Cell Theory and Mitosis Classwork

7th Grade PSI

1. What are the three components of cell theory?

2. Describe one key feature that is different between plant and animal cells.

3. What is the purpose of mitosis?

4. Create a graphic organizer to show the stages of mitosis. Be sure to include descriptions of the following key terms: chromosomes, spindle fibers, cleavage furrow and the names of each phase.
**Cell Theory and Mitosis Homework**

Name: ______________________________

7th Grade PSI

5. Complete the following chart about mitosis:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mitosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of parent cell</td>
<td></td>
</tr>
<tr>
<td>Number of divisions of the nucleus</td>
<td></td>
</tr>
<tr>
<td>Number of daughter cells produced</td>
<td></td>
</tr>
<tr>
<td>Chromosome number in daughter cells</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td></td>
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</tbody>
</table>

6. What would happen if the cells produced by mitosis were used to create new organisms?

7. Explain one difference between animal and plant cell mitosis.
8. Complete this chart to compare the types of asexual reproduction

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Example organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Fission</td>
<td></td>
<td></td>
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<tr>
<td>Budding</td>
<td></td>
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<tr>
<td>Mitotic cell division</td>
<td></td>
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<tr>
<td>Animal regeneration</td>
<td></td>
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<tr>
<td>Vegetative reproduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloning</td>
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</tbody>
</table>
Asexual Reproduction Homework

7th Grade PSI

9. Give three reasons why asexual reproduction is beneficial.
10. Draw a picture showing an example of budding.
11. Suppose a lizard’s tail was broken off and a new tail is then grown. Is this an example of asexual reproduction? Why or why not?
12. Justify the use of cloning to save endangered animals.
13. Complete the chart comparing meiosis and mitosis.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mitosis</th>
<th>Meiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of parent cell</td>
<td></td>
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</table>

14. What process will produce body cells? What process produces sex cells?

15. What is the difference between body cells and sex cells?

16. Describe one advantage and one disadvantage to sexual reproduction.
17. Humans are working to be able to clone individual animals and body parts. What might be the long-term effect if we could clone extinct species? Should there be a limit to which species get cloned?

18. Create a graphic organizer to show the stages of meiosis.
19. This is a daphnia. It is a small fresh water crustacean with a short life span. It can reproduce sexually and asexually. Why is it advantageous for daphnia to be able to bud AND release eggs or sperm?

Note, this is much larger than a real daphnia. They are 1-5 mm long. They live in lakes, ponds, streams and rivers.

20. Do the math! The first one is done for you.

<table>
<thead>
<tr>
<th>Body Cell</th>
<th>Primary Sex Cell</th>
<th>Egg or Sperm</th>
</tr>
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<td>46</td>
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<td>104</td>
<td>37</td>
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</tbody>
</table>
21. How can behaviors increase the reproductive success of animals? List two behaviors that animals use.

22. Body size is directly related to k or r selected strategies. Position in the food chain is also related. Do you see a pattern in k and r selected species and where they are in the food chain?

23. What are possible environmental factors that can increase or decrease the reproductive success of animals?
24. Explain the difference between r-selected and k-selected strategies. List an example of an animal that uses each type of strategy and explain why they use it.
25. Write a paragraph describing an animal's specific behavior that can lead to its reproductive success.
26. Why must the offspring of birds develop an egg with a hard structure?

27. Reptile eggs are somewhat flexible. This is a genetic trait (to have this shell type). At one time (dinosaur age) reptile eggs were rigid, and laid in above-ground nests. Over time the genetics shifted. What would happen now if a female turtle laid rigid eggs? Would those genes be likely to be passed on?

28. Many consider birds to be “modern day dinosaurs.” What are some genetic similarities between birds and dinosaurs?
29. Baby birds are born helpless or precocious (able to walk and follow the mother bird). The birds that are born helpless are most often meat eaters. The precocious birds are primarily plant eaters. How do these eating behaviors work in harmony with the development and survival of the newborn bird?

