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FOCUS: Sexual & Asexual Reproduction

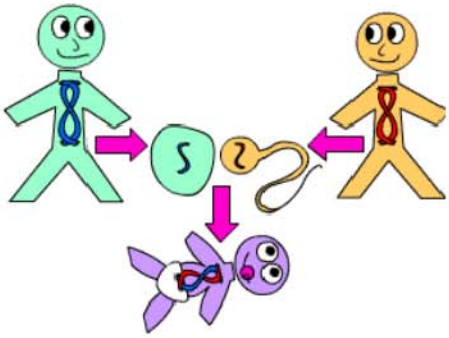
EQ:

- Can you explain the difference between sexual and asexual reproduction?
- Can you give some examples of organisms that reproduce asexually and describe the process? Can you give some examples of organisms that reproduce sexually and describe the process?
- What is the advantage to a species of reproducing sexually versus asexually?
- Can you explain the difference between mitosis and meiosis and describe when each is used?

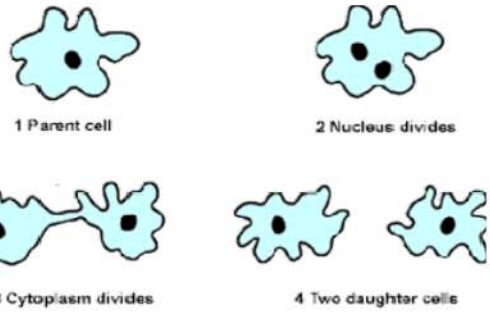
Reproduction

- All living things pass genetic information on to the next generation through the process of reproduction.
- Reproduction can happen in two ways:

1. ***Sexual reproduction:***
   - *Sex* means "to cross"
   - Occurs when genes from 2 parents cross.
   - Offspring contains a mixture of genetic information from both parents.
   - Offspring is genetically unique (different from both parents).



2. ***Asexual reproduction:***
   - *Asexual* means "not to cross"
   - Occurs when the genes from only one parent are passed on to an identical offspring
   - Offspring is a genetic clone of the parent.



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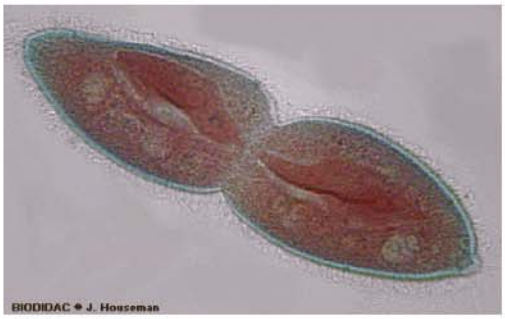
Asexual Reproduction

Five types:

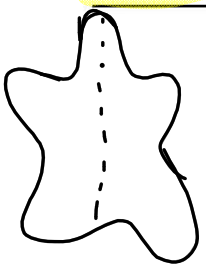
1. Binary Fission: Growth and splitting of an organism into two organisms
   - Ex: Bacteria, Protists

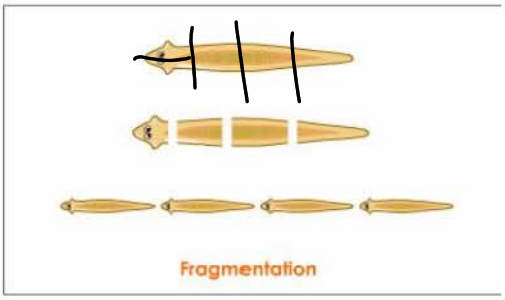


2. Budding: Rapid cell division (mitosis & cytokinesis) creates a "bud" off the side of an organism
   - The bud develops into an identical, but smaller version of the parent.
   - When it's large enough, it breaks off and becomes independent of the parent.
   - Ex: Hydra, coral, jellyfish, yeast


