
   b. neutrons
   c. electrons
   d. A and B
   e. All of the above

113. Neutrons have a ____________ charge.
   a. positive
   b. negative
   c. neutral
   d. variable

114. The numbers of neutrons in different atoms of the same element can vary, and these atoms are called ____________.
   a. epitopes
   b. isotopes
   c. cations
   d. anions

115. The atomic number of an atom refers to the number of ____________.
   a. protons
   b. electrons
   c. neutrons
   d. All of the above

116. The valence of an atom is the ____________.
   a. first orbital of electrons
   b. last orbital of electrons
   c. first orbital of protons
   d. last orbital of protons
117. An ion that is positively charged is called a(n) ___________.
   a. cation
   b. anion
   c. isotope
   d. positope

118. A chemical bond in which electron pairs are shared between atoms is called a(n) __________ bond.
   a. ionic
   b. covalent
   c. hydrogen
   d. peptide

119. Ionic bonds form between cations and __________.
   a. isotopes
   b. protons
   c. anions
   d. neutrons

120. The fundamental constituent of matter that retains the properties of an element is called the ________.
   a. mass
   b. valence
   c. atom
   d. energy

121. The passive movement of substances from areas of high concentration to areas of low concentration is known as __________.
   a. facilitated diffusion
   b. osmosis
   c. diffusion
   d. evaporation

122. Density is defined as the amount of ________ per volume.
   a. energy
   b. mass
   c. gravity
   d. polarity

123. Which of the following phase changes requires the addition of heat?
   a. freezing
   b. condensation
   c. melting
   d. deposition

124. The temperature at which the liquid and gas phases of a substance have the same density is known as the ________.
   a. boiling point
   b. sublimation point
   c. phase point
   d. critical point
125. The transition of liquid to gas is called __________.
   a. boiling
   b. evaporation
   c. condensation
   d. sublimation

126. Which of the following states of matter has the lowest molecular motion?
   a. solid
   b. liquid
   c. gas
   d. colloid

127. A substance that increases the rate of a chemical reaction without undergoing permanent chemical change is known as a(n) _________.
   a. metal
   b. acid
   c. base
   d. catalyst

128. A molecule which contains both carbon and hydrogen is known as a(n) ________ molecule.
   a. organic
   b. inorganic
   c. salt
   d. amine

129. An acid disassociates into free _________ molecules in solution.
   a. hydrogen
   b. hydroxyl
   c. phosphate
   d. carbon

130. Which of the following substances contains an ionic bond?
   a. CO
   b. NO2
   c. SO4
   d. NaCl

131. Which of the following compounds is organic?
   a. H2O
   b. H2CO4
   c. CO2
   d. C6H12O6

132. A chemical compound that is formed from the reaction of an acid with a base forming a cation is called a(n) _________.
   a. metal
   b. buffer
   c. enzyme
   d. salt
133. The reactants in a chemical reaction are found on what side of the arrow?
   a. left
   b. right
   c. both sides

134. What is the metric unit used to measure volume?
   a. meter
   b. liter
   c. gram

135. What does the prefix milli mean?
   a. 1000
   b. 100
   c. 0.01
   d. 0.001

136. One kilometer contains _____ meters
   a. 10
   b. 100
   c. 1000
   d. 10000

137. How many liters are in 1 centiliter?
   a. 10
   b. 0.1
   c. 0.01
   d. 0.001

138. 10 decagrams are ____ kilograms?
   a. 10
   b. 0.1
   c. 0.01
   d. 0.001

139. Which of the following is the term used to describe a specific experimental condition that is changed to measure its effect?
   a. data
   a. variable
   b. control
   c. bias

140. Data measured based on observation and experimentation is called __________ data.
   a. empirical
   b. bias
   c. physical
141. Which of the following is most appropriate for measuring the weight of an adult?
   a. grams
   b. kilograms
   c. milligrams
   d. micrograms

142. Which of the following is the most appropriate for measuring the volume of a swimming pool?
   a. centiliters
   b. liters
   c. kiloliters
   d. nanoliters

143. Which of the following can lead to emphysema, which is a severe respiratory problem?
   a. high salt diet
   b. alcohol consumption
   c. smoking cigarettes
   d. sleep deprivation

144. The element that makes something happen is called the __________.
   a. cause
   b. effect
   c. sequence
   d. nominal

145. An educated guess that serves as a starting point for further testing is called the __________.
   a. variable
   b. control
   c. hypothesis
   d. theory

146. The variable measured in an experiment as a possible effect is called the __________ variable.
   a. dependent
   b. independent
   c. control
   d. review

147. A researcher wants to test the hypothesis that soy based diets are superior to whole wheat based diets for reproduction in mice. Which of the following describes how the researcher should test this hypothesis?
   a. record the number of pups born from a single mouse on soy diet vs. the number of pups born from a single mouse on whole wheat diet
   b. count the pups born from 10 separate mice reared on soy vs. a single mouse on whole wheat
   c. Compare the pups born from 10 mice on soy diet vs. 10 mice on whole wheat diet
   d. record the pups from 1 mouse on soy diet vs. 10 mice on whole wheat diet
148. A negative control is used in an experiment for what purpose?
   a. a group where a response is expected
   b. a group where no response is expected
   c. a group to detect bias

149. When 2 closely related bacteria are placed in a culture in the same initial numbers, bacterium A increased in numbers while bacterium B declined in numbers. The growth difference in the numbers most likely indicates that the energy consumption efficiency of bacterium A is __________ bacterium B.
   a. less than
   b. less variable than
   c. greater than
   d. more variable than

150. A researcher collects data on subjects in an experiment over the course of 1 month. Every day at 10:00 am, every subject takes 3 pills (A, B, C) to help lose weight. The following data are collected:

<table>
<thead>
<tr>
<th>Client number</th>
<th>Initial Weight (lbs.)</th>
<th>Final Weight (lbs.)</th>
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<tr>
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<tr>
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<td>250</td>
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<tr>
<td>4</td>
<td>377</td>
<td>200</td>
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</tbody>
</table>

   a. pill A is effective in weight loss
   b. weight went down for all subjects
   c. the pill regimen is effective for the subjects
   d. 10:00 am is the correct time to take pills for weight loss
Answers and Rationales for Practice Questions for Human Body & Life Science, Physical Science, & Scientific Reasoning

1. B. Proximal and distal refer to distance
2. E. Inferior means below and thus the mouth is below the nose
3. D. Transverse sections are planes that run right to left
4. B. The basic definition of homeostasis is balance or stability
5. D. Visceral means pertaining to the organ and peritoneum means pertaining to abdomen
6. B. Polar means unequal sharing where nonpolar means equal sharing
7. A. Ph values below 7 are acidic, above 7 are basic and 7 equals neutral
8. B. Proteins are polymers of the monomers, amino acids
9. A. “philic” means to love, “phobic” means to fear and “hydro” means water
10. E. Uracil is found only in RNA
11. B. Carrier mediated requires a carrier that is usually a protein
12. B. Function of the mitochondria
13. A. Function of the ribosomes
14. A. Replication is the process of making a copy of the DNA
15. B. Mitosis gives genetically identical cells, where meiosis gives genetically different cells
16. D. Stratified means more than one layer of cells, squamous means flattened shape
17. D. Bones are hard due to calcification
18. B. Dermis is the only layer of skin containing both irregular dense connective tissues AND blood vessels
19. A. Basale means bottom or innermost, germinativum means mitotically active and generative
20. A. Definition of melanin
21. B. The suffix –clast means to break down, where –blast means to build
22. A. Definition of the epiphyseal plate or line

23. C. Diarthrosis joints include the knee, shoulder and hip

24. A. Synarthrotic joints are the least moveable joints

25. C. Cardiac muscle is the only muscle type that is striated AND involuntary.

26. D. Actin forms the thin filament and myosin forms the thick filament

27. B. Definition of the sarcoplasmic reticulum

28. C. Definition of the sarcomere, includes the thick and thin filaments

29. C. Shortening leads to contraction of a muscle

30. C. Acetylcholine is a neurotransmitter so it would be released by the neuron

31. D. Lactic acid, or acid in general, is a metabolic by product of incomplete aerobic metabolism

32. B. Axons carry impulses away from cell body, where the dendrites carry toward the cell body

33. C. Function of oligodendrocytes in the CNS, analogous to the Schwann cells in the PNS

34. A. Definition of astrocytes

35. A. Definition of the action potential, which is a change in the positive direction of charge on a membrane

36. A. These channels help to cause depolarization, once depolarized they close and the voltage gated potassium channels open

37. B. Definition of the cauda equina

38. A. Reason for the enlargements is due to the large numbers of nerves needed to control the limbs

39. A. The dorsal root of the spinal nerve contains only sensory nerves, and the ventral root has motor nerves

40. A. Pia means “delicate mother” layer and it is the innermost and attached directly to the brain or spinal cord

41. B. Function of the cerebellum

42. A. FSH controls gamete development and LH controls sex hormone production

43. A. The thalamus is part of the diencephalon and is primarily responsible for relaying
44. B. Sulci are shallow grooves, fissures are deep grooves on the cerebral cortex

45. A. Definition of the corpus callosum

46. B. The postcentral gyrus is a prominent wrinkle in the parietal lobe of the brain

47. A. Sympathetic responses are fight and flight, and parasympathetic responses are for rest and digest

48. A. Parasympathetic postganglion neurons are cholinergic meaning they release acetylcholine, sympathetic postganglion neurons are adrenergic meaning they release norepinephrine or epinephrine

