Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_ Date \_\_\_\_\_\_

**Mendelian Genetics Study Guide**

**Note: This study guide does not cover all activities we completed in class. You must review everything we have discussed in unit 3 to successfully pass this test.**

Use Quizlet to study all of the vocabulary associated with this unit.

Sign up for this class at: <https://quizlet.com/join/Zg9Qrg2mQ>

**Use this Fact bank for all questions:**

**Dimples (D) are dominant to no dimples (d)**

**Freckles (F) are dominant to no freckles (f)**

1. A male is heterozygous for dimples and a female is homozygous dominant for dimples
   1. What are all of the possible genotypes from a cross? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. What are all of the possible phenotypes for this cross? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Show your results in a Punnett Square.
2. Human males and females differ genetically by chromosome #23.
   1. How are these chromosomes different? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Why are males more susceptible to recessive disorders on this chromosome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Use this pedigree to determine how the following individuals are related:

**A**

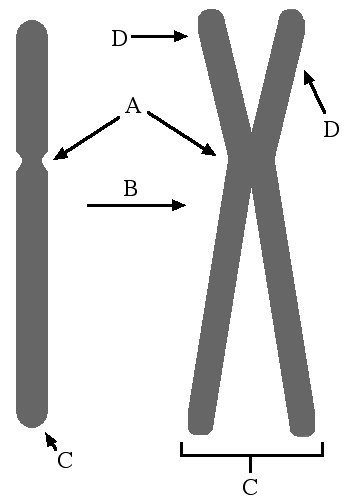
1. What are homologous chromosomes?

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1. How many chromosomes do our somatic cells contain? \_\_\_\_\_\_\_\_
2. How many chromosomes do our gametes (sex cells) contain? \_\_\_\_\_\_\_\_
3. The muscle cells of a dog have 78 chromosomes. How many chromosomes are in a dog’s:
   1. Bone cells \_\_\_\_\_\_\_\_\_\_
   2. Liver cells \_\_\_\_\_\_\_\_\_\_
   3. Somatic cell \_\_\_\_\_\_\_\_\_\_
   4. Sperm cell \_\_\_\_\_\_\_\_\_\_
4. Explain why our cells must duplicate the DNA molecules before they divide?

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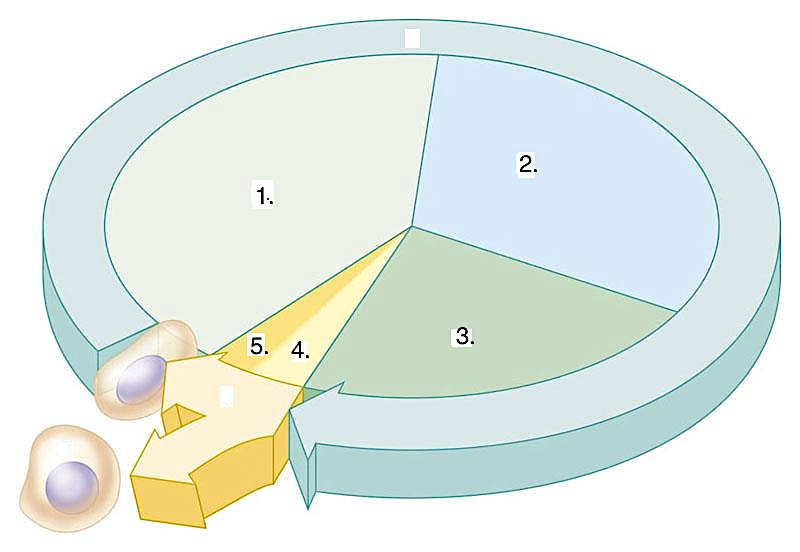
1. Label the diagram below using the following terms:



\_\_\_\_\_\_\_ Chromosome

\_\_\_\_\_\_\_ DNA replication

\_\_\_\_\_\_\_ Centromere

\_\_\_\_\_\_\_ Sister Chromatid

1. Complete the table using the diagram of the typical eukaryotic cell cycle. (Picture on the right)

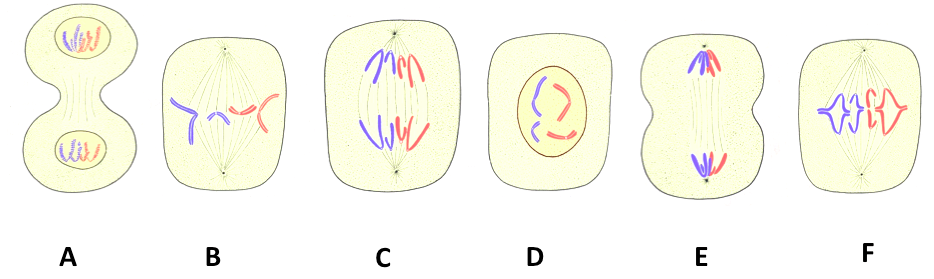
|  |  |  |
| --- | --- | --- |
|  | **Stage** | **What happens during this stage?** |
| **I**  **N**  **T**  **E**  **R**  **P**  **H**  **A**  **S**  **E** | 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | What happens to the mass of genetic material during this stage? |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | What is the physical appearance of chromosomes during this stage? |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |  |