Hydra

3. Fragmentation: A new organism grows from a piece of the parent organism
   - Ex: starfish, Planaria




Fragmentation

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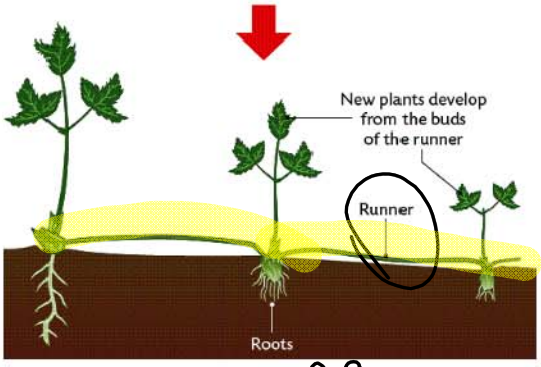
4. Vegetative propagation: New plants are produced from a cutting or runner of the parent plant

cut a piece off a plant & stick in ground

- Made possible by rapid cell division (Mitosis & cytokinesis)
- Ex: Strawberries, potatoes, bulbs'



5. Parthenogenesis: Eggs turn directly into offspring without fertilization

- AKA "Virgin Birth"
- Ex: fish, lizards, and insects, especially in difficult environmental conditions. Komodo Dragon

- ***Advantages:***
  - No genetic change is good if the environment is stable.
  - All individuals within the species are capable of producing offspring.
  - Energy is conserved since it does not have to be spent seeking a mate.
  - Occurs quickly and efficiently.
- ***Disadvantages:***
  - No recombination of genes = No genetic diversity
  - Weaknesses in the parent generation are passed on to the new generation.
  - Leaves an entire generation susceptible to extinction.

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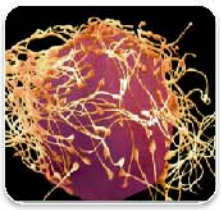
Sexual Reproduction

- Male parent provides half the genes and female parent provides the other half.
- Occurs through the process of fertilization in which two sex cells (gametes) come together to produce one fertilized cell (zygote).






Egg Production
- Ovaries produce female gametes (sex cells) through meiosis
- Egg = 23 chromosomes

Sperm Production
- Testes produce male gametes (sex cells) through meiosis
- Sperm = 23 chromosomes

Fertilization
- The joining of egg and sperm
- 23 + 23 = 46 chromosomes

Zygote
- An egg fertilized by a sperm forms a new cell called a zygote.
- Full set of DNA
- Develops into a baby

- ***Advantages:***
  - Offspring are genetically different from the parent generation.
  - Helps the species survive in an unstable environment.
  - Slower rate of reproduction, but faster rate of evolution.
  - Improvements in the species occur from generation to generation through natural selection.
- ***Disadvantages:***
  - Energy is expended to find, court, and copulate with a mate.
  - Only half the individuals within a species are capable of producing offspring.
  - Good genes can be covered up in the process.

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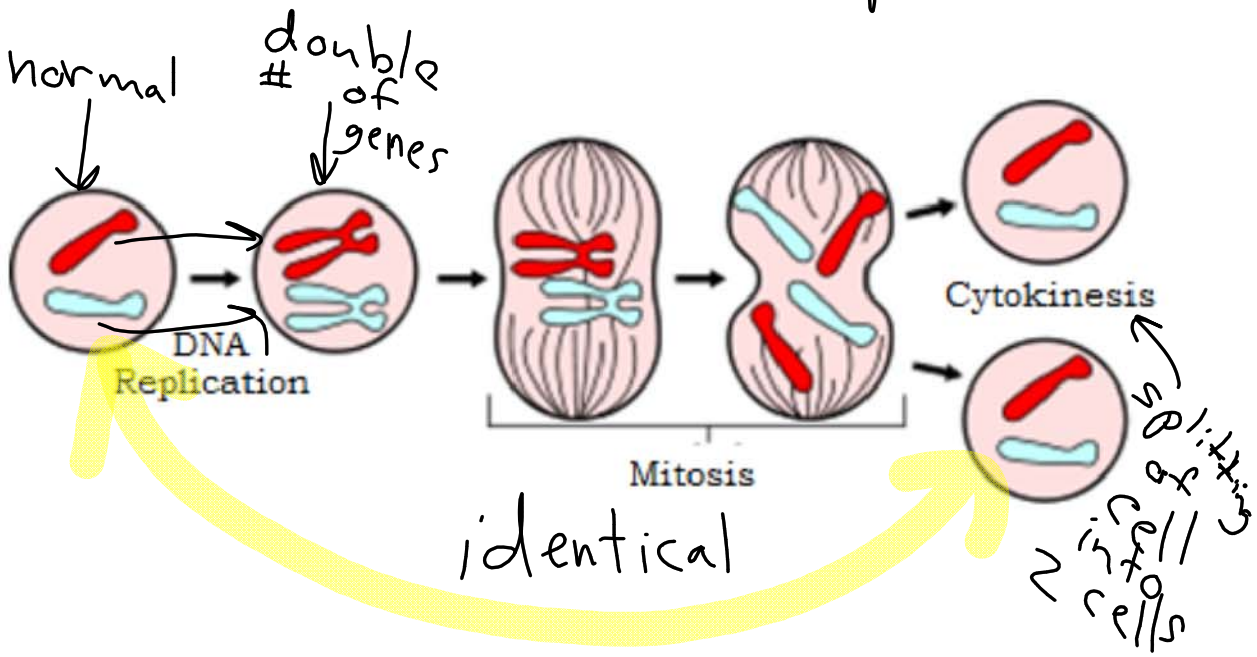
Processes that Make it All Happen: MITOSIS & MEIOSIS