49. D. Cells must have a receptor that is specific to a hormone to be affected by that hormone

50. C. These are the only 2 primary hormones involved in calcium regulation

51. D. Function of the protein hemoglobin is to carry oxygen

52. A. The ABO antigens are only found on the red blood cells

53. D. This is the only trigger for the hormone erythropoietin which is produced by the kidneys

54. D. The function of fibrin

55. A. Definition of neutrophils, sometimes called polymorphonuclear leukocytes due to the multi lobed nuclei

56. E. Lymphocytes in include T (mediates immunity) and B (produce antibodies) cells

57. C. Anatomy of the heart

58. D. Myocardium contains the cardiac muscle cells

59. A. Deoxygenated blood enters the heart in the right atrium and oxygenated blood enters the heart in the left atrium

60. D. Anatomy of the heart

61. B. Definition of the SA node

62. D. Oxygenated blood enters the heart through the left atrium

63. A. This shows the movement of blood from largest artery to smallest and then into the capillary and out into the smallest vein to the largest vein

64. A. Definition of blood pressure

65. B. Hepatic portal system anatomy and function
66. A. Smooth muscle is found in the walls of all blood vessels
67. C. Veins are the only blood vessel containing valves
68. B. BP decreases in arteries the further they are from the heart
69. D. Lymph is collected from the spaces surrounding tissues
70. D. Definition of the functions of T and B lymphocytes
71. E. Order of lymph flow from interstitial space to venous blood flow
72. E. Antigens are recognized by antibodies and help to elicit an immune response
73. A. Helper T cells main function is to direct or regulate other immune responses
74. C. The purpose of immune memory is to prevent these symptoms with subsequent exposure
75. C. Anatomy of the upper respiratory tract
76. C. Boyle’s Law states an inverse relationship to volume and pressure of a gas
77. A. Ventilation is the mechanical movement of air, respiration refers to movement of gasses
78. D. The epiglottis covers the glottis which is the opening to the larynx
79. A. Surfactants reduce surface tension which could cause issues in the gas-liquid interface of the lungs
80. B. Carbon dioxide is the MOST important regulator of respiration
81. A. Increased volume during inhalation leads to lower gas pressure allowing oxygen to enter the lungs and the opposite is true with exhalation
82. B. Chewing and mixing are mechanical processes
83. D. Absorption of nutrients is the main function of the small intestines
84. C. Definition of peristalsis
85. E. The first segment of the small intestines
86. C. Function of the defecation reflex
87. B. Definition of the esophagus
88. D. Bile is the only digestive secretion produced by the liver and it is involved in the digestion of lipids
89. C. The nephrons are the filtering structures of the kidneys
90. C. Anatomy of the nephron
91. D. Secretion in the nephron refers to movement of solutes into the ducts
92. D. Anatomy of the kidney
93. A. Each kidney has a tube connected to the urinary bladder called a ureter
94. B. Filtration removes most solutes, but reabsorption returns them to the blood supply
95. A. Anatomy of the testes
96. D. Sperm viability depends on temperatures slightly cooler than the internal body temperature, thus why the scrotum is located outside the body
97. D. Anatomy and pathway of sperm from testes to prostate
98. D. The innermost layer of the uterus
99. B. Anatomy and function of reproduction
100. E. Correct pathway of an unfertilized egg during menstrual cycle
101. C. Catalyst speed up chemical reactions
102. D. Due to the polarity of the DNA polymerase
103. A. Definition of a gene
104. D. Definition of a chromosome
105. A. Monohybrid refers to a single trait only
106. B. Phenotype is the resulting change due to the genotype sequence
107. C. Homozygous means same, heterozygous means different
108. A. 3 will have the genotype Tt with tall phenotype and 1 will have genotype tt with dwarf phenotype
109. C. Using a dihybrid cross
110. D. The distorted 9:3:3:1 ratio with last 2 numbers being combined is a result of non-Mendelian factors
111. D. Definition of non-Mendelian inheritance
112. D. Nucleus of an atom only contains protons and neutrons
113. C. Neutrons are neutral (have no charge)
114. B. Definition of an isotope

115. A. Atomic number only includes the number of protons

116. B. Valence shells or orbitals only contain electrons and are always the furthest from the nucleus

117. A. Refers to the term cathode meaning positively charged

118. B. Covalent bonds are always formed by the sharing of valence electrons

119. C. Anions are negative charged and cations are positive charged so they are attracted to each other

120. A. Fundamental rule of matter

121. C. Definition of diffusion

122. B. Density is mass divided volume

123. C. Melting requires heat to change phase

124. D. Definition of the critical point and the states of matter

125. B. Evaporation is the phase transition of a liquid into a gas

126. A. More fluid and space in matter allows more movement of molecules

127. D. Definition of a catalyst

128. A. Organic molecules must contain carbon AND hydrogen, AND not be acids or bases

129. A. Acids release protons into solution, protons are also called hydrogen atoms in solutions of acids

130. D. This is a molecule consisting of 2 metals, which tends to always form ionic bonds

131. D. This is glucose

132. D. The chemistry of salts

133. A. Reactants on left and products on right

134. B. Metric system

135. D. Mili is one thousandth

136. C. Metric system conversions (kilo is one thousand)

137. C. Metric system conversions (centi is one hundredth)
138. B. Metric system conversions (deca is ten)

139. B. Variables are always changed to be measured in an experiment

140. A. Empirical data is the foundation of scientific experimentation

141. B. Metric system (kilo is one thousand so get manageable number)

142. C. Metric system (kilo is one thousand so get manageable number)

143. C. Cause and effect, cigarettes are inhaled and emphysema has to do with lung pathology

144. A. The cause leads to an effect

145. C. Definition of hypothesis

146. A. The independent variable would be the possible cause to the dependent variable

147. C. More replicates give more valid results and energy consumption is correlated with cell number

148. B. Negative means no result, a positive control would be the opposite and have an expected response

149. C. Growth is positively correlated with energy consumption

150. B. The only options since pills taken together there is no way to determine which pill had an effect, time is not measurable because would need to know data points at more times to determine. The only real effect that can be seen is that all clients lost weight
Unemployment was the overriding fact of life when Franklin D. Roosevelt became president of the United States on March 4, 1933. At the time, the government did not systematically collect statistics of joblessness; actually, it did not start doing so until 1940. The Bureau of Labor Statistics later estimated that 12,830,000 persons were out of work in 1933, about one-fourth of a civilian labor force of more than 51 million.

Roosevelt signed the Federal Emergency Relief Act on May 12, 1933. The president selected Harry L. Hopkins, who headed the New York relief program, to run FERA. A gifted administrator, Hopkins quickly put the program into high gear. He gathered a small staff in Washington and brought the state relief organizations into the FERA system. While the agency tried to provide all the necessities, food came first. City dwellers usually got an allowance for fuel, and rent for one month was provided in case of eviction.

1. This passage is primarily about
   A. Methods of estimating unemployment rates in the 1930s
   B. The effect of unemployment on United States families
   C. President Franklin D. Roosevelt’s presidency
   D. The creation of President Roosevelt’s FERA program

2. Which of the following is a logical conclusion of the passage?
   A. The FERA program helped some people during the Great Depression.
   B. The FERA program was not managed well.
   C. President Roosevelt did not care about people.
   D. The FERA system was unpopular.

3. Which of the following is the purpose of this selection?
   A. Entertain
   B. Inform
   C. Persuade
   D. Compare/Contrast
4. Which of the following is an example of a FERA program benefit.

A. It helped President Roosevelt get re-elected.
B. It helped Harry Hopkins become a well-known person.
C. It helped feed people and provide emergency rent.
D. It helped people get a college education.

*In the words of Tomas De Quincey, “It is notorious that the memory strengthens as you lay burdens upon it.”*

If, like most people, you have trouble recalling the names of those you have just met, try this: The next time you are introduced, plan to remember the names. Say to yourself, “I'll listen carefully; I'll repeat each person’s name to be sure I’ve got it, and I will remember.” You’ll discover how effective this technique is and probably recall those names for the rest of your life.

5. The quotation from De Quincey indicates that the memory

A. always operates at peak efficiency
B. breaks down under great strain
C. improves if it is used often
D. becomes unreliable if it tires

6. What are the process steps (in order) De Quincey recommends to help people remember names?

A. Say you will remember, hear the name, same you will listen carefully, repeat the name.
B. Say you will listen carefully, hear the name, repeat the name, say you will remember it.
C. Hear the name, say you will remember it, say you will listen, repeat the name.
D. Repeat the name, hear the name, say the name, say you will listen.

7. The passage suggests that people remember names best when they

A. meet new people
B. are intelligent
C. decide to do so
D. are interested in people
With varying success, many women around the world today struggle for equal rights. Historically, women have achieved greater equality with men during periods of social adversity. The following factors initiated the greatest number of improvements for women: violent revolution, world war, and the rigors of pioneering in an undeveloped land. In all three cases, the essential element that improved the status of women was a shortage of men, which required women to perform many of society’s vital tasks.

8. We can conclude from the information in this passage that

A. Women today are highly successful in winning equal rights.
B. Only pioneer women have been considered equal to men.
C. Historically, women have only achieved equality through force.
D. Historically, the principle of equality alone has not been enough to secure women equal rights.

