1) What is the term for two chromosomes that have the same length, shape and genes, but do NOT have exactly the same DNA
sequence?
A) sister chromatids
B) centrioles
C) homologous chromosomes
D) haploid chromosomes
E) centromeres

2) What are the products of the replication of one DNA molecule?
A) two strands joined into one double-stranded DNA molecule
B) a pair of homologous chromosomes
C) four identical double-stranded DNA molecules
D) two identical double-stranded DNA molecules
E) a set of four sister chromatids

3) The base pairing rules of DNA are that
A) A pairs with C; T pairs with G.
B) A pairs with G; T pairs with C.
C) A pairs with T; G pairs with C.

4) The products of meiosis are
A) two genetically different, diploid cells.
B) four genetically different, haploid cells.
C) four genetically identical, haploid cells.
D) two genetically identical, diploid cells.
E) four genetically identical, diploid cells.

5) How many different types of amino acids are found in proteins?
A) 20
B) tens of thousands
C) 4
D) 100
E) thousands

6) What is the relationship between any two strands of DNA?

A) They are connected to each other by sugar-phosphate bonds.
B) They are a pair of sister chromatids.
C) An A base on one always pairs with a G base on the other.
D) One was the template for the synthesis of the other.
E) They have identical base sequences.

7) How many different types of bases are used to encode all the genetic information in a molecule of DNA?
A) 4 B) 2 C) 5 D) 10 E) 20

8) What is one of the differences between cell division in plant cells and cell division in animal cells?
A) Plant cells separate chromosomes by attachment to the plasma membrane.
B) In a plant cell, there is no nucleus around the chromosomes.
C) There is no DNA replication before cell division in plant cells.
D) Plant cells do not use a mitotic spindle to separate chromosomes.
E) Plant cells separate by growth of a cell wall and membrane in the middle of the cell.

9) What are the results of DNA replication?
A) two DNA molecules, each with one old and one new strand
B) two DNA molecules, one with two old strands and the other with two new strands
C) eight sister chromatids from one original chromosome
D) four sister chromatids from one original chromosome
E) the cell's DNA content is tripled

10) Mutations that occur in somatic cells are:
A) always harmful.
B) not passed on to future generations.
C) never harmful.
D) passed on to successive generations when they are incorporated into gametes.
E) responsible for the appearance of human diseases like sickle-cell anemia.

11) A 2n cell from an organism has 40 chromosomes. How many chromosomes would be in a haploid gamete from this organism?
A) 40 B) 46 C) 80 D) 20 E) 10

12) X-linked conditions are caused by
A) proteins that damage the X chromosome.
B) genes that only females have.
C) inheritance of an extra X chromosome.
D) genes on the X chromosome.
E) genes that only males have.

13) What is the initial step in DNA replication?
A) breakdown of the nuclear envelope
B) attachment of the chromosome to the plasma membrane
C) formation of the cleavage furrow
D) formation of the mitotic spindle
E) unwinding of the DNA double helix

14) What do the conditions hemophilia, Duchenne Muscular Dystrophy, and red-green color blindness have in common?
A) They are caused by inheritance of an extra sex chromosome.
B) The gene that causes them is on the Y chromosome.
C) They are more common in females than in males.
D) They are caused by inheritance of an extra autosome.
E) They are X-linked.

15) What is the relationship between genes and chromosomes?
A) Genes are the A, T, C, G bases on the nucleotides of chromosomes.
B) Genes are the proteins encoded by chromosomes.
C) Genes are the proteins around which DNA chromosomes are packaged.
D) A chromosome is a DNA molecule with many genes.
E) Chromosomes are proteins that carry genes made of DNA.

16) What is one of the main differences between somatic cells and gametes?
A) Gametes do not have nuclei.
B) In humans, somatic cells have a total of 23 chromosomes.
C) Gametes undergo meiosis.
D) Gametes will fuse to produce offspring.
E) Somatic cells are the products of meiosis.

17) What is the relationship between DNA and proteins?
A) DNA molecules are the enzymes that maintain chromosomes made of protein.
B) Proteins make up the individual sugar-phosphate-base units of DNA.
C) Genes are made of proteins that encode the base sequence of DNA.
D) DNA encodes for proteins, and protein enzymes replicate and maintain DNA.
E) DNA makes up the individual sugar-phosphate-base units of a protein.

