الملف مراجعة شاملة وفق الهيكل الوزاري انسباير
موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف التاسع المتقدم ⇦ علوم ⇦ الفصل الثالث

روابط مواقع التواصل الاجتماعي بحسب الصف التاسع المتقدم			
روابط مواد الصف التاسع المتقدم على تلغرام			
التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة علوم في الفصل الثالث	
1	نموذج مراجعة وفق الهيكل الوزاري الجديد
2	مراجعة وفق الهيكل الوزاري بريدج
3	مراجعة شاملة للمقرر وفق الهيكل الوزاري
4	حلول مراجعة لأهم الأسئلة والنقاط وفق الهيكل الوزاري انسباير النخبة
5	نموذج الهيكل الوزاري الجديد بريدج

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Chapter: Reproductive system

Lesson1: Reproductive systems

Human Male Reproductive System

The male reproductive glands are called the **testes** (singular, testis) and are located outside of the body cavity in a pouch called the scrotum. A temperature lower than 37°C-the average body temperature-is required for the development of sperm. Because the scrotum is located outside of the body cavity, it is several degrees cooler ⟶ This makes the environment suitable for the normal development of sperm.

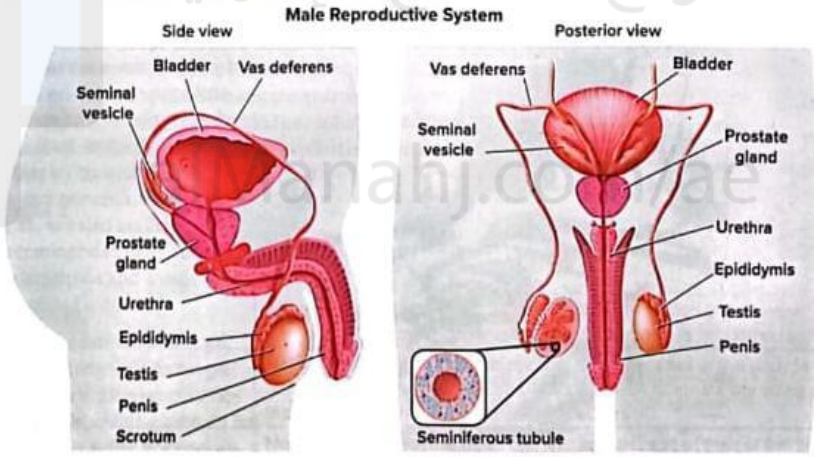

Figure 1 The male reproductive system produces gametes called sperm in the testes.

Sperm cells

The male reproductive cells, called **sperm cells**, are produced in the **testes**.

1- ***Sperm*** develop in the testes in the **seminiferous tubules** (These tubules produce 100-200 million sperm each day)
2- ***Sperm travel*** to the **epididymis** (a structure located on top of each testis where sperm mature and are stored)
3- When the sperm are released from the body; they travel through the **vas deferens** (duct leading away from the testis)

There are two vas deferens, one leading away from each testis.

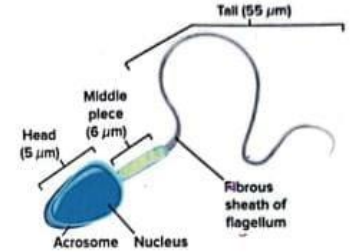

Figure 2 A sperm is a flagellated cell composed of a head, midpiece, and tail.
Identify, *in correct sequence, the structures that a sperm cell passes through or encounters as it makes its way out of the body.*

4- The two-vas deferens join together and enter the **urethra** (the tube that carries both semen and urine outside of the body through the penis).

5- Sperm require a nourishing fluid to survive long enough to fertilize an egg. **Semen** refers to the fluid that contains sperm, the nourishment, and other fluids from the male reproductive glands.
The seminal vesicles contribute over half of the semen and secrete the sugar needed for energy ⟶ They also provide other nutrients, proteins, and enzymes for the sperm.

6- The prostate gland **and bulbourethral glands** contribute an alkaline solution to the fluid to neutralize acidic conditions that sperm might encounter in the urethra and the female reproductive tract.

Human Female Reproductive System

A female's reproductive system:

1- produces egg cells,
2- receives sperm,
3- and provides an environment that is right for fertilization of an egg and the development of an embryo.

Egg cells

Female reproductive cells, called **egg cells**, are produced in the ovaries.
Inside each ovary are **oocytes**, which are immature eggs.

Approximately once every 28 days, oocyte development is stimulated and an egg, called an ovum, is formed.

The ovum is surrounded by follicle cells that protect and nourish.

After the egg is released from the ovary, it travels through an **oviduct** (a tube that connects to the uterus).

The uterus, or womb is where a baby develops before birth.

The cervix, at the lower end of the uterus, (has a narrow opening into the vagina), vagina leads to the outside of the female's body.

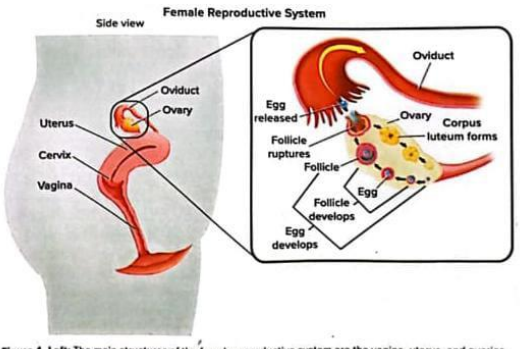

Figure 4 **Left:** The main structures of the female reproductive system are the vagina, uterus, and ovaries. **Right:** During every menstrual cycle, one follicle fully matures and releases an egg. The follicle is then called the corpus luteum.
Predict *what the result might be if more than one follicle fully develops during a cycle.*

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Female hormones

Estrogen and progesterone are steroid hormones made by cells in the ovaries.

