1) The structure above is:
   a) cholesterol
   b) arachidonic acid
   c) oleic acid
   d) palmitoleic

2) Palmitic acid differs from palmitoleic acid by:
   a) one double bond
   b) two double bonds
   c) 1 methyl group
   d) 1 carboxyl group

3) Arachidonic acid has _____ carbons:
   a) 20
   b) 16
   c) 18
   d) 12

4) If there are 11 possible saturated fatty acids and 10 possible unsaturated fatty acids, how many completely unsaturated triacylglycerides are possible:
   a) 1000
   b) 1331
   c) 110
   d) 1210

5) Arachidonic acid has a melting point of –49.5 degrees C and palmitoleic acid has a melting point of –0.5 C. If I select from a combinatorial mixture of unsaturated triacylglycerides for a triacylglyceride with a melting point of –0.5 C, then how many palmitoleic acid fatty acid tails do I have in that triacylglyceride:
   a) three
   b) two
   c) four
   d) one
6) Which fatty acid acts as a “fluidity buffer” in membranes
   a) cholesterol
   b) arachidonic acid
   c) oleic acid
   d) palmitoleic acid

7) Roger Kornberg and Jean Thomas explained the Hewish and Bourgogne pattern of nuclease digestion of Chromatin of __________as a structure they called a _______________.
   a) 200x n base pairs, where n is an integer; nucleosome
   b) 300x n base pairs, where n is 1/2, nucleosome
   c) 150x n base pairs, where n is an integer, nucleosome
   d) 472 nucleotides, nucleosome

8) Professor Pieczenik”Perceptor Model of Receptors” states that receptors have
   a) indigenous bound peptides
   b) fatty acid tails
   c) transmembrane hydrophobic regions
   d) alternating LEU zipper sequences

9) A solid black circle on a red sheet of paper will appear __________when there is a white paper with a circle place over the red paper.
   a) green
   b) purple
   c) yellow
   d) pink

10) This chap went to Woods Hole for 6 weeks in the summer, ran a 45 minute sea urchin labeling experiment and identified a protein that triggers the cell cycle. This experiment won him a Nobel prize. He is_______ and the protein is _______.
    a) Hunt, cyclin
    b) Kornberg, polymerase
    c) Ochoa, RNA polymerase
    d) Levine, p53
11) This young man won a Nobel at 25 years old for a Law he discovered at 22 years of age. He is ____________
   a)  Einstein
   b)  Bragg
   c)  Szilard
   d)  Snell

12) William Lawrence Bragg’s equation states that interference occurs when
   a)  \( n \lambda = 2d \sin \theta \), where \( n \) is 1,2,3,…
   b)  \( n \lambda = 2d \sin \theta \), where \( n \) is 1/2
   c)  \( n \lambda = 2d \sin \theta \), where \( \lambda \) is 1/2
   d)  \( n \lambda = 2d \sin \theta \), where \( \lambda \) is 1,2,3,…

13) The macroscopic angle of diffraction \( \psi \) is equal to ____ \( \theta \), the microscopic angle of diffraction.
   a)  3
   b)  2
   c)  1
   d)  4

14) In the Pieczenik modification of the Bragg Equation, 2 sin \( \theta \) is equal to _______
   a)  \( \Psi \)
   b)  \( \tan 2 \theta \)
   c)  \( \theta \)
   d)  \( 2\lambda \)

15) The main assumption in the Bragg equation is that
   a)  the extra distance traveled by the second wave has to be a 1/2 wavelength more to stay in phase
   b)  the extra distance traveled by the second wave has to be an exact multiple of a wavelength to stay in phase
   c)  walking helps you think
   d)  walking on grass in Cambridge, England is very productive

16) In x-ray diffraction the measurements in the structure are __________ to the measurements in the x-ray diffraction photos.
   a)  directly proportional
b) inversely proportional

c) geometrically

d) hyperbolically

17) The stolen photo 51 was 5.5cm from the DNA. What was the diffraction constant? Remember that \( \lambda = 1.54 \text{ Angstroms} \) and the constant is equal to \( \lambda D \).

   a) 10.21 cm-Angstroms
   b) 8.47 cm-Angstroms
   c) 13 cm-Angstroms
   d) 21 cm-Angstroms

18) This is the women scientist who was much abused by Watson and who took photo 51. She knew it was a double helix from the missing 4\(^{th}\) layer line and she is__________.

   a) Janet Mertz
   b) Rosalind Franklin
   c) Martha Stuart
   d) Dorothy Hodgkin

19) Francis Crick didn’t know that the 4\(^{th}\) missing layer line. He thought that it was a double helix because it had the same symmetry has his Hemoglobin thesis project. It had a _________symmetry.

