

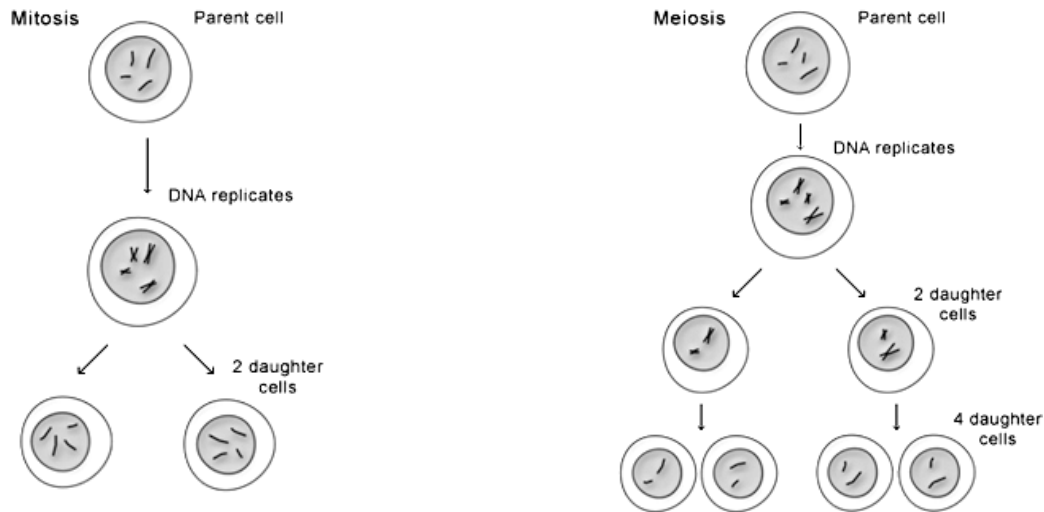
## REVIEW 4: REPRODUCTION

## MITOSIS

## MEIOSIS

**Mitosis vs. Meiosis:**

Notice the number of chromosomes *stays the same* in mitosis, but the number of chromosomes is *halved* in meiosis.



## 1. Asexual reproduction:

- Advantages: create numerous offspring quickly
- Disadvantage: No diversity (a disease can easily kill them all)

## 2. Sexual reproduction:

- Advantage: There is a more diversity in this type of reproduction
- Disadvantage: Takes longer, need to find a mate to reproduce

## 3. Mitosis

- Used in all forms of asexual reproduction.
- The number and types of chromosomes in the daughter cells are produced as in the parent cell.
- Multicellular (complex) organisms use mitosis for repair and grow.  
Simple one-celled organisms use it to reproduce.
- One division of a cell → two identical, diploid ( $2n$ ) cells.
  - Diploid: Cell with two sets of chromosomes.

## 4. Meiosis

- a. Makes gametes which will be used in sexual reproduction.
  - Gametes: sex cells → Sperm and egg
- b. One cell divides *twice* → four DIFFERENT haploid (1n) cells.
  - Haploid: cell with 1(n) set of chromosomes ( $\frac{1}{2}$  normal number)
- c. Separates pairs of chromosomes so that offspring gets 1 chromosome of each pair from each parent.
- d. Each daughter cell (gamete) gets only one half of the chromosomes of the “parent” cell.

## 5. Male Reproductive System

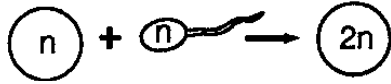
- a. teste produce and store sperm.
  - Sperm are haploid cells made by the process of meiosis
  - Sperm are produced in large numbers throughout a male’s life
  - Sperm are smaller than the egg and mobile
  - Sperm only provide offspring with 23 chromosomes — everything else is in the egg.
- b. testosterone is the male sex hormone, and is made in the testes.
- c. Penis transfers sperm into the female reproductive system.
- d. Semen is the fluid that carries sperm.
  - Semen contains sugar to give sperm energy.

## 6. Female Reproductive System

- a. Ovary produce eggs.
- b. Eggs are haploid cells made by the process of meiosis
- c. Females are born with all eggs they will ever need — millions of eggs, enough for several lifetimes
  - An egg is not fully matured / developed until ovulation
- d. Eggs contain 23 chromosomes and all cell parts (mitochondria, ribosomes, etc.) that the offspring will need to grow and develop.
- e. The menstrual cycle lasts 28 days (on average)
  - Ovulation — release of an egg (typically 1 per cycle)
  - Menstruation — shedding of the uterine wall if fertilization doesn’t occur
  - If pregnancy occurs, the menstrual cycle will temporarily stop.
- f. The oviduct carries the egg to the uterus.
- g. The uterus is the womb where the baby will develop.
- h. The vagina is the birth canal where the baby will leave the body.