- Asexual Reproduction would not be possible without mitosis.
  - ***Mitosis*** is the process that duplicates & then divides the cell's nucleus.
  - Allows cells to be copied and reproduced without losing genes.
  - Makes new generations that are identical to the previous generation.
  - Ex: skin cell production, growth, healing, All 5 forms of asexual reproduction.



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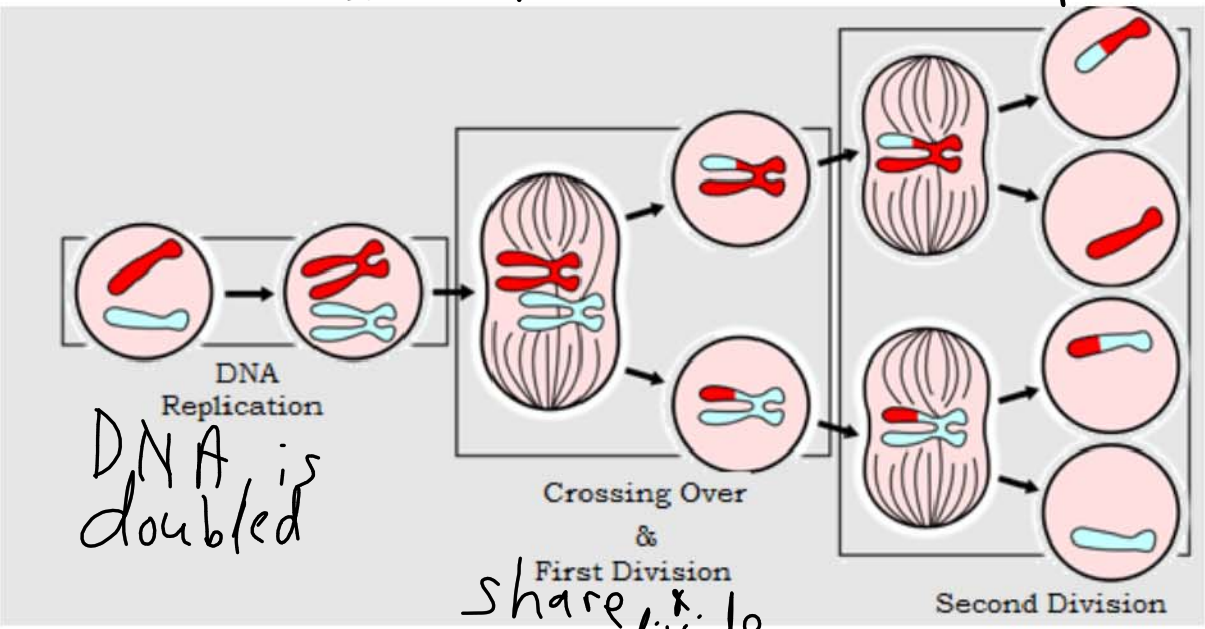
- Sexual reproduction would not be possible without meiosis.
  - ***Meiosis*** is the process of dividing the nucleus to produce gametes (sex cells).
  - Body cells have 2 copies of every gene, but after meiosis, sex cells (eggs & sperm) only have 1 copy of every gene.
  - Allows for diversity amongst offspring since the sex cells are not all identical to each other.
  - Occurs only in sex cells (gametes)
    - Ex: egg and sperm

haploid



DNA is doubled

share x

Duplicate → Divide in two → Divide again

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Reaction 7.01 – Compare and Contrast the ***processes*** and ***results*** of Mitosis & Meiosis.