Heredity Division B

Part 1: Multiple Choice

1) A person has brown hair and green eyes. This statement is an example of…
    a) Phenotype
    b) Genotype
    c) Karyotype
    d) Color
2) A female purebred mouse with a black coat is mated to a male purebred mouse with a white coat. Their progeny have grey coats. This is an example of...
    a) Codominance
    b) Incomplete dominance
    c) Transvection
    d) Recombination
3) Are sex-linked diseases more common in
    a) Males
    b) Females
    c) Neither
    d) Both
4) 2 mammals with the genotype CcEe are crossed. ‘C’ is a thick coat, and is dominant to ‘c’. ‘E’ is brown eyes and is dominant to ‘e’, which is red eyes, what fraction of offspring would you expect to have a thin fur coat and brown eyes?
    a) 3/16
    b) 1/16
    c) 9/16
    d) 5/16
5) Mitosis differs from meiosis because in meiosis we observe _____.
    a) Centromeres
    b) Chromatids
    c) Tetrads
    d) Homologues
6) In the F1 generation of a monohybrid cross, the phenotypic ratio would be _____.
    a) 3:1
    b) 1:2:1
    c) 2:1:1
    d) 1:1:2

7) A mouse has a mutation in which its sister chromatids are unable to separate during cell division. What phase should scientists target, to alleviate the condition using drug therapy?
    a) Prophase
    b) Metaphase
    c) Telophase
    d) Anaphase
8) A red and a white rose are bred together, and make a red flower with white tips. This is an example of…
    a) Codominance
    b) Incomplete dominance
    c) Transvection
    d) Recombination
9) A female infant is born with several hundred oocytes, each one genetically unique.This is due to…
    a) Recessive inheritance
    b) Independent assortment and random crossover
    c) Chromosome deletion
    d) Mutation
10) A hybrid organism for a trait represented by B's and b's would have which of the following genotypes.
    a) BB
    b) Bb
    c) bBb
    d) bb
11) Type AB blood type represents
    a) Sex-linked
    b) Dominance
    c) Codominance
    d) Recessiveness
12) What is a chromatid?
    a) A replicated chromosome
    b) 2 chromosomes
    c) A young chromosome
    d) An abnormally sized fetus

13)What type of cell divides during meiosis?

a) Skin
b) Cardiovascular
c) Sex
d) Cheek

14)What is transcription?

a) Gene information in DNA is copied into RNA
b) Writing a different type of gene
c) Nucleoids in RNA becoming a sequence of amino acids
d) A book on heredity

15)What is translation?

a) Gene information in DNA is copied into RNA
b) Nucleoids in RNA becoming a sequence of amino acids
c) The concept of
d) Changing how you talk about heredity

16) Hemophilia is linked on the….

a) X chromosome
b) 22nd pair of chromosomes
c) Y chromosome
d) 13th pair of chromosomes

17) A culture starts with 8 cells and ends with 512. How many generations did the culture go through?

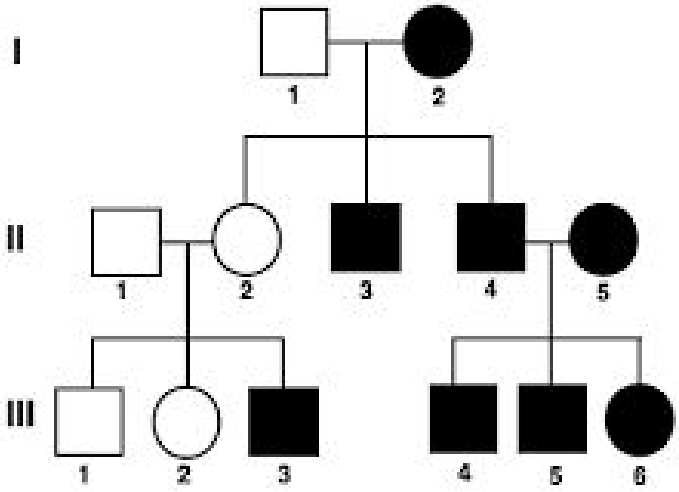
a) 7
b) 5
c) 64
d) 6

18)What is a perfect base pair?

