Unit 2: Cellular Reproduction and Meiosis Review

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التواصل الاجتماعي بحسب الصف التاسع المتقدم					
صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة أحياء في الفصل الثالث	
1	Coverage Of Biology
2	مراجعة هيكل الامتحان 2026م

(يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ)

Biology: It is the science concerned with the study of the life of living organisms.
So, can you reflect on the creation of Allah?
"Welcome to a new Biology lesson"

بسم الله الرحمن الرحيم
13-5-2026

Third Term 2025–2026

Advanced Grade 9 Students

Unit 2: Cellular Reproduction and Meiosis

Review

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I. Multiple Choice Questions

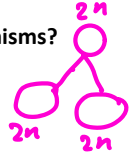
1. What is the primary factor that limits a cell's size?
a) The amount of DNA in the nucleus
b) The number of organelles in the cytoplasm
c) The ratio of surface area to volume
d) The density of the cytoskeleton

2. During which stage of the cell cycle does a cell spend the majority of its time?
a) Mitosis
b) Interphase
c) Cytokinesis
d) Prophase

G_1 S G_2

3. Which substage of interphase is characterized by DNA replication?
a) Gap 1 (G1)
b) Synthesis (S)
c) Gap 2 (G2)
d) Mitosis

4. What is the purpose of mitosis in multicellular organisms?
a) To produce gametes
b) To increase genetic variation
c) To replace damaged cells and support growth
d) To reduce the chromosome number by half



5. Which phase of mitosis involves the sister chromatids being pulled apart toward opposite poles?
a) Prophase
b) Metaphase
c) Anaphase
d) Telophase

6. In plant cells, what structure forms during cytokinesis to divide the cytoplasm?
a) Cleavage furrow
b) Centromere
c) Cell plate
d) Spindle apparatus

7. What are the proteins that bind to enzymes to initiate various activities in the cell cycle?
a) Carcinogens
b) Cyclins
c) Centromeres
d) Histones

8. Programmed cell death is known as:
a) Cancer
b) Cytokinesis
c) Apoptosis
d) Meiosis

9. Substances known to cause cancer are called:
a) Cyclins
b) Carcinogens
d) Gametes
d) Nucleosomes

10. A cell with "n" number of chromosomes is described as:
a) Diploid → 2n
b) Haploid
c) Homologous
d) Sister chromatid

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11. How many chromosomes are found in a human body (somatic) cell?
a) 23
b) 46
c) 92
d) 12

23 Pairs.

12. Which process results in the exchange of genetic segments between homologous chromosomes?
a) Nondisjunction
b) Fertilization
c) Crossing over
d) Synapsis

13. During which stage of meiosis do homologous pairs line up at the equator?
a) Metaphase I
b) Metaphase II
c) Anaphase I
d) Prophase I

14. How many daughter cells are produced at the completion of meiosis?
a) Two genetically identical cells
b) Two genetically different cells
c) Four genetically identical cells
d) Four genetically different cells

15. Protective caps at the end of chromosomes are called:
a) Centromeres
b) Telomeres
c) Histones
d) Spindles

16. A micrograph that shows the pairs of homologous chromosomes arranged in decreasing size is a:
a) Punnett square
b) Pedigree
c) Karyotype
d) Genotype

Body
- Down syndrome 21
- Patau syndrome 13
- Edward syndrome 18

17. What is the result of fertilization?
a) A haploid gamete
b) A diploid zygote
c) Four sister chromatids
d) Two polar bodies

sexual
- Turner syndrom
- Klinehelter syndrome

23

18. Which of the following is an example of nondisjunction?
a) The formation of a cell plate
b) Sister chromatids failing to separate properly
c) The replication of DNA during the S stage
d) The crossing over of genes during Prophase I

19. What occurs during Gap 2 (G2)?
a) The cell copies its DNA
b) The cell prepares for the division of its nucleus
c) The cell divides into two daughter cells
d) The nucleolus disappears

20. Which type of reproduction leads to greater genetic diversity?
a) Asexual reproduction
b) Binary fission
c) Sexual reproduction
d) Mitosis

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II. Completion Questions

1.As a cell grows larger, its surface area to volume ratio ..decreases.....

