**RAD guide—Meiosis Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_ Period\_\_**

|  |  |
| --- | --- |
| **p.323-327** | **Ch. 11.4 Meiosis** |
| Learning Goals & achievement standards | 1. The student will understand the process of meiosis and its importance in sexual reproduction. 2. The student will understand the similarities and differences of mitosis and meiosis. 3. The student will understand the difference between sexual and asexual reproduction and give examples which explain the advantages of each type of reproduction.   D3: The student will explain the process of meiosis and its importance in sexual reproduction using the following terms: somatic cells, gametes, dipoid(2n), haploid(n), variation, homologous chromosomes.  A4/D4: The student can explain how a homologous pair of chromosomes is alike and different.  D4/E4/F4: Explain how the process of meiosis accounts for diversity among siblings.  E3: The student will explain at least 3 similarities and 3 differences between mitosis and meiosis.  F3: The student will explain the advantages and disadvantages of sexual and asexual reproduction.  D2: The student can identify the end products of meiosis.  E2: The student can identify at least 2 similarities and 2 differences between mitosis and meiosis.  F2: The student can describe, identify, and give examples of both sexual and asexual reproduction. |
| |  | | --- | | **Karyotype** | | **Homologous** | | **Diploid** | | **Haploid** | | **Meiosis** | | **Autosomes** | | **Sex chromosomes** | | **Random segregation** | | **Independent assortment** | | **Tetrad** | | **Crossing over** | | **Zygote** |   **Gamete (sperm, egg)** | |
| **Chromosome Number**  What is the diploid number in human cells? What is the haploid number?  A donkey has a diploid number of 62. (2n=62) What is its haploid number? (1n=x)  **Phases of Meiosis**  How many rounds of DNA replication occur during meiosis?  How many nuclear & cytoplasmic divisions occur during meiosis? Why is this important?  What is crossing over? Why is it important?  Write **a brief description** and **draw a sketch** of each stage of meiosis. (use two different colors to represent homologous chromosomes)  What is a zygote? | ing things...   |  |  |  |  | | --- | --- | --- | --- | | **Prophase I** | **Metaphase I** | **Anaphase I** | **Telophase I** | | **Prophase II** | **Metaphase II** | **Anaphase II** | **Telophase II** | |
| **Comparing Meiosis**  **and Mitosis**  What are two differences between meiosis and mitosis?  What are two similarities between meiosis and mitosis? |  |
| Sketch a karyotype for a somatic cell having diploid number 2n=8 & a gamete having 1n=4 |  |

