**SECTION 3**

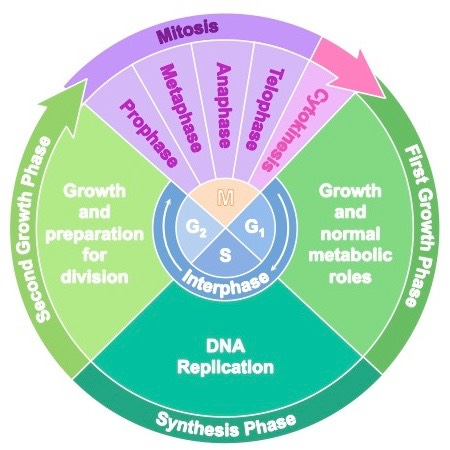
**CELLS: CELL CYCLE, CELL DIVISION, AND REPRODUCTION**

**Important Relationship:**

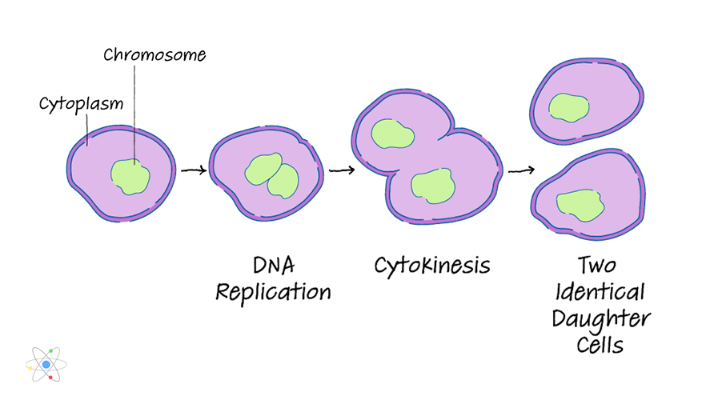
**Cell Cycle leads to Cell Division**

**BIO. 1 E. 1-2/ 3A. 1-3**

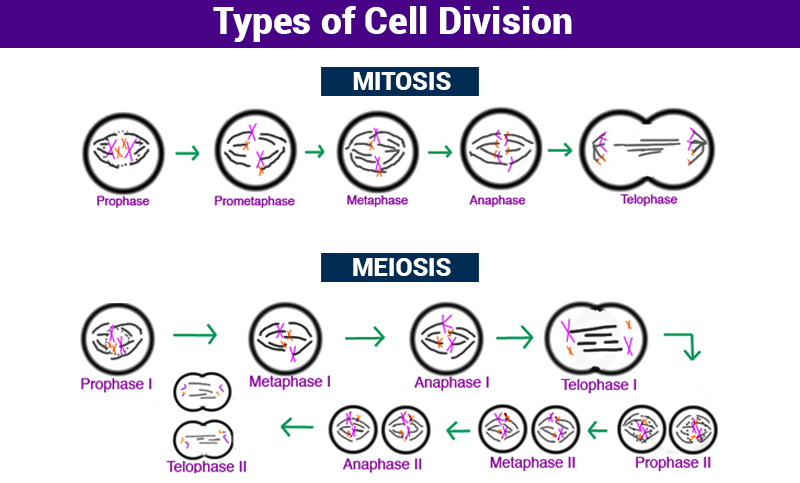
**Cell Division**



**CELL CYCLE**

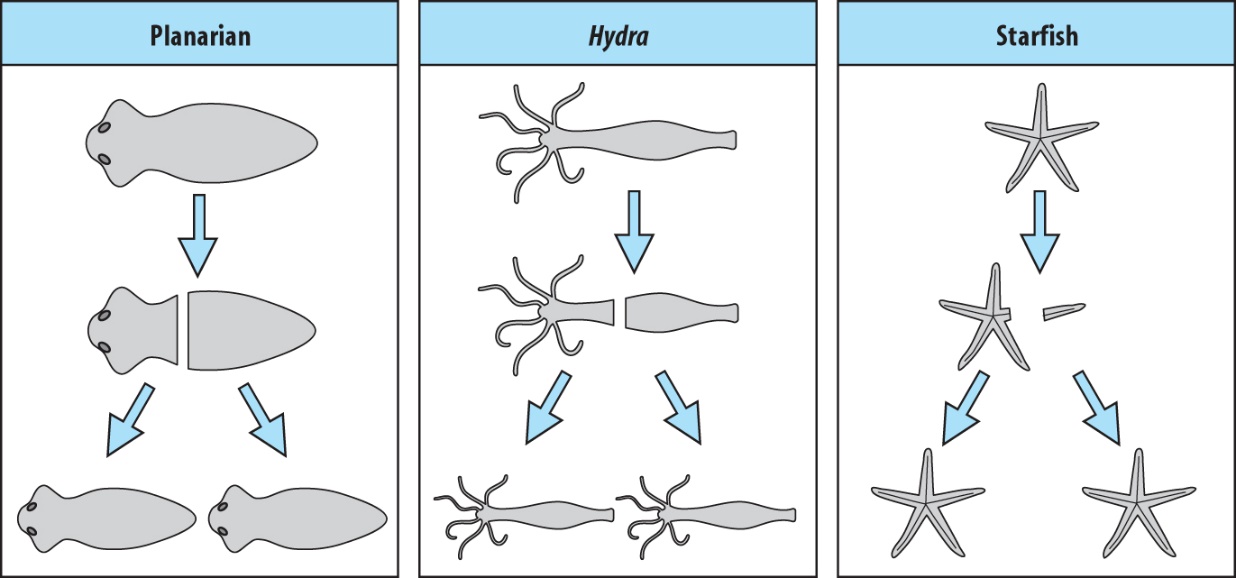


**BINARY FISSION**

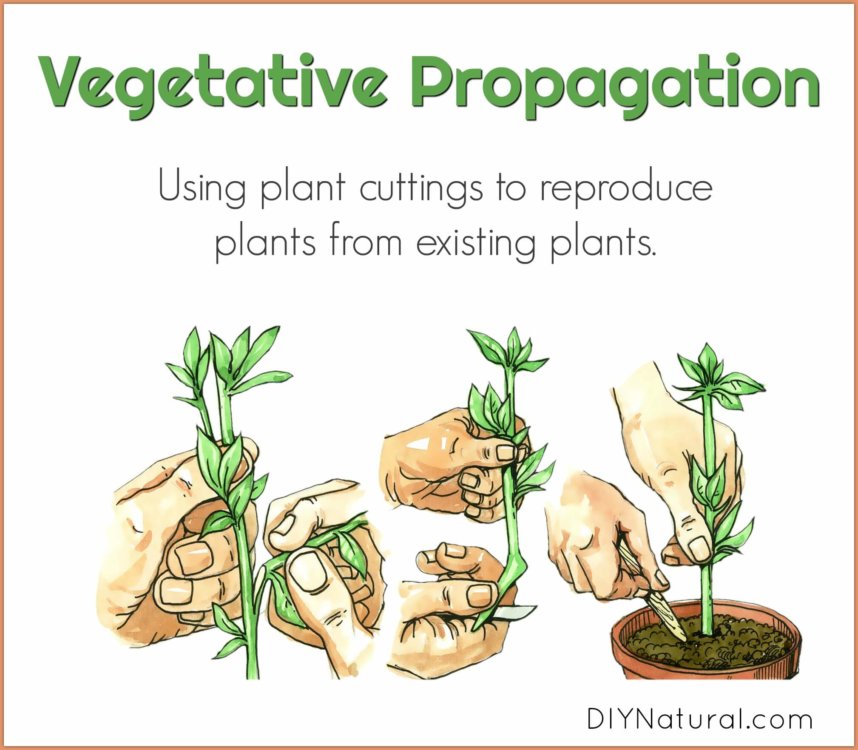


**EXPLAINS BOTH**





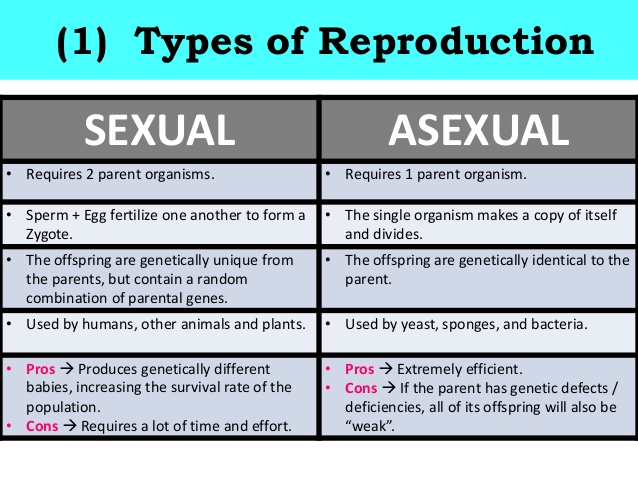
**REGENEARTION**



|  |
| --- |
| **KEY CONCEPTS ABOUT** **CELLS: CELL CYCLE, CELL DIVISION, AND REPRODUCTION** |
| MS-CCR Standard(s):  Bio. 1E. Students will relate the diversity of organelles to a variety of specialized cellular functions.  BIO. 1E. 1. Construct models to explain how the processes of cell division and cell differentiation produce and maintain complex multicellular organisms.  