All water molecules form six-sided structures as they freeze and become snow crystals. The shape of a snow crystal is determined by temperature, vapor, and wind conditions in the upper atmosphere. A snow crystal is always symmetrical because these conditions affect all six of its sides simultaneously.

9. The purpose of the passage is to present

A. a personal observation
B. a solution to a problem
C. factual information
D. an opinion
Science uses evidence to learn about the natural world. Science begins with observations – often taking data on what you see, hear or smell. Data are the information gathered from observations. There are two types of data, quantitative data (numbers) and qualitative data (description). An inference is a logical interpretation based on prior knowledge or experience (Ex. You see a window broken and a baseball on the floor next to the shattered glass. You can infer that a baseball broke your window.) A hypothesis is a proposed scientific explanation. This statement is testable and can be confirmed with experimentation or further observation. A prediction is an “if-then” statement that shows what you expect to see as a result of an experiment or observation. (Ex. If fertilizer makes a plant grow faster, then seedlings planted with fertilizer will be taller than the ones planted without fertilizer.)

Steps of the Scientific Method

1) Ask questions, make observations
2) Gather information
3) Form a hypothesis
4) Set up a controlled experiment
5) Record and analyze results
6) Draw a conclusion
7) Repeat

10. According to the passage, what is the first step in the scientific process?

A. Gather information
B. Form a hypothesis
C. Repeat
D. Ask questions, make observations

11. The sentences in parenthesis within the passage are

A. Examples to explain
B. Things to avoid during the process
C. Summaries of the previous statement
D. Opinions about the previous statement
12. The passage uses the following mode of development:

A. Comparison and Contrast
B. Cause and Effect
C. Narration and Classification
D. Definition and Process

For the questions that follow, two sentences are followed by a question or statement. Read the sentences, then choose the best answer to the question or the best completion of the statement.

Knowledge of another language fosters greater awareness of cultural diversity among the peoples of the world. Individuals who have foreign language skills can appreciate more readily other peoples’ values and ways of life.

13. How are the two sentences related?

A. They contradict each other.
B. They present problems and solutions.
C. They establish a contrast.
D. They repeat the same idea.

While most people think of dogs as pets, some dogs are bred and trained specifically for certain types of work. The bloodhound’s acute sense of smell and willing personality make it ideal for tracking lost objects or people.

14. What does the second sentence do?

A. It makes a contrast.
B. It restates an idea found in the first.
C. It states an effect.
D. It gives an example.

Studies show that the prevalence of fast-food restaurants corresponds with the rates of obesity in both children and adults. Obesity is now on the rise in countries where fast-food restaurants are becoming more common.

15. How do the two sentences relate?

A. They express roughly the same idea.
B. They contradict each other.
C. They present problems and solutions.
D. They establish a contrast.
If you are committed to healthy, green living and want to reduce your environmental footprint, you might consider expanding your daily diet to include bugs. Supporters of the edible insect initiative rightfully argue that farming insects has a much lower environmental impact than does raising livestock since bugs are easier to harvest and require a fraction of the water and land space that cattle need. Indeed, the high-protein, low-fat health benefits of bug-eating have long been known. For hundreds of years, crickets, silkworms and even tarantulas have been served roasted, stewed and fried at the dinner tables of many cultures.

16. Which words best describe the author’s attitude toward the “edible insect initiative”?

A. awe and amazement
B. interest and support
C. disgust and distaste
D. fear and apprehension

17. Which of the following statements best supports the argument in this paragraph?

A. Bugs require a fraction of the water and land space that cows need.
B. Fried crickets taste wonderful.
C. Americans eat too much beef.
D. You should consider expanding your diet to include eating tarantulas.

Read the following passage and use the accompanying visual to answer the following questions:

Samuel Morse, best known today as the inventor of Morse Code and one of the inventors of the telegraph, was originally a prominent painter. While he was always interested in technology and studied electrical engineering in college, Morse went to Paris to learn from famous artists of his day and later painted many pictures that now hang in museums, including a portrait of President John Adams. In 1825, Morse was in Washington, D.C., painting a portrait of the Marquis de Lafayette when a messenger arrived on horseback to tell him that his wife was gravely ill back at his home in Connecticut. The message had taken several days to reach him because of the distance. Morse rushed to his home as fast as he could, but his wife had already passed away by the time he arrived. Grief-stricken, he gave up painting and devoted the rest of his life to finding ways to transmit messages over long distances faster.

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<th>A</th>
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Morse Code
18. Morse left the art world and helped to invent the telegraph because he
   A. was tired of painting
   B. wanted to communicate with people far away
   C. loved his wife
   D. was fascinated by science

19. Using Morse Code, select the answer below that spells “Help”.
   A. .   -.   --   --..
   B. .... . -  ..-
   C. .... .-..  .--.
   D. ...  ---  ..-.  .--.

The next set of questions are based on this memo. (9.2 Memorandums and Letters by [Author removed at request of original publisher] is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License)
20. Which of the following best captures the author’s main purpose?
   A. To convince readers that the state budget cuts are a bad idea.
   B. To inform readers that out-of-state travel will require approval.
   C. To ask for ideas about how to cut expenses.
   D. To alert readers that budget cuts are being implemented for the current and following year.

21. The tone of the memo can best be described as
   A. Serious
   B. Mocking
   C. Comedic
   D. Ironic

Use your knowledge of word parts and/or context to select the best response to the following questions about the underlined word.

22. Joanna gave an especially lucid argument to support her request for a raise.
   A. hurried
   B. foolish
   C. strong
   D. clear

23. Photography, when literally translated, means ___________.
   A. light writing
   B. recording on film
   C. a realistic drawing
   D. artistic interpretation

24. The two nations began bilateral talks, hoping to make a peace treaty between them.
   A. one-sided
   B. between two sides
   C. mediated
   D. emergency
25. The lawyer asked for a transcript of a court case to review what had been said during the trial.
   A. court order
   B. audio recording
   C. written copy
   D. video recording

26. The geysers in Yellowstone National Park are geothermal.
   A. heated from a distance
   B. very high
   C. contain hot water
   D. heated from deep inside the earth

Read the passages below and then select the correct response.

Job sharing allows two workers to split the hours and benefits of a full-time job. This is ideal for people who want a professional position but can only work part-time. Full-time workers are attracted to “flextime,” which lets workers arrive and leave when they choose as long as they work the required number of hours. This is ideal for people who would rather work four ten-hour days than five days a week. Finally, there are many people who work full-time at home, where they can set their own hours.

27. Which statement below expresses the implied main idea of this passage?
   A. There are benefits to non-traditional job schedules.
   B. Working conditions are much different from those of a generation ago.
   C. An increasing number of workers are choosing part-time employment
   D. Some people prefer working at home.

28. The word “flextime” means
   A. Working a part-time job.
   B. Choosing when to arrive and leave work as long as the hours are met.
   C. Working from home.
   D. Sharing a job with another person.
A glance at the advertising sections of magazines and newspapers leaves no doubt of the American people’s interest in their weight. The dictators of fashion have made us “weight-conscious,” and now the writers of advertising copy are attempting to convince the thin and fat alike that if they will only bathe in water containing this salt or eat this food or buy this exercising machine or take this or that drug preparation, a figure like that of the professional model pictured in the advertisement will follow in due time.

29. Which of the following is the main idea in this passage?

A. People who are weight-conscious will have pleasing figures.
B. Both fat and thin people should lose weight.
C. Advertisers are encouraging our weight consciousness.
D. Beware of false advertising.

30. Which word from the passage has a negative connotation?

A. thin
B. writers
C. model
D. dictators
31. Which of the occupations commands the highest salary?

A. Veterinary assistants
B. Veterinarians
C. Nonfarm animal caretakers
D. Pet Store Owners

32. This information from the U.S. Census Bureau is an example of what type of source information?

A. A research study
B. A secondary source
C. A primary source (survey)
D. A primary source (focus group)

33. The chart uses all of the following text features, EXCEPT

A. images
B. table of contents
C. text color
D. headings and sub-headings
People have lived in the land we now call Ohio for more than 12,000 years! This timeline is an outline of the story of Ohio’s past, from 13,000 B.C. until 1843, as related by archaeologists and historians. It is organized by time period and cultural tradition and includes a few selected events from world history for comparison with what was happening in Ohio.

34. Which of the following statements is accurate based on the timeline?
A. The Early Woodland Adena era covered roughly 400 years.
B. The Archaic era began around 11,000 BC
C. The Paleoindians built conical earthen mounds.
D. Rock art paintings began in the Sahara in Africa around the same time as the Archaic era for Native Americans in Ohio.

35. The timeline is presented according to which type of organization plan?
A. Chronological order
B. Spatial order
C. Emphatic order
D. Parallel order

36. During the Archaic period, Ohio Native Americans gathered and processed food by all of the methods below, EXCEPT
A. Growing their own plants
B. Hunting and fishing
C. Using pottery to store and cook food
D. Moving to different locations
The wheel is considered one of the most important mechanical inventions of all time. Many technologies since the invention of the wheel have been based on its principles, and since the industrial revolution, the wheel has been a basic element of nearly every machine constructed by humankind. No one knows the exact time and place of the invention of the wheel, but its beginnings can be seen across many ancient civilizations.