   a) C3 symmetry
   b) C2 symmetry
   c) C1 symmetry
   d) C4 symmetry

20) The pub where Watson and Crick announced their successful rip off of the structure of DNA was named after the American volunteers during WWII that had to violate US laws to fly with the RAF against the nazi’s. It is called the ____________.

   a) Crow
   b) Eagle
   c) Pelican
   d) Sparrow

21) The distance between the glycosidic linkages in the purine-pyrimidine base pairs and the distance between the phosphates in photo 51 is _________Angstroms.
22) In ds DNA, the 6 carbon carbonyl of guanine hydrogen bonds with the _______carbon amine of Cytosine.  

a) 2  
b) 5  
c) 4  
d) 1  

23) In ds DNA, the 2 carbon amine of Guanine hydrogen bonds with the ______ Carbon of Cytosine  

a) 6  
b) 4  
c) 2  
d) 1  

24) This scientist now at the Antonnuchi Building at Roosevelt hospital measured the base ratios in DNA. They are a pattern that is a consequence of the dsDNA structure's base pairing. They are called the ______ rules  

a) Griffith  
b) Donahue  
c) Chargaff  
d) Pauling  

25) ______ gave your aunt, Dr. Beverly Griffith a drink of prime Scotch for her Ph.D. celebration. He got the Nobel for the phosphodiester linkage in DNA.  

a) Lord Rothshild  
b) Duke of Earl  
c) Lord Todd
d) Baron Bart Barrell of Trumpington

26) Your grandfather sequenced proteins, RNA and DNA. He did not sequence carbohydrates. They were sequenced by Prof. Poretz and Pieczenik who will be teaching this course next semester. Your scientific grandfather is _________.

   a) Crick  
   b) Brenner  
   c) Sanger  
   d) Klug  

27) The Sanger (+) system of DNA sequencing using the Ornstein-Davis-Pieczenik acrylamide gels converts nucleotide ________ to sequence

   a) charge  
   b) composition  
   c) length  
   d) isomerization  

28) The following dideoxy sequencing gel gives a mixed DNA sequence.

```
        ddATP  ddCTP  ddGTP  dd TTP
 4  --------
 3  ----------
 2  -----------
 1  ---------
```

What position has a mixed sequence? And what is the mix?

   a) 1; C + T  
   b) 2; A + C  
   c) 2; A + T  
   d) 4; A + G  

29) This year is the 50 Anniversary of the publication of the DNA structure by Watson and Crick. Which of the following is your uncle Crick?
30) This is another scientific uncle who just won this year's Nobel prize. He discovered mRNA, phage genetics, nematode genetics and its genome sequence, apoptosis and published with Prof. Pieczenik on the Origin of Protein Synthesis. He is ___________
   a)  Wilkins
   b)  Chargaff
   c)  Brenner
   d)  Mullis

31) The father and son discovered DNA polymerase I, II, and III. They are the ___________
   a)  Osbornes
   b)  Bushes
   c)  Bronxs
   d)  Kornbergs
32) This California scientist discovered PCR when under the influence of hallucinogenics. He sold his invention to Cetus for ten thousand dollars, who in return sold it to Roche for 300 million. Too many mushrooms to notice. He is ____________
   a) Okazaki
   b) Kornberg
   c) Ochoa
   d) Mullis

33) This scientist worked at NIH and broke the Genetic Code. He is Marshall__________
   a) Mullis
   b) Brenner
   c) Kornberg
   d) Nirenberg

34) Professor Pieczenik’s Lancet paper on a clinical trial of a non-pathogenic strain of HIV as a Potential molecular competitor for HIV enrolled _______”severely immunocompromised patients (T4 mean 66/ul) with immunological deterioration and disease progression despite zidovudine or dideoxyinosine treatment.
   a) 1,215
   b) 936
   c) 45
   d) 11

35) Professor Pieczenik recently identified the source of the non-pathogenic HIV strain in his donor from sequence he did in Denmark because the University tried to suppress his research in retaliation for his support of student tuition cap demands. The sequence identifies the strain as having come from ____________.
   a) Paris to London to Newark
   b) Hamburg to Paris to Newark
   c) Sydney to London to Newark
d) Gabon to Mexico to San Francisco

36) Klenow DNA polymerase has a ______ polymerase activity, ______ exonuclease, ______ exonuclease activity
   a) 3’ to 5’ ; 5’ to 3’, 3’ to 5’
   b) 5’ to 3’, 5’ to 3’; 3’ to 5’
   c) no 5’ to 3’, 5’ to 3’, 3’ to 5’
   d) 5’ to 3’, no 5’ to 3’, 3’ to 5’

and which of the following American Research Institutes collaborated with the nazi’s during WWII during their eugenics liquidation program?
   a) Harvard
   b) Columbia
   c) Waksman
   d) Cold Spring Harbor (Long Island Eugenics Society) and Rockefeller University

(same letter answer for both)