1. Explain what needs to happen before the cell can go through mitosis.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Draw a chromosome before and after the S phase.
2. When are condensed chromosomes first visible during a cell cycle? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Complete the following table comparing **MITOSIS** with **MEIOSIS**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | What is the purpose of this process?  (When would this process take place?) | How many cells are produced as a result of this process? | What happens to the number of chromosomes in the new daughter cells? | Are the daughter cells genetically identical to the parent cell or unique? |
| **MITOSIS** |  |  |  |  |
| **MEIOSIS** |  |  |  |  |

1. The diagram below represents cells at various stages of mitosis. Identify and label each of the stages in this diagram. Use the following terms: prophase, metaphase, anaphase, telophase
2. Match the following steps of the mitosis with the appropriate description.

|  |  |
| --- | --- |
| \_\_ Prophase | 1. Chromosomes move to the center of the cell and line up along the equator. |
| \_\_ Telophase | 1. Nuclear envelopes form around chromosomes at each end of the cell. |
| \_\_ Metaphase | 1. Chromosomes condense and become visible. |

|  |  |
| --- | --- |
| \_\_ Anaphase | 1. Sister chromatids separate and move toward opposite poles of the cell. |

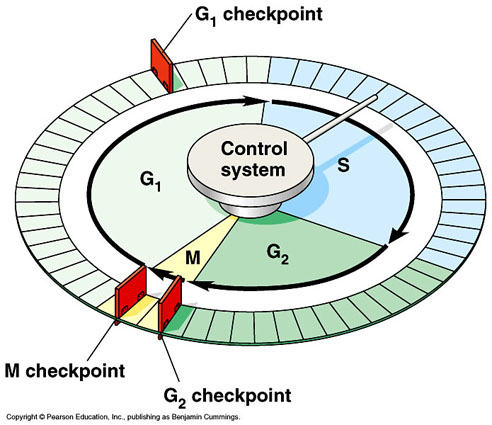
1. Why do chromosomes become more condensed by wrapping around the histone proteins during the cell cycle?

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Use the diagram below to answer the questions that follow.

1. Why must cells go through checkpoints?

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1. Explain what happens in each of these three checkpoints.

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1. If a problem occurs in the cell cycle, what can the cell do?

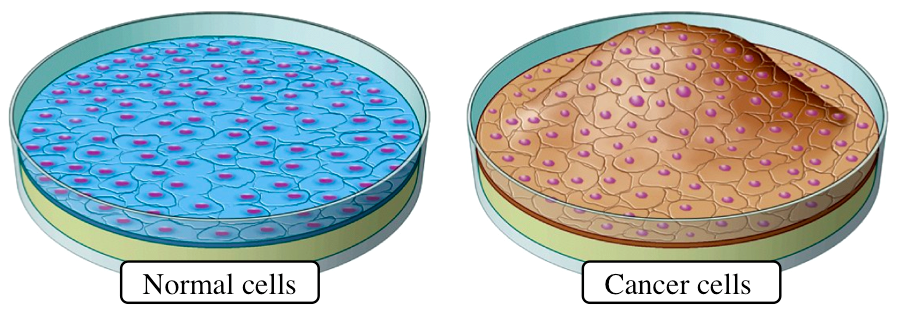
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is apoptosis?

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1. What is the relationship between apoptosis and cancer?

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1. Cancer cells have several features that distinguish them from normal cells. Describe two characteristics of cancer cells. Hint: Look at the pictures below.