- **A female's anterior pituitary gland also produces LH and FSH. During puberty.**
- **an increase in estrogen levels causes a female's breasts to develop, her hips to widen, and her amount of fat tissue to increase. During puberty, a female will also experience her first menstrual cycle, the events that take place each month in the human female to help prepare the female body for pregnancy.**

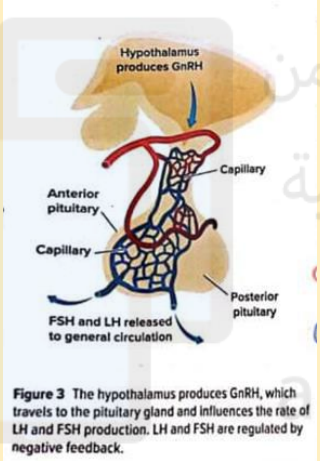


Figure 3 The hypothalamus produces GnRH, which travels to the pituitary gland and influences the rate of LH and FSH production. LH and FSH are regulated by negative feedback.

Male hormones

Testosterone (hormone which is made in the testes)

1- Is necessary for the production of sperm.
2- It also influences the development of male secondary sex characteristics that begin to appear at **puberty** (These characteristics include hair on the face and chest, broader shoulders, increased muscle development, and a deeper voice).
3- **Three hormones** influence testosterone production that the hypothalamus produces:

a- gonadotropin-releasing hormone **(GnRH)**, (which acts on the anterior pituitary gland).

GnRH stimulates the production of

1- follicle-stimulating hormone (FSH)	**2- and luteinizing hormone (LH)**

b- Both FSH and LH travel from the anterior pituitary gland through the bloodstream and to the testes.

In the testes

1- FSH promotes the production of sperm	**2- LH stimulates the production and secretion of testosterone.**

c- Levels of the male hormones are regulated by a negative feedback system that starts with the hypothalamus.

1- Increased levels of testosterone in the blood make the production of LH and FSH is decreased.	**2- When testosterone levels in the blood drop, the body responds by making more LH and FSH.**

Sex Cell Production

- Through meiosis, one cell in the testes or ovaries gives rise to four sex cells called gametes.
- In the human male, sperm are produced daily from primary spermatocytes, beginning at puberty and continuing throughout a male's lifetime.
- The production of eggs in the human female differs, A female is born with all of her eggs already beginning to develop.
- The genetic material has replicated in primary oocytes before birth.
- and meiosis stops before the first meiotic division is completed.
- Then, once in each menstrual cycle, meiosis continues for a single developing oocyte.
- The structures at the end of the first meiotic division of the oocyte are not equal in size.
- The smaller of the two structures is called a **polar body**, which disintegrates.
- The second meiotic division takes place only if fertilization occurs. Then, the zygote and the second polar body are formed. The second polar body also disintegrates.

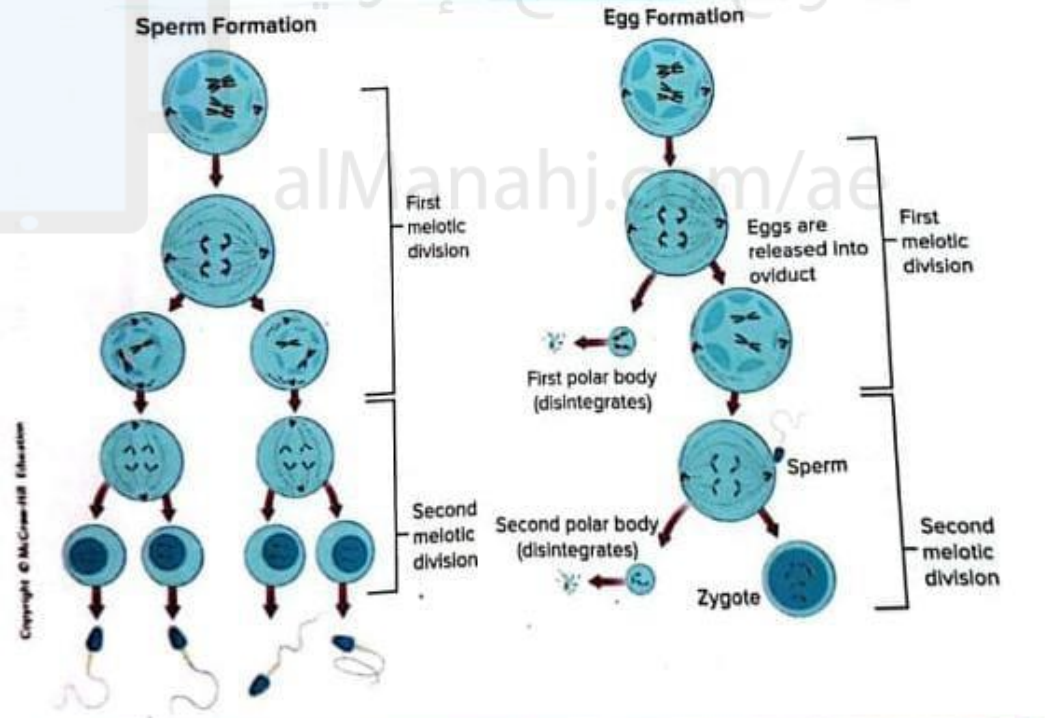
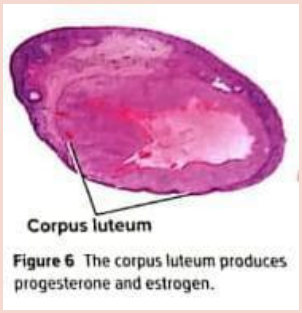