37. The passage suggests that the wheel is an important invention because it

   A. is one of the world’s oldest inventions
   B. forms the basis of so many later inventions
   C. can be traced to many ancient cultures
   D. is one the world’s most famous inventions

38. Which of the following best describes the mode of this passage?

   A. Expository
   B. Descriptive
   C. Persuasive
   D. Narrative

In 2010, talk show host Oprah Winfrey and novelist Jonathan Franzen kissed and made up after a nine-year feud. In 2001, Franzen was disinvited from appearing on Winfrey’s TV show to pitch his novel The Corrections after he made it clear that he was unhappy about the book’s being chosen for the Oprah Book Club. Describing his work as “in the high-art literary tradition,” Franzen said he didn’t want to be associated with the Club, which he accused of occasionally choosing “schmaltzy, one-dimensional” novels. But Winfrey is apparently able to forgive and forget: she chose Franzen’s next novel, Freedom, for her book club and said of it, “Now you haven’t heard me say this word often, but this book is a masterpiece.”

39. The passage implies that Franzen’s criticism of the Oprah Book Club was motivated primarily by

   A. pride
   B. anger
   C. insensitivity
   D. ignorance
The main authors of The Declaration of Independence and the Constitution are usually thought of as America’s “Founding Fathers.” Other, less known personages also deserve the title, however, and Noah Webster was one of these. Through his writings, which include the still influential dictionary that bears his name, Webster sought to legitimize an “American English” that was independent of British spelling and pronunciation. For instance, Webster removed the “u” from “colour,” creating the distinct American version of the word.

40. What is the main purpose of this passage?

A. To praise the Founding Fathers
B. To present information about an important American
C. To define and explain “American English”
D. To distinguish American dictionaries from British dictionaries

The 1922 German Expressionist film Nosferatu, directed by F. W. Murnau, is considered one of the most influential films in cinematic history—while also being a classic vampire movie. The film is closely based on Bram Stoker’s 1897 novel, Dracula; however, the villain in the film is called “Count Orlok” rather than “Count Dracula.” The reason is that the small studio that produced the film, Prana Film, was unable to secure the rights to Stoker’s novel. In fact, shortly after finishing Nosferatu, its one and only film, Prana went bankrupt in order to dodge copyright lawsuits from Stoker’s widow.

41. Why does the author say that the vampire in Nosferatu is named “Count Orlok” and not “Count Dracula”?

A. To show that the makers of Nosferatu made minor changes to Stoker’s novel
B. To suggest that the characters in Nosferatu were not based on Stoker’s literary work
C. To criticize Nosferatu for its differences from its source
D. To praise the makers of Nosferatu for their imagination in recreating Stoker’s novel

42. In the last sentence, the word “dodge” most nearly means

A. move away from
B. avoid
C. encourage
D. challenge
Use the information and map below to answer the questions that follow.

A family wants to take a trip to the Kalahari Water Park in Sandusky, Ohio. They are leaving from Sinclair Community College’s Main campus in Dayton, Ohio. Using MapQuest, they found the following three options for the trip on the map.

43. Which highways provide the most logical route to take to make a stop in Mt. Vernon on the way to Sandusky?
   A. 75 to 30 to 71
   B. 75 to 90 to 71
   C. 675 to 70 to 71
   D. 675 to 70 to 270

44. The OH-4 N route takes them to all of the following cities, EXCEPT
   A. Springfield
   B. Newark
   C. Marion
   D. Sandusky
You have been asked by your supervisor to compare the percentage of population growth for the U.S. population by “natural increase” and by immigration over the next 40 years. Your supervisor has provided the charts below. This information is based on U.S. Census Bureau predictions. Use the following instructions and data charts to answer the questions that follow.

A Look At The Future Of The U.S. Labor Force To 2060

In the next 50 years, demographic changes will significantly alter the U.S. population and labor force. These changes include an aging and more diverse population that will continue growing, but at a slower rate. These changes will impact the growth of the U.S. economy and its ability to create goods and services. The growth of the labor force is directly related to the growth of the population and changes in the labor force participation rate. A significant part of the changes in labor force growth results from changes in the population. The labor force participation rate has declined substantially since its peak in 2000, for both demographic and economic reasons. In this Spotlight, we look at projected long-term trends in the growth, size, and composition of the labor force.
45. Based on the first chart, between what years will the decline in population increase begin to level off?

A. Between 2030 and 2035
B. Between 2045 and 2050
C. Between 2050 and 2055
D. Between 2055 and 2060

46. Based on the second chart, what will be the approximate difference between population growth because of immigration as opposed to population growth by “natural increase” in the year 2060.

A. 10 points
B. 20 points
C. 30 points
D. 40 points

47. What information is NOT shown on the charts or in the text?

A. At some point, the rate of decline of natural increase and the rate of increase of immigrants are about the same.
B. The decline in resident population growth began around 2015.
C. Birth rates and death rates will level off around 2025.
D. More information is available by hovering your cursor over a point in the chart.

48. Which one of the following statement can you infer to be TRUE based on the data in the charts?

A. Most Americans will be immigrants in 2025.
B. Most immigrants will be illegal immigrants in the future.
C. The makeup of the country’s population is changing.
D. The data explains why people want to come to America.

49. If you look up the word “demographics” in a dictionary, you can expect to find all of the following, EXCEPT

A. A chart that explains the word
B. A pronunciation of the word
C. The part of speech the word falls under
D. A definition of the word
50. The term “natural increase” refers to
   A. The number of naturalized citizens
   B. The number of births and deaths
   C. The number of births
   D. The number of deaths

51. Your supervisor may be interested in these charts because
   A. He/She will want to make plans for hiring workers.
   B. He/She will want to move to another country.
   C. He/She wants to provide busy work.
   D. He/She wants to discourage natural increase.
1. Which of the following sentences is punctuated correctly?
   A. I have taken many courses in public speaking but, I still feel faint before addressing a group.
   B. I have taken many courses in public speaking but I still feel faint before addressing a group.
   C. I have taken many courses in public speaking, but I still feel faint before addressing a group.
   D. I have taken many courses in public speaking, but, I still feel faint before addressing a group.

I didn’t know about the disaster and I couldn’t believe my eyes’ when I saw the photos.

2. Which one of the following apostrophe marks is used incorrectly or missing in this sentence?
   A. didn’t
   B. couldn’t
   C. eyes’
   D. photos

3. Which of the following is a fragment?
   A. I can’t remember her name.
   B. Because it rained all night, I couldn’t sleep at all.
   C. Sally called me after she got home.
   D. Minerva, who is my mother.

Can you read the board? the teacher asked the students in her class as she wrote the homework assignment.

4. Which of the following correctly punctuates this sentence?
   A. “Can you read the board,” the teacher asked the students in her class as she wrote the homework assignment?
   B. “Can you read the board?” the teacher asked the students in her class as she wrote the homework assignment.
   C. “Can you read the board?” the teacher asked the students in her class as she wrote the homework assignment.
   D. “Can you read the board,” the teacher asked the students in her class as she wrote the homework assignment.
5. Correct any capitalization errors in the following paragraph. (Ten errors)

many years ago, a group of tourists was making its way through the house where the great german composer, Beethoven, spent his last years. As they arrived at the Special Conservatory where Beethoven had spent so many hours at the piano, the Guide paused and spoke quietly: “here is the Master’s instrument.” A well-meaning but thoughtless woman in the back of the group pushed her way up front, sat down at the bench, and immediately began to play one of Beethoven’s Great Sonatas as she said, “I suppose a lot of people love to play this piano.” The guide placed his hand over hers to stop her as he answered, “Well, Paderewski was here last Summer. Several in the group wanted him to play, but he responded, “Oh, no—I am unworthy to play the same keyboard as the Great Beethoven.”

6. Which of the following is a compound sentence?

A. A good friend is someone you hang around with; a best friend is like family.
B. A good friend is someone you hang around with a best friend is like family.
C. A good friend is someone you hang around with while a best friend is like family.
D. A good friend is someone you hang around with and is like family.

I’m going to vacation on a private beach this summer.

7. Which of the following words from the sentence above is an adjective?

A. beach
B. for
C. private
D. summer

I fertilize the grass every spring. I want to make it greener. I want to impress my neighbors. My neighbors are judgmental.

8. Which one of the following options combines the sentences above to construct a clear, correct sentence?

A. I fertilize the grass every spring because my neighbors are judgmental. I want to make it greener, so I want to impress my neighbors.
B. I fertilize the grass every spring because I want to impress my judgmental neighbors.
C. My judgmental neighbors are why I want to make it greener because I fertilize the grass every spring.
D. I want to make it greener because I fertilize the grass every spring for my judgmental neighbors.
9. Which of the following sentences uses the correct subject and verb combination?
   A. The fingerprints on the murder weapon are smudged.
   B. Do your roof leak when it rains hard?
   C. The toy trucks and action figures on the kitchen floor belongs to my niece.
   D. There are a bunch of flowers in a vase on the table.

10. Which sentence below uses the introductory comma correctly?
   A. While the pies were baking Mother, planted some tulip bulbs in her garden.
   B. While, the pies were baking Mother planted some tulip bulbs in her garden.
   C. While the pies were baking Mother planted some tulip bulbs, in her garden.
   D. While the pies were baking, Mother planted some tulip bulbs in her garden.

The people standing in line were drenched by the rain.

11. The underlined word in the sentence above could be replaced by which option below?
   A. angered
   B. soaked
   C. disappointed
   D. wetted

12. Which of the following makes the best topic sentence?
   A. Every February 14, people celebrate Valentine’s Day.
   B. Valentine’s Day is named after St. Valentine.
   C. Valentine’s Day is great for couples, but difficult for some single people to endure.
   D. Palentine’s Day is February 13th.

