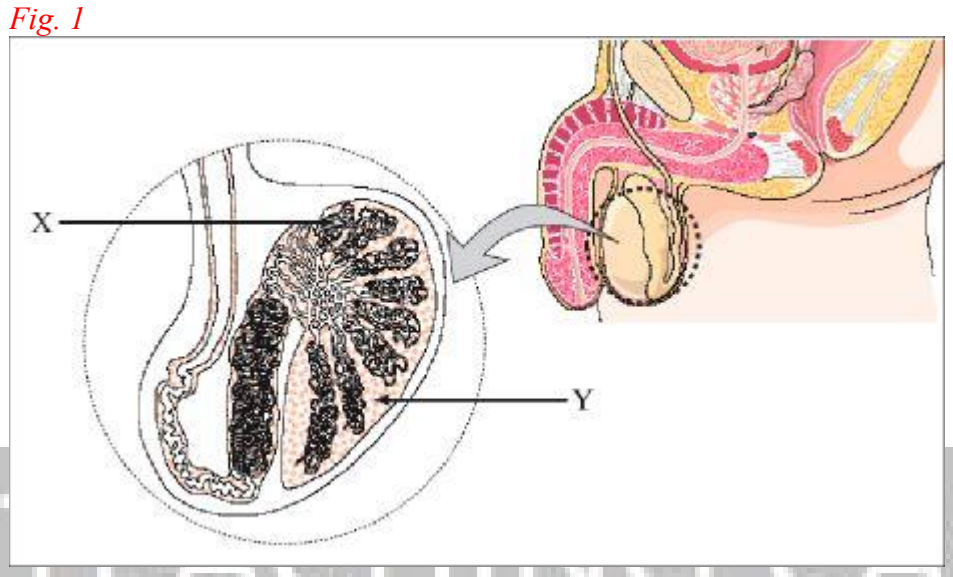
**No. of Questions: 200** **Time: 3 hour**

SECTION I Biology

1. Where do the cells stored in X (*Fig. 1*) move to next?

*Fig. 1*




a. the urethra
b. the vas deferens
c. the epididymis
d. the seminal vesicles

2. Which of the following is a function of seminal fluid?
a. to develop secondary sexual characteristics
b. to cause contraction of the uterus
c. to provide nutrition for the egg
d. to act as an acid to buffer the vagina

3. Which of the following is a function of the seminal vesicles?
a. to carry semen to the urethra
b. to add secretions to the seminal fluid
c. to provide a place for sperm to mature
d. to produce releasing hormones

4. Which of the following would be a result of increased levels of HCG in the blood?
a. Ovulation would not occur.
b. Menstruation would occur.
c. There would be an increase in the concentration of follicle-stimulating hormone in the blood.
d. There would be a decrease in the amount of progesterone secreted.

5. Which of the following would result if fructose was **not** present in seminal fluid?
a. Less testosterone would be secreted.

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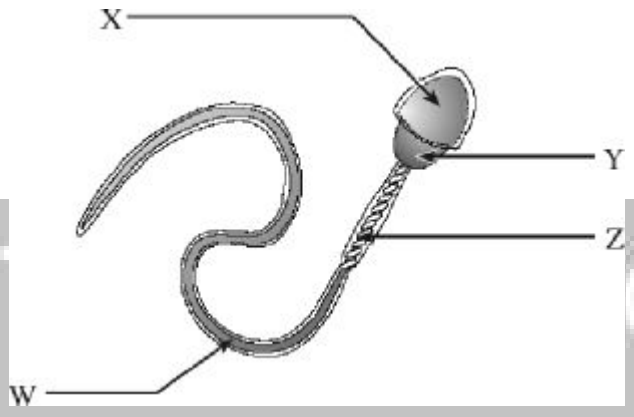
b. Less sperm would be produced.
c. Semen would become acidic.
d. Sperm would be less motile.

6. Taking birth control pills that contain estrogen and progesterone results in which of the following?
   a. an increased production of luteinizing hormone
   b. a decreased production of follicle-stimulating hormone
   c. the onset of menstruation
   d. an increased production of human chorionic gonadotropin

7. **Use the following diagram to answer the question below.**




Which part of the cell uses ATP most rapidly?
a. Y b. W c. Z d. X

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8. Which of the following would occur if the concentration of testosterone in the blood was too low?
   a. The hypothalamus would produce less follicle-stimulating hormone.
   b. The hypothalamus would produce more GnRH.
   c. The anterior pituitary gland would produce more testosterone.
   d. The testes would produce less luteinizing hormone.

