

Concepts of Biology

Guided Reading Notes

Chapter 8

1 Cancer Is a Genetic Disorder

- A cancer cell is _____ abnormal, loses _____, and _____ over and over again until _____.

2 Cell Division Ensures the Passage of Genetic Information

8.1 Cell division is involved in both asexual and sexual reproduction

- Define and describe what happens during **asexual reproduction**

Definition _____

Description of what occurs _____

- Describe what happens during **sexual reproduction**

Description _____

8.2 Prokaryotes reproduce asexually

- **Unicellular organism** reproduce by _____.

Draw the diagram of **binary fission** which Prokaryotes use to reproduce shown on p. 135

Contrast the function of asexual reproduction in **unicellular** and **multicellular organisms**.

3 Somatic Cells Have a Cell Cycle and Undergo Mitosis and Cytokinesis

8.3 The eukaryotic cell cycle is a set series of events

Draw the **eukaryotic cell cycle** as shown on p. 136 . Be sure to include terms and symbols.

Which part of the cell cycle—interphase or M stage—would you expect to be curtailed (decreased) in cancer cells?

Why? _____

8.4 Eukaryotic chromosomes are visible during cell division

- **Somatic cells** are _____ ($2n$) meaning that _____
_____.
- **Gametes** are _____ (n) meaning that _____
_____.

Draw Figure 8.4B found on p. 137

- Following mitosis, are diploid cells normally **diploid cells ($2n$)** or **haploid (n)** ? _____
- Would the same hold true for cancer cells? Why or why not? _____

8.5 Mitosis maintains the chromosome number

- Explain what happens in each phase of **Mitosis** pp. 138-139

1. Early Prophase

✓

✓

✓

2. Prophase

✓

✓

3. Early metaphase

✓

✓

4. Metaphase

✓

✓

5. Anaphase

✓

✓

6. Telophase

✓

✓

Imagine an adult stem cell that produces new skin cells. One daughter cell remains a stem cell. **What happens to the other cell.** _____

8.6 Cytokinesis divides the cytoplasm

- Explain how **cytokinesis** occurs in animal cells

- Explain how **cytokinesis** occurs in plant cells

Why is cytokinesis in plant cells more complex than in animal cells?

Compare the number and kind of chromosomes in the nucleus of parent and daughter cells following the **M stage** of the cell cycle.

4 Cancer Is Uncontrolled Cell Division

8.7 Cell cycle control occurs at checkpoints

- If **checkpoint G₁** is passed, _____
 - **Checkpoint G₂** ensures that _____
 - **Checkpoint M** ensures that _____
-

Draw the Cell Cycle checkpoints (Figure 8.7 p. 141)

Explain the process of **Apoptosis**

Explain why an altered **p53 protein** is found in most cancerous cells.

8.8 Signals affect the cell cycle control system

- **Internal signal molecules:** _____
 - **External signaling molecules:** _____
-

Draw the model of **Internal signals of the cell cycle** (Fig. 8.8A p. 142)

Draw the model (Fig. 8.8B on p. 142)

Embryonic cells have an enzyme called **telomerase**, which rebuilds telomeres. Why would you predict that cancer cells have an **active telomerase enzyme**?

8.9 Cancer cells have abnormal characteristics

- List and explain the abnormal characteristics of cancer cells.

✓

✓

✓

✓

Define and explain the function of **angiogenesis**

Which characteristics of cancer cells can be associated with the **loss of cell cycle control**?

Which are **mutations** that **reach beyond** loss of cell cycle control?

8.10 Protective behaviors and diet help prevent cancer

- List and explain **protective behaviors** which help prevent cancer

1.

2.

3.

4.

5.

6.

- List and explain the **dietary guidelines** which greatly reduce the risk of developing cancer

1.

2.

3.

4.

5.

Why do you think tobacco use increases the risk of other types of cancer besides lung cancer?

5 Meiosis Produces Cells That Become the Gametes in Animals and Spores in Other Organisms

8.11 Homologous chromosomes separate during meiosis

- As a result of meiosis one chromosome from _____ is in the haploid _____ and _____ (e.g. animals) and haploid _____ (e.g. plants).

Draw the diagram on p. 145 which illustrates the **separation of homologous chromosomes** during **meiosis**

At the completion of **meiosis I**, are the cells diploid ($2n$) or haploid (n)?

8.12 Synapsis and crossing-over occur during meiosis I

- During **meiosis I**, _____ (homologous pair) and _____ (exchange of genetic material) between _____ occurs.

Draw the **Synapsis of homologues** (Fig. 8.12A p. 146)

Draw the **crossing-over of nonsister chromatids**

(Fig. 8.12B p. 146)

Why does crossing-over between **non-sister chromatids increase genetic variation**, whereas crossing-over between **sister chromatids would not increase genetic variation**?

8.13 Sexual reproduction increases genetic variation

- Crossing-over recombines _____ and increases _____ the variability of _____ on the chromosomes.
- Independent assortment of _____ increases the possible combination of _____ in gametes.
- Explain the how the independent assortment increases genetic variation. (Fig. 8.13 p. 147)

1.

2.

3.

4.

Why does mating between relatives reduce possible variations?

8.14 Meiosis requires two division cycles

- Describe what happens in each phase of **Meiosis I**
Prophase I

Metaphase I

Anaphase I

- **Compare and contrast** what happens in each phase of **Meiosis II** with what happens in **Meiosis I**

How would you recognize a diagram of plant cell meiosis?

8.15 The life cycle of most multicellular organisms includes both mitosis and meiosis

- In animals, mitosis is involved in _____, while meiosis is part of _____ and _____.
- Gametes are the only _____ part of the life cycle.

Explain how and why a sperm that carries a cancer-causing gene could lead to cancer in various organs of offspring

8.16 Meiosis can be compared to mitosis

Draw a flow chart comparing and contrasting **Meiosis** and **Mitosis** (p. 156)

MEIOSIS

MITOSIS

6 Chromosomal Abnormalities Can Be Inherited

8.17 An abnormal chromosome number is sometimes traceable to nondisjunction

- **Nondisjunction** occurs when _____
or _____
- Nondisjunction causes _____ or _____.

Why might problems arise if a person were to inherit three copies, instead of two copies, of a chromosome?

8.18 Abnormal chromosome numbers cause syndromes

- Define the term **syndrome**:
- Describe and explain how **Trisomy 21** (Down Syndrome) develops

- Describe and explain how **Turner Syndrome** develops

- Describe and explain how **Klinefelter Syndrome** develops

Would the **XYY male** chromosome inheritance be due to nondisjunction during Meiosis I or Meiosis II?

8.19 Abnormal chromosome structure also causes syndromes

- Explain each of the following changes in **chromosome structure**
 1. **Deletion**

 2. **Duplication**

 3. **Inversion**

 4. **Translocation**

- Describe and explain how **Williams syndrome** occurs

- Describe and explain how **Cri du chat** (cat's cry) **syndrome** develops