## 7. Development

- a. Fertilization occurs in the fallopian tube.
- A fertilized egg is called a zygote
  - Fertilization restores the complete set of chromosomes, so the zygote is diploid (23 from the egg + 23 from the sperm = 46).

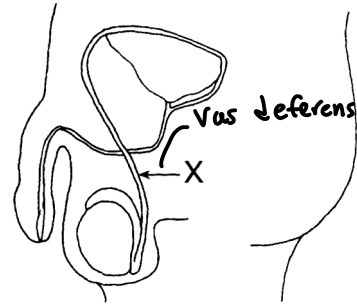
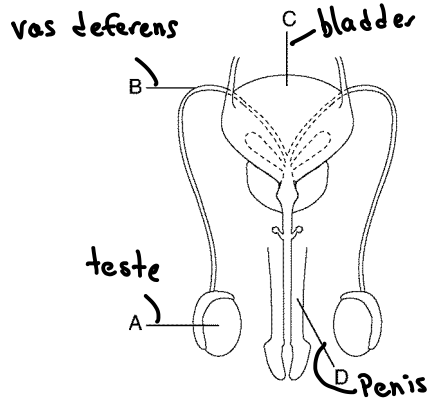


**Fertilization** restores the correct number of chromosomes.

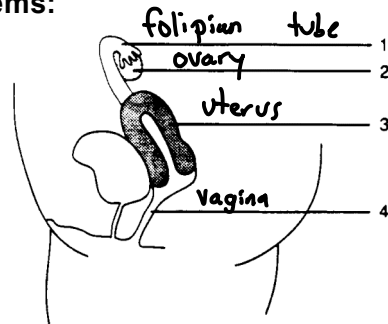
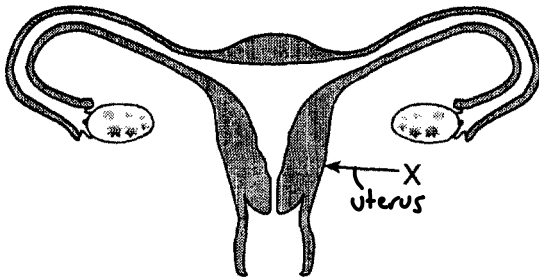
- b. A zygote develops in the following order:
- Cleavage: A form of mitosis → cells divide but do not differentiate
  - Differentiation: Cells begin to specialize and form into tissues and organs
    - All body cells have the same genes, but cells have different forms and different functions because during differentiation different genes are turned off or turned on in different cell types.
    - Zygote → Embryo → Fetus
- c. The umbilical cord transfers nutrients and oxygen from the mother's blood into the blood of the fetus through the process of blood flow.
- The blood of the mother and fetus do NOT mix.
  - The fetus is attached to the placenta by the umbilical cord.
  - Waste produced by the fetus is also removed by the placenta.
    - Waste (CO<sub>2</sub>, urea, salts) *diffuse* from placenta into mother's blood.
    - Since the fetus does not eat solid food, it does not have to eliminate feces.
- d. The child is vulnerable to alcohol, drugs, etc. because organs and systems are still developing.

8. Label the diagrams below

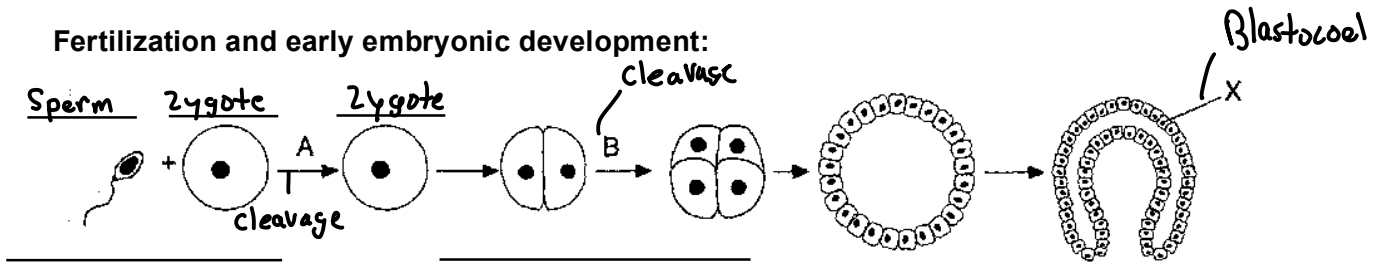
Front and side views of the male reproductive systems:



