

CHAPTER THREE

Answers to WHAT DID YOU LEARN?

1. (1) Mitosis produces two daughter cells that are genetically identical to the parent cell. Meiosis produces four daughter cells that are genetically different from the parent cell. (2) Mitosis produces diploid daughter cells (having 23 *pairs* of chromosomes), whereas meiosis produces haploid daughter cells (having 23 chromosomes only). (3) In meiosis, a process called crossing over occurs, whereby genetic material is exchanged between homologous chromosomes. Crossing over does not occur in mitosis.
2. In crossing over, genetic material is exchanged between homologous chromosomes during prophase I.
3. A secondary oocyte is arrested at metaphase II.
4. Spermatogonia are the stem cells that form mature sperm.
5. A secondary oocyte has not finished meiosis II (it is arrested in metaphase II). An ovum is equivalent to a zygote; meiosis has been completed, and the cell is diploid.
6. Sperm do not reach the secondary oocyte if they leak from the vagina, are destroyed by the acidity of the vaginal environment, are unable to swim, lose direction as they move through the uterus, or undergo the acrosome reaction before reaching the secondary oocyte.
7. The acrosome cap facilitates penetration of the corona radiata at fertilization.
8. Capacitation is the conditioning stage sperm cells undergo in the female reproductive tract.
9. The pre-embryonic cells undergo compaction to become a tightly grouped ball of cells.
10. The embryoblast (or inner cell mass) is located at one end of the blastocyst and forms the embryo proper.
11. The trophoblast subdivides into a cytotrophoblast and a syncytiotrophoblast.
12. The main functions of the placenta are (1) exchange of nutrients, waste products, and respiratory gases between the maternal and fetal bloodstreams; (2) transmission of maternal antibodies to the developing embryo or fetus; and (3) production of hormones to maintain and build the uterine lining.
13. Gastrulation is the process of establishing the three primary germ layers.
14. The primitive streak on the epiblast surface marks the beginning of gastrulation.
15. Invagination is the inward movement of cells through the primitive streak at gastrulation.
16. The trilaminar embryonic disc undergoes both cephalocaudal folding and transverse folding.
17. Induction is the process whereby one structure or tissue influences the development of another structure or tissue.
18. The notochord induces the process of neurulation.
19. The neural tube is formed by fusion of the neural folds.
20. Ectoderm gives rise to the nervous system, the epidermis of the skin, and epidermal derivatives such as hair and nails.

21. Bone, muscle, cartilage, dermis, and body connective tissues are derived from the somites.
22. The lining of the digestive tube and the lining of the respiratory tube are formed from endoderm.
23. Maturation of tissues and organs and rapid growth of the body are key events during the fetal period.