13. Which of the following prefixes should be added to the word “sensitive” to make it mean “not sensitive”?
   A. ex-
   B. anti-
   C. in-
   D. un
14. Using the writing process to develop and write an essay, during which of the following phases would you brainstorm for topics and ideas?

A. outlining  
B. prewriting  
C. drafting  
D. editing

15. In the sentence above, the word “looked” means which of the following?

A. saw  
B. ran  
C. felt  
D. seemed

16. Which of the following sentences uses diction that is appropriate for academic essay?

A. Anger is one of our basic emotions and can be dangerous if it is not carefully controlled.  
B. I get really teed off and lose my temper sometimes.  
C. Anger is like feeling hatred toward some dude who cut you off in traffic.  
D. I think the reason people get angry is because I feel like they have no internal resources.

17. Where is a surgeon cutting if she/he specializes in “rhinoplasty.”

A. the abdomen  
B. the neck  
C. the breast  
D. the nose
Work and school are very much alike in at least five ways.

I. First, both require an early start.

II. Second, promptness is important in both places.

III. Third, both involve quotas.

IV. Fourth, both work and school deadlines must be met.

V. Finally, both work and school benefit society.

18. In the outline above, what type of transition words are used?
   A. sequential transition words
   B. comparison/contrast transition words
   C. spatial transition words
   D. emphatic transition words

The squirming child sat between you and ________.

19. Which one of the following pronouns would correctly complete the following sentence?
   A. we
   B. me
   C. I
   D. his

My, what big ears you have

20. Which of the following marks of punctuation can be used to end this sentence?
   A. ?
   B. ;
   C. ,
   D. !

21. Which sentence is correctly punctuated using a series comma?
   A. My favorite ice cream flavors are chocolate, double chocolate, and chocolate fudge supreme.
   B. My favorite ice cream flavors are, chocolate double chocolate and chocolate fudge supreme.
   C. My favorite ice cream flavors are chocolate, double chocolate and, chocolate fudge supreme.
   D. My favorite ice cream flavors are chocolate, double chocolate and chocolate fudge supreme.
22. Which of the following sentences has an incorrect verb?
   A. She speaked so quietly that I could hardly hear her.
   B. The bus drove away before he could get on.
   C. He melted the butter in the microwave oven.
   D. When the dog trotted away, the girl relaxed.

23. Which of the following grammatical errors occurs in this sentence?
   A. subject/verb disagreement
   B. run on or comma splice
   C. pronoun form error
   D. shift in tense

24. The word “craftsmanship” could be replaced with which word below?
   A. instructions
   B. skill
   C. tools
   D. materials
1. D. The creation of President Roosevelt’s FERA program

2. A. The FERA program helped some people during the Great Depression.

3. B. Inform

4. C. It helped feed people and provide emergency rent.

5. C. improves if it is used often

6. B. Say you will listen carefully, hear the name, repeat the name, say you will remember it.

7. C. decide to do so

8. D. Historically, the principle of equality alone has not been enough to secure women equal rights.

9. C. factual information

10. D. Ask questions, make observations

11. A. Examples to explain

12. D. Definition and Process

13. D. They repeat the same idea.

14. D. It gives an example.

15. A. They express roughly the same idea.

16. B. interest and support

17. A. Bugs require a fraction of the water and land space that cows need.

18. B. wanted to communicate with people far away

19. C. .... .-.= ...-.=

20. D. To alert readers that budget cuts are being implemented for the current and following year.

21. A. Serious

22. D. clear

23. A. light writing

24. B. between two sides

25. C. written copy

26. D. heated from deep inside the earth

27. A. There are benefits to non-traditional job schedules.

28. B. Choosing when to arrive and leave work as long as the hours are met.

29. C. Advertisers are encouraging our weight consciousness.

30. D. dictators
31. B. Veterinarians
32. C. A primary source (survey)
33. B. table of contents
34. B. The Archaic era began around 11,000 BC
35. A. Chronological order
36. D. Moving to different locations
37. B. forms the basis of so many later inventions
38. A. Expository
39. A. pride
40. B. To present information about an important American
41. B. To suggest that the characters in Nosferatu were not based on Stoker’s literary work
42. B. avoid
43. D. 675 to 70 to 270
44. B. Newark
45. B. Between 2045 and 2050
46. D 40 points
47. C. Birth rates and death rates will level off around 2025.
48. C. The makeup of the country’s population is changing.
49. A. A chart that explains the word
50. B. The number of births and deaths
51. A. He/She will want to make plans for hiring workers.
1. C. I have taken many courses in public speaking, but I still feel faint before addressing a group.
2. C eyes’
3. D. Minerva, who is my mother.
4. B. “Can you read the board?” the teacher asked the students in her class as she wrote the homework assignment.
5. Many years ago, a group of tourists was making its way through the house where the great German composer, Beethoven, spent his last years. As they arrived at the Special Conservatory where Beethoven had spent so many hours at the piano, the Guide paused and spoke quietly: “here is the Master’s instrument.” A well-meaning but thoughtless woman in the back of the group pushed her way up front, sat down at the bench, and immediately began to play one of Beethoven’s Great Sonatas as she said, “I suppose a lot of people love to play this piano.” The guide placed his hand over hers to stop her as he answered, “Well, Paderewski was here last summer. Several in the group wanted him to play, but he responded, “Oh, no—I am unworthy to play the same keyboard as the Great Beethoven.”
6. A. A good friend is someone you hang around with; a best friend is like family.
7. C. private
8. B. I fertilize the grass every spring because I want to impress my judgmental neighbors.
9. A. The fingerprints on the murder weapon are smudged.
10. D. While the pies were baking, Mother planted some tulip bulbs in her garden.
11. B. soaked
12. C. Valentine’s Day is great for couples, but difficult for some single people to endure.
13. C. in-
14. B. prewriting
15. D. seemed
16. A. Anger is one of our basic emotions and can be dangerous if it is not carefully controlled.
17. D. the nose
18. A. sequential transition words
19. B. me
20. D. !
21. A. My favorite ice cream flavors are chocolate, double chocolate, and chocolate fudge supreme.
22. A. She speaked so quietly that I could hardly hear her.
23. C. pronoun form error
24. B. skill
M.1.1 Convert among non-negative fractions, decimals, and percentages.

<table>
<thead>
<tr>
<th>1. Convert fraction to a decimal:</th>
<th>2. Convert decimal to a fraction:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) ( \frac{231}{100} )</td>
<td>a) 4.02</td>
</tr>
<tr>
<td>b) ( \frac{14}{25} )</td>
<td>b) 0.0031</td>
</tr>
<tr>
<td>c) ( \frac{3}{8} )</td>
<td>c) 113.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Convert percent to a decimal:</th>
<th>4. Convert decimal to a percent:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 22.3%</td>
<td>a) 0.032</td>
</tr>
<tr>
<td>b) 312%</td>
<td>b) 0.532</td>
</tr>
<tr>
<td>c) 0.6%</td>
<td>c) 22.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Convert percent to a fraction:</th>
<th>6. Convert fraction to a percent:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 20%</td>
<td>a) ( \frac{3}{100} )</td>
</tr>
<tr>
<td>b) 75%</td>
<td>b) ( \frac{2}{5} )</td>
</tr>
<tr>
<td>c) 113%</td>
<td>c) ( \frac{7}{25} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Which of the following is equivalent to 35.3%?</th>
<th>8. Which of the following is equivalent to ( \frac{7}{5} )?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. ( \frac{353}{100} )</td>
<td>A. 1.4%</td>
</tr>
<tr>
<td>B. ( \frac{353}{10} )</td>
<td>B. 0.014%</td>
</tr>
<tr>
<td>C. ( \frac{353}{1000} )</td>
<td>C. 140%</td>
</tr>
<tr>
<td>D. ( \frac{35.3}{10} )</td>
<td>D. 14%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Which of the following is equivalent to ( \frac{12}{5} )?</th>
<th>10. Which of the following is equivalent to 2.31%?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 240%</td>
<td>A. ( \frac{231}{10} )</td>
</tr>
<tr>
<td>B. 2.4%</td>
<td>B. ( \frac{231}{100} )</td>
</tr>
<tr>
<td>C. 1.25%</td>
<td>C. ( \frac{231}{1000} )</td>
</tr>
<tr>
<td>D. 125%</td>
<td>D. ( \frac{231}{10000} )</td>
</tr>
</tbody>
</table>
M.1.2 Perform arithmetic operations with rational numbers.