2.The relaxed form of DNA in the cell's nucleus is called ..chromatin.....

3.The structures that contain identical copies of DNA and are attached at the centromere are ..sister chromatids.....

4.The ..spindle apparatus.....is responsible for moving and organizing chromosomes before cell division.

5.....cancer..... is the uncontrolled growth and division of cells.

1.The 22 pairs of chromosomes that do not determine an individual's sex are called ..autosomes.....

2.The process by which one haploid gamete combines with another is called ..fertilization.....

3.....Meiosis..... is a type of cell division that reduces the chromosome number by half.

4.A condition of having three of a particular type of chromosome is called ..Trisomy.....

5.....Cyclins.....(implied context) or specialized cells are regulated by chemical signals; however, signaling molecules made of a ..protein + enzyme..... kick off the cell cycle.

Cyclin kinases.

III. Short Answer Questions

6:1 5:1

1.Why is it beneficial for a cell to have a high surface-area-to-volume ratio?

To become more effecient and easier to Transport materials and remove wastes In addition good Communication.

2.Describe the difference between chromatin and chromosomes.

Relaxed DNA — interphase — condensed DNA — mitosis

3.List the four stages of mitosis in the correct order.

Prophase → metaphase → Ana phase → Telo phase.

4. How does cytokinesis differ between animal and plant cells?

cleavage furrow — cell plate form.

5. What is the role of quality control checkpoints in the cell cycle?

To ensure That each phase is Completely occurs and monitor DNA damage.

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معهد رواد التعليمية
و
مركز النخبة المتميزة
Mr. Ahmed Elhddad

6. Contrast haploid and diploid cells.

n → 23 chro. 2n → 46 chro.

7. What is the significance of "crossing over" in meiosis?

To prove genetic variation.

عدم الانفصال

8. Explain the term "nondisjunction."

is a failure of homologous chromosomes (in prophase I) or sister chromatids (in prophase II) to separate properly.

9. Why is apoptosis important for an organism?

Essential for maintaining health by:-
1- Removing damaged or old cells.
2- Block cancer to develop.
3- Fingers formation.

10. How does sexual reproduction provide a survival advantage over asexual reproduction?

→ Improve genetic variation which increase survival and strength of immune system.

IV. Scientific Terms

1- ....Cell cycle.... The cycle of growing and dividing by which cells reproduce.

2- ....Interphase.....The stage during which the cell grows, carries out cellular functions, and replicates DNA.

3- ....Centromere.....The structure at the center of the chromosome where sister chromatids are attached.

4- ....nucleosome.....The structure formed when DNA phosphate groups (negative charge) attract to histone proteins (positive charge).

5- ....kinases.....Enzymes that, when bound to cyclins, start various activities in the cell cycle.

6-....Haploid (gametes).....Sex cells that have half the number of chromosomes (n).

7-....Homologous.....A pair of chromosomes, one from each parent, that carry genes for the same traits at the same location.

8-....Synapse.....The process in Prophase I where homologous chromosomes condense and begin to form pairs.

9-....Telomeres.....Protective DNA caps found at the ends of chromosomes that might be involved in aging and cancer.

10-....Karyotype.....An image that shows pairs of homologous chromosomes arranged in decreasing size to study genetic material.

•Down syndrome is often called trisomy 21 because it is the result of an extra chromosome number:

a) 13 b) 18 c) 21 d) 23

•Which of the following conditions results from having only one sex chromosome (XO)?

a) Klinefelter's syndrome
b) Turner's syndrome
c) Down syndrome
d) Trisomy 21

•What happens to a zygote with a "OY" genotype?

a) It develops as a male.
b) It develops as a female.
c) It results in death.
d) It has no phenotypic effect.