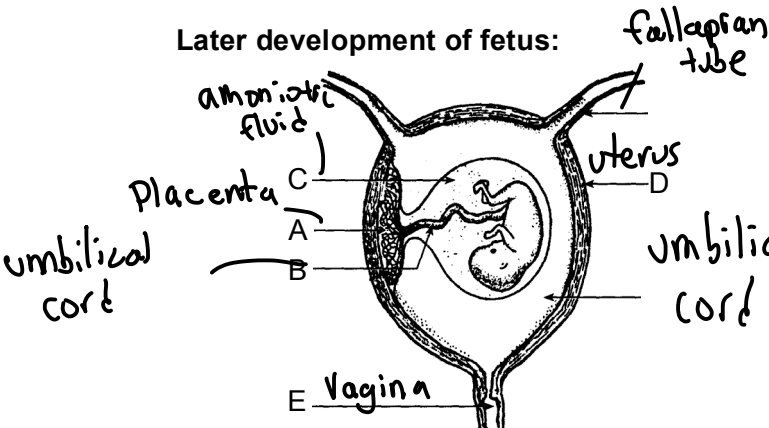
Front and side views of the female reproductive systems:



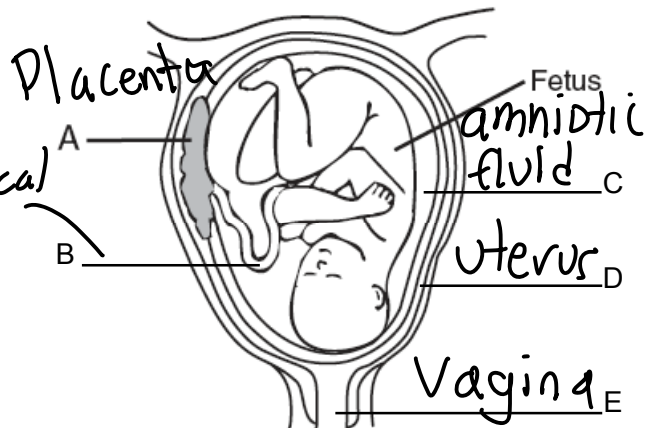
Fertilization and early embryonic development:



Later development of fetus:



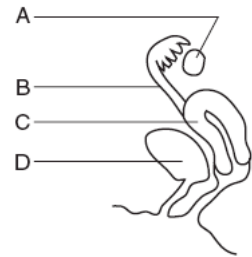
Ready for birth:



QUESTIONS

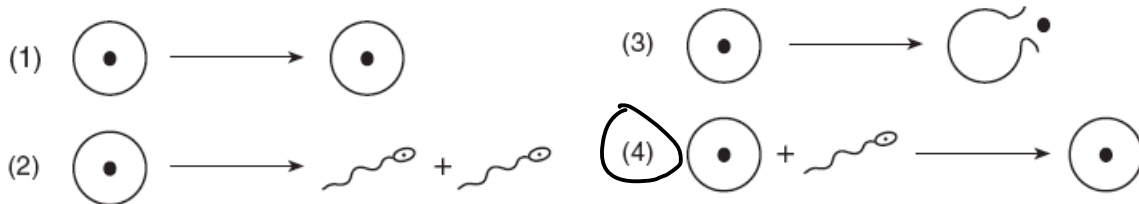
1. Structures in a human female are represented in the diagram.

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

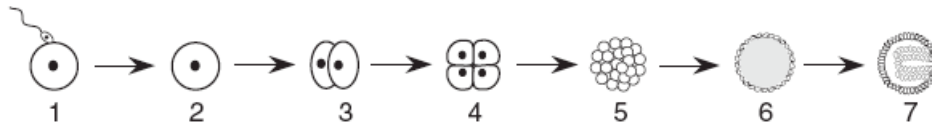


- a. A
- b. B
- c. C
- d. D

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



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

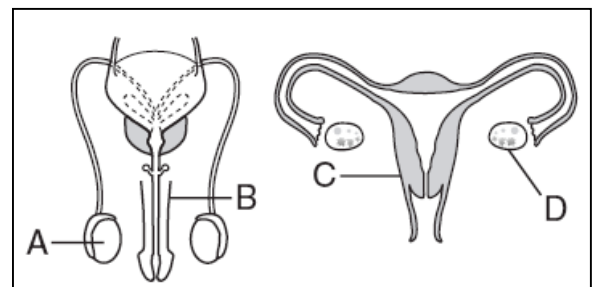


To regulate similar events in human reproduction, what adaptations are required?