a) Adenine and cytosine
b) Guanine and thymine
c) Adenine and thymine
d) Adenine and guanine

19)The following terms refer to human nuclear material. Arrange them in order of decreasing size and complexity:

a) Genes, chromosomes, genome, codons, exons
b) Codons, exons, genes, chromosomes, genome
c) Genome, chromosomes, genes, exons, codons
d) Chromosomes, genome, genes, exons, codons



Use the pedigree for questions 20 and 22.

20) Is the trait dominant or recessive?

a) dominant
b) recessive
c) neither
d) Not enough information

21) Is the trait autosomal or sex-linked?

a) Not enough information
b) autosomal
c) Sex-linked
d) Neither

22) What is the genotype of individual II-2?\

a) hH
b) HH
c) hh
d) Hh

23) The RNA primer is removed from the Okazaki fragment by:

a) DNA Pol 1
b) DNA Pol 2
c) DNA Pol 3
d) RNA polymerase

24) A child is born with blood type O. All of the following could be the blood types of the parents except:
    a) A and A
    b) A and O
    c) A and B
    d) AB and O
25) The codon is found in:
    a) DNA
    b) mRNA
    c) tRNA
    d) rRNA
26) What is the anticodon that recognizes CGA:
    a) UGC
    b) CGA
    c) GCU
    d) GCT
27) When one gene affects multiple characteristics, it is called _____ inheritance.
    a) Pleiotropy
    b) Incomplete dominance
    c) Polygenic
    d) Codominance
28) The DNA sequence of a gene can be altered in which of the following ways:
    a) Insertion
    b) Deletion
    c) Frameshift
    d) All of the above
29) If a male is colorblind, from whom did he receive the recessive allele?
    a) Father
    b) Mother
    c) Either mother or father
    d) Not enough information
30) During Mitosis, when the cytoplasm and all the organelles split between 2 cells, _____ phase of the cycle is occuring.
    a) Anaphase
    b) Telophase
    c) Prophase
    d) Cytokinesis

31) National DNA Day 2019 is on
    a) November 14th
    b) December 25th
    c) April 25th
    d) June 6th

Part 2: True or False

32) Non Coding intervening sequences in eukaryotic genes that interrupt the coding sequences are called exons.
    a) True
    b) False
33) A purine and a pyrimidine are a base pair.
    a) True
    b) False
34) Cellular RNA is usually much shorter than DNA.
    a) True
    b) False
35) After replication, each piece of DNA has an old strand and a new strand.
    a) True
    b) False
36) A gene encodes a protein product.
    a) True
    b) False
37) DNA replication occurs in the nucleus.
    a) True
    b) False
38) The X chromosome is considerably larger than the Y chromosome.
    a) True
    b) False
39) Genes can't be turned on and off in cells.
    a) True
    b) False
40) Hemophilia is an X-linked condition caused by a recessive gene.
    a) True
    b) False
41) RNA is double stranded and DNA has a single strand.
    a) True
    b) False

42) Genetic variation results from the crossing over and exchange of chromosomal parts that occur during meiosis II.
    a) True
    b) False
43) Patau Syndrome is associated with trisomy 14.
    a) True
    b) False
44) In incomplete dominance, the heterozygote has a phenotype intermediate between that of homozygous-dominant and homozygous-recessive individuals.
    a) True
    b) False
45) X-linked recessive inheritance is passed from mother to son or daughter and father to daughter, but not father to son.
    a) True
    b) False
46) A Punnett Square is a diagram that may be used to figure out the possible combinations of genes for a trait.
    a) True
    b) False
47) Okazaki fragments are found in lagging strands of DNA.
    a) True
    b) False
48) Most genetic disorders are inherited through dominant genes.
    a) True
    b) False
49) Dominant genes often skip a generation.
    a) True
    b) False
50) Hereditary characteristics are transmitted to offspring by genes.
    a) True
    b) False

Part 3: Short Answer

51) If parent 1 has blood type AB and the child has blood type AB, what blood type can parent 2 not have?