18) The two strands of a double helix of DNA are linked by what kind of bonds?
A) base-phosphate linkages
B) hydrogen bonds between sugars and phosphates

C) sugar-phosphate linkages
D) sugar-base linkages
E) hydrogen bonds between bases

19) A liver cell from a human male has
A) 22 pairs of autosomes and two X chromosomes.
B) 46 pairs of autosomes, an X and a Y chromosome.
C) 23 pairs of autosomes, an X and a Y chromosome.
D) 23 pairs of autosomes and two X chromosomes.
E) 22 pairs of autosomes, an X and a Y chromosome.

20) Which choice is FALSE about the products of a single cell that has gone through meiosis?
A) The result is eight separate cells.
B) They may function as gametes.
C) They are genetically diverse.
D) The result is four separate cells.
E) They are haploid.

21) If a 2n cell with 16 chromosomes undergoes mitosis, how many chromosomes will each daughter cell have?
A) 32 B) 4 C) 64 D) 8 E) 16

22) What cell components store the information for the production of proteins?
A) the A, T, C, and G bases in DNA
B) the amino acids of DNA
C) the ribosomes
D) the sugars and phosphates of DNA
E) the cytosol

23) How are the products of meiosis different from the products of mitosis?
A) Meiotic products are always diploid.
B) The products of a meiotic division are genetically identical to each other.
C) Mitotic products are gametes.
D) Mitotic products are always haploid.
E) Meiotic products are gametes.

24) If the sequence TCGTA was used as a template in DNA replication, what would the sequence of bases be on the newly
synthesized strand?
A) ATGCT

B) TCGTA
C) GCATC
D) CTACG
E) AGCAT

25) Much genetic information can be derived from pedigrees (family genetic histories). This is done primarily for humans
because
A) other animals have long life spans.
B) humans cannot be crossed experimentally.
C) we know relatively little about human genetics.
D) humans have so many chromosomes.

26) Which types of cells divide by mitosis and cytokinesis?
A) prokaryotic and eukaryotic cells
B) plant cells, but not animal cells
C) somatic animal cells, but not prokaryotic cells
D) somatic animal cells, but not plant cells
E) prokaryotic and animal cells, but not plant cells

27) A human male has
A) 2 X chromosomes, one from each parent.
B) a Y from his mother and an X from his father.
C) two Y chromosomes, one from each parent.
D) an X from his mother and a Y from his father.
E) an X and a Y, either of which could have come from either parent.

28) What is the complementary sequence for a segment of DNA with the sequence: ACGGCT?
A) GTAATC
B) TCGGCA
C) ACGGCT
D) AGCCGT
E) TGCCGA

29) What is being separated during anaphase of mitosis?
A) sister chromatids
B) plasma membranes
C) cytoplasm
D) nuclear membranes
E) centrosomes

30) How many chromosomes are in a human gamete?
A) 26 B) 23 C) 42 D) 46 E) 43

Use this information for the following item(s): A and a are dominant and recessive alleles, respectively, of the same gene.31)
Which genotype(s) would result in an individual with the dominant phenotype?
A) only AA
B) AA and Aa
C) only Aa
D) AA and aa
E) Aa and aa

32) Which genotype(s) would result in an individual with the recessive phenotype?
A) Aa or aa
B) AA or aa
C) Aa only
D) aa only
E) AA only

33) Which molecule is made in the nucleus, but exits to function in the cytoplasm?
A) chromosome
B) protein
C) gene
D) DNA
E) mRNA

34) Mendel postulated that individuals have "elements in pairs" that determine a single phenotype. What are the paired
elements?
A) two alleles of a gene on homologous chromosomes
B) pairs of sister chromatids
C) two haploid sets of chromosomes
D) pairs of centromeres
E) a sperm and an egg

35) What acts as the template for synthesis of a strand of DNA?
A) a single strand of DNA
B) a single strand of mRNA
C) a single strand of rRNA
D) a ribosome

E) a single strand of tRNA

36) What is an autosome?
A) a gene that confers male or female sex
B) a Y chromosome
C) an X chromosome
D) a chromosome that confers male or female sex
E) one of the non-sex chromosomes

37) How do daughter cells at the end of mitosis and cytokinesis, compare with the parent cell before DNA replication occurs?
A) The daughter cells have half the number of chromosomes, and half the amount of DNA.
B) The daughter cells have the same number of chromosomes and the same amount of DNA.
C) The daughter cells have half the amount of cytoplasm and half the amount of chromosomes.
D) The daughter cells may have the same number of chromosomes, but double the amount of DNA.
E) The daughter cells have the same number of chromosomes, but half the amount of DNA.