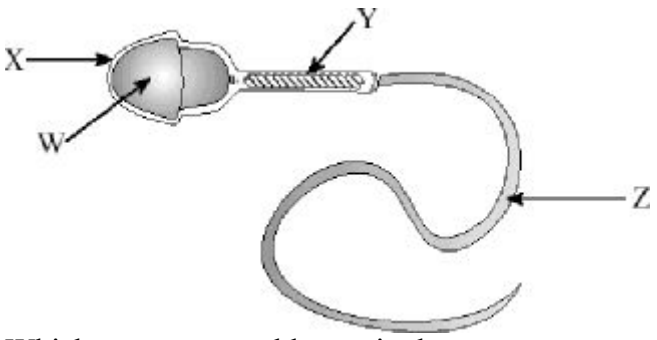
9. Through what structure does the egg travel in order to reach the uterus?
   a. the oviduct
   b. the vagina
   c. the ovary
   d. the cervix

10. The site of testosterone production in the cytoplasm of an interstitial cell is the
    a. rough endoplasmic reticulum.
    b. lysosome.
    c. mitochondrion.
    d. smooth endoplasmic reticulum.

11. Fertilization of the egg almost always occurs in the
    a. oviducts.
    b. uterus.
    c. cervix.
    d. ovaries.

12. The hormone produced as a result of implantation is called
    a. human chorionic gonadotropic hormone (HCG).
    b. follicle stimulating hormone (FSH).
    c. luteinizing hormone (LH).
    d. testosterone.

13.




Which structure would contain the greatest concentration of mitochondria?
a. Y b. Z c. W d. X

14. Sperm cells travel through which of the following structures?
    a. ureter
    b. prostate gland
    c. ductus (vas) deferens
    d. seminal vesicles

15. Testosterone is produced in the
    a. urethra.
    b. seminiferous tubules.
    c. interstitial cells.
    d. epididymis.

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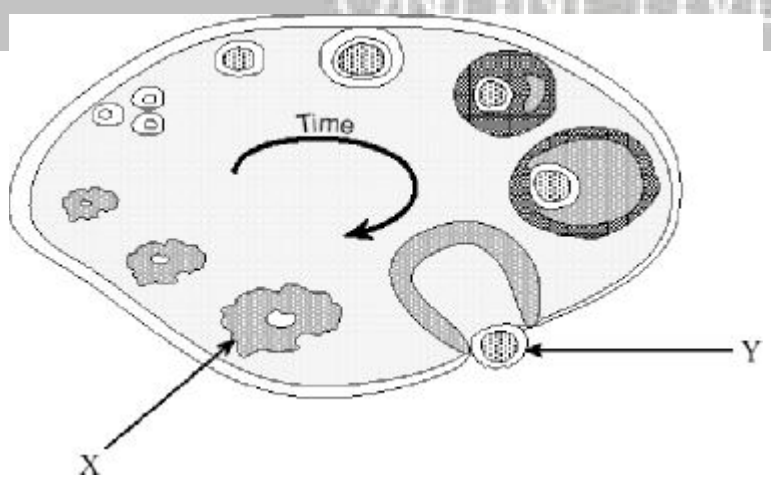


16. After leaving the ovary, the next structure that **Y** will enter is the
    a. endometrium.
    b. uterus.
    c. oviduct.
    d. cervix.

17. In order to prevent the degeneration of the corpus luteum, the concentration of which of the

following hormones increases during implantation?

a. human chorionic gonadotropin (HCG)
b. estrogen
c. luteinizing hormone (LH)
d. follicle-stimulating hormone (FSH)

18. Sperm acquire the ability to swim in the

a. seminiferous tubules.
b. ductus (vas) deferens.
c. epididymis.
d. seminal vesicles.

19. The hormone that controls the maturation of eggs in women and the production of sperm in men is

a. estrogen.
b. follicle-stimulating hormone (FSH).
c. luteinizing hormone (LH).
d. testosterone.

20. Which of the following is an example of positive feedback?

a. A drop in blood glucose levels stimulates the liver to release glucose.
b. An increase in thyroxin levels in the blood decreases the amount of thyroid-stimulating hormone (TSH) released from the pituitary.
c. A rise in oxytocin levels causes uterine contractions.
d. An increase in body temperature produces increased perspiration.

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21. One function of seminal fluid is to

a. provide a medium in which sperm swim.
b. provide nourishment for the egg.
c. lower the pH of the uterus.
d. lower the pH of the vagina.

22. The hormone that stimulates the secretion of sex hormones in both sexes is

a. luteinizing hormone (LH).
b. estrogen.
c. human chorionic gonadotropin (HCG).
d. testosterone.

