

MEIOSIS

19 FEBRUARY 2014



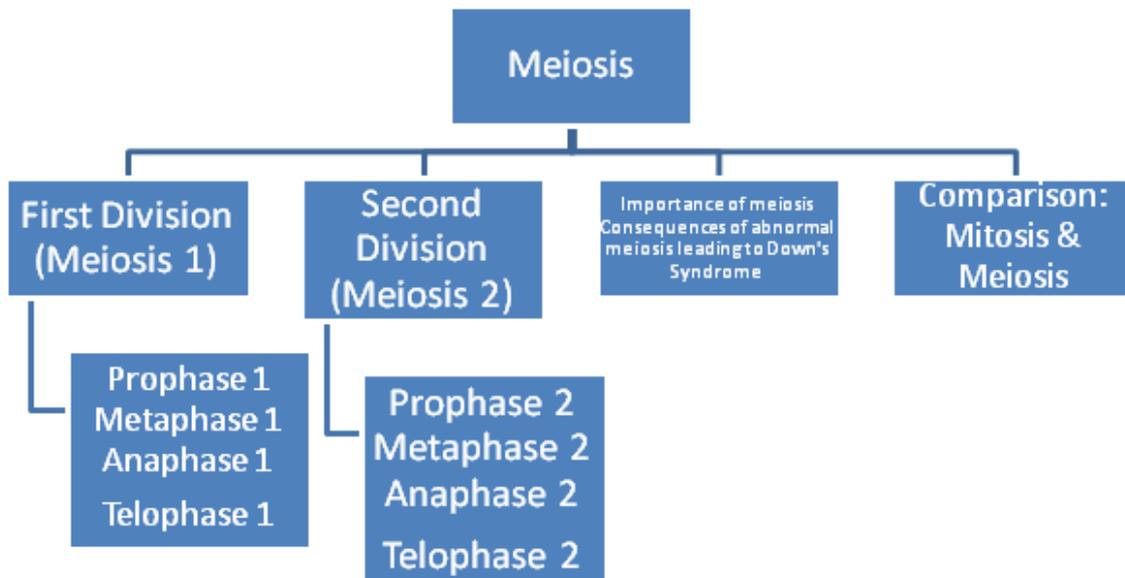
Lesson Description

In this lesson we:

- Describe the events of each phase of Meiosis I and II
- State the importance of meiosis
- State what is meant by non-disjunction
- State the consequences of non-disjunction
- Describe how non-disjunction of chromosome pair 21 in humans may lead to the formation of an abnormal gamete with an extra copy of chromosome 21
- Describe how the fusion between the abnormal gamete and a normal gamete may lead to Down syndrome



Summary





Test Yourself

Select the most correct answer from the options given. Write down only the correct letter

Question 1

The following are some phases of Meiosis

- (i) Telophase I
- (ii) Prophase II
- (iii) Prophase I
- (iv) Anaphase II

The correct sequence in which the above phases occur are

- A (iii), (ii), (iv) and (i)
- B (i), (iii), (iv) and (ii)
- C (ii), (iii), (iv) and (i)
- D (i), (ii), (iii) and (iv)

Question 2

The phase in Mitosis where DNA replication occurs

- A Metaphase
- B Interphase
- C Prophase
- D Telophase

Question 3

Mitosis and Meiosis are similar in that

- A Crossing over occurs during both
- B Both result in different cells forming
- C Both result in diploid cells forming
- D Both involve cytokinesis

Question 4

Which of the following is a significance of Meiosis?

- A Allows for repair of cells
- B Allows for replacement of cells
- C Brings about variety in species
- D Brings about growth in organisms

Question 5

Down's syndrome occurs when ...

- A A male sex cell undergoes mitosis.
- B Every cell of an organism has an extra pair of chromosomes.
- C All somatic cells have an extra chromosome.
- D A female sex cell undergoes mitosis.

Question 6

Indicate whether each of the statements in COLUMN I applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none**.

	COLUMN I	COLUMN II
1	Structure giving rise to spindle fibres during cell division in animal cells	A: Centromere B: Centriole
2	Holds the chromatids together	A: Centromere B: Centriole
3	Exact duplication	A: Mitosis B: Meiosis
4	Haploid	A: Gonads B: Gametes
5	Occurs in somatic cells	A: Meiosis B: Mitosis

Question 7

Give the correct biological term for each of the following descriptions. Write only the term next to the question number (a to d) in your ANSWER BOOK.

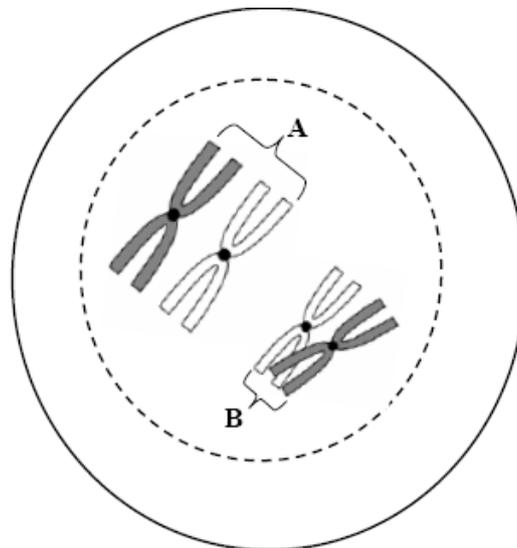
- a.) A point where the exchange of genetic material occurs during crossing over
- b.) Ordinary chromosomes
- c.) The condition where the cell has the full complement of chromosomes
- d.) The phase occurring between successive mitotic or meiotic divisions



Improve your Skills

Question 1

Study the diagram and answer the questions that follow:



- 1.1 What type of cell division is shown here?
- 1.2 Provide ONE OBSEVABLE reason for your answer.
- 1.3 Name the phase shown here.
- 1.4 What important process is shown at B?
- 1.5 What is the significance of the above-mentioned process?
- 1.6 Draw a fully labelled diagram to show the phase occurring immediately after this phase.

Question 2

Bacteria reproduce asexually by binary fission (ordinary mitotic division). Two sterile Petri dishes were filled with nutrient agar (a jelly). Red bacteria from a single colony of bacteria growing on another Petri dish were smeared onto the agar in both sterile Petri dishes. One Petri dish (A) was placed under an ultraviolet light and the other one (B) was left in the dark. The two Petri dishes were examined after 5 days. In A, all but one of the bacterial colonies were red. One bacterial colony was white. In B, all the bacterial colonies were red

- 2.1 Provide a hypothesis for this experiment.
- 2.2 Name the independent and dependent variables in the experiment.
- 2.3 Which apparatus, A or B, was the control and which was the experiment?
- 2.4 What was the result for the control?
- 2.5 Explain any TWO changes to the method that would improve the reliability of the investigation.

Question 3

The table below show the percentage relative risk of a mutation occurring during interphase of meiosis, at different ages.

AGE (years)	Relative chance of a mutation occurring during interphase (%)
< 20	7.5
21 – 40	18
41 – 60	37.5
61 – 80	57
>80	74.5

Use the data in the table to draw a histogram.

(8)

Question 4

Organisms display **TWO** distinct types of cell division which gives rise to the formation of new cells. Discuss the differences between these two types of cell division and state the significance of each.



Links

- LX Lesson – Cell Division (Mitosis & Meiosis):
<http://www.youtube.com/watch?v=fiqdfTQoOn4&list=PLOaNAKtW5HLQOqIIPY7QGcEGHpCm9RgtY>
- Mitosis and Meiosis Simulation:
<http://www.youtube.com/watch?v=zGVBAHAsjJM>