

L100 Exam One --- ANSWER KEY

Short answers section:

1. **Fill in the appropriate stage(s). Each stage may be used more than once and a stage may not be used at all. (7pts)**

Stages: Glycolysis // Pyruvate Oxidation // Krebs Cycle (Citric acid cycle) // Electron Transport Chain

- a. During which stage(s) is the input of oxygen necessary?
Electron Transport Chain
- b. The input of energy in the form of ATP is required in which stage(s)?
Glycolysis
- c. In which stages are electron carriers filled, specifically, NAD⁺ is converted to NADH or FAD is converted to FADH₂?
Glycolysis / Pyruvate Oxidation / Krebs Cycle
- d. In which stages are electron carriers stripped of their electrons, specifically, NADH is converted to NAD⁺ or FADH₂ is converted to FAD?
Electron Transport Chain
- e. Carbon Dioxide is formed as a waste product during which stage(s)?
Pyruvate Oxidation / Krebs Cycle
- f. Water is the output of which stage?
Electron Transport Chain

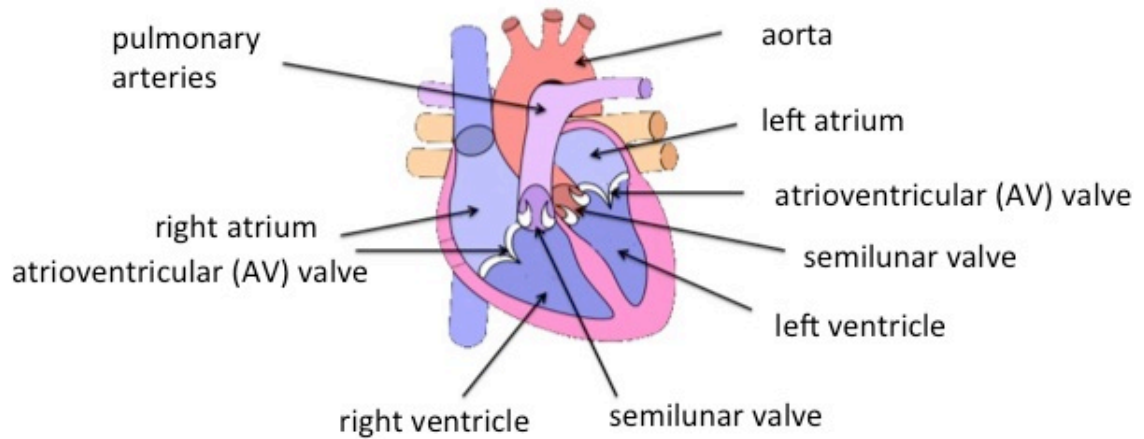
ATP is formed during which stages of cellular respiration? Which stage forms the most? **Glycolysis / Krebs Cycle / Electron Transport Chain**

Electron Transport Chain - most

2. Which side of the heart has more muscle, and why? (1.5pt)

Left side of the heart - need to pump a longer distance, needs more force behind it (right side is pumping only to the lungs - a short distance)

3. (a) Label the heart schematic below. There are four chambers, four valves and two vessels. If you are unsure of what the arrow is pointing to, ask! (2.5pts)



4. Place the following structures in the correct order based on the pathway that a piece of food would travel as it goes through the digestive system. In addition, indicate where each of the following processes occur. **NOTE: a process MAY occur at more than one place; indicate all places it occurs. AND some of the structures may NOT do any of the processes that are listed, if so, leave 'processes' column blank for that structure.** (5pts)

structures:

stomach
mouth
small intestine
large intestine
esophagus

processes:

water re-absorption
carbohydrate digestion
protein digestion
fat digestion
nutrient absorption

Structures: place in order	
(1) mouth	Carbohydrate digestion
(2) esophagus	
(3) stomach	Protein digestion
(4) small intestine	Carbohydrate digestion, Protein digestion, fat digestion, nutrient absorption
(5) large intestine	Water re-absorption

5. What is the pattern of inheritance depicted in the pedigree chart below (autosomal recessive, autosomal dominant or X-linked recessive) ? **X-linked of Autosomal Recessive** (2pts)