23. The function of the corpus luteum is to

a. produce more follicle-stimulating hormone (FSH).
b. produce human chorionic gonadotropin (HCG).
c. secrete luteinizing hormone (LH).
d. help maintain the endometrium.

24. A steroid hormone produced in the ovary that causes breast development is

a. estrogen.
b. luteinizing hormone (LH).
c. follicle-stimulating hormone (FSH).
d. aldosterone.

25. The function of the mid-piece of the sperm is to

a. carry genetic material.
c. protect the sperm.

b. produce ATP (energy).
d. nourish the sperm.

26. The correct pathway that sperm travel to leave the body is
    a. testes - vas deferens - urethra
    b. epididymis - testes - urethra
    c. epididymis - urethra - vas deferens
    d. testes - prostate gland - vas deferens

27. What is the function of the mid-piece of the sperm?
    a. to propel the sperm
    b. to produce ATP energy
    c. to carry genetic material
    d. to protect the sperm

28. On which day of a typical 28-day menstrual cycle will luteinizing hormone (LH) be the highest?
    a. day 13
    b. day 2
    c. day 7
    d. day 28

29. What is an effect of oxytocin?
    a. release of an egg
    b. development of breasts
    c. contraction of the uterus
    d. loss of the endometrium

30. What effect would decreasing levels of estrogen and progesterone have on the female reproductive system?
    a. The corpus luteum would degenerate.
    b. The uterine lining would become secretory.
    c. The endometrium would break down.
    d. Ovulation would occur.

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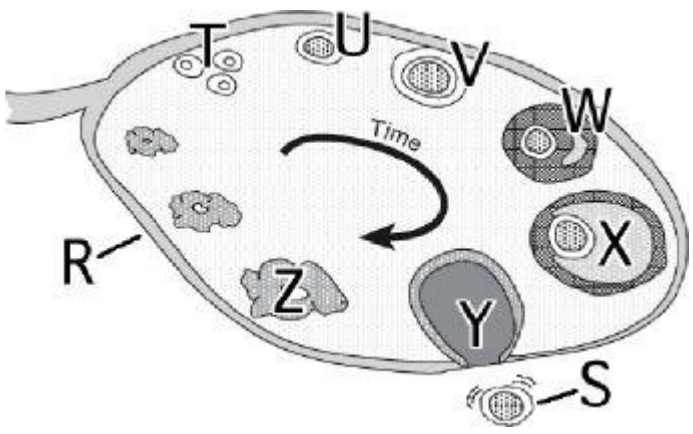
*Fig. 15*



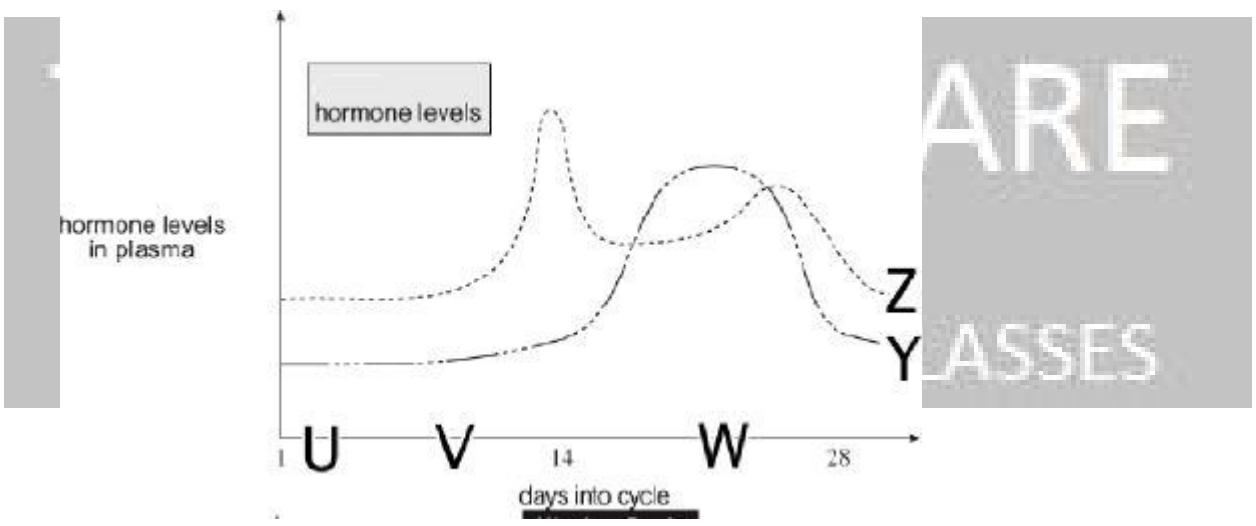

31. *Fig. 15*
    Identify "U"
    a. primary follicle
    d. oocyte

b. polar body
c. graafian follicle
e. corpus luteum

32. *Fig. 15*
Identify "X"
a. graafian follicle
b. corpus luteum
c. oocyte
d. polar body
e. primary follicle

