Living Environment Unit 5 Reproduction Study Guide

Due Date: ___________  Test Date: ____________

Unit 6 Important Topics:
I. Aim # 31 – Asexual vs. Sexual Reproduction
II. Aim # 32 – Cloning
III. Aim # 33 – Mitosis
IV. Aim # 34 – Meiosis
V. Aim # 35 – Comparing & Contrasting Mitosis and Meiosis
VI. Aim # 36 – Male and Female Reproductive Systems
VII. Aim # 37 – Menstrual Cycle
VIII. Aim # 38 – Fertilization, Development and Reproductive Technologies

Directions: Use Aim # 31-38 (Unit 5) to complete this study guide.

I. Topic One (Aim 31): Asexual vs. Sexual Reproduction:

1. Define the following terms:
   a. asexual reproduction: ______________________________________________________
   b. sexual reproduction: ______________________________________________________

2. Compare and Contrast Asexual and Sexual Reproduction:
   Include the following points:
   a. How many parents are required?
   b. What percentage of parent DNA is found in the offspring DNA? (100% vs. 50%)
   c. Is the offspring identical or not identical to the parent?
   d. Is fertilization required (Are sperm and egg required to join)?
   e. Include an example of when this type of reproduction occurs.
   f. An example of an organism that would perform this type of reproduction
   g. How are these two types of reproduction similar to one another? (Include at least 3 similarities)
3. What are the advantages of asexual reproduction?

________________________________________________________________________________________

4. What are the disadvantages of asexual reproduction?

________________________________________________________________________________________

5. What are the advantages of sexual reproduction?

________________________________________________________________________________________

6. What are the disadvantages of sexual reproduction?

________________________________________________________________________________________

II. Topic 2 (Aim 32): Cloning:

7. Define the following terms:

   Cloning: __________________________________________________________

8. Explain why you need the nucleus of a SOMATIC cell and not a GAMETE to clone an organism:

   __________________________________________________________

9. Describe the process of creating an animal clone in your own words.

   Step 1: __________________________________________________________

   Step 2: __________________________________________________________

   Step 3: __________________________________________________________

   Step 4: __________________________________________________________

   Step 5: __________________________________________________________

10. You took the nucleus of a somatic cell from a black dog and inserted into the egg cell of a white dog. You then inserted the embryo into a brown dog with very curly hair who will give birth the organism. What will your clone look like and why?

    ______________________________________________________________

    ______________________________________________________________
11. Why would it be bad for farmers to clone their crops instead of selectively breed them?
_________________________________________________________________________________________________________
_________________________________________________________________________________________________________
_________________________________________________________________________________________________________

III. Topic Three (Aim 33): Mitosis Notes:

12. Define the following terms:
   a. cell division:
       __________________________________________________________________________________________
       _______________________________________________________________________________________
   b. mitosis: ________________________________________________________________________________
       _______________________________________________________________________________________

13. When does mitosis occur and which organism(s) perform mitosis?
   • _______________________________________________________________________________________
       _______________________________________________________________________________________
   • _______________________________________________________________________________________

14. Compare the results of asexual reproduction, cloning and mitosis in the space below:
____________________________________________________________________________________________________
____________________________________________________________________________________________________
____________________________________________________________________________________________________

15. Why does a duplication of chromosomes have to occur before a cell divides during mitosis?
____________________________________________________________________________________________________
____________________________________________________________________________________________________

16. How come no new characteristics are produced as a result of mitosis?
____________________________________________________________________________________________________
____________________________________________________________________________________________________
17. Write the correct vocab word next to the definition.

<table>
<thead>
<tr>
<th>Definition</th>
<th>Vocabulary Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>A thick structure that contains DNA (there are 46 in each human cell)</td>
<td>Chromosome</td>
</tr>
<tr>
<td>Organelles in animal cells that move to opposite ends of the cell and form the spindle fibers</td>
<td>Centriole</td>
</tr>
<tr>
<td>Site that attaches the chromatids together</td>
<td>Centromere</td>
</tr>
<tr>
<td>Long threadlike network of DNA (looks like spaghetti) in the nucleus. This is how the DNA exists before chromosomes become visible</td>
<td>Spindle fiber</td>
</tr>
<tr>
<td>The result of a chromosome copying itself before cell division (resembles an “X – two chromosomes placed together). It consists of two sister chromatids</td>
<td>SISTER CHROMATID</td>
</tr>
<tr>
<td>A network of fibers (strings) that pull chromosomes apart during cell division</td>
<td>Spindle apparatus</td>
</tr>
</tbody>
</table>