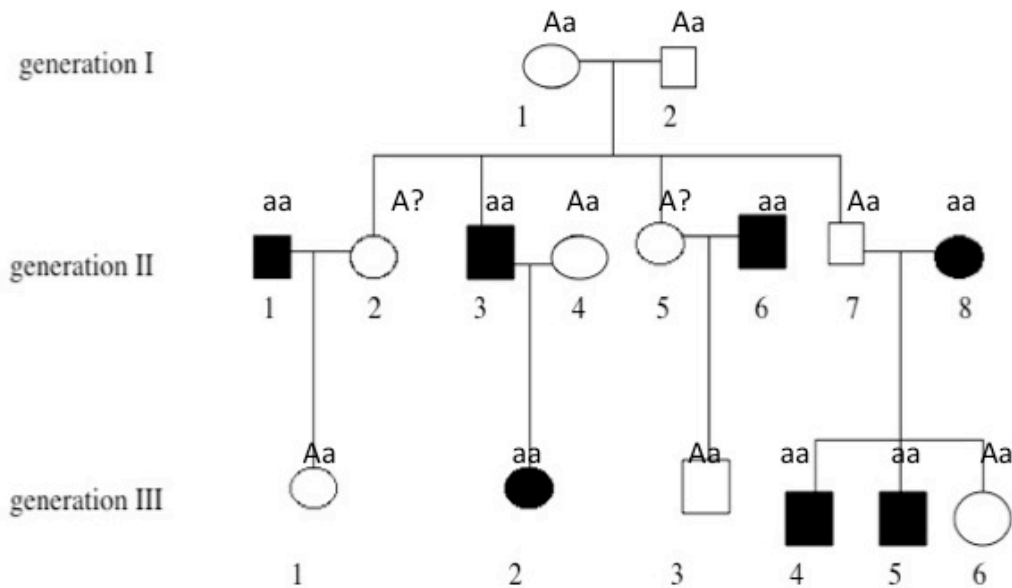
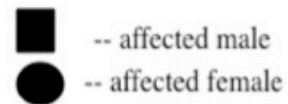
(b) Are the other two patterns 100% ruled out? Be specific as to why. (2pts)

You can rule out Autosomal dominant, because if it was a dominant trait than the two parents in the 1st generation would have only recessive alleles (being homozygous recessive since they don't express the trait) and could not pass down a dominant allele (could not have a child with the trait).

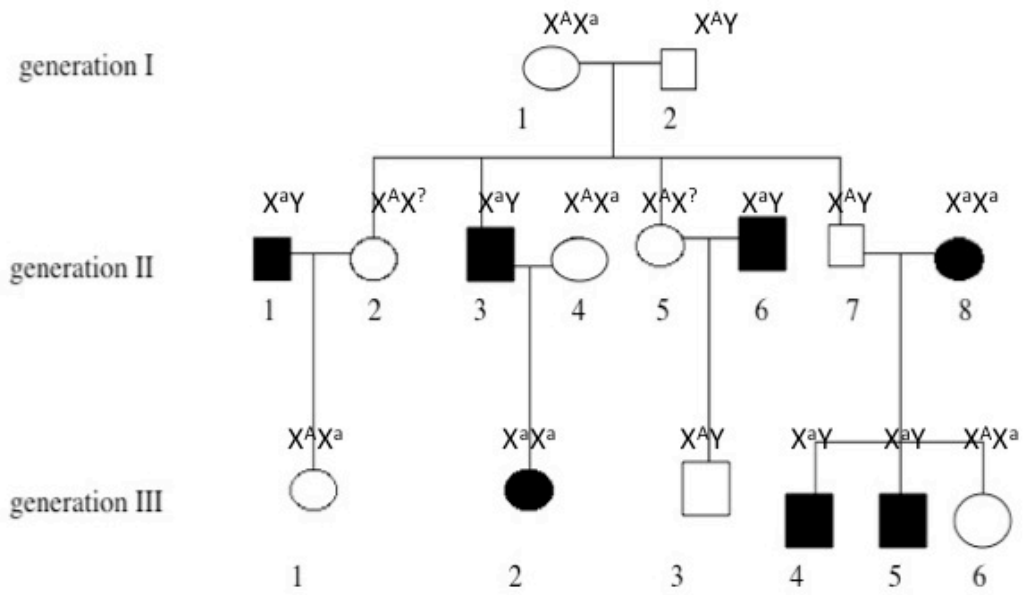
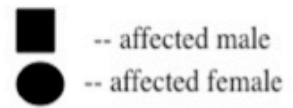
Can't rule out either of the recessive patterns.