BIO. 1E. 2. Identify the describe the changes that occur in a cell during replication. Explore problems that might occur if the cell does not progress through the cycle correctly (cancer).  BIO. 1E. 3. Relate the processes of cellular reproduction to asexual reproduction in simple organisms (i.e., budding, vegetative propagation, regeneration, binary fission. Explain why the DNA of the daughter cells is the same as the parent cell.  BIO 1E. 4. Enrichment: Use an engineering design process to investigate the role of the stem cells in regeneration and asexual reproduction, then develop application of stem cell research to solve human medical conditions.  BIO. 3A. Students will develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.  BIO. 3A. 1. Model sex cell formation (meiosis) and combination (fertilization) to demonstrate the maintenance of chromosome number through each generation in sexually reproducing populations. Explain why the DNA of the daughter cells is different from the DNA of the parent cell.  BIO. 3A. 2. Compare and contrast mitosis and meiosis in terms of reproduction. |

Important: Types of Cell Division based on reproduction to study

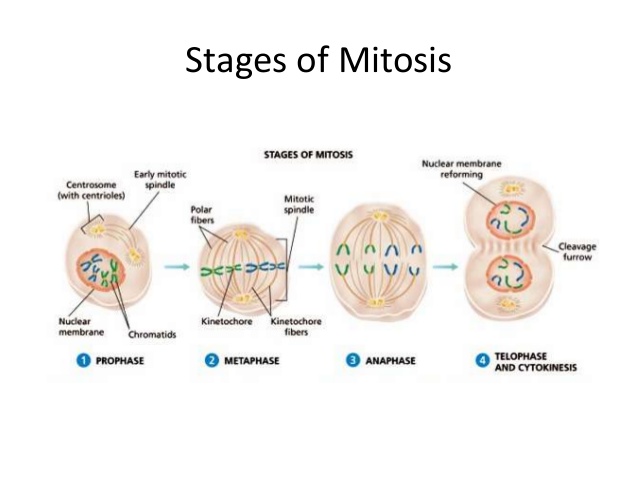
|  |  |  |  |
| --- | --- | --- | --- |
| Type of Cell Division | Asexual Reproduction | Sexual Reproduction | What are the offspring called? |
| Mitosis |  |  | Daughter cells |
| Meiosis |  |  | Daughter cells |
| Binary Fission |  |  | Daughter cells |
| Vegetative Propagation |  |  | Uniform Offspring |
| Regeneration |  |  | Uniform Offspring |
| Budding |  |  | Uniform Offspring |



**Key Information:**

* End of Mitosis ends with 2 daughter cells
* Miosis= somatic or body cells

Adeeper look



**Clues**

**Prophase**- chromosomes are bunch up/about to divide

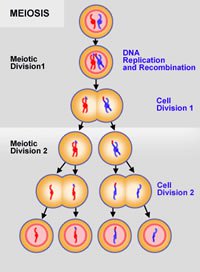
**Metaphase-** chromatids line up in the middle