18. Directions: Match the description with the phase of the cell cycle. You can use some phases more than once.

   a. _______ The chromosomes line up in the middle of the cell.  
   b. _______ In plant cells, the cell plate forms, instead of pinching in.  
   c. _______ This is the first phase of mitosis.  
   d. _______ Two new daughter cells are formed.  
   e. _______ The cell grows and eventually copies its DNA.  
   f. _______ This is the last phase of mitosis.  
   g. _______ The last phase where the sister chromatids are attached by the centromere  
   h. _______ The duplicated chromosomes are pulled apart, to opposite ends of the cell.  
   i. _______ The cell begins to tear apart, and two new nuclei form.  
   j. _______ The cell spends most of its life in this phase.  
   k. _______ This phase occurs after metaphase.  
   l. _______ The genetic material condenses, the duplicated chromosomes become visible, the nuclear envelope starts to dissolve.

19. How many cell divisions occur during mitosis? _________

20. How many cells are produced by mitosis? ___________

21. What kind of cell (body/sex) do you start with? ____________ What kind of cell (body/sex) do you end with? ____________

22. Are the daughter cells identical or not identical from the parent cell? ________________________________

23. If a cell had 20 chromosomes, how many chromosomes would each daughter cell have after mitosis occurred? _________
IV. **Topic Four (Aim 34): Meiosis Notes:**

24. **Define Meiosis:**

- How many cells do you start with for meiosis? _________
- How many viable cells do you end with? Males: _______ Females: _______
- What kind of cells do you start with? ___________________ What kind of cells do you end with? ________________
- Do the cells produced have a **full number of chromosomes** or **half**? __________________
- Because of **crossing over and independent assortment**, no two ______________________ or ______________________from a single parent are exactly alike.
25. ______________________ Is the production of sperm and ______________________ Is the production of eggs, in which ______ large cell is created and 3 ______________________

26. If an organism has a haploid cell with 15 chromosomes, how many chromosomes are in its diploid cell? _________

27. Explain what happens when disjunction does not occur. In your answer:
   - Define disjunction
   - Name the process when disjunction does not occur
   - Explain what happens during the process
   - Give an example of a disorder that is caused by this process

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

28. Define and explain the process of crossing over. In your answer:
   - Explain what happens during crossing over
   - Explain the importance of crossing over
   - Explain how this process allows a species to evolve

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

29. Explain at least 3 reasons why the image below represents Meiosis and not Mitosis:

   1. 
   2. 
   3. 
V. **Topic Five (Aim 35): Mitosis vs. Meiosis:**

30. **Compare and Contrast Mitosis and Meiosis in the following Venn-Diagram:**

Include the following points:

- a. Which type of cell does the process begin with?
- b. Which type of cell does the process end with?
- c. How many functioning cells are produced by the end of the process?
- d. How many cell divisions are there (how many times did the cell/s split)?
- e. Does crossing over occur between chromosome pairs (exchanging of genes)?
- f. How is the genetic makeup of the cells produced, compared to the original cell? (identical genetic makeup or not identical genetic makeup)
- g. What is the number of chromosomes compared to the original cell (same number or half the number)?
- h. What is the function of the cells produced?
- i. How are these types of cell divisions similar to one another? (include at least 3 similarities)
VI. Topic Six (Aim 36): – Male and Female Reproductive Systems

31. What is the function of the female reproductive system? ____________________________________________
__________________________________________________________________________________________
_____________________________________________________________________________________

32. Match the female reproductive structures/hormones to their function.
   • ______ Produces egg cells and produces the hormones estrogen and progesterone
   • ______ Stimulates the development of secondary sex characteristics and thickens the lining of the uterus for possible pregnancy
   • ______ The site where the embryo and fetus develop
   • ______ Maintains the thickness of the uterus during the pregnancy
   • ______ The site where sperm enters and swims to the egg in the oviduct. It is also the passageway for the birth of the baby.
   • ______ Tubes that carry the eggs from the ovary to the uterus.

<table>
<thead>
<tr>
<th>A. Oviducts</th>
<th>B. Birth Canal</th>
<th>C. Uterus</th>
<th>D. Ovary</th>
<th>E. Progesterone</th>
<th>F. Estrogen</th>
</tr>
</thead>
</table>

33. What is the function of the male reproductive system? ____________________________________________
__________________________________________________________________________________________
_____________________________________________________________________________________

34. Match the male reproductive structures/hormones to their function.
   • ______ Tubes that carry sperm away from the testes to the penis
   • ______ Produce sperm cells and the hormone testosterone
   • ______ Where semen and urine travel to leave the body
   • ______ Male hormone that controls sperm production

<table>
<thead>
<tr>
<th>A. Testes</th>
<th>B. Vas Deferens</th>
</tr>
</thead>
</table>

35. Describe ovulation:_______________________________________________________________________
________________________________________________________________________________________
______________________________________________________________________________________

36. Describe fertilization (include where it occurs):___________________________________________
________________________________________________________________________________________
______________________________________________________________________________________

37. As the zygote begins to grow, does it divide by the process of mitosis or meiosis? Explain why.
________________________________________________________________________________________
______________________________________________________________________________________
______________________________________________________________________________________

38. Describe implantation (include where it occurs and why it occurs): __________________________
________________________________________________________________________________________
______________________________________________________________________________________
______________________________________________________________________________________
39. Label the diagrams below:

40. 