Figure 5 **Left:** The human male sex cell production follows the general pattern of meiosis and results in many sperm. **Right:** Meiosis in the human female results in one egg. The second division in meiosis will not be completed in a human female unless the egg is fertilized.

The Menstrual Cycle

The menstrual cycle typically lasts about 28 days. The entire menstrual cycle can be divided into three phases: the flow phase, the follicular phase, and the luteal phase.

Flow phase	Follicular phase	Luteal phase
▪ Day one of the menstrual cycle is when menstrual flow begins. ▪ Menstrual flow is the shedding of blood, mucus, and epithelial cells from the endometrium (The tissue that lines the uterus). ▪ The endometrium is where the embryo implants if fertilization of the egg occurs. ▪ Because an embryo needs oxygen and nutrients, the endometrium has a blood supply. ▪ During menstruation, bleeding occurs as the outer layers of the endometrium tear away, and blood vessels that supply the endometrium are ruptured. ▪ Around day five, repair of the endometrial lining begins. ⟶ It becomes thicker as the cycle continues.	▪ At the beginning of a menstrual cycle, when estrogen levels are low, the anterior pituitary begins to increase production of LH and FSH. ▪ This stimulates a few follicles to begin to mature in the ovary. ▪ Cells in the follicles then begin to produce estrogen and a small amount of progesterone. ▪ Inside each follicle is an immature egg, the oocyte. After about a week, usually only one of the growing follicles remains. This remaining follicle continues to grow and secrete estrogen, which keeps levels of LH and FSH low (an example of negative feedback). ▪ On about day 12, the high level of estrogen causes the anterior pituitary gland to release a surge of LH. ▪ This rapid release of a large quantity of LH causes the follicle to rupture, and (ovulation occurs).	▪ After ovulation, the cells of the follicle change, and the follicle is transformed into a structure called the **corpus luteum**. ▪ The corpus luteum slowly degenerates as the menstrual cycle continues. ▪ The corpus luteum produces high amounts of progesterone and some estrogen ⟶ which keep levels of LH and FSH low (through negative feedback). ▪ Toward the end of the cycle, the corpus luteum breaks down, and it no longer produces progesterone and estrogen. ▪ This results in a rapid decrease in progesterone and estrogen levels ⟶ A rapid decrease in hormones triggers detachment of the endometrium, and the flow phase of a new menstrual cycle will begin.  **Figure 6** The corpus luteum produces progesterone and estrogen.

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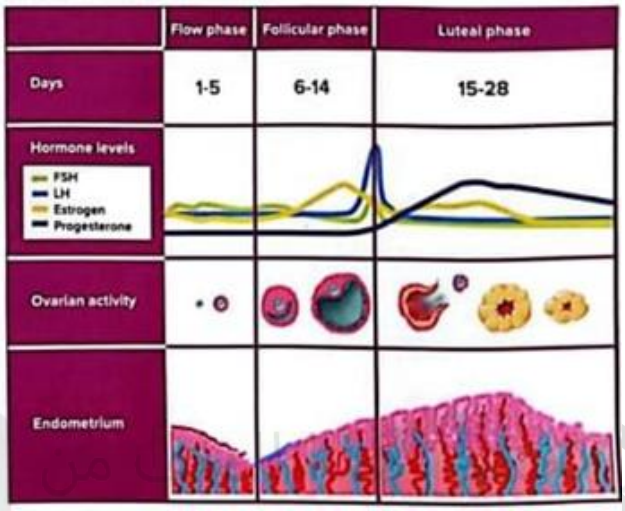
(If the egg is fertilized, a different chain of events occurs, and a new menstrual cycle does not begin).

Table 1 Menstrual Phases



Summary of the menstrual cycle hormones

Flow phase	Follicular phase	Luteal phase
- Estrogen and progestron (very low) - LH-FSH (high)	- More estrogen and small amount of progestron. • Ovulation: LH (very high)	- More progestron and small amount of estrogen. - LH- FSH (low)

Lesson2: Human Development before Birth

Fertilization

fertilization the process of a sperm joining with an egg.

Fertilization usually occurs in the upper portion of an oviduct near the ovary. In humans, both sperm and eggs are haploid (and each normally has 23 chromosomes) Fertilization brings these chromosomes together, restoring the diploid number of 46 chromosomes.

Sperm enter the vagina when strong muscular contractions ejaculate semen from the male's penis during intercourse.

Sperm can survive for 48 hours in the female reproductive tract, but an unfertilized egg can survive for only 24 hours ⟶ Fertilization can happen if intercourse occurs anytime from a few days before ovulation to a day after ovulation.