38) Which molecule is synthesized in transcription, exits the nucleus, and has information in the form of codons?
A) a ribosomal protein
B) an rRNA
C) a gene
D) an mRNA
E) a tRNA

39) If we create the figure: DNA rightarrow RNA rightarrow Protein, what do the arrows indicate?
A) physical movement B) information flow
C) energy flow D) chemical reactions

40) One strand of DNA is the template for the synthesis of another strand. What does this mean?
A) One strand of DNA acts as a wedge to separate other strands before replication.
B) A strand of DNA is taken apart to supply nucleotides for synthesis of a new strand.
C) A strand of DNA is the enzyme that connects nucleotides in replication.
D) The template specifies the bases on the nucleotides of the strand being made.
E) The new strand will have exactly the same base sequence as the template strand.

41) In a human cell that is haploid, how many chromosomes are there, and of what type?
A) 12: 11 autosomes and one sex chromosome
B) 23: 22 autosomes and one sex chromosome
C) 45: 44 autosomes and one sex chromosome

D) 46: 44 autosomes and two sex chromosomes
E) 11: 11 autosomes and no sex chromosomes

42) The law of independent assortment states that
A) in meiosis, crossing-over creates genetically diverse gametes.
B) generation of male and female gametes must occur in separate organisms.
C) in gamete formation, gene pairs are transmitted independently of each other.
D) in fertilization, the combining of sperm and eggs is random.
E) in any dihybrid cross, it is possible to get any combination of phenotypes.

43) The code of DNA is specified in
A) the 4 bases A, T, G, or C.
B) the repeating sugar and phosphate molecules.
C) the number of different chromosomes.
D) the proteins of the ribosome.
E) the 20 different amino acids of proteins.

44) Which type of gene, or gene combination, can be present in a generation without affecting phenotype?
A) recessive
B) homozygous dominant
C) dominant
D) heterozygous dominant
E) homozygous recessive

45) What would most likely happen if one base were changed in the base sequences of a DNA molecule?
A) The cell would die.
B) Protein synthesis would stop.
C) Messenger RNA would correct the mistake.
D) A defective protein would be produced.
E) Genome copying would be impossible.

46) When does DNA replication take place?
A) continually throughout the cell cycle
B) before a cell divides
C) only during G1
D) during mitosis
E) during cytokinesis

47) Which of the following is NOT a component of DNA nucleotides?
A) guanine

B) adenine
C) a phosphate group
D) arginine
E) deoxyribose

48) What is the term for an observable trait of an organism?
A) genotype
B) pleiotropy
C) element
D) phenotype
E) allele

49) The three components of a DNA nucleotide are
A) polymerases, ligases and sugars.
B) amino acids, phosphates and deoxyribose.
C) phosphates, sugars and bases.
D) genes, sugars and bases.
E) bases, deoxyribose and polymerases.

50) In DNA, A, C, G, and T stand for
A) the different types of bases on the nucleotides.
B) the different types of sugars on the nucleotides.
C) the different types of bonds that form between nucleotides.
D) the different types of phosphates on the nucleotides.
E) the types of genes found on DNA chromosomes.

51. Chromatids that are attached together at the centromere are called _____ chromatids?
a. mother
b. daughter
c. sister
d. programmed
e. either mother or daughter.

52. When chromosomes become visible during prophase of mitosis, it is the result of
a. uncoiling.
b. DNA synthesis and condensation
d. chromatid duplication.
e. addition of proteins to the DNA.

53. If a parent cell has 16 chromosomes, how many sister chromatids will be present at metaphase of mitosis?
a. 64

b. 32
c. 16
d. 8
e. 4

54. Chromosomes are aligned at the equator of the cell during _____ of mitosis
a. anaphase.
b. metaphase.
c. interphase.
d. prophase.
e. telophase.