VII. **Topic Seven (Aim 37): Menstrual Cycle**

41. How long is the female menstrual cycle? ________________________

42. Which four hormones are involved in the female reproductive cycle? (Include where they are produced)
   - ___________________________ produced in the ______________________________
   - ___________________________ produced in the ______________________________
   - ___________________________ produced in the ______________________________
   - ___________________________ produced in the ______________________________

43. According to your menstrual cycle chart, which day during the cycle does ovulation occur? ____________

44. Which hormone **BEGINNS** to thicken the lining of the uterus? ____________________

45. For pregnancy to occur, why is it important for the lining of the uterus to thicken?

46. Which hormone **MAINTAINS** the thickness of the uterine lining? ___________________

47. Which hormones decrease if fertilization and implantation do not occur?
   and __________________________________

48. Explain what occurs to the lining of the uterus once the two hormones above decrease.
   __________________________________________________________________________

49. Which hormone is referred to as the “pregnancy” hormone? _________________________

50. Explain why this hormone is tested for during a pregnancy test. ____________________
   __________________________________________________________________________
VIII. Topic Eight (Aim 38): Fertilization, Development and Reproductive Technologies

51. Where does fertilization occur? ________________________________________________

52. What is a fertilized egg called? ______________________________________________

53. Look at the diagram below. On the top lines, label the structure. On the bottom lines, label the process.

54. Place the stages and events below following in number order:
   ____ Gametes
   ____ Fertilization
   ____ Meiosis
   ____ Zygote
   ____ Embryo
   ____ Mitosis

55. What is differentiation: ________________________________________________________

56. If all of the cells in our body have the SAME DNA, why do cells have different forms and functions? ______________

57. Explain the difference between a zygote, embryo and fetus: _______________________

58. Does the blood of the mother and the fetus every mix? ____________________________

59. What is gestation? ____________________________________________________________

60. How long is the human gestation period? ________________________________________

61. Explain the importance of the placenta. In your answer
   • state WHERE the placenta forms
   • what diffuses from the mother to the fetus
   • what diffuses from the fetus to the mother

   ________________________________________________________________
62. State three harmful environmental factors or actions taken by the mother that can be dangerous to a developing fetus.

63. Why are harmful environmental factors more dangerous to the fetus than to a pregnant woman?

64. What can these harmful environmental factors cause?

65. Label each of the structures below

Write the letter or letters from the diagrams on the previous page that correspond to each statement:

- _____ Liquid sac protecting fetus
- _____ Supplies nutrients and oxygen to fetus and allows wastes to leave fetus
- _____ Attaches the fetus to the placenta
- _____ Supports the developing fetus

66. What is in vitro fertilization?

67. What is an amniocentesis?

68. How come only certain cells respond to the male and female reproductive hormones on the body? (Think about what is on the cells that interact with the hormones)
69. Base your answers to the following questions on the diagram:

- Write the # of the processes that result in the formation of cells with half the amount of genetic material ________
- Process 3 represents which process? _________________________
- Process 4 represents which process? _________________________
- State one difference between the cells produced by process 1 and the cells produced by process 4: __________________________

How does process 3 affect the amount of genetic information an offspring receives? _________________________

QUESTIONS

1. Structures in a human female are represented in the diagram.

A heavy dose of radiation would have the greatest impact on genetic information in future offspring if it reached gametes developing within structure

a. A  c. C
b. B  d. D

2. Which diagram best illustrates an event in sexual reproduction that would most directly lead to the formation of a human embryo?

   (1) □ □
   (2) □
   (3) □
   (4) □

3. The sequence of diagrams below represents some events in a reproductive process.

   1 □ □ 2 □ □ 3 □ □ 4 □ □ 5 □ □ 6 □ □ 7 □ □

To regulate similar events in human reproduction, what adaptations are required?

a. the presence of genes and chemicals in each cell in stages 1 to 7
b. an increase in the number of genes in each cell in stages 3 to 5
c. the removal of all enzymes from the cells in stage 7
d. the elimination of mutations from cells after stage 5

4. The diagram to the right represents human reproductive systems.

Which one represents the female reproductive system?

A. [Diagram A]
B. [Diagram B]
C. [Diagram C]
D. [Diagram D]