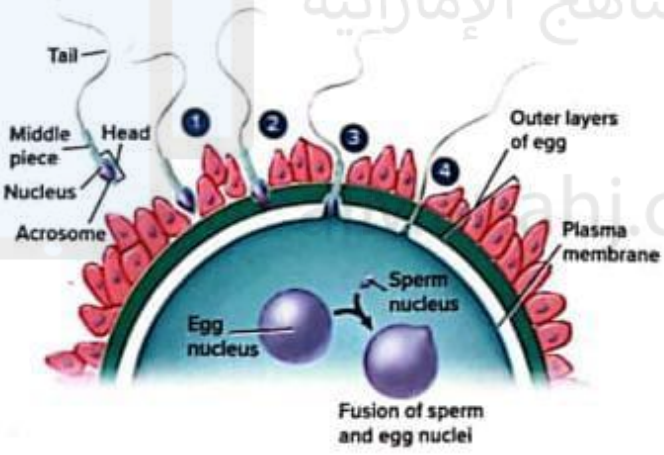


Figure 7 Although many sperm are needed to weaken the barrier that surrounds the egg, only one sperm fertilizes an egg (steps 1-4). Fertilization is complete when the sperm nucleus fuses with the egg nucleus.

About 300 million sperm are released into the vagina during intercourse.
Only several hundred of them will successfully reach the egg (**1- Many never make it out of the vagina, 2- some are attacked by white blood cells, 3- and many simply die along the way**)
Only **one sperm** can fertilize an egg, but it takes several hundred to participate in the process.
A single sperm cannot penetrate the plasma membrane of a human egg.
The tip of each sperm is a specialized lysosome called an **acrosome** ⟶ (As several hundred sperm bombard the egg) **the enzymes** inside of the acrosomes weaken the plasma membrane of the egg.
Eventually the plasma membrane becomes weak enough that one sperm can penetrate the egg Immediately
the egg forms a barrier to prevent other sperm from entering the now-fertilized egg.
https://youtu.be/y4HK5CTVkXM

Extraembryonic membranes

The membranes that extend beyond an embryo are called the **extraembryonic mem branes**.

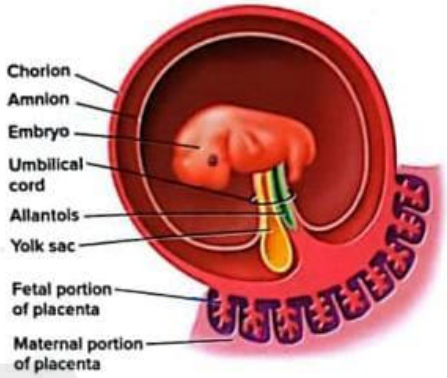


Figure 9 Four extraembryonic membranes—the amnion, chorion, yolk sac, and allantois—are important in development.
Identify *the role of the yolk sac in humans.*

Early in human development, four extraembryonic membranes form.
These membranes are the amnion, the chorion, the yolk sac, and the allantois.

1- **The amnion** is a thin layer that forms a sac around the embryo.

Inside this sac is the **amniotic fluid**, (which protects, cushions, and insulates the embryo).

2- Outside of the amnion is the **chorion**, which, together with the **allantois**, contributes to the formation of the placenta.
3- **The yolk sac** in humans does not contain any yolk but serves as the first site of red blood cell formation for the embryo.

The placenta

About two weeks after fertilization, tiny fingerlike projections of the chorion called **chorionic villi**, begin to grow into the wall of the uterus.

The placenta the organ that provides food and oxygen and also removes waste, begins to form.

The placenta has two surfaces:

1- a fetal side that forms from the chorion and faces the fetus.
2- a maternal side that forms from uterine tissue.

The umbilical cord a tube containing blood vessels, serves as the connection between the fetus and the mother.

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The placenta regulates what passes from the mother to the fetus and from the fetus to the mother

Oxygen and nutrients travel from the mother to the fetus. Alcohol, drugs, and the human immunodeficiency virus (HIV) also can pass through the placenta to the developing fetus.

Metabolic waste products and carbon dioxide travel from the fetus to the mother.

Because the mother and the fetus have their own separate circulatory systems, blood cells do not pass through the placenta.

However, the mother's antibodies pass to the fetus and help protect the newborn until its immune system is functioning.