•Which type of stem cells can be directed to become all of the different types of cells in an animal's body?

a) Adult stem cells
b) Embryonic stem cells
c) Specialized cells
d) Muscle cells

•Where are adult stem cells typically found?

a) Only in embryos
b) In various tissues of the body
c) Only in nerve cells
d) In the blastocyst stage only

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•Autosomes..... are chromosomes that are not sex chromosomes.

•The process by which an unspecialized cell develops into a specialized cell with a defined structure and function is called cell...differentiation.

•An individual with klinefelter's syndrome has three sex chromosomes (XXY).

•Embryonic stem cell research is considered Controversial..... because of ethical concerns about the source of the cells.

جدال

•After a heart attack, stem cells might be used to repair .Cardiac...muscle.

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1.Describe the characteristics of Down syndrome.

Physical traits
- flattened facial.
- slant up eyes.
- short neck - small ears.

Developmental trait
- delays in speech.
- " " motor skills.

Health factors
- High risk of heart defects.
- Hearing loss.
- vision problems.

1.Why might the term "adult stem cells" be considered somewhat misleading?

Because it is not only in adults. مضلل

they are present in children and infants.
الأطفال الرضع

1.How does the DNA in embryonic stem cells direct them to become specialized cells?

Regarding to cell differentiation.

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• Nondisjunction.....A process during meiosis where sister chromatids fail to separate properly, resulting in gametes with an abnormal number of chromosomes.

• Stem cells.....Unspecialized cells that have the ability to undergo cellular differentiation and develop into specialized cells.

• Trisomic.....A condition where an individual has an extra copy of a particular chromosome (three copies instead of two).

2n+1 Trisomic

2n normal

2n−1 monosomic

• Monosomic.....A condition resulting from nondisjunction where an individual has only one copy of a particular chromosome.

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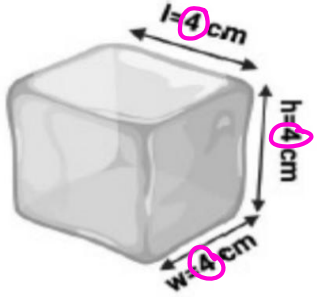
c. Calculate the surface area-to-volume ratio for the object below. You need to show your work to get the full mark. Use the following formulas in your answer. (3 marks)

Surface area of a cube = l × w × 6

Volume of a cube = l × w × h



SA = 4×4×6
= 96

V = 4×4×4
= 64

$\frac{96 : 64}{8}$

$\frac{12 : 8}{4}$

= 3 : 2

= 1.5 : 1

2. Which of the following does not occur as a cell grows larger and larger in size?

A. Difficulty obtaining nutrients
B. Difficulty eliminating wastes
C. Ratio of surface area to volume increases
D. Diffusion across the cell membrane is reduced

6. As a cell grows larger, its ____ increases more rapidly than its ____, making the surface area-to-volume ratio _____.

A.	volume	surface area	increase
B.	volume	surface area	decrease
C.	surface area	volume	decrease
D.	surface area	volume	increase

What is meant by the G0 stage of the cell cycle?

A. The stage at which the cells become unlikely to divide.
B. The stage at which the cell is dividing
C. The stage at which the nucleus is duplicating
D. The stage at which the cell is programmed to die
E. The stage at which the cell prepares for mitosis

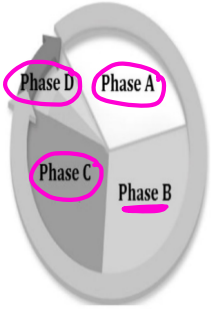
In what stage of the cell cycle does DNA get copied?

A. Cytokinesis
B. G1
C. G2
D. Mitosis
E. Synthesis S

9. Use the figure below to answer questions **a - c**. [12 marks]

a. Complete the table below about the cell cycle. (6 marks; 1 each)

Phase	Name	Main event that occurs
A	G1	
C	G2	
D	M	



b. What is Phase B? What would happen to the daughter cells if the cell didn't pass through this phase? Justify your answer. (6 marks)

S, cell not recieve exact number of chromosomes.

