

# Mitosis / Meiosis Questions

Use the following information to answer the next question.

## Some Events that Occur During Meiosis

- 1 Gametes are produced.
- 2 Spindles form and homologous pairs of chromosomes separate.
- 3 Centromeres divide and chromatid pairs separate.
- 4 Chromosomes are replicated.

### Numerical Response

Provide the correct sequence of these four events that occur during meiosis.

(Record your **four-digit answer** in the numerical-response section of the answer sheet.)

Answer: \_\_\_\_\_

Use the following information to answer the next question.

Many adult newts and salamanders have a remarkable ability to regenerate **amputated** limbs. After amputation of a foot, a newt will regenerate the lost foot. However, if a newt has its foot amputated and receives a particular dosage of vitamin A, the animal grows back a whole new forelimb, not just the foot!

—from Pietsch

A logical interpretation that can be drawn from this information is that vitamin A may play a major role in growth by

- A. increasing the amount of mitosis
- B. increasing the amount of meiosis
- C. decreasing the amount of mitosis
- D. decreasing the amount of meiosis

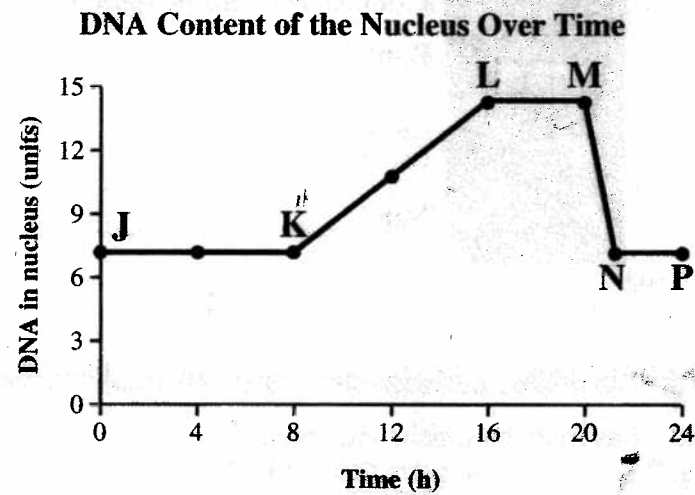
Use the following information to answer the next three questions.

During the cell cycle, cells in growing tissue normally progress through interphase:

- stage 1—cells grow, carry out normal metabolism, and produce more organelles
- stage 2—DNA replication, chromosome duplication, and cell growth occur
- stage 3—cell growth occurs

and mitosis.

Human cells were cultured for a day in a nutrient-rich medium. The DNA content of a typical nucleus was determined every hour, and the data collected were graphed.



The process that occurs during interval K–L is

- A. cytokinesis
- B. chromatid separation
- C. replication of genetic material
- D. synapsis of homologous chromosomes

On the graph, N likely indicates the completion of which mitotic event?

- A. Prophase
- B. Anaphase
- C. Telophase
- D. Metaphase

On the graph, interval N–P corresponds to the period between the end of

- A. mitosis and the beginning of stage 1
- B. stage 2 and the beginning of stage 3
- C. stage 1 and the end of stage 2
- D. stage 1 and the end of mitosis

One difference between mitosis and meiosis is that, during mitosis,

- A. one replication of chromosomes and one division occurs
- B. one replication of chromosomes and two divisions occur
- C. two replications of chromosomes and one division occurs
- D. two replications of chromosomes and two divisions occur

*Use the following information to answer the next question.*

**Chromosome Number of a Horse**

Horse, *Equus caballus*

66 (2n)

Starting from a single cell, spermatogenesis in horses produces

- A. one cell with 33 chromosomes
- B. two cells, each with 66 chromosomes
- C. four cells, each with 33 chromosomes
- D. three cells, each with 22 chromosomes

Use the following information to answer the next question.

**Some Events That Occur During Cell Division**

- 1 Centromeres divide
- 2 Cytokinesis occurs
- 3 Identical cells are produced
- 4 DNA is replicated
- 5 Haploid cells are produced
- 6 Spindle fibres form

**Numerical Response**

Four events that occur in **both** human asexual and sexual cell reproduction are represented by numbers \_\_\_\_\_.

(Record your **four-digit answer in lowest-to-highest numerical order** in the numerical-response section of the answer sheet.)

Answer: \_\_\_\_\_

In a human cell cycle, the event that occurs before mitosis begins and the event that occurs at or near the completion of mitosis are, respectively,

- A. crossing over and synapsis
- B. cytokinesis and crossing over
- C. replication of DNA and synapsis
- D. replication of DNA and cytokinesis

Use the following information to answer the next question.

During his study of genetics, Gregory Mendel cross-pollinated many pea plants. He recorded the number and types of offspring produced and applied his knowledge of mathematics to create explanations for his observations. He hypothesized that factors are inherited separately and proposed the law of segregation.