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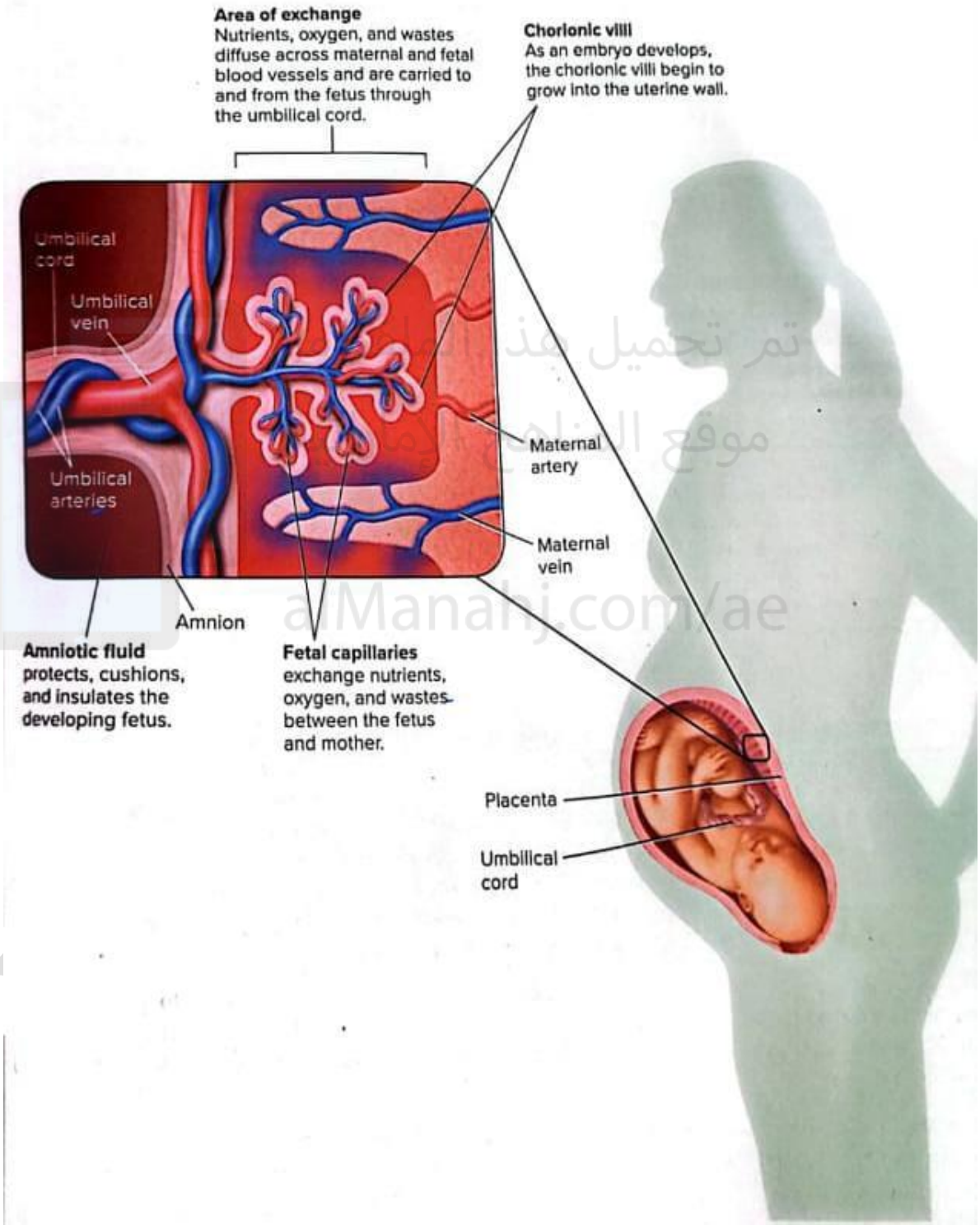
Figure 10 Visualizing a Placenta

A growing fetus exchanges nutrients, oxygen, and wastes with the mother through the placenta. The placenta contains tissue from both mother and fetus.



Hormonal regulation during pregnancy

1- During the first week of development, **the embryo** begins to secrete a hormone called **human chorionic gonadotropin** (hCG) ⟶ which keeps the corpus luteum intact (If the corpus luteum remains active, progesterone levels, and to a lesser extent estrogen levels. remain high) ⟶ When levels of these hormones remain high, a new menstrual cycle does not begin.

2- Two to three months into development, **the placenta** secretes enough progesterone and estrogen to maintain the proper conditions for pregnancy.

Three Trimesters of Development

Human development takes about 266 days from fertilization to birth.

This time span is divided into three trimesters ⟶ (each around three months long)

During this time, the zygote grows from a single cell into a baby that has trillions of cells that develop into tissues and organs.

Figure 11 The embryo develops into a fetus during the first trimester of pregnancy. By the end of the third month, the fetus can make small movements.

1) The first trimester

During the first two weeks of development ⟶ the mother might not realize that she is pregnant and exposure to certain substances or a lack of certain essential nutrients might cause irreversible damage to the developing embryo. A few of the major causes of preventable birth defects are listed in Table:

Cause	Defect
Alcohol consumption	• Mental retardation
Cigarette smoking	• Health problems related to premature births and underweight babies.
Lack of folic acid in diet	• Anencephaly (head and brain do not completely form) • Spina bifida (nerve cells from the spinal cord are exposed, leading to paralysis).
Methamphetamine	• Premature birth • Extreme irritability

1- In the first trimester, all tissues, organs, and organ systems begin to develop.
2- At the end of eight weeks, the embryo is called a fetus.
3- All of the organ systems have begun to form.
4- By the end of the first trimester, the fetus can move its arms, fingers, and toes and make facial expressions.
5- Fingerprints are also present.

2) The second trimester

The second trimester primarily is a period of growth.

a- Around 18 to 20 weeks, the fetal heartbeat might be heard using a stethoscope.
b- The developing fetus is capable of sucking its thumb and can develop the hiccups.
c- The mother might feel a fluttering sensation or might even feel light kicks.
d- Hair usually forms,
e- the fetal eyes will open during this period.
f- At the end of this trimester, the fetus might be able to survive outside the mother's uterus with the aid of medical intervention.