<table>
<thead>
<tr>
<th>1. Calculate:</th>
<th>2. Calculate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) $16 - 8 ÷ 4 - 2$</td>
<td>a) $16 - 8 ÷ (4 - 2)$</td>
</tr>
<tr>
<td>b) $(16 - 8) ÷ 4 - 2$</td>
<td>b) $16 - (8 ÷ 4 - 2)$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Calculate:</th>
<th>4. Calculate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) $10 \times 4 - 2 \times 6 - 3$</td>
<td>a) $10 + 16 ÷ 4 \times 2 - 1$</td>
</tr>
<tr>
<td>b) $10 \times (4 - 2) \times 6 - 3$</td>
<td>b) $10 + 16 ÷ (4 \times 2) - 1$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Calculate:</th>
<th>6. Calculate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) $\frac{20 - 2 \times 4}{2 + 2 \times 2}$</td>
<td>a) $(20 - 2 \times 4) ÷ 2 + 2 \times 2$</td>
</tr>
<tr>
<td>b) $20 - 2 \times 4 ÷ 2 + 2 \times 2$</td>
<td>b) $(20 - 2 \times 4) ÷ (2 + 2 \times 2)$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Which of the following is the correct value of $22 - 2 \times 5 + 1$?</th>
<th>8. Which of the following is the correct value of $\frac{10 \times 3 - 1 \times 4}{6 - 2 \times 2}$?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 101 B. 120 C. 10 D. 13</td>
<td>A. 13 B. 10 C. 3 D. 40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Which of the following is the correct value of $10 ÷ 2 + 3 \times 5 - (1 + 3)$?</th>
<th>10. Which of the following is the correct value of $\frac{40}{2 + 3} - (10 ÷ 2 + 3)$?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 6 B. 36 C. 2 D. 16</td>
<td>A. 0 B. 6 C. 15 D. 21</td>
</tr>
</tbody>
</table>
M.1.3 Compare and order rational numbers.

1. Write in increasing order:
   a) 23, 15, 123, 21
   b) −23, −15, −123, −21

2. Write in increasing order:
   a) 2, −5, 0, −7, 1
   b) 11, 0.5, −5, −2/3, 2

3. Write in increasing order:
   a) \(\frac{1}{11}, \frac{1}{25}, \frac{1}{17}, \frac{1}{21}\)
   b) \(\frac{2}{3}, \frac{2}{5}, \frac{7}{8}, \frac{8}{15}\)

4. Write in increasing order:
   a) \(3 \frac{1}{5}, \frac{17}{5}, 3.21, 3 \frac{1}{3}\)
   b) 0.32, \(\frac{1}{3}\), 0.23, \(\frac{1}{4}\), 0.33

5. Write in increasing order:
   a) \(\frac{2}{5}, -\frac{1}{3}, 0.3, -\frac{2}{5}, \frac{1}{10}\)
   b) \(\frac{5}{3}, \frac{1}{6}, \frac{2}{3}, -\frac{2}{7}\)

6. Write in increasing order:
   a) 0.2, 0.22, 0.02, 0.022, 0.222
   b) 0.375, 0.339, 0.341, 0.331, 0.299

7. Which of the following is correct?
   A. \(11 \frac{2}{3} = 11.66\)
   B. \(11 \frac{2}{3} \leq 11.66\)
   C. \(11 \frac{2}{3} < 11.66\)
   D. \(11 \frac{2}{3} > 11.66\)

8. Which of the following has the numbers in increasing order?
   A. \(\frac{5}{3}, 1 \frac{1}{3}, 1.3, -1 \frac{1}{3}, -1.12\)
   B. \(-1 \frac{1}{3}, -1.12, 1.3, 1 \frac{1}{3}, \frac{5}{3}\)
   C. \(-1.12, -1 \frac{1}{3}, 1.3, 1 \frac{1}{3}, \frac{5}{3}\)
   D. \(-1 \frac{1}{3}, -1.12, 1 \frac{1}{3}, 1.3, \frac{5}{3}\)
M.1.4 Solve equations involving one variable.

1. Solve:
   a) \(x + 7 = 25\)
   b) \(x - 3 = 11\)
   c) \(x - 3 = -11\)

2. Solve:
   a) \(5x = 120\)
   b) \(5x = 11\)
   c) \(\frac{4}{7}x = 12\)

3. Solve:
   a) \(5x - 2 = 28\)
   b) \(5x + 7 = 27\)

4. Solve:
   a) \(5x - 8 = 3x\)
   b) \(3x + 12 = -2x\)

5. Solve:
   a) \(5x - 1 = 3x + 11\)
   b) \(2x + 3 = 5x - 12\)

6. Solve:
   a) \(2x - 11 = -3x + 4\)
   b) \(2x + 8 = -7x - 1\)

7. Solve:
   a) \(10x + 1 = x - 1\)
   b) \(-2x + 8 = -7x + 1\)

8. If you solve the equation \(3x - 5 = 4\), what is the answer?
   A. \(\frac{1}{3}\)  B. \(-3\)  C. \(3\)  D. \(-\frac{1}{3}\)

9. For the equation \(5x + 2 = 3x - 8\) which of the following is an acceptable first step towards solving it?
   A. Adding 2 to both sides.
   B. Subtracting \(3x\) from both sides.
   C. Subtract 8 from both sides.
   D. Adding \(5x\) to both sides.
M.1.5 Solve real world one- or multistep problems with rational numbers.

1. A medical assistant earns $500 per 40-hour workweek, and he gets paid for overtime work at a rate of $18 per hour. How much did he earn last week if he worked 48 hours?

2. If a bottle of cough syrup contains 12 ounces of medication, how long will it last if an adult dose is $\frac{3}{4}$ ounce every 4 hours?

3. A physician orders a patient to have no more than 400 units of a particular medication in 1 day. However, the patient can have a little less than 400 units if necessary. In stock are containers that hold 75 units of medicine. If the containers cannot be split, how many containers should be administered to this patient to come as close to 400 units as possible? How many units will the patient receive?

4. An owner of a garden plot, which is 30 feet long and 24 feet wide, wants to pave a path along its border. If he wants the path to be a two feet wide and uses square slabs with a side of one foot, how many slabs does he need to buy?

5. A cake recipe calls for $1\frac{3}{4}$ cups of sugar. A caterer needs to make 25 cakes. How many 15-cup packages of sugar does he need to buy?
M1.6 Solve real-world problems involving percentages.

<table>
<thead>
<tr>
<th>1. Solve:</th>
<th>2. Solve:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) What is 20% of 30 pounds?</td>
<td>a) 16 is what % of 400?</td>
</tr>
<tr>
<td>b) What is 15% of 90 mg?</td>
<td>b) 90 is what % of 150?</td>
</tr>
<tr>
<td>c) What is 125% of 120 kg?</td>
<td>c) 20 is what % of 80?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Solve:</th>
<th>4. A shirt that normally sells for $45 is on sale at 40% off. What is its sale price?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 30 is 5% of what number?</td>
<td></td>
</tr>
<tr>
<td>b) 12 is 25% of what number?</td>
<td></td>
</tr>
<tr>
<td>c) 120 is 80% of what number?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Suppose that the local sales tax is 6% and you buy a car for $13,600. What is the total amount you have to pay?</th>
<th>6. A charity has raised $24,000, with a goal of raising $40,000. What percent of the goal has been raised?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>7. If 300 fl oz of solution contains 18 fl oz of some liquid drug, what percent of the solution is not the liquid drug?</th>
<th>8. The cholesterol count in a blood sample was 198. In six months, the count was 178. What was the percent decrease in the cholesterol count?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. 10.1%  B. 11.2%  C. 20%  D. 89.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. If 1.2% of all shipped volumetric flasks are damaged on arrival, approximately how many flasks will be damaged out of a shipment of 2,400 flasks?</th>
<th>10. The price of a sweater is reduced by 30% of its original price. When it still does not sell, its price is reduced by 20% of the reduced price. What is actual percent reduction from the original price?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 12  B. 20  C. 29  D. 200</td>
<td>A. 40%  B. 44%  C. 50%  D. 56%</td>
</tr>
</tbody>
</table>
M.1.7 Apply estimation strategies and rounding rules to real-world problems.

1. Which of the following estimates the answer to \( \frac{231.5}{1.728 \times 23.7} \)?

A. \( \frac{232}{2 \times 24} \)  
B. \( \frac{231}{1 \times 23} \)  
C. \( \frac{2}{1 \times 2} \)  
D. \( \frac{200}{2 \times 20} \)

2. Round the numbers in the table:

<table>
<thead>
<tr>
<th>Round this number to ones</th>
<th>Your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{2}{15} )</td>
<td></td>
</tr>
<tr>
<td>( 13 \frac{3}{7} )</td>
<td></td>
</tr>
<tr>
<td>( 20 \frac{5}{9} )</td>
<td></td>
</tr>
<tr>
<td>( \frac{8}{15} )</td>
<td></td>
</tr>
<tr>
<td>( \frac{27}{4} )</td>
<td></td>
</tr>
</tbody>
</table>

3. Round the numbers in the table:

<table>
<thead>
<tr>
<th>Number</th>
<th>Round to this place</th>
<th>Your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>237.28</td>
<td>Tens</td>
<td></td>
</tr>
<tr>
<td>237.28</td>
<td>Tenths</td>
<td></td>
</tr>
<tr>
<td>225,731</td>
<td>Thousands</td>
<td></td>
</tr>
<tr>
<td>0.13514</td>
<td>Thousandths</td>
<td></td>
</tr>
<tr>
<td>0.13514</td>
<td>Ones</td>
<td></td>
</tr>
</tbody>
</table>

4. Round the numbers in the table:

<table>
<thead>
<tr>
<th>Number</th>
<th>Round to this place</th>
<th>Your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>989.32</td>
<td>Hundreds</td>
<td></td>
</tr>
<tr>
<td>989.32</td>
<td>Tens</td>
<td></td>
</tr>
<tr>
<td>35.3973</td>
<td>Hundredths</td>
<td></td>
</tr>
<tr>
<td>25.03</td>
<td>Tens</td>
<td></td>
</tr>
<tr>
<td>1235</td>
<td>Hundreds</td>
<td></td>
</tr>
</tbody>
</table>