30. Give five traits of mammals that make them different from other animals.
31. **Directions:** Label the flower below. Find the stamen (anther and filament), pistil (stigma and style, only) petals. Answer the questions below.

32. The stamen on the flower above are extremely long. Why is this an advantage for this plant?

33. What type of pollinator does this plant most likely require? Explain why.
Plant Structure and Pollination Homework  Name: __________________________

7th Grade PSI

34. Look at the flower structures in the pictures. Explain how each plant minimizes the possibility of self-pollination?
   a. Lemon tree flower
   b. Hibiscus flower
   c. Mulberry female flower

35. Fill in the chart below. Beside each structure, briefly describe its function in plant reproduction.

<table>
<thead>
<tr>
<th>Male flower structures</th>
<th>Female flower structures</th>
<th>Neutral flower structures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
7th Grade PSI

36. When you eat an orange, there are many seeds inside the fruit. Where do these seeds come from?

37. Tumbleweed (slide121) is a non-native plant in the U.S. A few settlers brought it from Europe to the Midwest. Look at the distribution map of Russian-thistle (tumbleweed). How did it spread from the Midwest to the East coast? Why isn’t the population kept in check?
38. Velcro is a product of “biomimetic” design. It mimics the seed type (burr) shown here. How are Velcro and this burr similar? Do you know any other biomimetic designs? Why is it smart to copy Nature’s designs?

39. How do animals influence the success of plant reproduction?
40. How do plants overcome the lack of locomotion to find mates and disperse offspring? Write a paragraph explaining and using at least three different specific examples.
Environmental and Genetic Factors Classwork

Name: __________________________

7th Grade PSI

41. How can animals or plants that have the same DNA have different physical characteristics?

42. What is meant by the phrase “nurture vs. nature?”

43. Use the Internet or other available resources to identify the effect of wind, nutrients or open space on a specific animal or plant.
Environmental and Genetic Factors Homework

7th Grade PSI

An ecosystem remains balanced unless there is a major shift, such as a fire, drought or human intervention. Consider the Yellowstone National Park ecosystem. Each change affected a different population. For each change described, draw up or down arrows to show the change in population of the listed plants, animals and other ecosystem features. Use words to explain what happens to the environment. Then give a short explanation why that happened.

44. Wolves, bear and mountain lions are killed.
   Elk _____ Bison _____ Deer ___

45. Elk, bison and deer populations increase drastically.
   Grasses _______

46. Elk, bison and deer eat winter food in fall.
   Aspen ______ Elk _______ Bison ____________ Deer ____________
   Crows _______ Badgers _______

47. All aspen and other small trees are eaten.
   Beaver ________
48. Soil, once held by roots, becomes loose.
   Soil ___________

49. Beaver dams fall apart
   Streams ________ Fish ______ Migratory birds __________

50. Bear, mountain lions return to the park
   Elk _______ Deer _________ Grasses ___________ trees ____________

51. Wolves are brought back to the park.
   Elk __________ Deer __________ Bison __________ Beaver ______
   Birds _______ Streams____________ Fish________ Otter _______
   Aspen __________ Grasses ______________
Answer Key
1. All living things are made of cells; cells are the building blocks of life; cells arise from other cells.
2. Answers will vary; plant cells have a cell wall, vacuole and chloroplasts, which animal cells do not.
3. To create new cells for growth and repair.
4. Responses will vary but should show all 6 stages and include key words as mentioned.
5.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mitosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of parent cell</td>
<td>Body</td>
</tr>
<tr>
<td>Number of divisions of the nucleus</td>
<td>1</td>
</tr>
<tr>
<td>Number of daughter cells produced</td>
<td>2</td>
</tr>
<tr>
<td>Chromosome number in daughter cells</td>
<td>1 pair</td>
</tr>
<tr>
<td>Function</td>
<td>To grow or repair</td>
</tr>
</tbody>
</table>