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3) The third trimester

During the third trimester, the fetus continues to grow at a rapid rate.

a- Fat accumulates under the skin to provide insulation for the fetus once it is born. Adequate protein intake by the mother is important during this time (**Protein** is essential for the rapid amount of brain growth that occurs)

b- New nerve cells in the brain are forming at a rate of 250,000 cells per minute.

c- The fetus now might respond to sounds in the environment, such as music or the sound of its mother's voice.

Chapter: Cellular reproduction and Sexual reproduction

Lesson1: Cellular reproduction

Cell Size Limitations

Most cells are less than 100 µm (100 x 10 m) in diameter.

Why are most cells so small?

The key factor that limits the size of a cell is the ratio, or mathematical comparison, of **its surface area to its volume.**

The surface area of the cell refers to the area covered by the plasma membrane.

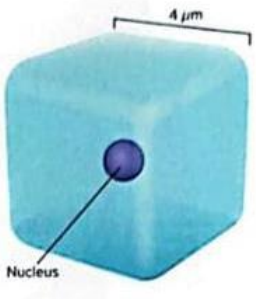
The volume of the cell refers to the space taken up by all of the inner contents of the cell.

Ratio of surface area to volume

To illustrate the ratio of surface area to volume, think about a small cube, which has six sides.

Surface area = length x width x number of sides

Volume = length x width x height



Surface area= 1 x 1 x 6 = 6 Mm^2

Volume = 1 x 1 x 1 = 1 Mm^3

Ratio between surface area to volume = 6: 1

Surface area= 2 x 2 x 6 = 24 Mm^2

Volume = 2 x 2 x 2 = 8 Mm^3

Ratio between surface area to volume = 24: 8 = 3: 1

Calculate the ratio of surface area to volume to this cell.

Chromosomes

Chromatin	Chromosomes
Chromatin is the relaxed form of DNA.	**Chromosomes** are condensed structures that contain the DNA that are visible during mitosis.

The phosphate groups in DNA create a negative charge, which attracts the DNA to the positively charged histone proteins and forms a **nucleosome**.

The nucleosomes group together into **chromatin fibers**, which supercoil to make up the structure recognized as a **chromosome.**

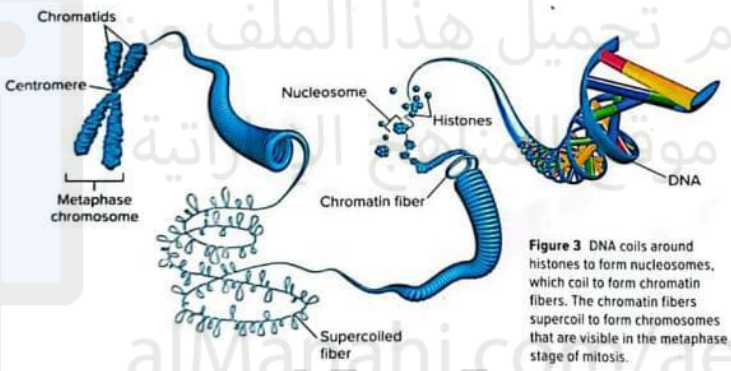


Figure 3 DNA coils around histones to form nucleosomes, which coil to form chromatin fibers. The chromatin fibers supercoil to form chromosomes that are visible in the metaphase stage of mitosis.

The Cell Cycle

1- Interphase ***2- Mitosis*** ***3- Cytokinesis***

Cells reproduce by a cycle of growing and dividing called the **cell cycle**.

- Cellular reproduction allows your body to grow and heal certain injuries.
- Each time a cell goes through one complete cell cycle, it becomes two cells.

Interphase

Interphase is the stage during which the cell grows, develops into a mature, functioning cell, duplicates the DNA in its nucleus, and prepares for division.

Interphase is divided into three stages:

G_1, S and G_2, also called Gap 1, synthesis, and Gap 2.

1- Gap 1 (G_1):

a- During G it a cell is growing.
b- carrying out normal cell functions.
c- preparing to replicate DNA.

2- Synthesis (S):

S, is the period when a cell copies its DNA in preparation for cell division.

3- Gap 2 (G2):

Is the period when the cell prepares for the division of its nucleus.