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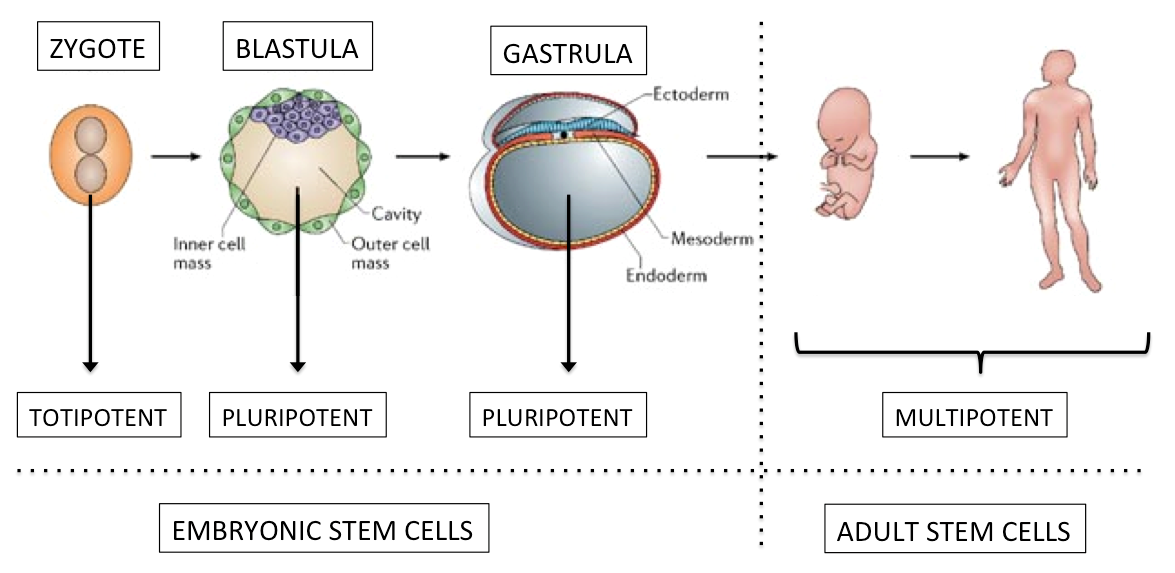
1. What is cell differentiation?

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1. What are stem cells?

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1. Stem cells can be organized in different categories based on their origin and the amount of potential to become other cells. Use the diagram below to answer the following questions:



Stem cells that can differentiate into any types of cells are said to be: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Stem cells that can differentiate into most of the types of cells are said to be: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Stem cells that can differentiate into only few types of cells are said to be: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Multipotent stem cells can be found in: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Pluripotent stem cells can be found in: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Totipotent stem cells can only be found in: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

