**AP Biology QW13 1-7**
1. Describe what happens to the tetrads after they form.

1. Prophase I of meiosis forms the tetrads. They line up at the midway point between the two poles of the cell to form the metaphase plate. There is equal chance of a microtubule fiber to encounter a maternally or a paternally inherited chromosome. Orientation of each tetrad is independent of the orientation of other tetrads.
2. Prophase II of meiosis forms the tetrads. They line up at the midway point between the two poles of the cell to form the metaphase plate. There is equal chance of microtubule fiber to encounter maternally or paternally inherited chromosome. Orientation of each tetrad is independent of the orientation of other tetrads.
3. Prophase I of mitosis forms the tetrads. They line up at the midway between the two poles of the cell to form the metaphase plate. There is equal chance of a microtubule fiber to encounter a maternally or a paternally inherited chromosome. Orientation of each tetrad is independent of the orientation of other tetrads.
4. Prophase I of meiosis forms the tetrads. They line up at the midway between the two poles of the cell to form the metaphase plate. There is a chance of microtubule fiber to encounter maternally inherited chromosome. Orientation of each tetrad is independent of the orientation of other tetrads.

2. Which of the following distinguishes metaphase I from metaphase II?

1. Metaphase I occurs when chromosomes appear in homologous pairs on the spindle. Metaphase II has a single line of chromosomes on the spindle. A Pair of chromosomes is pulled apart and migrate towards pole in anaphase I, while in anaphase II sister chromatids separate. Telophase I reconstitutes the nucleus and loosen the chromosomes, while telophase II mimics telophase I.
2. Prophase I condenses the chromosomes and eliminates the nuclear membrane. The microtubules arrange in a spindle. Prophase II mimics prophase I. Metaphase I occurs when chromosomes appear in homologous pairs on the spindle. Metaphase II has a single line of chromosomes on the spindle. Pairs of chromosomes are pulled apart and migrate towards the poles during anaphase I, while in anaphase II sister chromatids separate. Telophase I reconstitutes the nucleus and condenses the chromosomes, while telophase II mimics telophase I.
3. Prophase I condense the chromosomes and add nuclear membrane. The microtubules arrange in a spindle. Prophase II mimics prophase I. Metaphase I occurs when chromosomes appear in homologous pairs on the spindle. Metaphase II has a single line of chromosomes on the spindle. Pair of chromosomes are pulled apart and migrate towards the poles in anaphase I, while in anaphase II sister chromatids separate. Telophase I reconstitutes the nucleus and loosens the chromosomes, while telophase II mimics telophase I.
4. Prophase I condenses the chromosomes and eliminates the nuclear membrane. The microtubules arrange in a spindle. Prophase II mimics prophase I. Metaphase I occurs when chromosomes appear in homologous pairs on the spindle. During Metaphase II, the chromosomes line up in a double line across the spindle. Each pair of chromosomes is pulled apart and migrate towards the poles in anaphase I, while in anaphase II sister chromatids separate. Telophase I reconstitutes the nucleus and loosen the chromosomes, while telophase II mimics telophase I.

**3.** Though the stages of meiosis have the same names as the stages of mitosis, they exhibit fundamental differences. What are the main differences between the two processes?

1. Meiosis differs from mitosis in that the number of chromosomes is halved and genetic variation is introduced in meiosis, but not in mitosis.
2. Meiosis differs from mitosis in that the number of chromosomes is halved and genetic variation is reduced in meiosis, but not in mitosis.
3. Metaphase and telophase portions of meiosis and mitosis are the same. Meiosis and mitosis are also the same, except for the number of chromosomes. Anaphase I and anaphase are different.
4. Prophase and telophase portions of meiosis and mitosis are the same. Meiosis II and mitosis are also the same and have the same number of chromosomes. Anaphase I and anaphase are different.

**4.** Explain how the orientation of homologous chromosomes during metaphase I of meiosis contributes to greater variation in gametes.

1. The random alignment of homologous chromosomes at the metaphase plate ensures the random destination of the chromosomes in the daughter cells.
2. Because homologous chromosomes dissociate from the spindle fibers during metaphase I, they move randomly to the daughter cells.
3. The homologous chromosomes are paired tightly during metaphase I and undergo crossover as the synaptonemal complex forms a lattice around them.
4. Recombination of maternal and paternal chromosomes occurs in metaphase I, because the homologous chromosomes are not connected at their centromeres.

**5.** Explain how the Red Queen’s catchphrase, “It takes all the running you can do to stay in the same place,” describes co-evolution between competing species.

1. When a sexually reproducing species and an asexually reproducing species compete for the same resources, they both “run [evolve] in the same place” because the increased genetic variation in the sexually reproducing species balances the loss in energy it uses to find and attract mates.
2. When one species gains an advantage with a favorable variation, selection increases on another species with which it competes. This species must also develop an advantage or it will be outcompeted. The two species “run [evolve] to stay in the same place.”
3. When one species develops a mutation that decreases its ability to survive, a competing species will become better able to survive even though it has not changed in any way. In effect, this species “runs [evolves] to stay in the same place.”
4. When two asexually reproducing species encounter rapid environmental change, the species that is also able to reproduce sexually will outcompete the other. This way it can “run [evolve] to stay in the same place.”

**6.** Which three processes lead to variation among offspring that have the same two parents?

1. genetic recombination, fertilization, meiosis
2. crossing over, random chromosome assortment, genetic recombination
3. meiosis, crossing over, genetic recombination
4. fertilization, crossing over, random chromosome assortment

**7.** Compare the three main types of life cycles in multicellular organisms and give an example of an organism that employs each.

1. In a diploid dominant cycle, the multicellular diploid stage is present, as in humans. Haploid-dominant life cycles have a multicellular haploid stage, as in fungi. In alternation of generations, both haploid-dominant and diploid-dominant stages alternate, as in plants.
2. In a diploid-dominant cycle, the unicellular diploid stage is present, as in humans. In a haploid-dominant life cycle, a unicellular haploid stage is present, as in fungi. In alternation of generations both haploid-dominant and diploid-dominant stages alternate, as in plants.
3. In a diploid-dominant cycle, a multicellular haploid stage is present, as in humans. In a haploid-dominant life cycle, a multicellular diploid stage is present, as in fungi. In alternation of generations, both haploid-dominant and diploid-dominant stages alternate, as in plants.
4. In a diploid-dominant cycle, a multicellular diploid stage is present, as in algae. In a haploid-dominant life cycle, a multicellular haploid stage is present, as in plants. In alternation of generations, both haploid-dominant and diploid-dominant stages alternate, as in fungi.