- 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 statement best describes part of the human reproductive process?



- a. Testosterone produced in A is transferred to D, where it influences embryonic development.
- b. Testosterone produced in D influences formation of sperm within B.
- c. Estrogen and progesterone influence the activity of C.
- d. Progesterone stimulates the division of the egg within C.

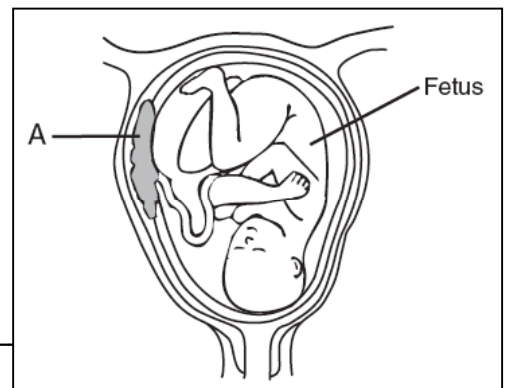
5. Hereditary traits are transmitted from generation to generation by means of
- specific sequences of bases in DNA in reproductive cells
  - proteins in body cells
  - carbohydrates in body cells
  - specific starches making up DNA in reproductive cells
6. Which process can produce new inheritable characteristics within a multicellular species?
- cloning of the zygote
  - mitosis in muscle cells
  - gene alterations in gametes
  - differentiation in nerve cells
7. Which developmental process is represented by the diagram below?



- fertilization
- differentiation
- evolution
- mutation

**Questions 8–9.** Women are advised to avoid consuming alcoholic beverages during pregnancy.

8. Identify the structure labeled A and explain how the functioning of structure A is essential for the normal development of the fetus.



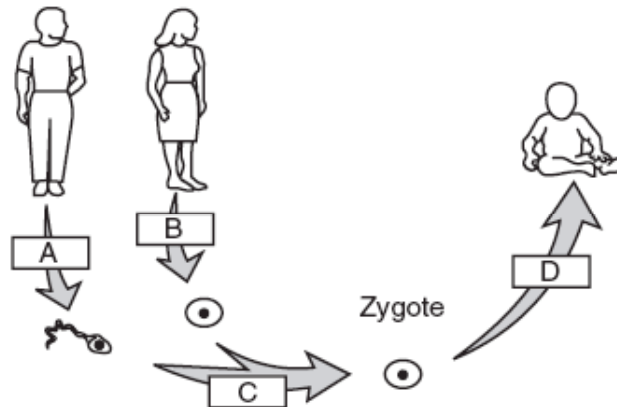
Structure A: Placenta

Responsible for the diffusion of materials to and from the embryo

9. Explain why consumption of alcoholic beverages by a pregnant woman is likely to be more harmful to her fetus than to herself.

The brain and the organ are only first forming in the fetus.  
Alcohol can diffuse through the placenta into the bloodstream of the fetus and disrupt brain and organ formation.

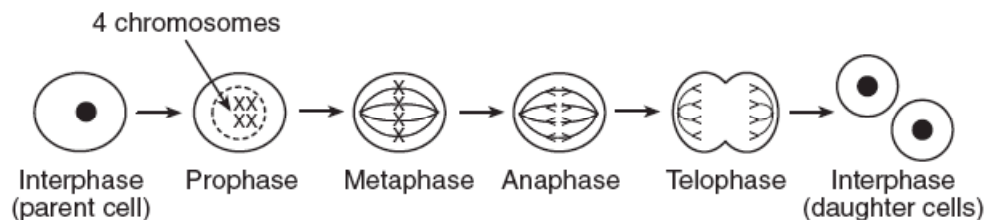
10. The diagram below represents processes involved in human reproduction.



Which row in the chart below correctly identifies the processes represented by the letters in the diagram?

Row	A	B	C	D
(1)	mitosis	meiosis	fertilization	differentiation
(2)	meiosis	meiosis	fertilization	differentiation
(3)	meiosis	mitosis	differentiation	fertilization
(4)	mitosis	mitosis	differentiation	fertilization

11. The diagram below illustrates the process of cell division.



What is the significance of anaphase in this process?

- a. Anaphase usually ensures that each daughter cell has the same number of chromosomes as the parent cell.
- b. Anaphase usually ensures that each daughter cell has twice as many chromosomes as the parent cell.
- c. In anaphase, the cell splits in half.
- d. In anaphase, the DNA is being replicated.