

Question bank of Practical Medical Genetics

Biology Department-College of Science
Second Year Students

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Q1) Why the process of mitosis is critical to all eukaryotic organisms?

Q2) How many monads, bivalents, tetrads and dyads would you find during the following stages of meiosis in human beings?

	Monad	Dyad	Tetrad	Bivalent
Zygonema				
Prophase II				
Pachynema				

Q3) How could you differentiate between males and females of fruit fly in the lab.?

Q4) Fill the following blanks: (15 marks)

1. Histones are proteins rich in and..... residues, so they have which binds tightly to in DNA.
2. *Drosophila* is being used as a genetic model for several human diseases including and
3. Cell cycle consists of two alternate processes
 - a.
 - b.

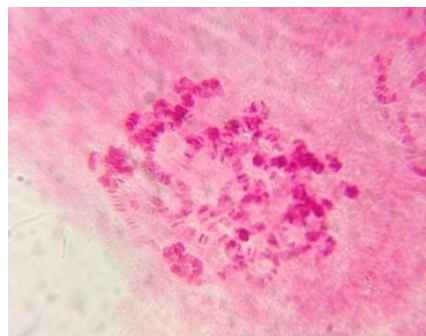
Q5) Describe how chromosomes are named on the basis of their centromere placement, with example for each one.

Q6) An organism has six pairs of chromosomes, in the absence of crossing over, how many different chromosomal combinations are possible in the gametes?

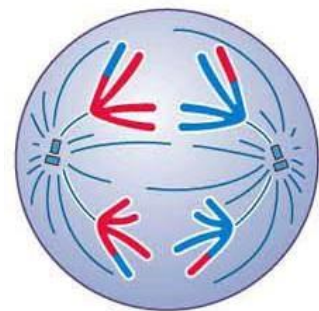
Q7) Identify the following slides:



A-



B-



C-

Q8) Write the name, type and location of each of the following mutations: (15 marks)



Name:

Type:

Location:



Name:

Type:

Location:

Q9) Write the type of chromosome for each of the following depending on the basis of their centromere placement.

Chromosome number (13) in human

1. (Y) chromosome in mice
2. Chromosome number (1) in human
3. (X) chromosome in human

Q10) What is the probability of a sperm cell of a man containing only maternal chromosomes in the absence of crossing over?

Q11) Choose the correct answer(s) for each of the following: (

Most human chromosomes are belonging to this type:

- 1- Polytene chromosomes commonly stained with:
- 2- Chemical modification of histone protein to unwind chromosome:
- 3- Fruit flies, commonly anesthetized with:
- 4- Multiple rounds of replication produce many sister chromatids that remain synapsed together:
- 5- Spindle fibers attach to each chromosome through a complex of proteins:
- 6- Fruit fly is being used as a genetic model organism especially in:
- 7- Kind of histone protein which is rich in lysine residue:
- 8- The replicated chromosomes that retain their individual identity, usually limited to certain tissues in animals:

9- This type of chromosome contain only one arm:

(down syndrome, polyploidy, H3, giemsa stain, acrocentric, tubulin, sub-metacentric, kinetochore, telocentric, kidney, house mouse, metacentric, H1, methylation, ketamine, liver, H4, acetocarmin, polytene chromosome, ether, neurodegenerative disease)

Q12) Why the process of mitosis is critical to multicellular diploid organisms?

Q13) What is the probability of a child containing only grandfathers chromosomes in the absence of crossing over?

Q14) Enumerate the cells signals which regulates the cell cycle.

Q15) Write only (4) Differences between male and female of fruit fly.

Q16) Write the number (n) of chromosomes of each of the following:

- 1- First polar body
- 2- Primary spermatocyte
- 3- Secondary oocyte
- 4- Ootid

Q17) Why the process of mitosis is critical to multicellular diploid organisms?

Q18) What is the probability of a sperm cell of a man containing only paternal chromosomes in the absence of crossing over?

Q19) Write only (5) characteristics of fruit fly as a model organism. (5 marks)

Q20) How many bivalents, tetrads, dyads and monads would you find during the following stages of meiosis in human?

	Monad	Dyad	Tetrad	Bivalent
Prophase II				
Zygonema				
Pachynema				

Q20) Which step of mitosis leads to significant genetic variation?

Q21) When we view a cell under a microscope during mitosis, why do its chromosomes?

Q22) Wingless mutation (*wg*), *let* (lethal), in *Drosophila*, If a female heterozygous for *let* is crossed with a wild type male, what will the sex ratio of the adult progeny would be?