55. Which of the following descriptions of Mendel is INCORRECT?
a. He was simply lucky to work out the laws of genetics.
b. He focused on contrasting phenotypic characteristics.
d. He kept exact mathematical data and was the first scientist to utilize numerical analysis of results.
e. He was a monk, a science teacher, and a gardener.

56. The usual F2 phenotypic ratio of a dihybrid cross is
a. 1:1.
b. 2:1.
c. 9:3:3:1.
d. 1:2:1.
e. 3:1.

57. What is the probability that the cross of AaBbCc with AaBbCc will produce an offspring of genotype aabbcc?
a. 1/64
b. 1/32
c. 3/64
d. 1/16
e. 9/64

58. Chromosomes other than those involved in sex determination are known as
a. nucleosomes.
b. heterosomes.
c. alleles.
d. autosomes.
e. liposomes.

59. In karyotyping, individual chromosomes may be distinguished from others by
a. a comparison of chromosome lengths.
b. bands produced on chromosomes by differential staining.
c. the position of centromeres.
d. all of these

e. none of these

60. If two genes are on the same chromosome,
a. crossing over occurs frequently.
b. they assort independently.
c. they are in the same linkage group.
d. they are segregated during meiosis.
e. an inversion will usually occur.

61. A chromosome's gene sequence that was ABCDEFG before damage and ABFEDCG after is an example of
a. inversion.
b. deletion.
c. duplication.
d. translocation.
e. aneuploidy.

62. The failure of chromosomes to separate during mitosis or meiosis is called
a. genetic displacement.
b. trisomy.
c. crossing over.
d. nondisjunction.
e. disjunction.

63. Down syndrome involves trisomy
a. 3.
b. 5.
c. 15.
d. 19.
e. 21.

64. PKU can be detected by
a. karyotyping.
b. urine analysis.
c. blood tests.
d. saliva tests.
e. both urine analysis and blood tests.

65. Four of the five answers listed below describe the heterozygous condition. Select the exception.
a. homozygous
b. carrier
c. heterozygotes
d. hybrid
e. Aa

66. The DNA molecule is made up of how many strands?
a. 1
b. 2
c. 3
d. 6
e. 12

67. _____ molecules carry protein-assembly instructions from the nucleus to the cytoplasm.
a. DNA
b. Messenger RNA
c. Transfer RNA
d. Ribosomal RNA
e. all of these

68. The nitrogenous base found in RNA but not in DNA is
a. adenine.
b. cytosine.
c. guanine.
d. uracil.
e. thymine.

69. There are how many different kinds of amino acids in proteins?
a. 3
b. 6
c. 12
d. 20
e. 28

70. The concept that a set of three nucleotides specifies a particular amino acid provides the basis for
a. the one gene, one enzyme hypothesis.
b. the one gene, one polypeptide hypothesis.
c. the genetic code.
d. biochemical reactions among nucleic acids.
e. all of these

71. The model of the prokaryote operon explains the regulation of which of the following?
a. replication
b. transcription
c. induction
d. Lyonization
e. none of these

72. All the different kinds of RNA are transcribed in the
a. mitochondria.
b. cytoplasm.

c. ribosomes.
d. nucleus.
e. endoplasmic reticulum.

73. The obvious advantage of the lactose operon system is that
a. lactose is not needed as energy for bacteria.
b. lactose-metabolizing enzymes need not be made when lactose is not present.
c. the bacteria will make lactose only in the presence of the proper enzymes.
d. milk is not needed for adult humans' diet.
e. glucose can substitute for lactose in the diet of intolerant persons.

Answers:

1) C 2) D 3) C 4) B 5) A 6) D 7) A 8) E 9) A 10) B 11) D 12) D 13) E 14) E 15) D
16) D 17) D 18) E 19) E 20) A 21) E 22) A 23) E 24) E 25) B 26) C 27) D 28) E 29) A
30) B 31) B 32) D 33) E 34) A 35) A 36) E 37) B 38) D 39) B 40) D 41) B 42) C 43) A
44) A 45) D 46) B 47) D 48) D 49) C 50) A 51).C 52).B 53.B) 54.B) 55).A 56).C 57) A 58).D 58) 59)D .D
60).C 61).D 62).D 63).E 64).E 65).A 66).B 67).B 68).D 69).D 70).C 71).B 72).D
73).B