**Anaphase-** separate/ move to opposite sides of the cells

**Telophase-** 2 new nuclear membrane starts to form.

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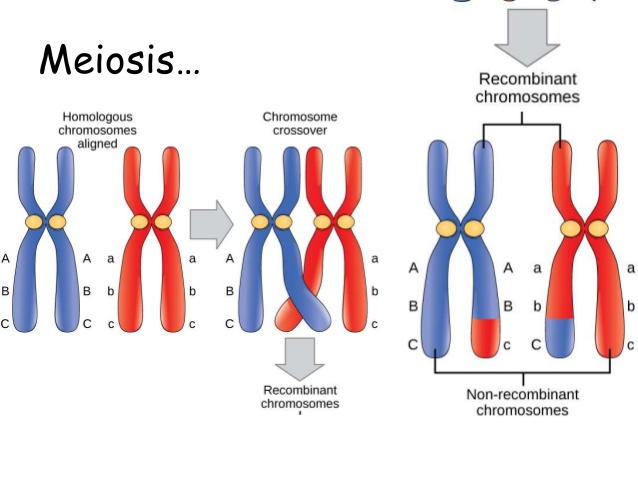
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**Remember**

-During cross over below, genetic variation increases

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**Key Information:**

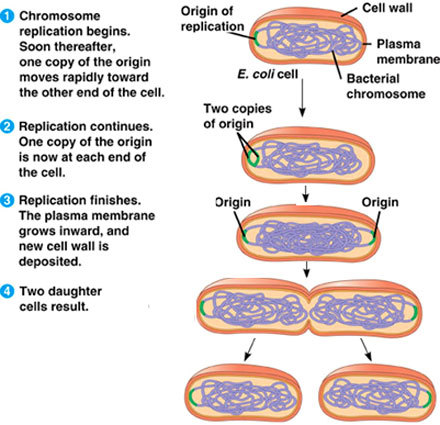
* Meiosis makes the sex cells called gametes (sperm=male & egg=female)
* At the end of Meiosis 4 gametes. 4 sperm survive and 1 out of the 4 eggs survives
* Meiosis- zygotes ends up with half of the parent’s chromosome.

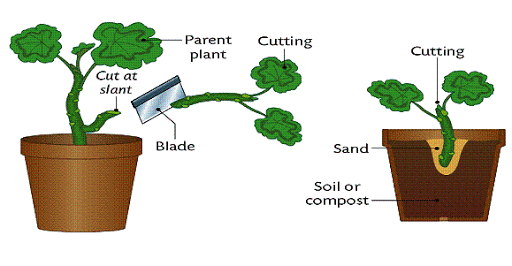
**BINARY FISSION**

**Key Information:**

* DNA of bacterium uncoils and duplicates.
* DNA is pulled to separate poles of the bacterium.
* a growing (new) cell wall begins to separate the bacterium.
* the complete development of the cell wall results in the. split of the bacterium.
* the daughter cells have tightly coiled DNA rods, ribosomes, and. plastids.