Q23) Fill the following blanks:

1. (H1,H2A,H2B,H3,H4) are proteins rich inand residues, so they have.....which binds tightly to -ve charged phosphates in DNA.
2. Example of metacentric chromosome in human cell is
3. & both control the cell cycle.
4. Tetrads appear in Of meiosis by process called

Q24: Answer the followings depending on the slide:

- 1- Which larval stage used? :
- 2- Stain used in lab:
- 3- Name of the pointed part :

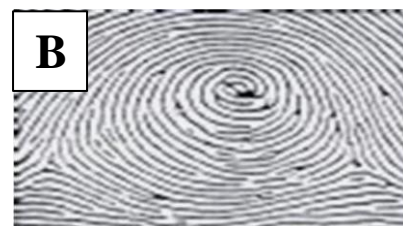
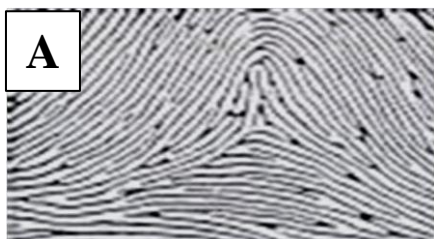


Q25) What are the two classes of accessory pigments in eye of *Drosophila*.

Q26) write the number of barr body in the following cases.

- A- XX Male syndrome. B- Turner syndrome.

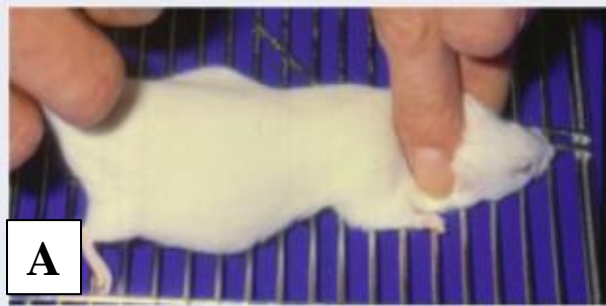
Q27) Identify (Name) the followings:



Q28) Enumerate (**only 5**) simple Human non metric traits.

Q29) Enumerate nuclear abnormalities depending on micronucleus test and write the name of the stain which is used in the lab.

Q30) Identify (Name) the followings:



Q31) depending on the mentioned informations, write the name of the syndrome in the following cases:

A- Male, has 2 X chromosomes and Total ridge count is 130.

B- Female, 1 X chromosome and Total ridge count is 180.

Q32) Write the name of the test of the followings:

Handedness test.

B- Ocular dominancy test.

Q33) A normal human cell has a diploid number of 46. A normal human germ line cell undergoing meiosis contains how many *bivalents* during prophase I?

Q34) A place in the eukaryotic cell cycle at which a "decision" is made whether to proceed through the cell cycle or to arrest cell cycle progression is generally known as

Q35) Which step of mitosis leads to significant genetic variation?

Q36) When we view a cell under a microscope during mitosis, why do its chromosomes look like X's?

Q37) Which of the following statements about meiosis is false?

1. the products of meiosis are usually haploid.
2. **somatic cells enter into meiosis....(only germ line cells undergo meiosis)**
3. during meiosis, crossing over may occur between homologous chromosomes.
4. all of the above.

Q38) Which of the following statements about homologous chromosomes is true?

1. They are identical.
2. In each cell there are two pairs of homologous chromosomes--one pair from each parent.
3. The homologous pairs of chromosomes pair up and undergo recombination during prophase of mitosis.
4. **They contain all of the same genes but not necessarily the same alleles.**

Q39) With respect to the indicated genes, how many *different* kinds of gametes can be produced by an individual with the genotype AABBCCDdEe? (Assume independent assortment.)

Q40) In each of Mendel's monohybrid crosses of pea plants, the trait that was observed in the F₁ generation ?

Q41) An *allele*

1. **is a form of a gene.**
2. can encode only a dominant trait.
3. cannot display codominance with another allele.
4. all of the above.

Q42) Two normal looking *Drosophila* were mated and produced 41 gold (normal) and 13 ebony-bodied flies. Which of the following statements is most likely true?

1. one of the parental flies was homozygous for gold body color.
2. ebony and gold assort independently.
3. epistasis exists between gold and ebony body color.
4. **ebony body is a recessive trait. ... (3:1 ratio is classic monohybrid cross ratio)**

Q43) A plant heterozygous for three unlinked genes (genotype AaBbCc) is self-crossed. What percentage of the offspring should have the phenotype ABC?

Q44) Suppose you had an organism displaying the *phenotype* BC. In order to determine the *genotype* of this individual, with which of the following genotypes should you cross it in a *test cross*?

Q44) A man with blood type AB is married to a woman with blood type A who has three children with blood types A, AB, and B. Which child could the man reasonably suspect was not his own on the basis of blood groups?

Q45) Suppose you are performing a trihybrid cross and want to determine if the phenotypes observed in the F₂ generation fall into a 27:9:9:9:3:3:3:1 ratio indicative of independent assortment of the three genes under study. Which statement is correct?

Q46) In a human pedigree, a male is symbolized by a

1. circle
2. square
3. diamond
4. triangle

Q47) Enumerate Types of Mutation (According to dominancy).

Q48) Give 2 Examples of Recessive lethal mutations.

Q49) Define Micronucleus and write the best four (4) stains used for its detection

Q50) Write the classes of accessory pigments of red eye of fruit fly with the phenotype of the final products.

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