(c) Write the genotypes for all individuals. (2pts)

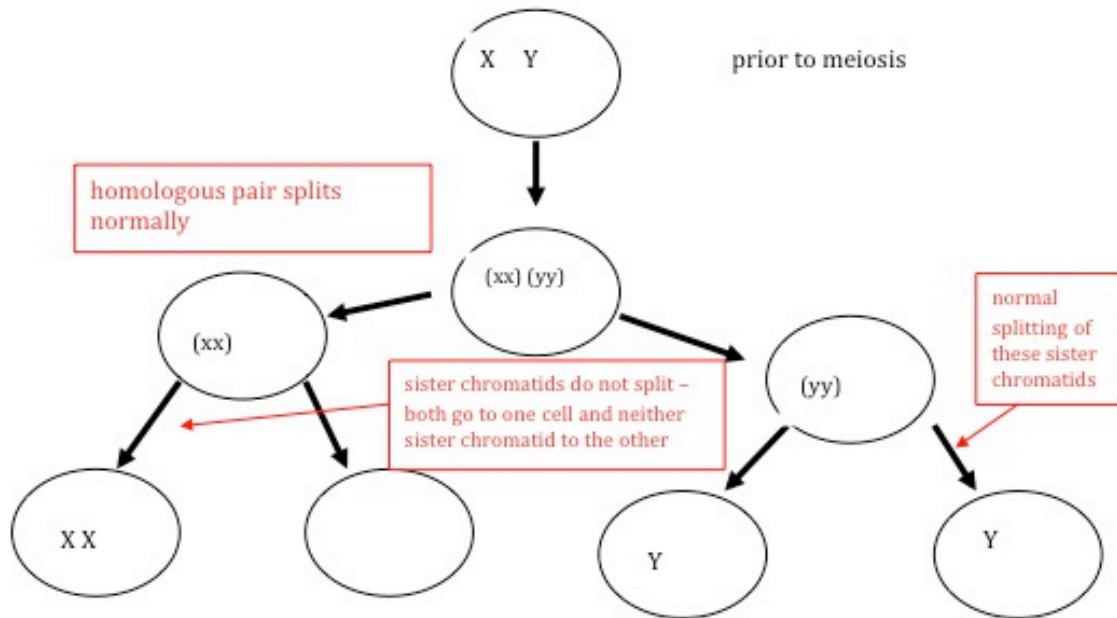
Autosomal Recessive



X-linked Recessive



6. Fill in the cells below showing the process of meiosis of the male's sex chromosomes (XY) with **non disjunction of the X-chromosome occurring during meiosis II**. DO NOT show crossing over. (2pts)



- (b) Assuming a normal egg, could this man (with the above gametes) father a Turner syndrome (XO) child? Again, assuming a normal egg, could this man father a Klinefelter's syndrome child (XXY)? (2pts)

Yes to the male could donate a gamete with no sex chromosomes in it and combined with a normal egg would result in Turner's Syndrome.

If the egg was normal, than NO this man (with non-disjunction in meiosis II) could not have fathered the child, since none of his gametes would be XY (and the Y has to come from the male).

7. In a bird species, a dominant allele B codes for the plumage (feather) color to be blue, while a recessive allele codes for a brown plumage color. In addition the dominant allele F codes for a large beak and the recessive allele f codes for a small beak. What is the **predicted phenotypic and genotypic ratios** of the offspring from a cross of between a male heterozygous for both traits and female who has brown plumage & and is heterozygous for large beak? Show your work for partial credit. (4pts)

Parents' genotypes:

BbFf * bbFf

	BF	bF	Bf	bf
bF	BbFF	bbFF	BbFf	bbFf
bf	BbFf	bbFf	Bbff	bbff
bF	BbFF	bbFF	BbFf	bbFf
bf	BbFf	bbFf	Bbff	bbff

Do not have to do the bottom two rows since they are repeats of the top two rows. Answer is the same, just multiples of each other.

Genotypic Ratio:

- BbFF - 2/16
- BbFf - 4/16
- Bbff - 2/16
- bbFF - 2/16
- bbFf - 4/16
- bbff - 2/16

Phenotypic Ratio:

- Blue & large beak - 6/16
- Blue & small beak - 2/16
- Brown & large beak - 6/16
- Brown & small beak - 2/16

Bonus: An electrocardiogram is a picture of the electrical pattern of the heart during a normal heartbeat. On the electrocardiogram below indicate the part of the graph that represents: (1.5pts)

- (1) atria contracting
- (2) ventricles contracting
- (3) atria relaxing
- (4) ventricles relaxing

(Note: ONLY three of the four are visible as a change in the EKG below - only indicate the three that can be seen on the figure).