52) What pairing is a pyrimidine?

53) Someone with brown hair (BB) and green eyes (Gg) had a child with someone with blond hair (bb) and blue eyes (gg). What is the probability that the child will have brown hair and blue eyes?

54) If person A can give blood to anyone, and person B can receive blood from anyone, what are their blood types?

55) What pairing makes a purine?

56) What would the other half of this strand of DNA be? AATCGGTGA

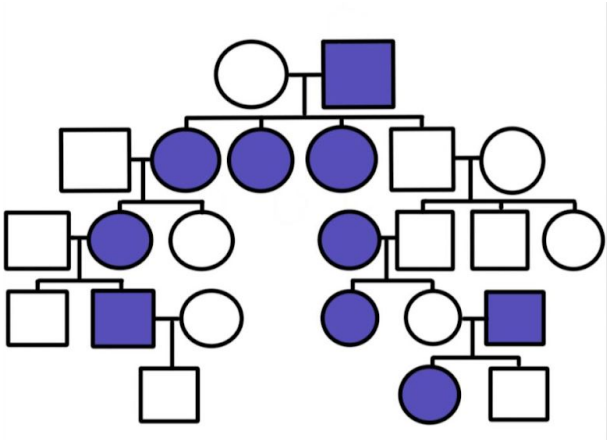
57) What happens in meiosis during prophase 2?

58) What happens in meiosis during metaphase 2?

59) What happens in meiosis during anaphase 2?

60) What happens in meiosis during telophase 2?

61) What happens in meiosis during cytokinesis?



62) What type of trait is this?

63) How many chromosomes of IV-3 have the trait?

64) An albino man marries a normal pigmented woman who had an albino mother. If albino is recessive and normal is dominant, draw a punnett square to figure out the pigmentation of their children. Will any of the children be homozygous dominant?

65) Is red hair a genetic mutation, and if so, what is it a mutation in?

66) Parent 1 has blood type A, and Parent 2 has blood type B. What blood type(s) can the child have?

67) What are exons?

68) What are codons?

69) Define genome.

70)What are chromosomes?

71) What is a gene?

72) What is hemophilia?

73) What are Okazaki fragments and what do they do?

74) What is an allele?

75) What does it mean to be homozygous?

76) What does it mean to be heterozygous?

77) What is a genotype?

78) What is a phenotype?

79) What is a karyotype?

80) What is a nondisjunction disorder?

Heredity Division B Answer Key

1) A. Phenotype **(1 pt)**
2) B. Incomplete Dominance **(1 pt)**
3) A. Males **(1 pt)**
4) A. 3/16 **(1 pt)**
5) C. Tetrads **(1 pt)**
6) A. 3:1 **(1 pt)**
7) D. Anaphase **(1 pt)**
8) A. Codominance **(1 pt)**
9) B. Independent Assortment and random crossover **(1 pt)**
10) B. Bb **(1 pt)**
11) C. Codominance **(1 pt)**
12) A. A replicated chromosome **(1 pt)**
13) C. Sex cells **(1 pt)**
14) A. Gene information in DNA is copied into RNA **(1 pt)**
15) B. Nucleoids in RNA becoming a sequence of amino acids **(1 pt)**
16) A. X chromosome **(1 pt)**
17) D. 6 generations **(1 pt)**
18) C. Adenine and thymine **(1 pt)**
19) C. Genome, chromosomes, genes, exons, codons **(1 pt)**
20) B. Recessive **(1 pt)**
21) C. Sex-linked **(1 pt)**
22) D. Hh **(1 pt)**
23) A. DNA Pol 1 **(1 pt)**
24) D. AB and O **(1 pt)**
25) B. mRNA **(1 pt)**
26) C. GCU **(1 pt)**
27) A. Pleiotropy **(1 pt)**
28) D. All of the above: insertion, deletion, frameshift **(1 pt)**
29) B. Mother **(1 pt)**
30) D. Cytokinesis **(1 pt)**
31) C. April 25th **(1 pt)**
32) B. False **(1 pt)**
33) B. False **(1 pt)**
34) A. True **(1 pt)**