KEY 11.4 Meiosis Rad guide 2/10/2014

**RAD guide—Meiosis Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_ Period\_\_**

|  |  |
| --- | --- |
| **p.323-327** | **Ch. 11.4 Meiosis** |
| Learning Goals & achievement standards | 1. The student will understand the process of meiosis and its importance in sexual reproduction. 2. The student will understand the similarities and differences of mitosis and meiosis. 3. The student will understand the difference between sexual and asexual reproduction and give examples which explain the advantages of each type of reproduction.   D3: The student will explain the process of meiosis and its importance in sexual reproduction using the following terms: somatic cells, gametes, dipoid(2n), haploid(n), variation, homologous chromosomes.  A4/D4: The student can explain how a homologous pair of chromosomes is alike and different.  D4/E4/F4: Explain how the process of meiosis accounts for diversity among siblings.  E3: The student will explain at least 3 similarities and 3 differences between mitosis and meiosis.  F3: The student will explain the advantages and disadvantages of sexual and asexual reproduction.  D2: The student can identify the end products of meiosis.  E2: The student can identify at least 2 similarities and 2 differences between mitosis and meiosis.  F2: The student can describe, identify, and give examples of both sexual and asexual reproduction. |
| |  | | --- | | **Karyotype**  Photo of chromosomes; usually shot at metaphase of mitosis for a somatic (body cell); shows paired homologous chromosomes | | **Homologous**  Matching in appearance homo—same -logous—appearance  Homologous chromosomes are the maternal (mom) and paternal copies of each chromosome. The homologous chromosomes have the same size, shape, and genes. | | **Diploid 2n**  Having two sets of chromosomes (having one copy of each chromosome received from a mother and another set received from a father) | | **Haploid 1n**  Having only a single set of chromosomes. In animals, only sex cells (gametes, sperm, eggs) have a haploid number of chromosomes | | **Meiosis**  Sexual cell division; produces 4 genetically unique gametes (sex cells)  Remember— My—O!4—Sex  (versus My-2-sis for mitosis) | | **Autosomes**  All chromosomes except the X and Y chromosomes | | **Sex chromosomes**  In animals, the chromosomes that determine the sex of offspring. In humans, XX codes a female, whereas XY codes a male. | | **Random segregation**  Random passing of one, but not both, homologous chromosome into each gamete. For example, one gamete could receive maternal chromosome 1, but a different gamete could receive paternal chromosome 1. Or for example, a man whose somatic cells contain both X and Y chromosomes can produce sperm that carry an X chromosome, producing daughters. However, half of his sperm carry a Y chromosome instead, and these produce sons. | | **Independent assortment**  Each pair of homologous chromosomes is split up, but each is sorted separately. So for example, a woman produce eggs having chromosomes 1,3,5,7,9,11, 13, 15 17, 21, and an X chromosomes from her mother, then all the other chromosomes from her father OR vice versa. There exist 223 combinations possible for sorting human chromosomes into gametes! So if a man releases 8 million sperm in one sexual event, it is *unlikely that any two have exactly the same set of chromosomes*! | | **Tetrad**  During meiosis, the homologous chromosomes partner up after S phase and they can switch matching segments of the maternal and paternal chromosomes Before separating the sets, giving even more chances for being unique! | | **Crossing over**  During meiosis, crossing over is the term for when homologous chromosomes partner up after S phase and can switch matching segments of the maternal and paternal chromosomes. Cross over does NOT happen during mitosis. | | **Zygote**  A fertilized egg. It is diploid (2n) because the sperm transfers in one set of chromosomes, while the egg provides a second set of chromosomes. |   **Gamete (sperm, egg)**  Sex cells produced by meiosis—each round of meiosis produces 4 sex cells. These cells are haploid. They are only produced in sex organs, ovaries for eggs & testes for sperm | |
| **Chromosome Number**  What is the diploid number in human cells? What is the haploid number?  A donkey has a diploid number of 62. (2n=62) What is its haploid number? (1n=x)  **Phases of Meiosis**  How many rounds of DNA replication occur during meiosis?  How many nuclear & cytoplasmic divisions occur during meiosis? Why is this important?  What is crossing over? Why is it important?  Write **a brief description** and **draw a sketch** of each stage of meiosis. (use two different colors to represent homologous chromosomes)  What is a zygote? | 2n = 46  1n = 23  ing things...  2n = 62  1n = 31  One round of DNA replication  Two separate rounds of chromosome set separation using a spindle, followed by cytokinesis. This halves the number of chromosomes for gametes so that 2 parents contribute to the genetic make-up of offspring during sexual reproduction.  e.g.  human cell meiosis  diploid cell with 46 chromosomes 🡪 cell with 92 chromosomes  then  1st division of meiosis 🡪 2 cells with 46 chromosomes  Then  2nd division 🡪 4 cells (called gametes) with 23 chromosomes  Later, at fertilization, the 1n egg provides 23 chromosomes, while the 1n sperm provides 23 more, so the zygote (fertilized egg) becomes 2n with 46 chromosomes  See vocabulary term  It provides another way to make gametes genetically different from each other, providing greater diversity among the traits of offspring. This makes it more likely that when the environment changes, at least some offspring will be able to survive, adapt, & prevent extinction of the species.  You don’t need to do this for the unit test for introductory biology. But, the slides are in the text (11.4), as well as in the powerpoint and the movie at [www.discoveryeducation.com](http://www.discoveryeducation.com) (username nadinegoodmanbrown, password discoveryeducation) search with the term “mitosis and meiosis” and choose the movie that has pink stained cells as its label.  The fertilized egg formed at conception, when the sperm & egg meet and combine. It undergoes mitosis (asexual cell division to grow and develop into a baby). |
| **Comparing Meiosis**  **and Mitosis**  What are two differences between meiosis and mitosis?  What are two similarities between meiosis and mitosis? |  |
| Sketch a karyotype for a somatic cell having diploid number 2n=8 & a gamete having 1n=4 | SOMATIC CELL 2N=8  Gamete 1n=4 |
| **Compare the advantages(A) & disadvantages(DA) of sexual reproduction and asexual reproduction** | |  |  | | --- | --- | | sexual | asexual | | Need opposite sexes (DA) | Only one sex needed (A) | | Partner required (DA) | No partner required (A) | | Takes longer (DA) | Less time needed (A) | | More genetic diversity gives greater chance for some offspring surviving and adapting to new conditions,allowing natural selection and evolution when conditions change. (A) | LESS genetic diversity gives lower chance for some offspring surviving and adapting to **new** conditions, NOT allowing natural selection and evolution when conditions change. (DA) |  | | When conditions are **stable** (not changing) and when the species is **already well adapted** to its environment, then the offspring with different characteristics have a lower chance of surviving. (DA) | When conditions are **stable** (not changing) and when the species is **already well adapted** to its environment, all offspring will be as well adapted as their parents since they’ll be identical. | |