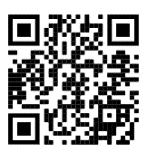




**Key Information:**

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**VEGATATIVE PROPAGATION**

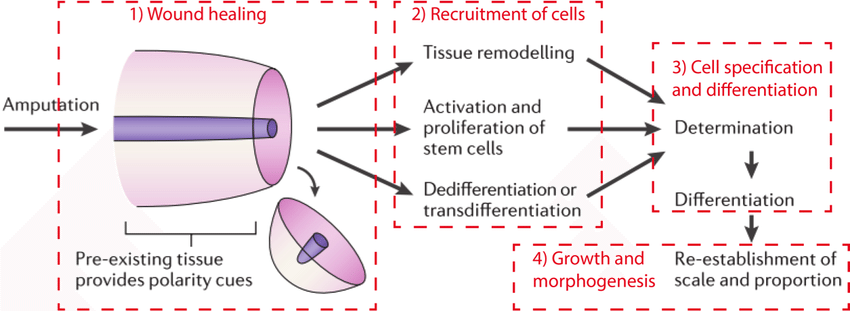


**Remember**

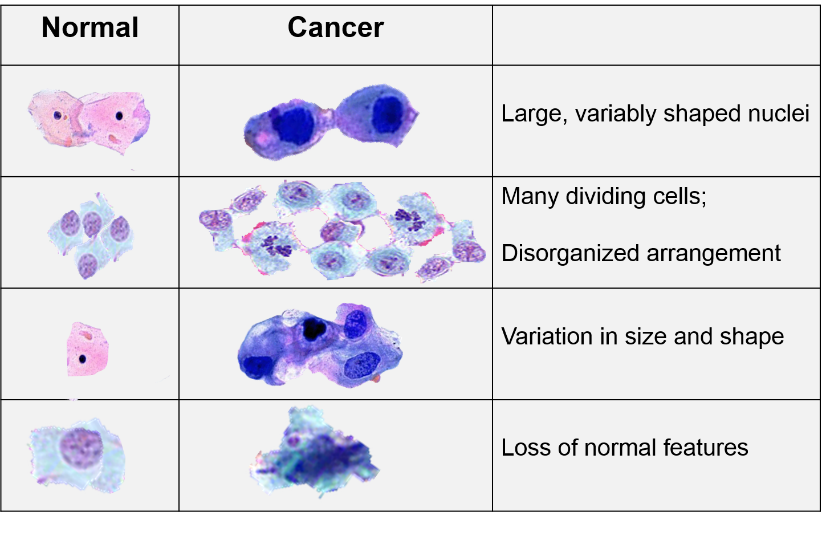
-During regenartion, a piece cut off, comes back as the exact length and copy of the original

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**REGENERATION**







**Problems within cell division can lead to cancer….**



|  |
| --- |
| **KEY VOCABULARY** **CELLS: CELL CYCLE, CELL DIVISION, AND REPRODUCTION** |
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|  |  |  |
| --- | --- | --- |
| KEY TERMS | KEY IMAGE | CLUES TO REMEMBER |
| Cell division | Image result for cell divison | * Two main types (mitosis/meiosis) * Result of the Cell cycle |
| Asexual Reproduction | Image result for asexual reproduction | * Produces identical offspring from ONE single parent cell |
| Sexual Reproduction | Image result for asexual reproduction | * Produces genetically different offspring from TWO parent cells |
| Budding | Image result for budding | * Type of asexual reproduction * Results in an exact copy of the parent cell |
| Vegetative Propagation | Image result for vegetative propagation | * Type of asexual reproduction * Results in an exact copy of the parent cell |
| Regeneration | Image result for regeneration | * Type of asexual reproduction * Results in an exact copy of the parent cell |
| Binary Fission | Image result for Binary fission | * Type of asexual reproduction * Results in an exact copy of the parent cell |
| Chromosome | Image result for chromosome | * In cell division, the chromosome replicates in the nucleus |
| Chromatin | Image result for chromatin | * Composed of DNA & proteins that condense (shrink) to form chromosomes in cell division. |
| Chromatid | Image result for chromatid | * One side of the chromosome |
| Centriole | Image result for centriole | * Helps form the spindle fibers that are used to separate the chromosomes |
| Spindle Fibers | Image result for spindle fibers | * Separate the chromosomes during Anaphase of Cell division |
| Somatic Cells | Image result for somatic cells | * Body cell (none sex cells) |
| Cell Cycle | Image result for cell cycle | * Process used to reproduce cells resulting in two daughter cells |
| Interphase | Image result for interphase | * Cell mostly stays in this phase and copies its DNA waiting to divide |
| Mitosis | Image result for mitosis | * a part of the cell cycle when replicated chromosomes are separated into two new nuclei |
| Gap 1 Phase | Image result for gap 1 phase | * the first of four phases of the cell cycle, the cell synthesizes mRNA and proteins in preparation for subsequent steps leading to mitosis |
| Gap 2 Phase | Image result for gap 2 phase | * the third subphase of interphase in the cell cycle directly preceding mitosis, the cell’s DNA is replicated |
| Synthesis Phase | Image result for synthesis phase | * DNA is packaged into chromosomes and replicated. This event is an essential aspect of the cell cycle because replication allows for each cell created by cell division to have the same genetic make-up. |
| Cytokinesis | Image result for daughter cell | * the cytoplasm of a single eukaryotic cell divides into two daughter cells |
| Prophase | Image result for daughter cell | * first stage of cell division, Beginning after interphase, condensation of the chromatin and the disappearance of the nucleolus |
| Metaphase | Image result for daughter cell | * chromosomes are at their second-most condensed and coiled stage, align in the equator of the cell before being separated into each of the two daughter cells |
| Anaphase | Image result for daughter cell | * after the process of metaphase, replicated chromosomes are split and the newly copied chromosomes are moved to opposite poles of the cell |
| Telophase | Image result for daughter cell | * the final stage in both meiosis and mitosis, the effects of prophase |
| Daughter Cell | Image result for daughter cell | * are genetically identical to the parent cell because they contain the same number and type of chromosomes |
| Cancer | Image result for cancer | * Uncontrolled cell growth causing tumors to form |
| Tumor |  | * mass of tissue that's formed by an accumulation of abnormal cells |
| Metastasis | Image result for metastasis | * pathogenic agent's spread from an initial or primary site to a different or secondary site within the host's body |
| Growth Factor | Image result for growth factor | * naturally occurring substance capable of stimulating cellular growth |
| Stem Cell | Image result for stem cell | * Unspecialized cells that can form differentiated cells |
| Embryo |  | * an early stage of development of a multicellular organism |

