

**BIOL 100 – General Biology**  
**Exam 2 – Fall 2008 -- Prof. Hardy**

Instructions:

- Scantron answer bubbles should be completely filled in with a number 2 pencil.
- Choose THE BEST single answer.

-Please do not open exam until requested to do so by Instructor.

**-PLEASE RECORD YOUR EXAM VERSION IN PENCIL AT THE VERY BOTTOM LEFT CORNER OF YOUR SCANTRON SHEET.**

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**YOU HAVE EXAM VERSION "A". RECORD THIS AT THE BOTTOM LEFT OF SCANTRON.**

- 1) The process converting light energy into chemical energy is
  - A) cellular respiration.
  - B) phosphorylation.
  - C) a thermonuclear reaction.
  - D) photosynthesis.**
  
- 2) The process by which the cytoplasm of a eukaryotic cell divides to produce two cells is called
  - A) mitosis.
  - B) cytokinesis.**
  - C) binary fission.
  - D) telophase.
  - E) spindle formation.
  
- 3) Eukaryotic cells spend most of their cell cycle in which phase?
  - A) interphase**
  - B) prophase
  - C) metaphase
  - D) anaphase
  - E) telophase
  
- 4) Chromatin, the stuff chromosomes are made of, is made up of what?
  - A) lipids and DNA
  - B) proteins and RNA
  - C) ribosomes and DNA
  - D) protein and DNA**
  - E) proteins and amino acids
  
- 5) Which of the following occurs during interphase?
  - A) a reduction in the size of the nuclear membrane
  - B) duplication of the chromosomes
  - C) cytokinesis
  - D) cell growth and duplication of the chromosomes**
  - E) None of the choices are correct.
  
- 6) Looking into your microscope, you spot an unusual cell. Instead of the typical rounded cell shape, the cell has a very narrow middle separating two bulging ends. It sort of looks like the number 8! Then you realize, this is a cell
  - A) undergoing cytokinesis.**
  - B) in the S phase of interphase.
  - C) in the G1 phase of interphase.
  - D) in the G2 phase of interphase.
  - E) that is about to undergo mitosis.

7) During which phase of mitosis do the chromosomes line up on a plane located equidistant from the two spindle poles?

- A) interphase
- B) prophase
- C) metaphase
- D) anaphase
- E) telophase

8) Which one of the following does *not* occur during mitotic anaphase?

- A) Sister chromatids separate.
- B) The chromatid DNA replicates.
- C) Daughter chromosomes begin to move toward opposite poles of the cell.
- D) All of the choices occur during mitotic anaphase.
- E) None of the choices occur during mitotic anaphase.

9) Which of the following is a feature of plant cell division that distinguishes it from animal cell division?

- A) A cell plate forms.
- B) A cleavage furrow forms.
- C) Cytokinesis does not occur.
- D) Four new cells (rather than two) are produced per mitotic division.
- E) The nucleolus disappears and then reappears.

10) Nucleotides

- A) contain nitrogenous bases.
- B) contain sugar molecules.
- C) contain phosphate groups.
- D) can be linked together to form nucleic acids.
- E) All of the choices are correct.

11) DNA differs from RNA because DNA

- A) contains thymine in place of uracil.
- B) consists of a single rather than a double polynucleotide strand.
- C) contains the sugar ribose rather than the sugar deoxyribose.
- D) contains phosphate groups not found in RNA.

12) Genetic information is encoded in the

- A) quaternary structure of a protein.
- B) sequence of nucleotides in DNA.
- C) degree of saturation of fatty acids.
- D) length of glycogen.
- E) linear sequence of amino acids in a polypeptide.