5. The average adult walks with what speed?

A. 4 m per hour  
B. 4 km per minute  
C. 4 km per hour  
D. 4 m per minute

6. The average loaf of bread weighs about what amount?

A. 600 g  
B. 60,000 g  
C. 60 g  
D. 6,000 g
M.1.8 Solve real-world problems involving proportions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. After Ann had pumped 5.0 gal of gasoline, the display showing the price read $11.60. When she finished pumping the gasoline, the price display read $29.00. How many total gallons did she pump?</td>
<td>2. The distance between Singapore and Tokyo is 3300 mi. On a map this distance is represented by 4.2 in. The actual distance between Mexico City and Cairo is 7700 mi. How far apart are they on the same map?</td>
</tr>
<tr>
<td>3. According to the directions on a bottle, for routine floor-cleaning, $\frac{1}{4}$ cup of cleaner should be used for each gallon of water. How much cleaner should be mixed with $10\frac{1}{2}$ gal of water?</td>
<td>4. If 2 lb. of fertilizer will cover 150 sq. feet of lawn, how many pounds would be needed to cover 480 sq. feet?</td>
</tr>
<tr>
<td>5. There are 140 calories per 30 g of a particular cereal. How many calories are in a 48 g serving?</td>
<td>6. A salt-water fish tank requires 3 ounces of salt for every 5 gallons of water. How many ounces of salt are needed for a 75-gallon tank?</td>
</tr>
</tbody>
</table>
1. Find the best buy of each item:
   a) Cereal
   
<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 oz.</td>
<td>$2.69</td>
</tr>
<tr>
<td>20 oz.</td>
<td>$3.29</td>
</tr>
<tr>
<td>25.5 oz.</td>
<td>$3.49</td>
</tr>
</tbody>
</table>

   b) Juice
   
<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 oz.</td>
<td>$1.95</td>
</tr>
<tr>
<td>48 oz.</td>
<td>$2.89</td>
</tr>
<tr>
<td>64 oz.</td>
<td>$3.29</td>
</tr>
</tbody>
</table>

2. A recipe requires $3 \text{ cups}$ of flour, $\frac{1}{2} \text{ cup}$ of sugar, 1 cup of milk, and $\frac{1}{2} \text{ cup}$ of melted butter.
   a) What is the ratio of flour to the total mixture?
      A. $\frac{3}{2}$  B. $\frac{3}{5}$  C. $\frac{2}{3}$  D. $\frac{5}{3}$

   b) What is the ratio of sugar to the total mixture?
      A. $\frac{1}{5}$  B. $\frac{1}{4}$  C. $\frac{2}{5}$  D. $\frac{1}{10}$

3. Find the ratio not equivalent to $\frac{150 \text{ miles}}{2 \text{ hours}}$
   A. $\frac{75 \text{ mi.}}{1 \text{ hr.}}$  B. $\frac{1.25 \text{ mi.}}{1 \text{ min}}$  C. $\frac{180 \text{ mi.}}{1.5 \text{ hr.}}$  D. $\frac{5 \text{ mi.}}{4 \text{ min}}$

4. If a car is driven at $\frac{30 \text{ mi}}{\text{hr}}$, how long does it take to drive 1 mile?
   A. 1 min  B. 2 min  C. 3 min  D. 4 min

5. In 1950 the population of Farmville was 10,520, and in 2000 it was 25,370. What is the closest approximation of the population growth in Farmville?
   A. $\frac{100 \text{ people}}{\text{year}}$  B. $\frac{200 \text{ people}}{\text{year}}$  C. $\frac{300 \text{ people}}{\text{year}}$  D. $\frac{400 \text{ people}}{\text{year}}$

6. A company has 250 employees, 75 of which are women. What is the ratio of men to women working in this company?
   A. $\frac{7}{3}$  B. $\frac{7}{10}$  C. $\frac{10}{7}$  D. $\frac{3}{7}$

7. Amy read 127 books in 8 years. What most accurately presents her average reading rate?
   A. $\frac{15 \text{ books}}{\text{year}}$  B. $\frac{16 \text{ books}}{\text{year}}$  C. $\frac{17 \text{ books}}{\text{year}}$  D. $\frac{18 \text{ books}}{\text{year}}$

8. City A has a population of 95,570 people and a total area of all of its parks equal to 7,520 acres. City B has a population of 240,352 and 21,720 acres of park area. Which city has more park area relative to its population?
M.1.10 Translate phrases and sentences into expressions, equations, and inequalities.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A car can be rented from a certain company for $80 per week plus 50 cents for each mile driven. Write an inequality for determining how many miles you can travel if you can spend at most $400 for the week.</td>
</tr>
<tr>
<td>2.</td>
<td>A shipment contained several boxes. One employee moved one fourth of the boxes to a storage room, and another employee moved half. Altogether, they moved 60 boxes. Write an equation needed to find out how many boxes were in the shipment.</td>
</tr>
<tr>
<td>3.</td>
<td>To rent a piece of equipment, a store charges $25 a day plus an $85 flat fee. Write an inequality to determine how long you can rent this equipment if you can spend at most $270.</td>
</tr>
<tr>
<td>4.</td>
<td>If each packet of aspirin contains 3 tablets, set up an equation to calculate a total number of tablets $T'$, using $n$ as the number of packets.</td>
</tr>
<tr>
<td>5.</td>
<td>Michael needs $1500 to buy an engagement ring. He got $300 from his grandmother, and puts aside $125 from his weekly earnings. Set up an inequality to find out in how many weeks Michael can propose.</td>
</tr>
<tr>
<td>6.</td>
<td>Johnny had $2 less than his sister. After that he earned $20 by mowing the neighbor’s lawn. Now he has three times more money than his sister. Write an equation to find out how much money Johnny’s sister has.</td>
</tr>
<tr>
<td>7.</td>
<td>Ann got $5000 from her aunt who won a lottery. She decides to use $70 of this money every weekend to go out. She plans to do so until there is close to $500 left. Which inequality below will help to determine for how many weeks Ann will have at least $500 of that money left?</td>
</tr>
<tr>
<td></td>
<td>A. $5000 - 70x &lt; 500  B. $5000 - 70x \leq 500  C. $5000 - 70x &gt; 500  D. $5000 - 70x \geq 500$</td>
</tr>
<tr>
<td>8.</td>
<td>A small cake shop owner rents equipment at $200 a week, and bakes cakes at a cost of $5 per cake. She sells them for $12 each. Which inequality below will allow her to determine how many cakes she should make and sell each week to make a profit of at least $500?</td>
</tr>
<tr>
<td></td>
<td>A. $12x \geq 700 + 5x  B. $12x + 500 \geq 200 + 5x  C. $12x \leq 700 + 5x  D. $12x + 500 \leq 200 + 5x$</td>
</tr>
</tbody>
</table>
M.2.1 Interpret relevant information from tables, charts, and graphs.

1. Which of the following statements is supported by the graph?

A. In 1960 people used a bus more than anything else for transportation.

B. From 1960 to 2000, the use of bus steadily declined.

C. In all these years less than 50% travelled on foot.

D. In the year 2000 most people travelled by car.

2. Answer the following questions:

a) When was the least number of cakes sold?

b) On which day was the biggest increase in sales?

c) What was the average rate of change in sales from Monday to Friday?

d) On how many days were more than 10 cakes sold?
M.2.2 Evaluate the information in tables, charts, and graphs using statistics.

1. Which of the following best describes the distribution portrayed on the graph?
   - A. Bell-shaped
   - B. Uniform
   - C. Bimodal
   - D. Normal

2. Which of the following best describes the distribution portrayed on the graph?
   - A. Uniform
   - B. Skewed left
   - C. Skewed right
   - D. Normal

3. For the given list of numbers,
   \[10, 5, 7, 8, 8, 4, 8, 8, 9, 9, 1, 8, 7, 9, 7\]
   Find:
   a) mean
   b) median
   c) mode
   d) range
   e) outliers

4. Which of the following describes the trend of the data portrayed on the graph?
   - A. Increasing
   - B. Decreasing
   - C. Stable
   - D. No trend
M.2.3 Explain the relationship between two variables.

1. According to the data shown on the picture, which of the following describes the relation between the two variables?

   A. The two variables have positive covariance.
   B. The two variables have negative covariance.
   C. The two variables are inversely related.
   D. The two variables are independent.

2. On the picture, the data presented are: the weight of a car and its mileage. Which of the following is true?

   A. The two variables have positive covariance.
   B. The two variables have negative covariance.
   C. The two variables are directly related.
   D. The two variables are independent.

3. In the following table, do the variables have positive covariance, negative covariance, or they are independent?

<table>
<thead>
<tr>
<th>First variable</th>
<th>Second variable</th>
<th>Your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The time required for a trip</td>
<td>The speed you drive at</td>
<td></td>
</tr>
<tr>
<td>b) The price of a pizza</td>
<td>The diameter of the pizza</td>
<td></td>
</tr>
<tr>
<td>c) Years of experience</td>
<td>Salary</td>
<td></td>
</tr>
<tr>
<td>d) Number of hours spent studying</td>
<td>Number of mistakes on the test</td>
<td></td>
</tr>
</tbody>
</table>
M.2.4 Calculate geometric quantities.

1. a) Find the area of the shown figure.
   b) Find the perimeter.