CONCEPT REVIEW

1. The growth phase of the cell cycle is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The 3 substages of interphase are: \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, & \_\_\_\_\_\_\_\_.
3. During the \_\_\_\_\_\_\_ stage, DNA is replicated
4. Mitosis occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or body cells
5. The end result of mitosis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ daughter cells with the

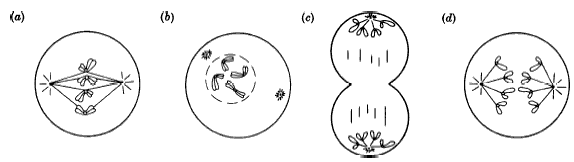
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of chromosomes.

1. Daughter cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or 2n
2. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the chromatids pair up. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

the chromatids line up and down the equator of the cell. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the

chromatids pull apart. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 cells are made.

1. Identify the following stages of mitosis.



a)\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ c) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ d) \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Disorder in which some of the body’s own cells cannot stop dividing; they have lost the ability to control the cell cycle.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Mass of growing tissue that may form when a cell or group of cells begins to grow and divide uncontrollably.
3. Examples of **asexual reproduction** include:

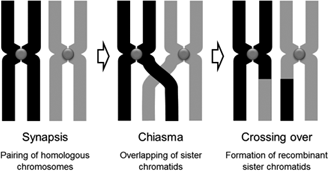
a.

b.

c.

d.

1. Meiosis produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells or gametes.
2. The two types of gametes are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Meiosis produces #\_\_\_\_\_\_\_\_\_ gametes that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(n).
4. Meiosis 1 involves the separation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, while Meiosis 2 involves the separation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Crossing over occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