- 13) The transfer of genetic information from DNA to RNA is called
- A) translation.
  - B) transcription.**
  - C) initiation.
  - D) elongation.
  - E) promotion.
- 14) We would expect that a 36-nucleotide sequence will direct the production of a polypeptide that consists of
- A) 2 amino acids.
  - B) 3 amino acids.
  - C) 5 amino acids.
  - D) 12 amino acids.**
  - E) 15 amino acids.
- 15) The directions for each amino acid in a polypeptide are indicated by a codon that consists of \_\_\_\_\_ nucleotide(s) in an RNA molecule.
- A) 5
  - B) 4
  - C) 3**
  - D) 2
  - E) 1
- 16) A base substitution mutation in a gene sometimes does not result in a different protein. Which of the following factors could account for this?
- A) the mutation affects only the sequence of the protein's amino acids, so the protein stays the same
  - B) the rarity of such mutations
  - C) the fact that such mutations are usually accompanied by a complementary deletion
  - D) some amino acids are produced from more than one codon**
- 17) Translation consists of which of the following?
- A) the conversion of genetic information from the language of nucleic acids to the language of proteins**
  - B) the conversion of genetic information from DNA nucleotides into RNA nucleotides
  - C) the addition of nucleotides to a DNA template
  - D) the conversion of genetic information from the language of proteins to the language of enzymes
  - E) DNA replication
- 18) What type of bonds hold the two strands of a DNA double helix together?
- A) Covalent
  - B) Ionic
  - C) Hydrogen**

19) Which nucleotides (abbreviated by their bases) pair?

- A) A with T, G with C
- B) A with G, T with C
- C) A with C, T with G

20) The genotypic and phenotypic frequencies for the F1 generation, produced by the cross between the two parents shown below, are....

System: J = dominant allele for telling bad jokes      j = recessive allele for good jokes

P: Jj x jj

- A) Genotypic: jj (3) : Jj (1) : JJ (0); Phenotypic: good jokes (3) : bad jokes (1)
- B) Genotypic: jj (1) : Jj (2) : JJ (1); Phenotypic: good jokes (1) : bad jokes (3)
- C) Genotypic: jj (1) : Jj (1) : JJ (0); Phenotypic: good jokes (1) : bad jokes (1)
- D) Genotypic: jj (1) : Jj (1) : JJ (1); Phenotypic: good jokes (1) : bad jokes (2)

21) Starting with the Parental generation below, follow the crossing through to the F2 generation and give me the genotypic and phenotypic frequencies for the F2 generation.

System: J = dominant allele for telling bad jokes      j = recessive allele for good jokes

P: jj x JJ

- A) Genotypic: jj (3) : Jj (1) : JJ (0); Phenotypic: good jokes (0) : bad jokes (1)
- B) Genotypic: jj (1) : Jj (2) : JJ (1); Phenotypic: good jokes (1) : bad jokes (3)
- C) Genotypic: jj (1) : Jj (1) : JJ (0); Phenotypic: good jokes (0) : bad jokes (1)
- D) Genotypic: jj (3) : Jj (0) : JJ (1); Phenotypic: good jokes (0) : bad jokes (1)

22) A dihybrid cross is

- A) the second generation of a self-fertilized plant.
- B) a breeding experiment in which the parental varieties have only one trait in common.
- C) a breeding experiment in which the parental varieties differ in only one trait.
- D) a triploid plant that results from breeding two very different plants.
- E) a breeding experiment in which the parental varieties differ in only two traits.

23) Starting with the Parental generation below, follow the crossing through to the F2 generation and give me the expected phenotypic frequencies.

System:

Gene #1: J = dominant allele for telling bad jokes      j = recessive allele for good jokes  
Gene#2: B = dominant allele for blond hair      b = recessive allele for red hair

P: JJBB x jjbb

- A) bad jokes & blond 9: bad jokes & red 3: good jokes & blond 3: good jokes & red 1
- B) bad jokes & blond 1: bad jokes & red 3: good jokes & blond 3: good jokes & red 9
- C) bad jokes & blond 3: bad jokes & red 1: good jokes & blond 3: good jokes & red 1
- D) bad jokes & blond 3: bad jokes & red 9: good jokes & blond 9: good jokes & red 3

24) It is possible for an expressed phenotypic trait to skip a generation or two in your family.