33. *Fig. 15*
Identify "R"
a. polar body
b. graafian follicle
c. ovary
d. oocyte
e. ovum

*Fig. 611*




*Note:*
U, V, W are events/phases
Y, Z are hormones

34. *Fig. 611*
Identify the Cycle.
a. ovarian
b. luteal
c. uterine
d. endometrial

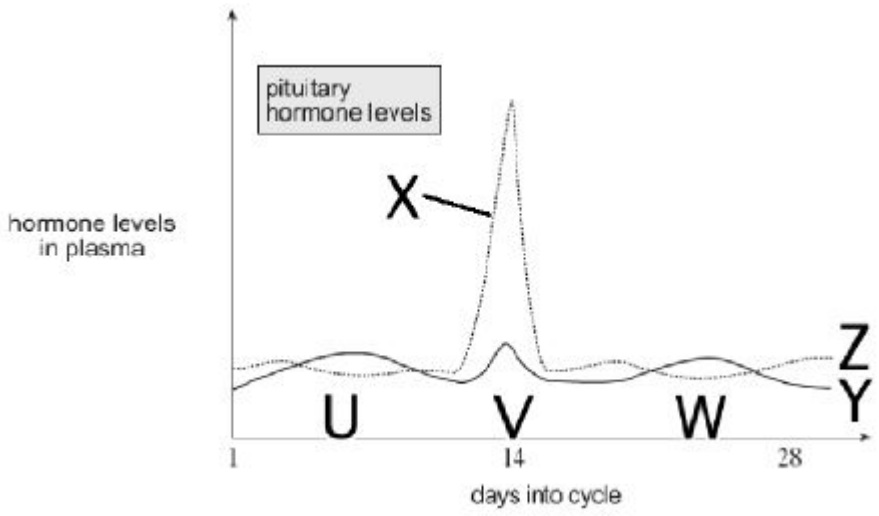
35. *Fig. 611*
Identify the "Z".
a. estrogen
b. LH
c. progesterone
d. FSH

36. *Fig. 611*

Identify the “Y”.

a. FSH
b. LH
c. estrogen
d. progesterone

*Fig. - 1217*



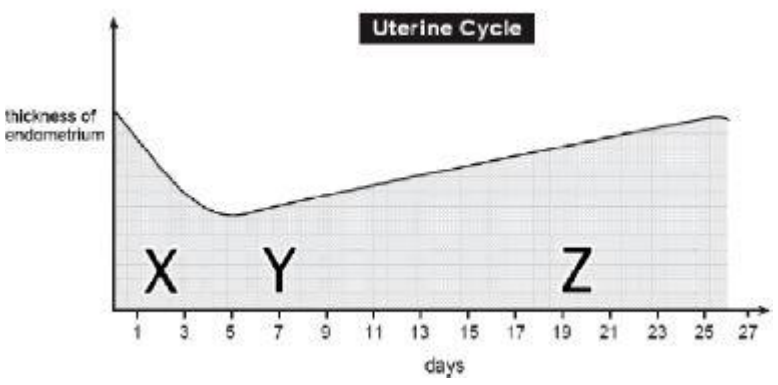

*Note:*

U, V, W, X are events/phases
Y, Z are hormones

37. *Fig. 1217*
Identify the “U”.

a. secretory phase
b. follicular phase
c. luteal phase
d. proliferative phase
e. menstrual phase

*Fig. - 1821*




38. *Fig. - 1821*
This diagram represents

a. the menstrual period
b. the development of the graafian follicle
c. the period leading up to ovulation
d. the development of the endometrium

39. *Fig. - 1821*
Identify "Y"
a. menstrual period
b. proliferative phase
c. follicular phase
d. secretory phase
e. luteal phase

40. *Fig. - 1821*
Identify "Z"
a. follicular phase
b. luteal phase
c. menstrual period
d. secretory phase
e. proliferative phase

41. Movement of a fertilized egg in an oviduct occurs with the help of
a. cilia.
b. flagella.
c. diffusion.
d. active transport.