The modern-day interpretation of Mendel's law of segregation is that

- A. alleles are expressed independently during mitosis
- B. alleles are expressed independently during meiosis
- C. paired alleles separate during mitosis and are distributed into different gametes
- D. paired alleles separate during meiosis and are distributed into different gametes

*Use the following information to answer the next two questions.*

Biologists using light microscopes to study mitosis noticed that the nuclear membrane of a cell disappeared and then re-formed during the process. They could not explain this disappearance until they used electron microscopes to view mitotic cells. These observations revealed a large number of vesicles (small bubble-shaped structures bounded by membranes) that appeared in the cytoplasm during mitosis and then disappeared when mitosis was nearly complete. During mitosis, the nuclear membrane appeared to disintegrate and form these tiny vesicles. The vesicles disappeared when new nuclear membranes formed.

The vesicles observed with the aid of an electron microscope appeared and disappeared, **respectively**, during

- A. prophase and anaphase
- B. prophase and telophase
- C. interphase and anaphase
- D. interphase and telophase

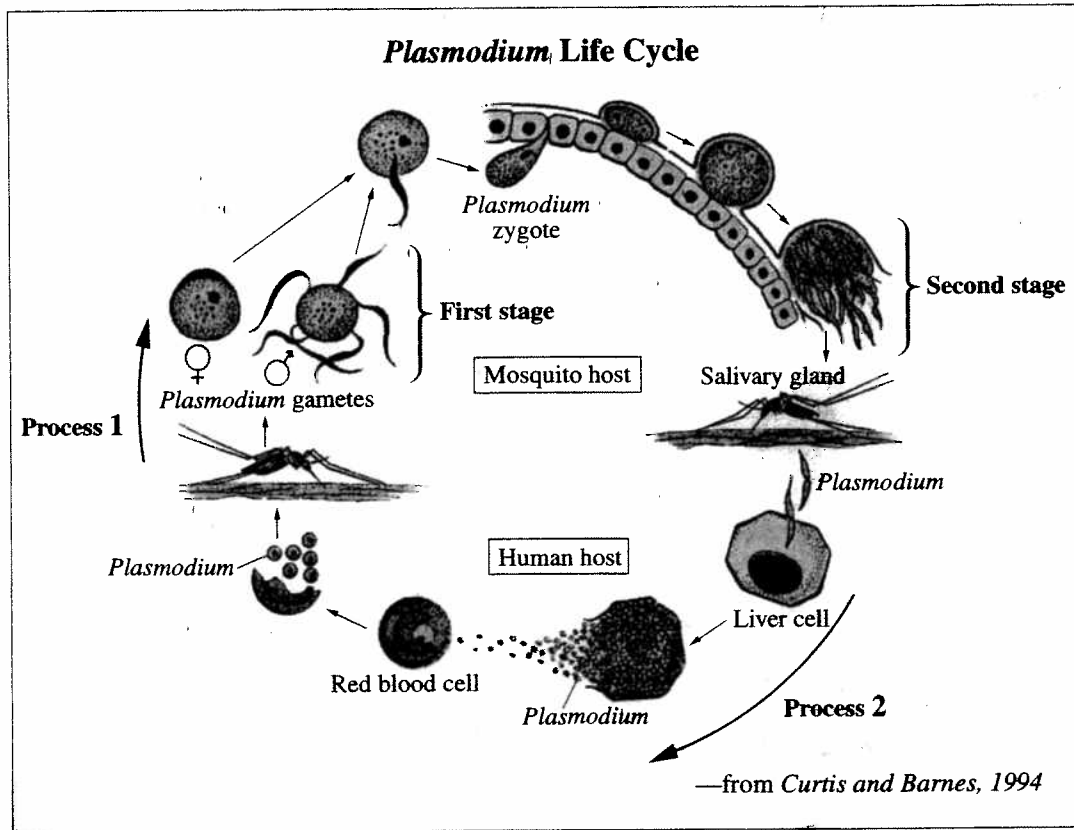
During mitosis, the chromosomes

- A. are located at the cell equator during prophase
- B. are located at the cell equator during telophase
- C. move toward the poles of the cell during anaphase
- D. move toward the poles of the cell during metaphase

One aspect of meiosis that is different from mitosis is that normally by the end of meiosis

- A. two diploid cells result
- B. four diploid cells result
- C. two haploid cells result
- D. four haploid cells result

Use the following additional information to answer the next two questions.



The row below that identifies process 1 and process 2 is

Row	Process 1	Process 2
A.	mitosis	meiosis
B.	mitosis	mitosis
C.	meiosis	mitosis
D.	meiosis	meiosis

The row below that identifies the chromosome number at the first stage and the chromosome number at the second stage is

Row	First stage	Second stage
A.	diploid	haploid
B.	diploid	diploid
C.	haploid	diploid
D.	haploid	haploid

In humans, cells Y and Z represent individual cells that

- A. are two eggs
- B. will no longer divide
- C. will become a  $4n$  cell
- D. could develop into identical twins

*Use the following information to answer the next question.*

**Phases of Mitosis**

- 1 Anaphase
- 2 Metaphase
- 3 Prophase
- 4 Telophase

**Numerical Response**

The phases of mitosis in the sequence in which they occur are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

(Record your **four-digit answer** in the numerical-response section on the answer sheet.)