A) True

B) False

25) Which one of the following is *false*?

A) The genetic makeup of an organism constitutes its genotype.

B) An organism with two different alleles for a single trait is said to be heterozygous.

C) Alleles are alternate forms of a gene.

D) An allele that is fully expressed is referred to as recessive.

E) The expressed physical traits of an organism are called its phenotype.

26) The pumpkin is a \_\_\_\_\_, which develops from the \_\_\_\_\_ of a \_\_\_\_\_.

A) seed, flower, plant.

B) flower stalk, base, flower.

C) fruit, ovary, flower

D) ovary, fruit, flower

E) none of the above

27) Originally, Jack of the Lantern

A) was a doomed soul who roams the Earth with a lantern made from a pumpkin.

B) was a doomed soul who roams the Earth with a lantern made from a *Cucurbita pepo*.

C) was a doomed soul who roams the Earth with a lantern made from a turnip.

D) was a doomed soul who roams the Earth with a lantern made from a gourd.

E) both A and B.

28) *Cucurbita pepo* is the scientific Latin name for the cultivated turnip.

a. true

b. false.

29) *Cucurbita* as a genus has been cultivated by humans for at least

a. 2000 years.

b. 8000 years.

c. 9,000-10,000 years.

d. 500 years, since the discovery of America by Columbus.

30) A hollowed-out *Cucurbita pepo* with a lit candle and a face carved into it was originally used throughout the Scottish and Irish country-side to scare away evil spirits in Halloween.

a. true

b. false.

31) Pumpkin plants are able to climb via

A) long hairs on the stem

B) leaves that twine around other plants

C) tendrils

D) spines

32) The ribosome is

- A) a probe for examining rib orientation
- B) an organelle inside of a nucleus that directs protein production.
- C) an organelle in the cytoplasm that directs protein production.
- D) an organelle inside the nucleus that directs translation
- E) B and D

33) tRNA

- A) is the genetic transcript that is translated into a protein.
- B) is a major structural component of the ribosome.
- C) is an RNA molecule to which specific amino acids can attach.

34) rRNA

- A) is the genetic transcript that is translated into a protein.
- B) is a major structural component of the ribosome.
- C) is an RNA molecule to which specific amino acids can attach.

35) mRNA

- A) is the genetic transcript that is translated into a protein.
- B) is a major structural component of the ribosome.
- C) is an RNA molecule to which specific amino acids can attach.

36) Amino acid sequence of a protein is that protein's

- A) Primary structure
- B) Secondary structure
- C) Tertiary structure
- D) Quaternary structure

37) The mitotic spindle directs the

- A) division (cytokinesis) of a cell during mitosis.
- B) division (cytokinesis) of a cell during meiosis.
- C) movement and segregation of the chromosomes during mitosis.

38) A cell that goes through 1 round of the cell cycle without recognizing the proper signal to enter cytokinesis will

- A) have 1 nucleus with double the genetic content
- B) have 2 nuclei
- C) have 1 nucleus
- D) have 4 nuclei

39) A cell that goes through 4 rounds of the cell cycle without recognizing the proper signals to enter cytokinesis (i.e., no cytokinesis has occurred) will

- A) have 1 nucleus
- B) have 4 nuclei
- C) have 8 nuclei
- D) have 12 nuclei
- E) have 16 nuclei

40) The genetic code is the set of codons that

A) determine how DNA is copied.

B) determine how DNA or mRNA sequences are ultimately translated into amino acid sequences.