42. Sperm cells travel through which of the following structures?
a. ureter
b. prostate gland
c. seminal vesicles
d. ductus (vas) deferens

43. Which of the following is **not** a function of seminal fluid?
a. to provide energy for sperm
b. to cause the growth of sperm
c. to provide a medium for movement of sperm cells
d. to transport prostaglandins that promote uterine contraction

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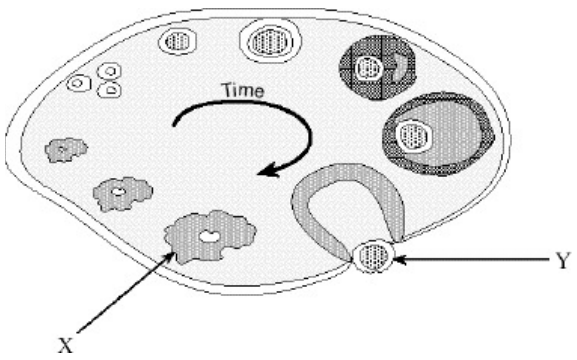
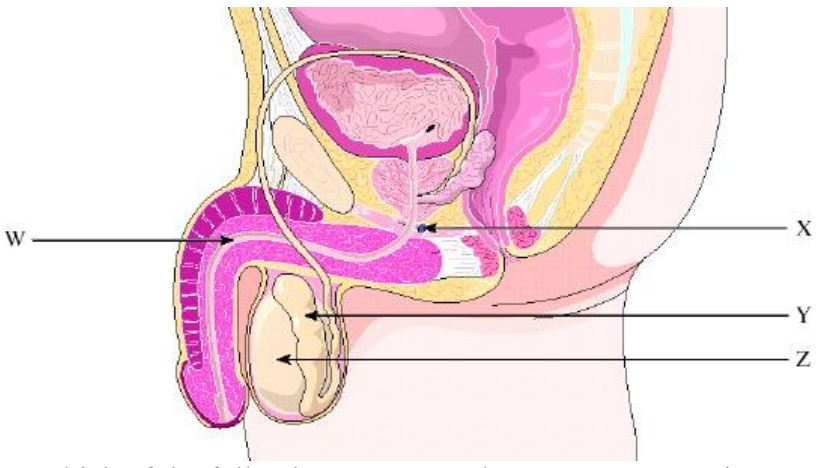



44. Which of the following structures within the ovary is labelled **X**?
a. egg
b. follicle
c. oviduct
d. corpus luteum

45. 


In which of the following structures does sperm maturation occur?

a. W b. X c. Y d. Z

46. One function of seminal fluid is to

a. lower the pH of the uterus.
b. lower the pH of the vagina.
c. provide nourishment for the egg.
d. provide prostaglandins for contraction of uterus.

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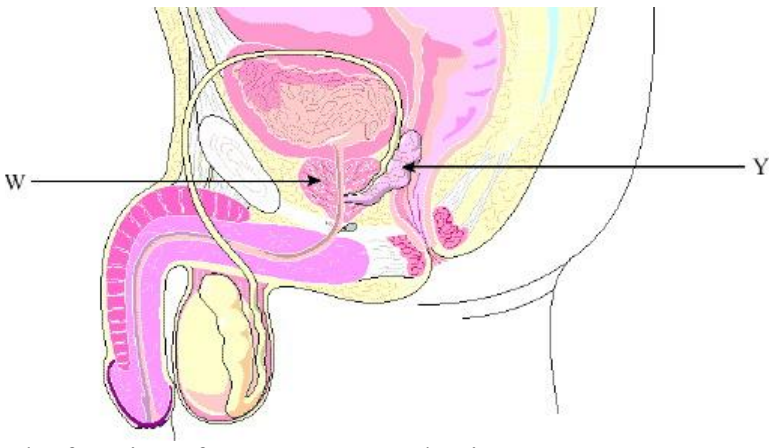
47. 


Which of the following structures is labelled **X**?

a. ovary
b. uterus
c. cervix
d. oviduct

48. 


The function of structures **W** and **Y** is to

a. produce testosterone.
b. mature and store sperm.
c. deliver the sperm to the female.
d. produce fluids that make up semen.

49. Which of the following statements is correct regarding the sequence of events during the ovarian and uterine cycles?
a. Ovulation occurs when progesterone levels decrease.
b. The endometrium is shed as estrogen levels increase.
c. As the corpus luteum degenerates, progesterone levels decrease.
d. When implantation occurs, HCG (human chorionic gonadotropic) hormone levels decrease.

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50. The part of a sperm cell containing the greatest number of mitochondria is the
a. head.
b. flagellum.
c. acrosome.
d. mid-piece.