6. The offspring would all be genetically identical.
7. Plant cells have a cell plate between new cells that become the cell wall.
8.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Example organisms</th>
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<tbody>
<tr>
<td>Binary Fission</td>
<td>DNA is copied and attached to the cell membrane which separate, creating 2 new cells</td>
<td>Prokaryotes, bacteria, single celled organisms</td>
</tr>
<tr>
<td>Budding</td>
<td>Small organism forms on the body of the parent</td>
<td>Hydra</td>
</tr>
<tr>
<td>Mitotic cell division</td>
<td>Same as mitosis</td>
<td>Single-celled eukaryote</td>
</tr>
<tr>
<td>Animal regeneration</td>
<td>Each piece of organism can recreate the missing parts to form a completely new organism.</td>
<td>Planarian, sea stars</td>
</tr>
<tr>
<td>Vegetative reproduction</td>
<td>Plants send out shoots that form roots and a new plant</td>
<td>Strawberry, ivy</td>
</tr>
<tr>
<td>Cloning</td>
<td>Occurs in the lab</td>
<td>Crop animals and endangered species</td>
</tr>
</tbody>
</table>
9. No mates are needed; many offspring are created, very quickly.
10. Should resemble slide drawings
11. This is not considered reproduction because a new living thing is not created. This represents growth.
12. Students should list several reasons why this is used. Some examples include:
   Mates are not needed so only one animal is needed to create offspring. Because it occurs in a lab, the young is protected.
13.

<table>
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<tbody>
<tr>
<td>Type of parent cell</td>
<td>Primary sex cell</td>
<td>Body</td>
</tr>
<tr>
<td>Number of divisions of the nucleus</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Number of daughter cells produced</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Chromosome number in daughter cells</td>
<td>1 per cell</td>
<td>1 pair</td>
</tr>
<tr>
<td>Function</td>
<td>To create offspring</td>
<td>To grow or repair</td>
</tr>
</tbody>
</table>

14. Mitosis produces body cells and meiosis produces sex cells.
15. Body cells have 2 x chromosomes and sex cells have just one chromosome.
16. Advantage - variation of DNA helps protect survival of species; Disadvantage - requires a mate which can be difficult to attract.
17. Cloning extinct species from ancient times would thoroughly upset the ecosystem balance. Perhaps recent extinctions caused by humans could be cloned.
18. Responses will vary but should show all stages (2 divisions of the nucleus).
19. Daphnia may not be able to find a mate in a lake. They can reproduce without one asexually. If they find a mate, the offspring can have variation.
20. Do the math! The first one is done for you.

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<td>52</td>
</tr>
<tr>
<td>74</td>
<td>74</td>
<td>37</td>
</tr>
</tbody>
</table>

21. Behaviors such as displaying feathers or releasing scent can help animal reproduction because it increases the chances of finding a mate.
22. Animals at the top of the food chain are not eaten and live to old age. They can have few offspring and the likelihood is good that most will survive. Organisms
lower on the food chain do get eaten; most of their young will die before adulthood. It is better to have many offspring.

23. Drought and floods decrease success; normal weather patterns increase success, for example.

24. R-selected strategies involve no parental care but involve having as many offspring as possible. Frogs are an example, since frogs are small and vulnerable to predators, it is good to have many offspring to increase chances of species survival. K-selected strategies involve much more parental care and fewer offspring. Kangaroos are an example. Their larger size increases their chances of survival as they can brave environmental elements, etc.

25. Answers will vary but can include things discussed in class such as bioluminescence, feather displays, scents, etc.

26. Only mammals’ internal offspring development. The egg is to protect the external offspring development from outside/environmental factors.

27. The rigid eggs would probably break, and the genes would not be passed on.

28. Hard shelled eggs, above ground nests, feathers.

29. Ducklings (for example) can eat plants without parental guidance. A carnivore needs skill to catch food, a newborn would suffer without parental guidance to show them how to catch food.

30. Mammals have internal fertilization, internal development, mammary glands that produce milk, extended parental care, fur covered bodies, internal control of temperature.