2. a) Find the area.
    b) Find the perimeter.

3. Find the area.

4. Find the area.

5. a) Find the area.
    b) Find the perimeter.

6. a) Find the area.
    b) Find the perimeter.

7. A parallelogram has a base of 25 cm, a height of 10 cm, and a side length of 15 cm. Find its area and perimeter.

6. Calculate the surface area of the rectangular solid:
### M.2.5 Convert within and between standard and metric systems.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A patient knows that he is 173 cm tall. What is his height in feet</td>
<td>A. 6 feet</td>
</tr>
<tr>
<td>and inches, if 1 inch equals 2.54 cm?</td>
<td>B. 5 feet, 10 inches</td>
</tr>
<tr>
<td></td>
<td>C. 5 feet, 9 inches</td>
</tr>
<tr>
<td></td>
<td>D. 5 feet, 8 inches</td>
</tr>
<tr>
<td>2. A car has 21 mi/gal gas mileage. Convert the mileage into km/L if</td>
<td>A. 8 km/L</td>
</tr>
<tr>
<td>1 mi=1.61 km and 1 L=1.06 qt.</td>
<td>B. 9 km/L</td>
</tr>
<tr>
<td></td>
<td>C. 10 km/L</td>
</tr>
<tr>
<td></td>
<td>D. 11 km/L</td>
</tr>
<tr>
<td>3. The scar is 0.002 meter long. How many cm long is the scar?</td>
<td>A. 0.02 cm</td>
</tr>
<tr>
<td></td>
<td>B. 0.2 cm</td>
</tr>
<tr>
<td></td>
<td>C. 2 cm</td>
</tr>
<tr>
<td></td>
<td>D. 20 cm</td>
</tr>
<tr>
<td>4. You participated in a 5K run. How many meters did you run?</td>
<td>A. 3.1</td>
</tr>
<tr>
<td></td>
<td>B. 50</td>
</tr>
<tr>
<td></td>
<td>C. 500</td>
</tr>
<tr>
<td></td>
<td>D. 5000</td>
</tr>
<tr>
<td>5. A person weighs 172 lb. What is his weight in kilograms? (1 kg=2.2 lb)</td>
<td>A. 78 kg</td>
</tr>
<tr>
<td></td>
<td>B. 82 kg</td>
</tr>
<tr>
<td></td>
<td>C. 372 kg</td>
</tr>
<tr>
<td></td>
<td>D. 378 kg</td>
</tr>
<tr>
<td>6. If the price of gasoline is $ 2.35/gal, find the price per liter (1</td>
<td>A. $ 0.42/L</td>
</tr>
<tr>
<td>gal=3.79 L)</td>
<td>B. $ 0.55/L</td>
</tr>
<tr>
<td></td>
<td>C. $ 0.62/L</td>
</tr>
<tr>
<td></td>
<td>D. $ 0.72/L</td>
</tr>
<tr>
<td>7. A person has a 100 square-meter apartment in Berlin. What is its</td>
<td>A. 3,280 sq. ft.</td>
</tr>
<tr>
<td>size in square feet? (1m=3.28 ft.)</td>
<td>B. 328 sq. ft.</td>
</tr>
<tr>
<td></td>
<td>C. 1,076 sq. ft.</td>
</tr>
<tr>
<td></td>
<td>D. 1,276 sq. ft.</td>
</tr>
<tr>
<td>8. A 1.19-kilogram container of cereal contains 30 servings. How many</td>
<td>A. 0.4 g</td>
</tr>
<tr>
<td>grams approximately are in each serving?</td>
<td>B. 4 g</td>
</tr>
<tr>
<td></td>
<td>C. 40 g</td>
</tr>
<tr>
<td></td>
<td>D. 400 g</td>
</tr>
<tr>
<td>9. Convert 125 ft. into yards.</td>
<td>A. 41 ( \frac{2}{3} ) yd</td>
</tr>
<tr>
<td></td>
<td>C. 12.5 yd</td>
</tr>
<tr>
<td></td>
<td>B. 10 ( \frac{5}{12} ) yd</td>
</tr>
<tr>
<td></td>
<td>D. 15 ( \frac{5}{8} ) yd</td>
</tr>
<tr>
<td>10. Convert 6 km/h into m/min.</td>
<td>A. 36 m/min.</td>
</tr>
<tr>
<td></td>
<td>C. 60 m/min.</td>
</tr>
<tr>
<td></td>
<td>B. 166 ( \frac{2}{3} ) m/min</td>
</tr>
<tr>
<td></td>
<td>D. 100 m/min.</td>
</tr>
</tbody>
</table>
ANSWERS.

M.1.1 1. a) 2.31, b) 0.56, c) 0.375; 2. a) $\frac{402}{100}$ or $\frac{201}{50}$, b) $\frac{31}{10000}$, c) $\frac{1137}{10}$; 3. a) 0.223, b) 31,200, c) 0.006; 4. a) 3.2%, b) 53.2%, c) 2210%; 5. a) $\frac{1}{5}$, b) $\frac{3}{4}$, c) $\frac{113}{100}$; 6. a) 3%, b) 40%, c) 22%; 7. C; 8. C; 9. A; 10. D.

M.1.2 1. a) 12, b) 0; 2. a) 201, b) 50; 3. a) 31, b) 10,000; 4. a) 0.223, b) 31,200, c) 0.006; 5. a) 1, b) 3, c) 113, 100; 6. a) 3%, b) 40%, c) 28%; 7. D; 8. C; 9. A; 10. D.

M.1.3 1. a) 15, 21, 23, 123; b) -123, -23, -11, -15; 2. a) -7, -5, 0, 1, 2; b) -5, $\frac{-2}{3}$, $\frac{0.5, 2, 11}{3}$; 3. a) $\frac{-2}{3}$, $\frac{1}{25}$, $\frac{1}{21}$, $\frac{1}{17}$, $\frac{1}{11}$, $\frac{1}{8}$; 4. a) $\frac{2}{3}$, $\frac{7}{15}$, $\frac{8}{15}$, $\frac{3}{5}$, $\frac{2}{3}$; b) $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{7}$, $\frac{1}{5}$, $\frac{1}{3}$; 5. a) $\frac{-2}{3}$, $\frac{-1}{5}$, $\frac{-1}{10}$, $\frac{0.3, 2}{5}$; b) $\frac{2}{5}$, $\frac{1}{7}$, $\frac{2}{3}$, $\frac{5}{5}$, $\frac{5}{3}$; 6. a) 0.02, 0.022, 0.2, 0.22, 0.222; 7. b) 0.299, 0.331, 0.339, 0.341, 0.375; 8. B.

M.1.4 1. a) 18, b) 14, c) -8; 2. a) 24, b) $\frac{11}{5}$, c) 21; 3. a) 6, b) 4; 4. a) 4, b) $\frac{12}{5}$; 5. a) 6, b) 5; 6. a) 3, b) -1; 7. a) $\frac{-2}{9}$, b) $\frac{-7}{5}$; 8. C, 9. B.

M.1.5 1. $644; 2$. 64 hours or $\frac{2}{3}$ days; 3. 5 containers, 375 units; 4. 200 slabs; 5. 3 packages.

M.1.6 1. a) 6 pounds, b) 13.5 mg, c) 150 kg; 2. a) 4%, b) 60%, c) 25%; 3. a) 600, b) 48, c) 150; 4. $27; 5$. $14,416; 6$. 60%; 7. 94%; 8. A; 9. C; 10. B.

M.1.7 1. D; 2. 0,13,21,1,7; 3. 240; 237.3; 226,000; 0.135; 0; 4. 1000; 990; 35.40; 30; 1200; 5. C; 6. A.

M.1.8 1. 12.5 gallons; 2. 9.8 in.; 3. $\frac{5}{8}$ cups; 4. 6.4 lb.; 5. 224 calories; 6. 45 ounces.

M.1.9 1. a) 25.5 oz. size, b) 64 oz. size; 2. a) B, b) D; 3. C; 4. B; 5. C; 6. A; 7. B; 8. City B.
\textbf{M.1.10} 
1. $80 + 0.5x \leq 400$; 
2. $\frac{1}{4}x + \frac{1}{2}x = 60$; 
3. $25x + 85 \leq 270$; 
4. $T = 3n$; 
5. $300 + 125x \geq 1500$; 
6. $x - 2 + 20 = 3x$; 
7. D; 
8. A.

\textbf{M.2.1} 
1. C; 
2. a) Tuesday, b) Thursday, c) 1.75 cakes/day, d) 4.

\textbf{M.2.2} 
1. C; 
2. B; 
3. a) mean 7.2, b) median 8, c) mode 8, d) range 9, e) outliers 1,4,5; 
4. A.

\textbf{M.2.3} 
1. A; 
2. B; 
3. a) negative, b) positive, c) positive, d) negative.

\textbf{M.2.4} 
1. a) $21 + 2\pi$, b) $16 + 2\pi$; 
2. a) 50 cm$^2$, b) 36 cm; 
3. 40 cm$^2$; 
4. 34 cm$^2$; 
5. a) 48, b) 34; 
6. a) 37, b) 42; 
7. Area 250 cm$^2$, Perimeter 80 cm; 
8. 52 m$^2$.

\textbf{M.2.5} 
1. D; 
2. B; 
3. B; 
4. D; 
5. A; 
6. C; 
7. C; 
8. C; 
9. A; 
10. D.