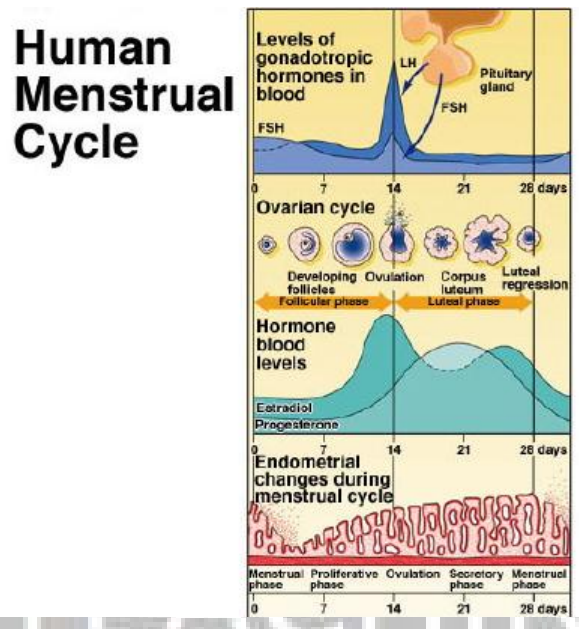
51. A rise in blood levels of FSH at the beginning of the ovarian cycle causes
a. menopause.
b. the release of the egg.
c. the maturation of the follicle.
d. the breakdown of the endometrium.

52. Which part of a sperm cell contains the enzymes that aid the penetration of an ovum?
a. tail
b. head
c. acrosome
d. mid-piece

53. Which of the following would be affected by removal of the prostate gland?
a. Urine formation.
b. Motility of sperm.
c. Sperm maturation.
d. Follicle development.

54. The ovaries lie in the _____ cavity.
a. external scrotal
b. scrotal

c. upper pelvic
d. upper abdominal
e. lower thoracic

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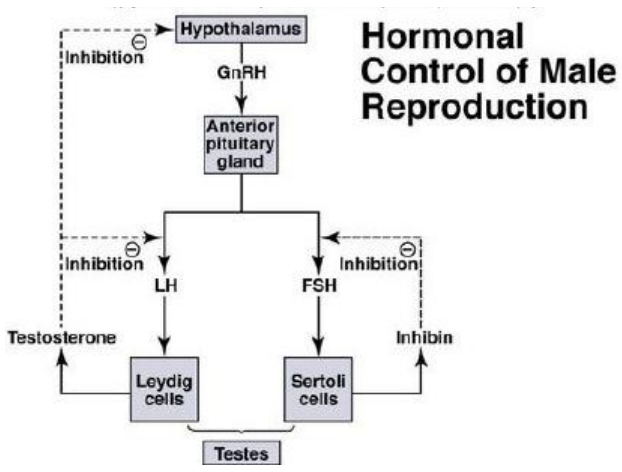
55. What causes the onset of menstruation?
    a. a decrease in levels of FSH
    b. luteal regression and a drop in estradiol and progesterone
    c. ovulation
    d. aging of the endometrium

56. The acrosome contains _____.
    a. mitochondria wrapped around microtubules to provide movement
    b. interstitial cell-stimulating hormone
    c. a haploid set of chromosomes
    d. enzymes allowing the sperm to penetrate the egg
    e. testosterone

57. The hypothalamus secretes _____.
    a. LH
    b. FSH
    c. gonadotropic-releasing hormone (GnRH)
    d. all of the above




58. What hormone is produced at puberty that initiates the sexual maturation of the male?
    a. GnRH
    b. testosterone
    c. FSH
    d. LH

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**59** Which is the most accurate statement?

The principal role of a flower in the life cycle of a plant is:

(a) attracting insects

(b) producing seeds

(c) producing pollen

(d) producing nectar

**60** Which of the following statements is correct? In flowering plants:

(a) pollination can take place without fertilisation

(b) fertilisation can take place without pollination

(c) pollination and fertilisation are the same

(d) pollination and fertilisation must occur at the same time

61. The products of meiosis in plants are always which of the following?

a. spores

b. eggs

c. sperm

d. seeds

e. both B and C

62. Which of the following is the *correct* sequence during alternation of generations in a flowering plant?

a. sporophyte-meiosis-gametophyte-gametes-fertilization-diploid zygote

b. sporophyte-mitosis-gametophyte-meiosis-sporophyte

c. haploid gametophyte-gametes-meiosis-fertilization-diploid sporophyte

d. sporophyte-spores-meiosis-gametophyte-gametes

e. haploid sporophyte-spores-fertilization-diploid gametophyte

63. Which of the following is *true* in plants?

a. Meiosis occurs in gametophytes to produce gametes.

b. Meiosis occurs in sporophytes to produce spores.

c. The gametophyte is the dominant generation in flowering plants.

d. Plants exist continually as either sporophytes or gametophytes.

e. Male gametophytes and female gametophytes have the same structure.