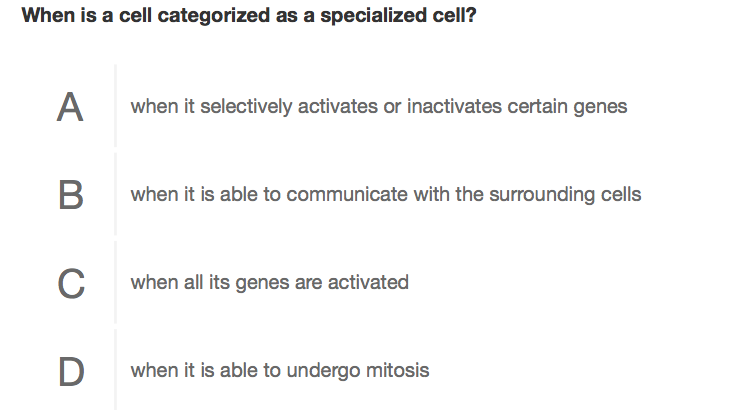


1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reduces the number of chromosomes.
2. If a gamete of an organism has 6 chromosomes, the body cells have \_\_\_\_\_\_\_\_ chromosomes.
3. If a liver cell of an organism has 32 chromosomes, a muscle cell of the same organism will have \_\_\_\_\_\_\_ chromosomes and a gamete will have \_\_\_\_\_\_\_ chromosomes.
4. Complete the chart below by checking off which cell division has which characteristics.

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Mitosis | Meiosis | neither |
| Cell division in body cells |  |  |  |
| Cell division in gametes |  |  |  |
| Eukaryotic cells |  |  |  |
| Produces haploid cells |  |  |  |
| Produces diploid cells |  |  |  |
| Produces 2 cells |  |  |  |
| Produces 4 cells |  |  |  |
| Used by bacteria to divide |  |  |  |

MAAP TEST PREP

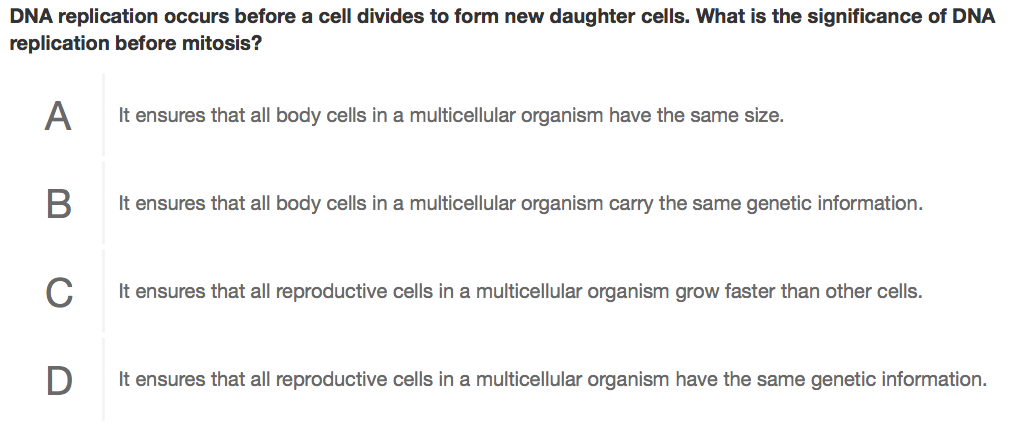
1)



1. Define the following terms from the question above:

Specialized

1. Rewrite the question in your own words. What are they really asking?
2. What is the correct answer and WHY? (you will not get credit without an explanation)

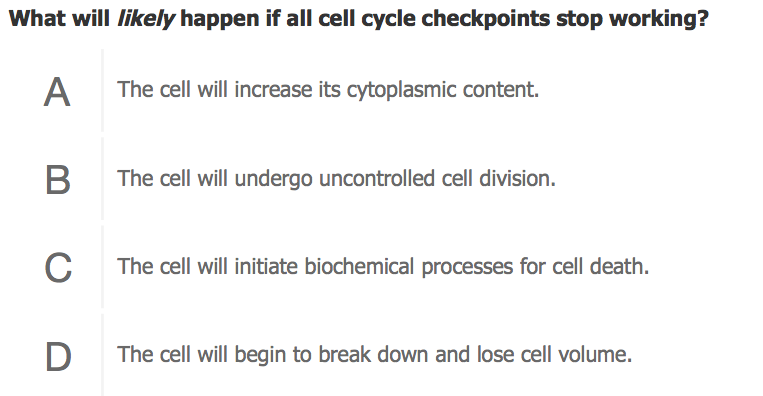
2)