41) The enzyme involved with DNA polymerization is

A) RNA polymerase

B) Helicase

C) Ligase

D) DNA polymerase

42) RNA exists in the form of a double helix

A) True

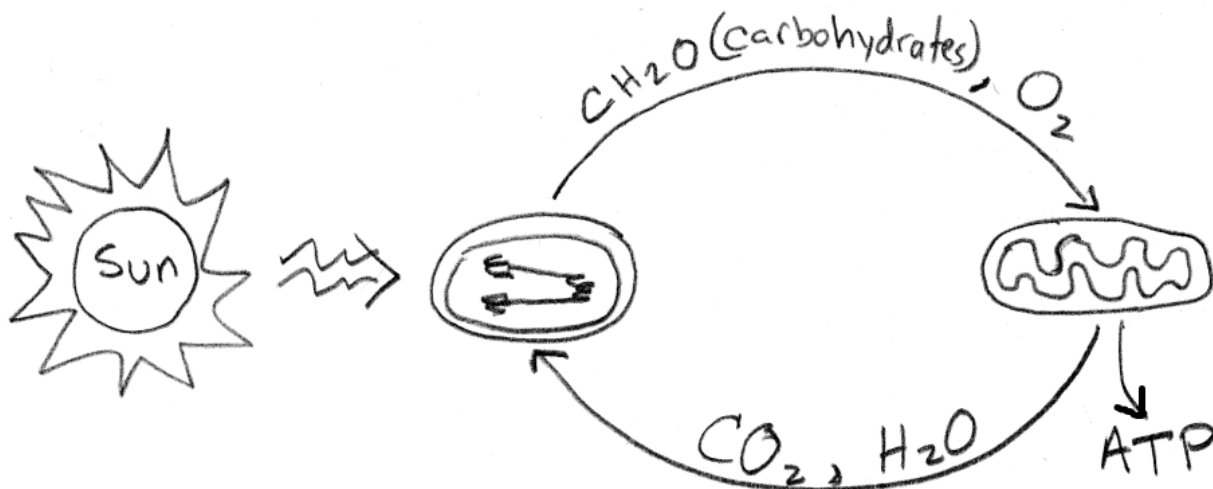
B) False

43) The Semi-conservative Model for DNA replication states that

A) Each of the two daughter DNA double helices are comprised completely of new DNA molecules.

B) Each of the two daughter DNA double helices are comprised completely of old DNA molecules.

C) Each of the two daughter DNA double helices are comprised of 1 old and 1 new DNA molecule.



44) Based on the figure above, which of the following statements is *false*?

A) Photosynthesis and aerobic cellular respiration are essentially the reverse of one another.

B) The carbon of carbohydrates comes from the carbon atoms of  $\text{CO}_2$ .

C) The cycle of photosynthesis and aerobic cellular respiration is perpetual, requiring no input of energy.

- 45) The light reactions of photosynthesis occurs in the thylakoid membranes.  
A) True  
B) False
- 46) Photosystems I and II do the following  
A) harvest energy from ATP molecules  
B) pump protons (H<sup>+</sup>) down their concentration gradient to make ATP  
C) harvest the light energy that ultimately drives photosynthesis  
D) take CO<sub>2</sub> and convert it into carbohydrates.
- 47) O<sub>2</sub> comes from what?  
A) cellular respiration  
B) the splitting of water molecules during the Calvin cycle  
C) the splitting of water molecules during the light reactions  
D) the splitting of CO<sub>2</sub> molecules during photosynthesis.
- 48) The majority of the carbon atoms in our bodies can be traced to  
A) the CO<sub>2</sub> molecules taken in by a plant and into the Calvin cycle.  
B) the CO<sub>2</sub> molecules taken in by a plant and into the light reactions.
- 49) The majority of the carbon atoms in our bodies can also be traced to one of the products of cellular respiration.  
A) True  
B) False
- 50) Which mode of energy production would result in the lesser accumulation of the greenhouse gas CO<sub>2</sub> in the atmosphere?  
A) The mining and burning of fossil fuels such as coal and oil.  
B) The growing and burning of wood from trees.