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64. All of the following are features of angiosperms *except*

a. a triploid endosperm.

b. an ovary that becomes a fruit.

c. animal pollination.

d. a small (reduced) sporophyte.

e. double fertilization.

65. All of the following floral parts are directly involved in pollination or fertilization *except* the

a. stigma.

b. anther.

c. sepal.

d. carpel.

e. style.

66. A mutation in which of the following floral parts would have the greatest impact on pollination?

a. sepal

b. petal

c. stamen

d. carpel

e. either C or D

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67. A mutation in which of the following floral parts would have the greatest potential impact on fertilization?

a. sepal

b. petal

c. stamen

d. carpel

e. either C or D

68. Which of the following is the *correct* order of floral organs from the outside to the inside of a complete flower?

a. petals-sepals-stamens-carpels

b. sepals-stamens-petals-carpels

c. spores-gametes-zygote-embryo

d. sepals-petals-stamens-carpels

e. male gametophyte-female gametophyte-sepals-petals

69. All of the following are primary functions of flowers *except*

a. pollen production.

b. photosynthesis.

c. meiosis.

d. egg production.

e. sexual reproduction.

70. Meiosis occurs within all of the following flower parts *except* the

a. ovule.

b. style.

c. megasporangium.

d. anther.

e. ovary.

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71. A perfect flower is fertile, but may be either complete or incomplete. Which of the following correctly describes a perfect flower?

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a. It has no sepals.

b. It has fused carpels.

c. It is on a dioecious plant.

d. It has no endosperm.

e. It has both stamens and carpels.

72. Which of the following types of plants is *not* able to self-pollinate*?*

a. dioecious

b. monoecious

c. complete

d. wind-pollinated

e. insect-pollinated

73. In flowering plants, pollen is released from the

a. anther.

b. stigma.

c. carpel.

d. filament.

e. pollen tube.

74. In the life cycle of an angiosperm, which of the following stages is diploid?

a. megaspore

b. generative nucleus of a pollen grain

c. polar nuclei of the embryo sac

d. microsporocyte

e. both megaspore and polar nuclei

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75. Where does meiosis occur in flowering plants?

a. megasporocyte

b. microsporocyte

c. endosperm

d. pollen tube

e. megasporocyte and microsporocyte

76. Which of the following is a *correct* sequence of processes that takes place when a flowering plant reproduces?

a. meiosis-fertilization-ovulation-germination

b. fertilization-meiosis-nuclear fusion-formation of embryo and endosperm

c. meiosis-pollination-nuclear fusion-formation of embryo and endosperm

d. growth of pollen tube-pollination-germination-fertilization

e. meiosis-mitosis-nuclear fusion-pollen

77. Which of these is *incorrectly* paired with its life-cycle generation?

a. anther—gametophyte

b. pollen—gametophyte

c. embryo sac—gametophyte

d. stamen—sporophyte

e. embryo—sporophyte

78. Which of the following is the *correct* sequence of events in a pollen sac?

a. sporangia—meiosis—two haploid cells—meiosis—two pollen grains per cell

b. pollen grain—meiosis—two generative cells—two tube cells per pollen grain

c. two haploid cells—meiosis—generative cell—tube cell-fertilization—pollen grain

d. pollen grain—mitosis—microspores—meiosis—generative cell plus tube cell

e. microsporocyte-meiosis-microspores-mitosis-two haploid cells per pollen grain

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79. Which of the following occurs in an angiosperm ovule?

a. An antheridium forms from the megasporophyte.

b. A megaspore mother cell undergoes meiosis.

c. The egg nucleus is usually diploid.

d. A pollen tube emerges to accept pollen after pollination.

e. The endosperm surrounds the megaspore mother cell.

80. Where and by which process are sperm produced in plants?

a. meiosis in pollen grains

b. meiosis in anthers

c. mitosis in male gametophytes

d. mitosis in the micropyle

e. mitosis in the embryo sac

81. In which of the following pairs are the two terms equivalent?

a. ovule—egg

b. embryo sac—female gametophyte

c. endosperm—male gametophyte

d. seed—zygote

e. microspore—pollen grain

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82. Which of the following is the male gametophyte of a flowering plant?