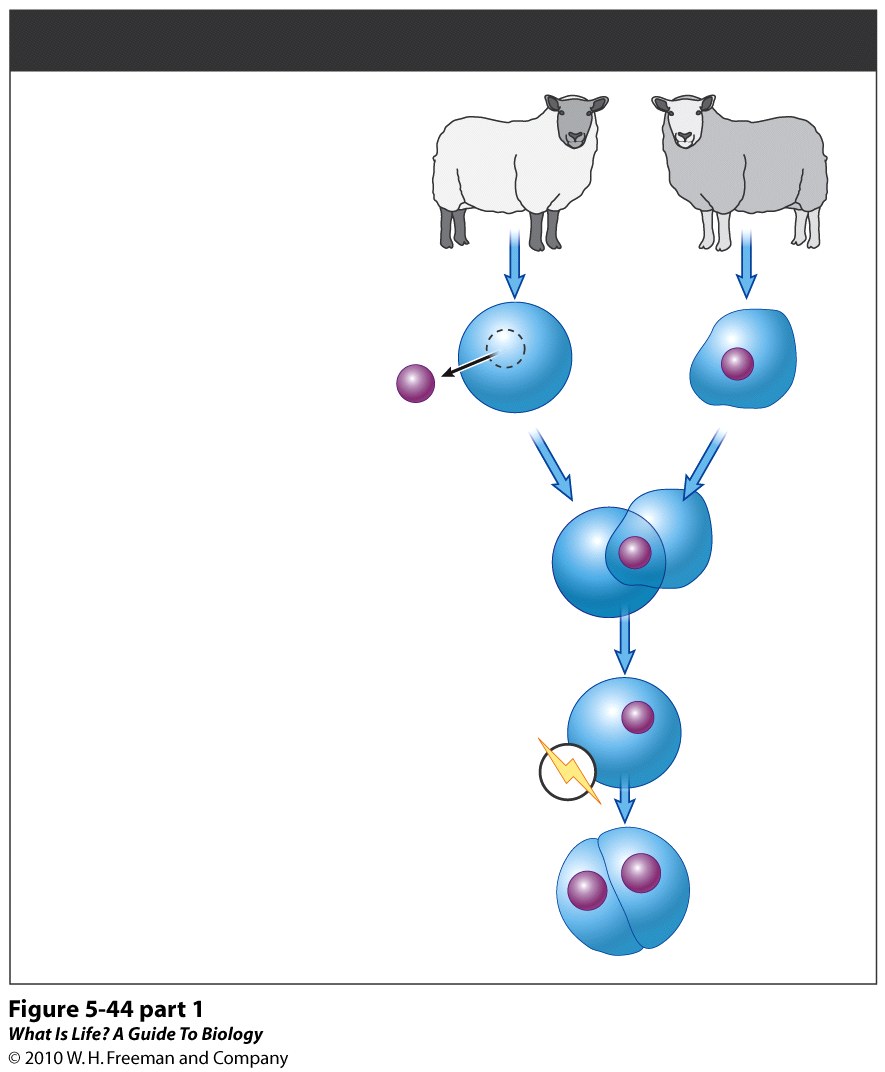
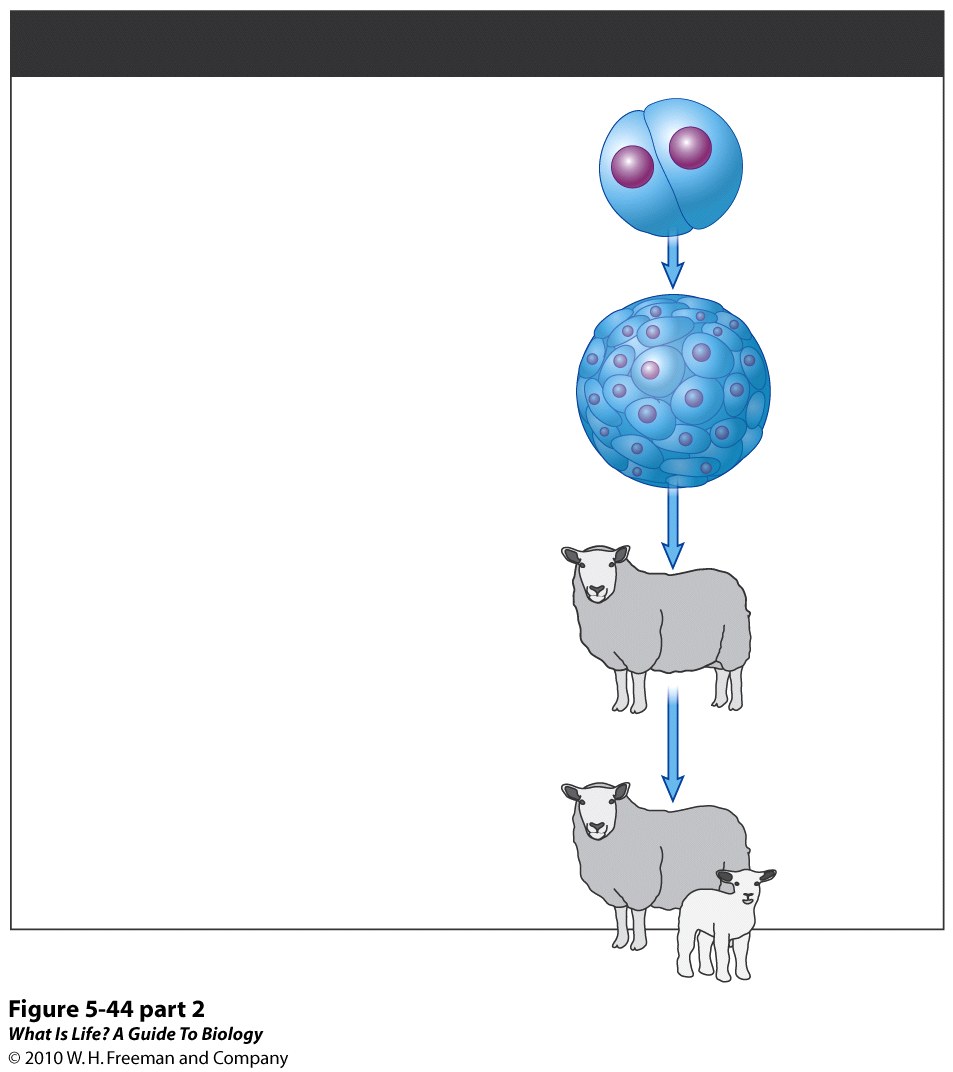
1. Discuss how stem cells may be used for such treatments. Use a **specific** example of a disease/disorder that could be treated using stem cells. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why is the use of stem cells so controversial?

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1. Define cloning.

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1. List the steps used in the cloning of Dolly the sheep.



1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_