1. Define the following terms from the question above:

Significance

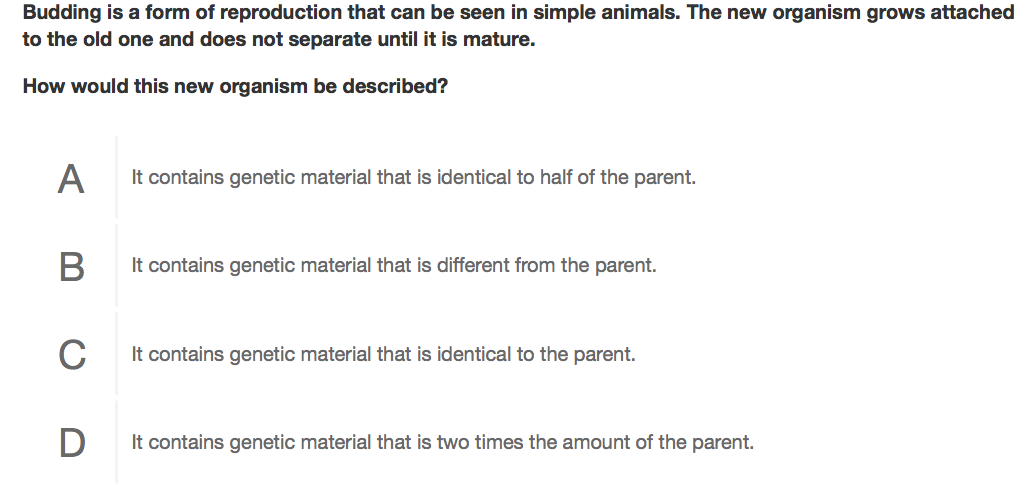
1. Rewrite the question in your own words. What are they really asking?
2. What is the correct answer and WHY? (you will not get credit without an explanation)

3)



1. When are the cell cycle checkpoints?
2. Rewrite the question in your own words. What are they really asking?
3. What is the correct answer and WHY? (you will not get credit without an explanation)

4)



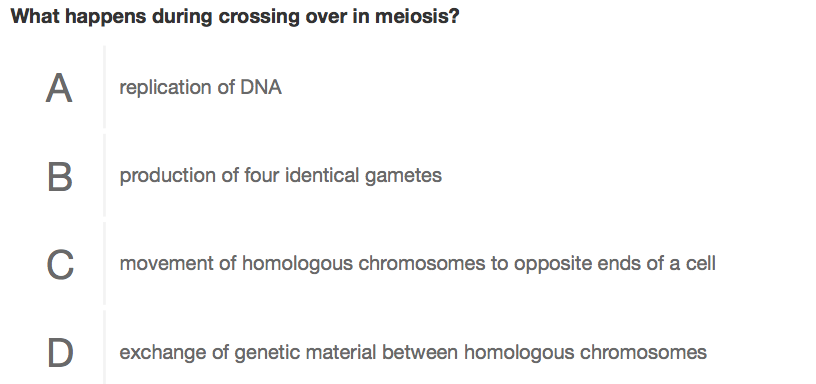
1. Define the following terms from the question above:

Budding

1. Rewrite the question in your own words. What are they really asking?

What is the correct answer and WHY? (you will not get credit without an explanation)

1)



1. Define the following terms from the question above:

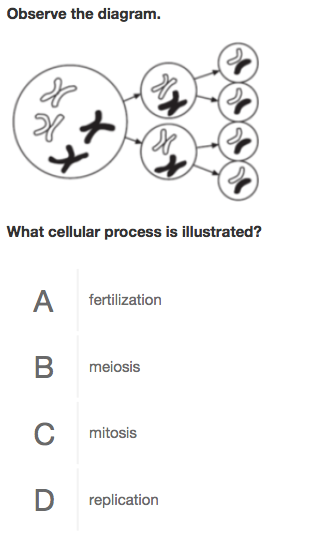
Crossing over

DNA replication

Homologous chromosomes

1. Rewrite the question in your own words. What are they really asking?
2. What is the correct answer and WHY? (you will not get credit without an explanation)

2)



1. What are the products of mitosis?
2. What are the products of meiosis?
3. Rewrite the question in your own words. What are they really asking?
4. What is the correct answer and WHY? (you will not get credit without an explanation)