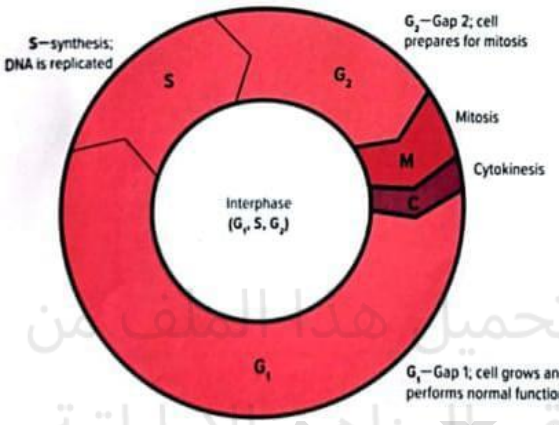
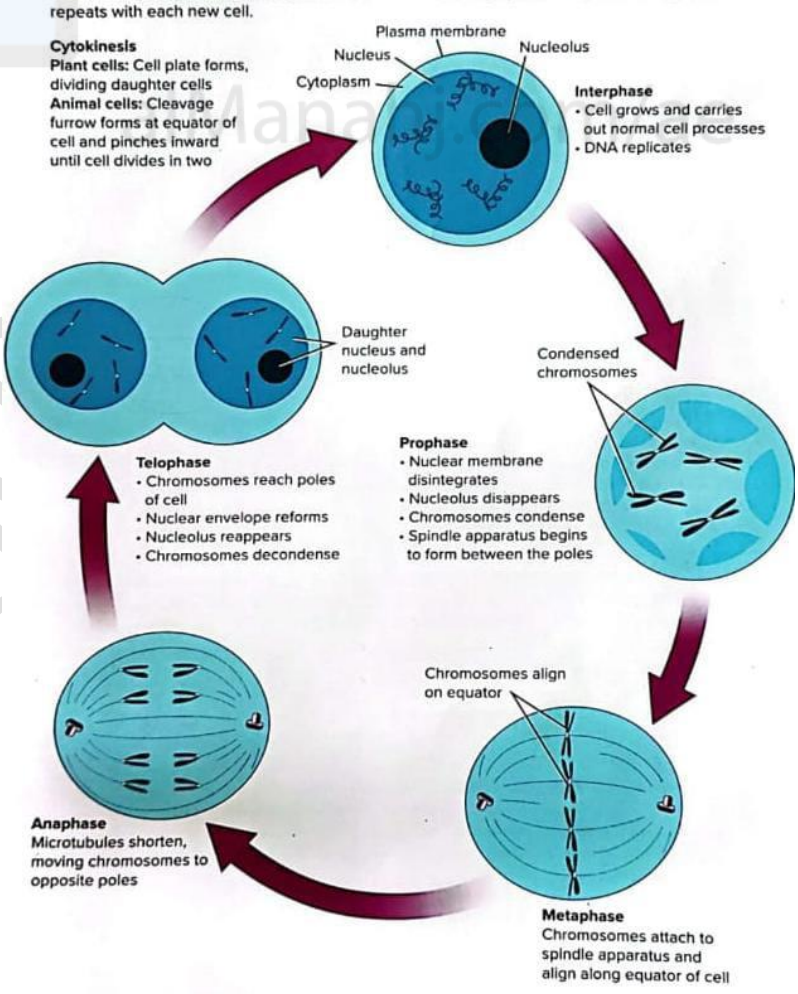


Figure 6 Visualizing the Cell Cycle

The cell cycle begins with Interphase. Mitosis follows, occurring in four stages—prophase, metaphase, anaphase, and telophase. Mitosis is followed by cytokinesis, then the cell cycle repeats with each new cell.



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Apoptosis

Some cells go through a process called **apoptosis.** or programmed cell death.

All animal cells appear to have a "death program" that can be activated.

- One example of apoptosis occurs during the development of the human hand and foot.
- When the hands and feet begin to develop, cells occupy the spaces between the fingers and toes.
- Normally, this tissue undergoes apoptosis with the cells shriveling and dying at the appropriate time so that the webbing is not present in the mature organism.

An example of apoptosis in **plants** is the localized death of cells that results in leaves falling from trees during autumn.

Abnormal cell cycle: cancer

Cancer is the uncontrolled growth and division of cells a failure in the regulation of the cell cycle.

When unchecked, cancer cells can kill an organism by crowding out normal cells. resulting in the loss of tissue function.

Causes of cancer

Cancer does not just occur in a weak organism. In fact, cancer occurs in many healthy, active, and young organisms.

The changes that occur in the regulation of cell growth and division of cancer cells are due to:

1- mutations
2- changes in the segments of DNA that control the production of proteins.
3- environmental factors can affect the occurrence of cancer cells
(Substances and agents that are known to cause cancer) are called **carcinogens**.

❖ Although not all cancers can be prevented, avoiding known carcinogens can help reduce the risk of cancer.

1- Avoiding **tobacco** of all kinds, even secondhand smoke and smokeless tobacco, can reduce the risk of cancer.

2- Some radiation, such as **ultraviolet** radiation from the Sun, is impossible to avoid completely. There is a connection between the amount of ultraviolet radiation to which a person is exposed and the risk of developing skin cancer.
Sunscreen is recommended for everyone who is exposed to the Sun.
3- Other forms of radiation, such as **X-rays**, are used for medical purposes, you might have worn a heavy lead apron when an X-ray was taken.

Lesson2: Meiosis and Sexual reproduction

❖ *Homologous chromosomes*

- Human body cells have 46 chromosomes.
- Each parent contributes 23 chromosomes, resulting in 23 pairs of chromosomes.
- The chromosomes that make up a pair, one chromosome from each parent, are called **homologous chromosomes.**
- homologous chromosomes in body cells have the same length and the same centromere position ⟶ and they carry genes that control the same traits.

Figure 13 Homologous chromosomes carry genes for any given trait at the same location. The genes that code for earlobe type might not code for the exact same type of earlobe.