31. The stamen are the white structures that stretch beyond the flower. The pistil is the central vertical structure.

32. This prevents self-pollination. The pollen has little chance of getting to the stigma. This increases cross pollination, and variability of the offspring.

33. The showy flower is to attract an animal pollinator.

34. Self-pollination is minimized in each case because the pollen from the stamen is situation so as not to easily reach the stigma. In the last case, there is no stamen.
   a. Stamen are spread out from stigma
   b. Stamen are very short and separate from stigma
   c. The female flower only has pistils, no stamen
35.

<table>
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<th>Male flower structures</th>
<th>Female flower structures</th>
<th>Neutral flower structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anther-makes pollen</td>
<td>Stigma-catches pollen</td>
<td>Base- no direct role in reproduction</td>
</tr>
<tr>
<td>Filament- lifts pollen higher</td>
<td>Style- tube that carries pollen to the ovules in the ovary</td>
<td>Petals- no direct role in reproduction</td>
</tr>
<tr>
<td>Stamen-composed of filament and anther, so makes and lifts pollen</td>
<td>Ovary- contains the ovules which will become seeds after pollination</td>
<td>Sepals- no direct role in reproduction</td>
</tr>
<tr>
<td></td>
<td>Ovules- become the seeds after pollination</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pistil- contains all the female flower parts</td>
<td></td>
</tr>
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</table>

36. Each seed was an ovule inside the female plant ovary that was fertilized.
37. Tumbleweed spreads by wind pushing the dried plant. Weather and wind travel in the US to the east, pushing tumbleweeds as they go. There are no predators to keep the population in check because it is a non-native species.
39. Animals spread seeds, pollinate flowers and their waste is fertilizer for plants.
40. Answers will vary but should include topics covered in class:
   Plant structures lead to reproductive success by producing pollen and ovules, **enticing pollinators** like bees to come to the flower. Other ways to entice bees and other insects that can pollinate include **mimicry**. **Wind** pollinated flowers produce lots of pollen to increase the odds of fertilization. The ovary can become a **fruit** to increase dispersal as animals eat the fruit and disperse the seeds as waste.
41. Animals that are clones or plants from vegetative propagation are identical. The environment can affect them during their growth, giving a different outcome. Wind blown trees, sponges, and malnourishment lead to different traits than the genetic traits.
42. Nurture vs. nature refers to the argument of the importance of genes or environment.
43. Answers will vary. Fish grow larger in bigger ponds, wind can cause a tree to grow sideways.
44. Wolves, bear and mountain lions are killed.
   Elk _I__Bison ___I__ Deer  I___
   Without predators, populations grew quickly.
45. Elk, bison and deer populations increase drastically.
   Grasses ___D_______
   Huge herds eat all the grasses.
46. Elk, bison and deer eat winter food in fall.
   Aspen ____D____ Elk  _D___ Bison  _D_______ Deer  _D_
   Crows _I__ Badgers _I____
   Without interfood in the winter, herds die of starvation. Scavengers increase as food supply increases.
47. All aspen and other small trees are eaten.
   Beaver _D_
   Trees are the beavers’ home and food. They die off or leave
48. Soil, once held by roots, becomes loose.
   Soil _washed away
   Soil is held down by plant roots, plants are now gone so soil is washed away.
49. Beaver dams fall apart
   Streams _become swift_ Fish  _D_ Migratory birds  D
   Fish and birds are not adapted to swift water. They leave or die.
50. Bear, mountain lions return to the park
   Elk  _D_Deer  D, Grasses  I, trees  I
   Predators begin to thin the herds. Plants can grow back.
51. Wolves are brought back to the park.
   Elk  _D_, Deer  _D_, Bison  _D_, Beaver  I,
   Birds  I, Streams _become slow_, Fish  I, Otter  I,
   Aspen  _I_, Grasses  I,
   Wolves bring park to natural balance. Populations return to pre-human influence.