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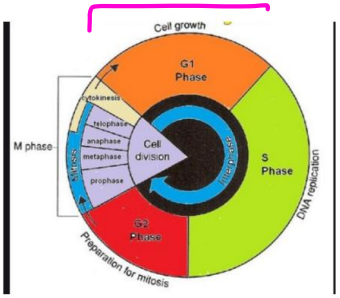
Summarize the Cell Cycle

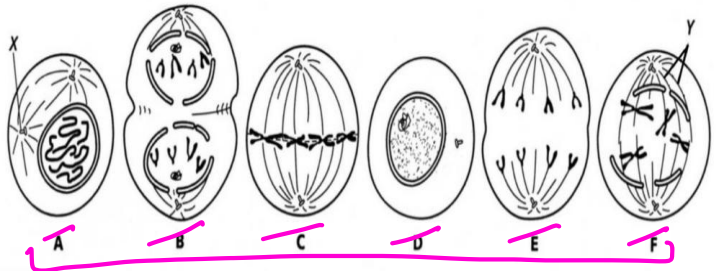
Complete the following passage using terms from the diagram to the right.

1. During the cell cycle, the cell divides its nucleus and chromosomes during [mitosis]. The cytoplasm and cell membrane divide during [cytokinesis]. Before the cell can divide again, it must grow and synthesize proteins during the [G1] phase and duplicate its chromosomes during the [S] phase.



Statement	Interphase	Mitosis
Cell growth occurs	✓	
Nuclear division occurs		✓
Chromosomes are distributed equally to daughter cells.		✓
Protein production is high	✓	
Chromosomes are duplicated	✓	
DNA synthesis occurs	✓	
Cytoplasm divides immediately after this period		✓
Mitochondria and other organelles are made.	✓	

The Animal Cell Cycle – Phases are out of order



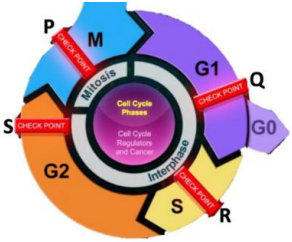
D A F C E B

. Which two components combine to control the cell cycle/ cellular reproduction process?

A. Cyclins
B. Carcinogens
C. Chromosomes
D. Cyclin-dependent kinases CDKs

Identify the processes that are checked at checkpoints P, Q, and S in the figure here.

Checkpoint	Process Checked
P	
Q	
S	



2. Which is the best description of homologous chromosomes?

A) chromosomes that are identical and come from the same parent

B) chromosomes that are identical but come from different parents

C) chromosomes that are similar and come from the same parent

D) chromosomes that are similar and come from different parents

. Which of the following statements best defines apoptosis?

A. It is harmful for the cells

B. It is called programmed cell death

C. It is known as uncontrolled growth of cells

D. It is caused by a failure in the regulation of cell cycle

6. The processes of mitosis and meiosis have many similarities. Which event does NOT occur in both mitosis and meiosis?

A) homologous pairs align in the center of the cell

B) chromosomes condense and become visible

C) sister chromatids separate

D) cytokinesis

1. In 1879, the cytologist Edouard van Beneden was surprised to find varying chromosome numbers in roundworms. Gametes had two chromosomes, while all other cells had four. Which explanation correctly explains this observation?

A) Gametes in roundworms are defective and lack the full number of chromosomes.

B) Gametes will go through an extra round of DNA replication just before fertilization, restoring the diploid number.

C) Gametes will fuse and join their chromosomes with another gamete, which requires them to have half the diploid number.

D) Gametes in roundworms are not used for sexual reproduction.

9. Down syndrome is also called trisomy 21, a reference to the presence of an extra 21st chromosome. What error results in the presence of this extra chromosome?

A) crossing-over

B) euploidy in metaphase I

C) nondisjunction during mitosis

D) nondisjunction during meiosis

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