35)A. True **(1 pt)**
36)B. False **(1 pt)**
37)A. True **(1 pt)**
38)A. True **(1 pt)**
39)B. False **(1 pt)**
40)A. True **(1 pt)**
41)B. False **(1 pt)**
42)B. False **(1 pt)**
43)B. False **(1 pt)**
44)A. True **(1 pt)**
45)A. True **(1 pt)**
46)A. True **(1 pt)**
47)A. True **(1 pt)**
48)B. False **(1 pt)**
49)B. False **(1 pt)**
50)A. False **(1 pt)**
51) Blood type O **(1 pt)**
52) Thymine and Cytosine **(2 pt; 1 for each correct base)**
53) 50% **(2 pt; correct punnett square and correct percentage)**
54) Person A: O-; Person B: AB+ **(2 pt; one for each correct blood type)**
55) Adenine and Guanine **(2 pt; 1 for each correct base)**
56)TTAGCCACT **(2 pt; at least 1 correct match, full points for total completion)**
57) The chromosomes are compacted so it will be organized to split. **(2 pt; 1 for what happens, 1 for why it happens)**
58) Chromosomes split into chromatids. **(1 pt)**
59)The chromosomes continue separating. **(1 pt)**
60)The chromatids have completed their separation and have traveled to opposite poles. **(2 pt; 1 for separation, 1 for the poles)**
61)The 2 cells split to create 4 haploid daughter cells that become the new sex cells. **(1 pt)**
62) X-linked Dominant **(2 pt; 1 for sex linked, 1 for dominant vs recessive)**
63) One **(1 pt)**
64) Aa, Aa, aa, aa (Aa x aa), No **(2 pt; 1 for correct punnett square, 1 for answer)**
65) Yes, the melanocortin receptor in gene 16 **(2 pt; 1 for the correct answer, 1 for explanation)**
66) Blood type O, A, B, or AB **(2 pt; 1 pt for at least 1 correct answer, both for complete list)**
67) a segment of a DNA or RNA molecule containing information coding for a protein or peptide sequence. **(2 pt; 1 for what it is and 1 for what it does)**

68) a sequence of three nucleotides which together form a unit of genetic code in a DNA or RNA molecule. **(2 pt; 1 for what it is and 1 for what it does)**
69) The genetic material of an organism. It includes both the genes and noncoding DNA. **(2 pt; 1 for what it is and 1 for what it does)**
70) a deoxyribonucleic acid molecule with part or all of the genetic material of an organism **(2 pt; 1 for what it is and 1 for what it does)**
71) a sequence of nucleotides in DNA or RNA that codes for a molecule that has a function **(2 pt; 1 for where it resides and 1 for what it does)**
72) Hemophilia is when your blood won't clot. **(2 pt; 1 for it being a blood disease and 1 for telling how it affects the blood)**
73) short sequences of DNA nucleotides which are synthesized discontinuously and later linked together by the enzyme DNA ligase to create the lagging strand during DNA replication. **(2 pt; 1 for what it is and 1 for what it creates)**
74) A variant form of a given gene **(1 pt)**
75) When the genes from both parents are the same. **(1 pt)**
76) When the genes from both parents aren't the same. **(1 pt)**
77) The genetic makeup. **(1 pt)**
78)The genetic expression. **(1 pt)**
79) The number and visual appearance of the chromosomes in the cell nuclei **(2 pt; 1 for number or appearance, 2 for both)**
80) The failure of chromosomes or sister chromatids to separate normally during nuclear division, resulting in an abnormal distribution of chromosomes in the daughter nuclei. **(2 pt; 1 for cause, 1 for the effect)**