a. ovule

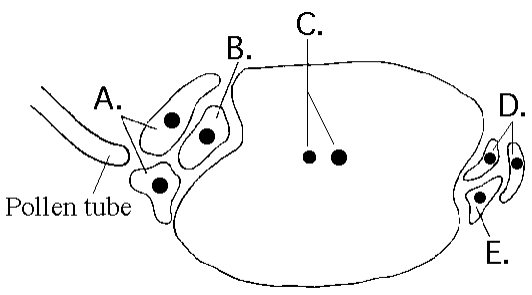
b. microsporocyte

c. pollen grain

d. embryo sac

e. stamen

*The following questions refer to the diagram of an embryo sac of an angiosperm.*



83. Which cell(s), after fertilization, give(s) rise to the embryo plant?

a. A

b. B

c. C

d. D

e. E

84. Which cell(s) become(s) the triploid endosperm?

a. A

b. B

c. C

d. D

e. E

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85. What is the relationship between pollination and fertilization in flowering plants?

a. Fertilization precedes pollination.

b. Pollination easily occurs between plants of different species.

c. Pollen is formed within megasporangia so that male and female gametes are near each other.

d. Pollination brings gametophytes together so that fertilization can occur.

e. If fertilization occurs, pollination is unnecessary.

86. Genetic incompatibility does *not* affect the

a. attraction of a suitable insect pollinator.

b. germination of the pollen on the stigma.

c. growth of the pollen tube in the style.

d. membrane permeability of cells.

e. different individuals of the same species.

87. The integuments of an ovule function to do what?

a. protect against animal predation

b. ensure double fertilization

c. form a seed coat

d. both A and B

e. both A and C

88. A fruit includes

a. one or more seeds.

b. the ovary wall.

c. fleshy cells rich in sugars.

d. brightly colored pigments to attract animal dispersers.

e. both A and B

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89. Which of the following is *not* an advantage of an extended gametophyte generation in plants?

a. Male gametophytes can travel more easily within spore walls.

b. The protection of female gametophytes within ovules keeps them from drying out.

c. The lack of need for swimming sperm makes life on land easier.

d. Female gametophytes develop egg cells, which are fertilized within an ovule that will become a seed.

e. Endosperm forms a protective seed coat.

90. What is typically the result of double fertilization in angiosperms?

a. The endosperm develops into a diploid nutrient tissue.

b. A triploid zygote is formed.

c. Both a diploid embryo and triploid endosperm are formed.

d. Two embryos develop in every seed.

e. The fertilized antipodal cells develop into the seed coat.

91. Which of the following statements regarding the endosperm is *false?*

a. Its nutrients may be absorbed by the cotyledons in the seeds of eudicots.

b. It develops from a triploid cell.

c. Its nutrients are digested by enzymes in monocot seeds following hydration.

d. It develops from the fertilized egg.

e. It is rich in nutrients, which it provides to the embryo.

92. What is the embryonic root called?

a. plumule

b. hypocotyl

c. epicotyl

d. radicle

e. shoot

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93. Which of the following "vegetables" is botanically a fruit?

a. potato

b. lettuce

c. radish

d. celery

e. green beans

94. Which of these structures is unique to the seed of a monocot?

a. cotyledon

b. endosperm

c. coleoptile

d. radicle

e. seed coat

95. Fruits develop from

a. microsporangia.

b. receptacles.

c. fertilized eggs.

d. ovaries.

e. ovules.

96. The first step in the germination of a seed is usually

a. pollination.

b. fertilization.

c. imbibition of water.

d. hydrolysis of starch and other food reserves.

e. emergence of the radicle.

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97. When seeds germinate, the radicle emerges before the shoot. This allows the seedling to quickly

a. obtain a dependable water supply.

b. mobilize stored carbohydrates.

c. protect the emerging coleoptile.

d. avoid etiolation.

e. initiate photosynthesis.

98. In plants, which of the following could be an advantage of sexual reproduction as opposed to asexual reproduction?

a. genetic variation

b. mitosis

c. stable populations

d. rapid population increase

e. greater longevity

99. Regardless of where in the world a vineyard is located, in order for the winery to produce a Burgundy, it must use varietal grapes that originated in Burgundy, France. The most effective way for a new California grower to plant a vineyard to produce Burgundy is to

a. plant seeds obtained from French varietal Burgundy grapes.

b. transplant varietal Burgundy plants from France.

c. root cuttings of varietal Burgundy grapes from France.

d. cross French Burgundy grapes with native American grapes.

e. graft varietal Burgundy grape scions onto native (Californian) root stocks.

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100. Which of the following is *not* a scientific concern relating to creating genetically modified crops?

a. Herbicide resistance may spread to weedy species.

b. Insect pests may evolve resistance to toxins more rapidly.

c. Non target species may be affected.

d. The monetary costs of growing genetically modified plants are significantly greater than traditional breeding techniques.

e. Genetically modified plants may lead to unknown risks to human health.