❖ *Haploid and diploid cells*

- In order to maintain the same chromosome number from generation to generation, an organism produces **gametes** (which are sex cells that have half the number of chromosomes) In humans **each gamete contains 23 chromosomes.**
- The symbol ***n*** can be used to represent the number of chromosomes in a gamete.
- A cell with a number of chromosomes is called a **haploid cell**.
- The process by which one haploid gamete (sperm) combines with another (egg) haploid gamete is called **fertilization.**
- As a result of fertilization, the cell now will contain a total of ***2n*** chromosomes (n chromosomes from the female parent plus n chromosomes from the male parent)
- A cell that contains 2 number of chromosomes is called a **diploid cell.**

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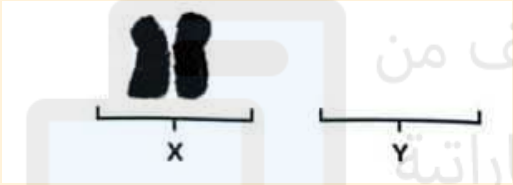
❖ *Sex determination*

- Each cell in your body, **except for gametes**, contains 46 chromosomes, or 23 pairs of chromosomes.
- One pair of these chromosomes, the **sex chromosomes**, determines an individual's sex.
- There are two types of sex chromosomes-X and Y.

Individuals with two X chromosomes are genetically classified as female.



Individuals with an X and a Y chromosome are genetically classified as male.

- The other 22 pairs of chromosomes are called **autosomes**.

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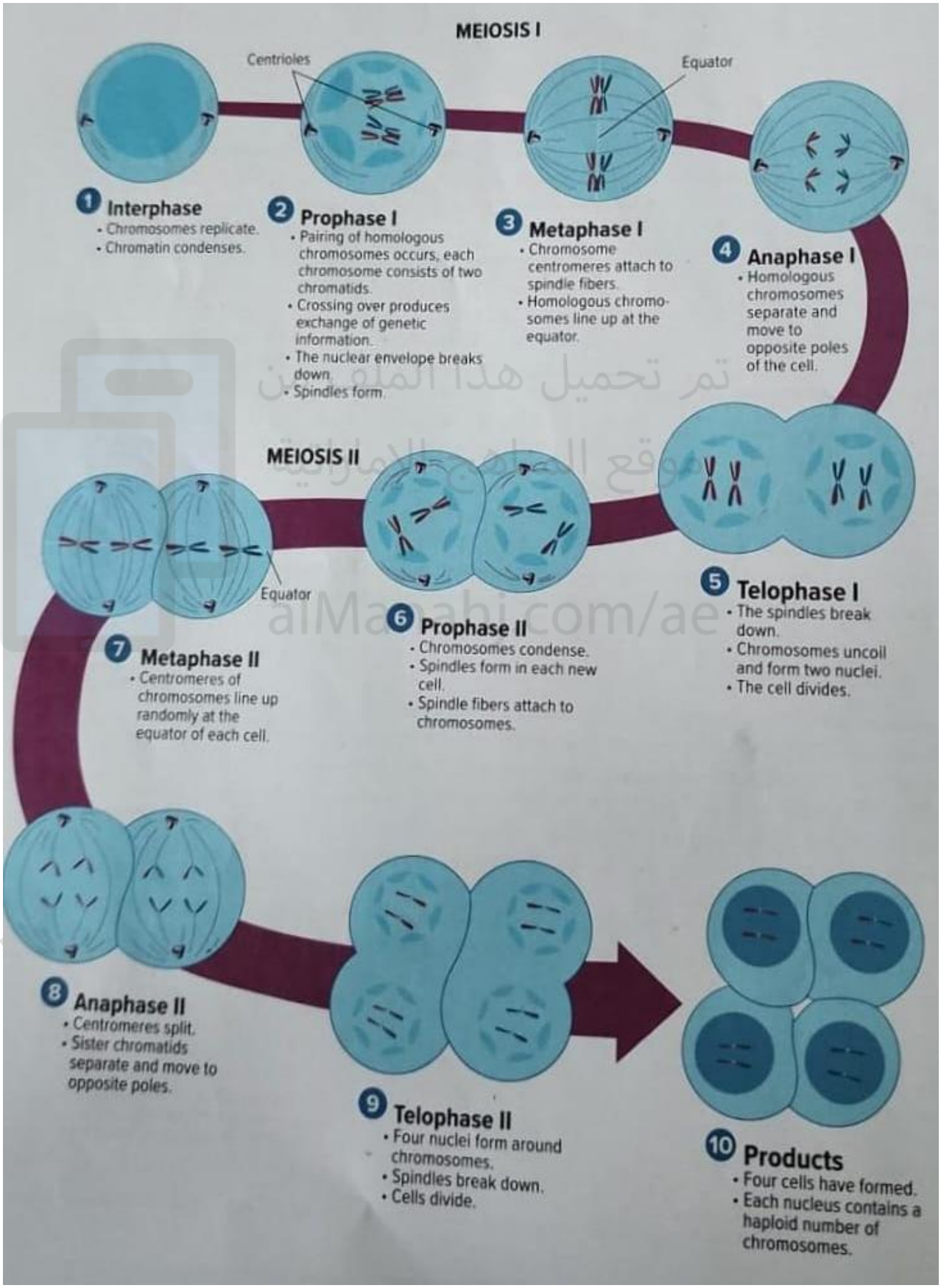
Visualing Meiosis



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Sex chromosomes Nondisjunction occurs in both autosomes and sex chromosomes. Some of the results of nondisjunction in human sex chromosomes are listed in Table.

Genotype	XX	XO	XXX	XY	XXY	XYY	OY
Example							
Phenotype	Genetically classified as female	Female with Turner's syndrome	No phenotypic affect	Genetically classified as male	Male with Klinefelter's syndrome	No phenotypic affect	Results in death