Name: _____ **AP Biology** [redacted]

Chapter 36 Active Reading Guide
Reproduction and Development

Section 1

1. Distinguish between sexual reproduction and asexual reproduction.

2. Which form of reproduction:

   a. relies entirely on mitosis: _____

   b. forms *gametes*: _____

   c. results in offspring genetically identical to the parent: _____

   d. produces a *zygote*: _____

   e. occurs in *budding*: _____

   f. is seen in *parthenogenesis*: _____

3. Return to the list above, and define the terms that are in italics.
   gametes:

   zygote:

   budding

   parthenogenesis

4. What advantage does sexual reproduction provide? In what type of an environment would it be favored?

5. For animals that are sessile (stationary), finding a mate presents a problem. What is one solution to this problem? Explain the origin of the term that describes this solution.

6. Here's an interesting concept – in some animals, the sex is not fixed but can change during the life span of an individual. Males can become female, and females can become male! What is a possible trigger for these sex changes?

7. What conditions are always required for external fertilization?

8. An AP Review Question (not in this chapter): Life on land presents both plants and animals with problems related to moving sperm to egg. What plant groups have swimming sperm and require water for fertilization?

9. Now, how have animal species solved the problem of moving sperm to egg in a dry environment? How have plants solved that same problem?

10. Consider the problems of fertilization and protection for the embryo. Compare these groups by filling in the blanks with the word high or low.

Group	**# Eggs Produced**	**# Offspring Produced**	**Protection of the Embryo/ Parental Care**
Salmon			
Oysters			
Frogs			
Chicken			
Horse			

11. In populations that are stable in size, each mating pair of animals must produce a pair of offspring. The purpose of the preceding exercise was to lead you to making the following generalizations:
    a. Animals that have internal fertilization tend to produce _____ (many/few) offspring.
    b. Animals that have greater parental care tend to produce _____ (many/few) offspring.
    c. Animals that have external fertilization tend to produce _____ (many/few) eggs.

12. What are the gonads?

Section 2

13. The female gonads are the ovaries. What are the male gonads? _____

14. Both male and female gonads have the same function: to produce the gametes and to produce the sex hormones. With that in mind, what is produced by the ovaries?

15. You need to know the correct anatomical name and function of the reproductive organs. Give the function of each structure:
    oviduct-

    ovary-

    uterus-

    labia-

    vagina-

    cervix-

    corpus luteum-

    follicle-

    endometrium-

16. In a similar manner, you will need to know the structure and function of the male reproductive system. Describe the function of each structure:
    vas deferens-

    seminal vesicle-

    prostate gland-

    bulbourethral gland-

    epididymis-

    testis-

    scrotum-

penis-

urethra-

urinary bladder-

17. What three accessory glands produce the fluid part of semen?

18. Within the testes, where specifically are sperm formed?

19. What is produced in the Leydig cells?

20. Sperm are produced within the seminiferous tubules. List the structures, in order, through which sperm will pass before ejaculation.

21. What is gametogenesis in males called? _____

22. What is gametogenesis in females called? _____

23. Study spermatogenesis in Figure 36.10 in your text carefully to answer the next group of questions. Which cells are constantly replenished by mitosis?

24. Some of the spermatogonia will differentiate to become the primary spermatocytes, which undergo meiosis. How many sperm cells are produced as a result of meiosis?

25. What is contained within the acrosome?

26. How long is the process of spermatogenesis in humans?

27. Now, study oogenesis in Figure 36.10 in your text. First note that the process of meiosis begins during embryonic development but is halted before birth. At what stage are all the "eggs" when a female is born?

28. What is a follicle?

29. When a female ovulates, what is released?

30. When is meiosis completed for the ovum?

31. When ovulation occurs, into what does the ruptured follicle develop?

32. Human males produce hundreds of millions of sperm per day! Do a rough count of the number of secondary oocytes a typical human female might produce in her lifetime. (See the end of this reading guide for a solution.)

33. What is a polar body?

34. If the first polar body divided, how many polar bodies could be formed in human female gametogenesis? How many eggs are formed?

Section 3

35. What is menstruation?

The female reproduction cycle involves changes in the uterus, and events in the ovaries, so we will need to look at both of these at once: the ovarian cycle and the menstrual (uterine) cycle. Since the control of menstruation is under hormonal control, we will begin at the hypothalamus.

36. In females the hypothalamus secretes _____, which causes the anterior pituitary to produce two hormones, _____ and _____. These are tropic hormones. The target of FSH is the ovarian follicles, and as FSH levels increase, follicles grow and oocytes mature.

37. FSH and LH get their names from events of the female reproductive cycle, but they also function in males. How are their functions in females and males similar?

38. Study Figure 36.13 carefully. There are two ovarian hormones: estradiol and progesterone. What hormone does the maturing follicle produce?

39. What does the LH surge trigger?

40. After ovulation, the follicle is transformed into a corpus luteum. What hormones does the corpus luteum produce?

41. How do high levels of progesterone and estradiol affect the uterine lining (endometrium)?

42. If fertilization does not occur, the corpus luteum disintegrates and the levels of both progesterone and estradiol drop. How do low levels of progesterone and estradiol affect the uterine lining?

43. Describe what occurs in each of these phases of the ovarian cycle:
follicular phase:

luteal phase:

proliferative phase:

secretory phase:

menstrual flow phase:

44. By convention, what occurs on day 1 of the menstrual cycle?

45. In males the hypothalamus secretes _____, which causes the anterior pituitary to produce two hormones, _____ and _____. These are tropic hormones, and their target tissues are in the ovaries and testes. They will regulate gametogenesis, as well as cause the production of _____ in the testes and _____ in the ovaries. (All blanks in this question should be filled with the name of a hormone.)

46. What is the role of FSH in males?

47. What is the role of LH in males?

Section 4

48. What is the acrosome of a sperm? What does it contain?

49. Describe what happens in the acrosomal reaction.

50. The fusion of the egg and sperm plasma membranes allows sodium ions to flow into the egg.

51. How does this result in a fast block to polyspermy?

52. Describe the cortical reaction.

53. The early embryo is called a blastocyst. What is the outer layer of the blastocyst called?

54. The inner cell mass will become the embryo. What will the trophoblast form?

55. What marks the transition from an embryo to a fetus? When does this occur?

56. What hormone stimulates uterine contractions?

57. Explain how each of these hormonal contraceptives prevents pregnancy, based on your understanding of the menstrual cycle.
    a. birth control pills/hormone skin patch or injection:

    b. progestin:

58. Hormone-based contraceptives typically have pregnancy rates of 1% or less. What are their negative side effects?

59. In what ways are tubal ligation and vasectomy similar?

Solution to question 32:
If a female begins to menstruate at age 12 and continues to menstruate for 40 years, with an average of 12 cycles/year, she would ovulate approximately 480 times. This is only a rough estimate!