All multiple choice, true or false, and fill in the blank questions are worth one point. Short answer question point values are specified on the test.

MULTIPLE CHOICE

1. A - The parents are homozygous recessive and heterozygous
2. B - 9:3:3:1
3. A - The number of sets of chromosomes in a cell
4. C - This individual has Klinefelter syndrome
5. B - Autosomal recessive
6. A, B, D, E
7. C - S
8. C - Each codon codes for one amino acid, but multiple codons can code for the same amino acid
9. C - When genes are exchanged between chromosomes in meiosis
10. D - An enzyme that removes RNA primers from DNA after replication
11. A - 17%
12. B & C - Possesses a phosphate-ribose backbone & Single-stranded
13. A - I - Helicase, II - DNA gyrase
14. D - Describing the structure of DNA
15. C - I - p arm, II - centromere, III - q arm
16. A - Cellular division in prokaryotes
17. B - Codominance involves the blending of traits, while in incomplete dominance both traits are expressed at the same time
18. A - This is the only point when the chromosomes are distinguishable
19. A - The genetic code is universal

TRUE OR FALSE / FILL IN THE BLANK

20. False
21. True
22. False
23. True
24. False
25. False
26. hydrogen
27. methionine
28. transfer
29. polyadenylation
30. phosphodiester

SHORT ANSWER

31. 25%
32. Heterozygous and homozygous recessive. Half a point each.
33. TTFF (true breeding means that he is homozygous for both traits)
34. No, {1} because some codons code for multiple amino acids. {1}
35. A sequence of DNA that codes for one protein. {1} Any definitions that allude to alleles will not be accepted.
36. Similarities - both have a phosphate sugar backbone, nitrogenous bases, adenine/guanine/cytosine, etc.
    Differences - RNA is single stranded while DNA is double stranded, ribose vs deoxyribose, thymine vs uracil, etc.
37. Substitution, insertion, deletion, frameshift, etc. One point each.
38. This individual is a male {1} with no chromosomal abnormalities. {1}
39. Purines have two rings, {1} while pyrimidines only have one. {1}
40. Purines HAVE to bond to pyrimidines in order to keep the width of the DNA strand consistent; {2} if pyrimidines bonded to pyrimidines and purines to purines the DNA strand would be wavy instead of straight. {2}
41. Chromatid - one half of a duplicated chromosome; each containing one double helix of DNA
    Chromatin - the loosely packed DNA which makes up chromosomes
    Chromosome - a long, tightly bound double helix which facilitates the separation of genetic material in mitosis
42. Three accurate characteristics are necessary - circular DNA, not bound by histones, found freely floating in the nucleus, etc.
43. Poly-A tail {1} and 5′ cap, {1} helping mRNA to exit the nucleus {1} and protect it from degradation {1}
44. The TATA box is a part of the core promoter region, and is responsible for the binding of transcription factors.
45. An accurate description of alternative splicing would get full points on this question.
46. Transcription would not complete, {1} as the DNA fragments could not be connected and a complete DNA molecule would not be formed. {1}
47. ddNTPS are missing a hydroxyl group, {1} and are used to halt replication in order to produce fragments of different lengths. {1}
48. Primary - amino acid sequence; Secondary - beta sheets/alpha helices; Tertiary - 3D folding; Quaternary - interactions between polypeptides. Half a point each.
49. Lyonization
50. Incest, or consanguineous mating