

Human Anatomy, 7e (Marieb/Mitchell/Smith)
Chapter 3 Basic Embryology

3.1 Multiple Choice Questions

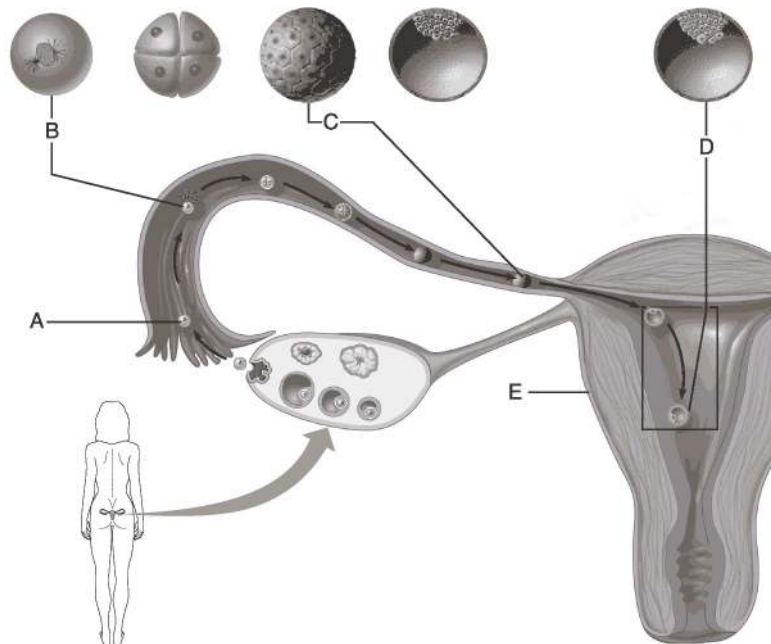


Figure 3.1

Use the diagram above to answer the following questions.

1) Which letter indicates the blastocyst?

- A) A
- B) B
- C) C
- D) D
- E) E

Answer: D

Diff: 2 Page Ref: 49

2) Which letter indicates the uterus?

- A) A
- B) B
- C) C
- D) D
- E) E

Answer: E

Diff: 2 Page Ref: 49

3) Which letter indicates the oocyte?

- A) A
- B) B
- C) C
- D) D
- E) E

Answer: A

Diff: 2 Page Ref: 49

4) Which letter indicates the zygote?

- A) A
- B) B
- C) C
- D) D
- E) E

Answer: B

Diff: 2 Page Ref: 49

5) Which letter indicates the morula?

- A) A
- B) B
- C) C
- D) D
- E) E

Answer: C

Diff: 2 Page Ref: 49

6) Quickening occurs (mother feels fetus moving).

- A) 8 weeks (end of embryonic period)
- B) 9-12 weeks (month 3)
- C) 13-16 weeks (month 4)
- D) 17-20 weeks (month 5)
- E) 21-30 weeks (months 6 and 7)

Answer: D

Diff: 2 Page Ref: 59

7) Limbs are complete.

- A) 8 weeks (end of embryonic period)
- B) 9-12 weeks (month 3)
- C) 13-16 weeks (month 4)
- D) 17-20 weeks (month 5)
- E) 21-30 weeks (months 6 and 7)

Answer: A

Diff: 2 Page Ref: 58

8) Sex can be determined from the genitals.

- A) 8 weeks (end of embryonic period)
- B) 9-12 weeks (month 3)
- C) 13-16 weeks (month 4)
- D) 17-20 weeks (month 5)
- E) 21-30 weeks (months 6 and 7)

Answer: B

Diff: 2 Page Ref: 58

9) Eyes open and lungs develop.

- A) 8 weeks (end of embryonic period)
- B) 9-12 weeks (month 3)
- C) 13-16 weeks (month 4)
- D) 17-20 weeks (month 5)
- E) 21-30 weeks (months 6 and 7)

Answer: E

Diff: 2 Page Ref: 59

10) All major organs are present in rudimentary form.

- A) 8 weeks (end of embryonic period)
- B) 9-12 weeks (month 3)
- C) 13-16 weeks (month 4)
- D) 17-20 weeks (month 5)
- E) 21-30 weeks (months 6 and 7)

Answer: A

Diff: 2 Page Ref: 58

11) This develops into the brain and spinal cord.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: B

Diff: 2 Page Ref: 57

12) This develops into the lining of the gastrointestinal tract.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: A

Diff: 2 Page Ref: 57

13) This develops into the epidermis of the skin.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: B

Diff: 2 Page Ref: 57

14) The epiblast develops a primitive streak during days 14-15, the initial cells that ingress through the primitive streak become this germ layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: A

Diff: 3 Page Ref: 50

15) Mucus-producing glands of the respiratory tract arise from this layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: A

Diff: 3 Page Ref: 57

16) What embryonic epiblast cells that remain on the surface of the trilaminar disc are ultimately called.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: B

Diff: 3 Page Ref: 50-51

17) The neural tube develops from this layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: B

Diff: 2 Page Ref: 52

18) The mesoderm located deep to the neural tube forms the kidneys and the gonads is the _____.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: E

Diff: 3 Page Ref: 57

19) The ribs and vertebrae form from this primary germ layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: C

Diff: 3 Page Ref: 57

20) The ectoderm develops into the epithelium of the skin, whereas this layer gives rise to the epithelial lining of the gut tube.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: A

Diff: 3 Page Ref: 57

21) This layer will give rise to the bones, ligaments and joints of the embryonic limbs.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: D

Diff: 2 Page Ref: 57

22) Neural crest cells are derived from this germ layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: B

Diff: 2 Page Ref: 57

23) The dermis of the dorsal body region is derived from somites. However, the dermis of the ventral body region is derived from

- A) endoderm.
- B) ectoderm.
- C) mesoderm—somites.
- D) mesoderm—lateral plate.
- E) intermediate mesoderm.

Answer: D

Diff: 2 Page Ref: 57

24) Blood vessels and the heart arise from this primary germ layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: D

Diff: 2 Page Ref: 57

25) The splanchnic mesoderm forms next to this layer.

- A) endoderm
- B) ectoderm
- C) mesoderm—somites
- D) mesoderm—lateral plate
- E) intermediate mesoderm

Answer: A

Diff: 2 Page Ref: 57

26) Conception occurs in the

- A) lateral third of the uterine tube.
- B) ovary.
- C) peritoneal cavity.
- D) uterine cavity.

Answer: A

Diff: 2 Page Ref: 48

27) The middlemost embryonic germ layer to develop is

- A) ectoderm.
- B) endoderm.
- C) mesoderm.
- D) protoderm.

Answer: C

Diff: 2 Page Ref: 50-51

28) The embryonic notochord will eventually be replaced by the developing _____, leaving only remnants that persist as the nucleus pulposus of intervertebral discs.

- A) spinal cord
- B) pharynx
- C) lateral muscle
- D) vertebral column

Answer: D

Diff: 2 Page Ref: 50, 55

29) Which of the following is the proper sequence for neurulation?

- A) neural tube, neural plate, neural groove
- B) neural groove, neural plate, neural tube
- C) neural plate, neural groove, neural tube
- D) neural groove, brain, neural tube

Answer: C

Diff: 2 Page Ref: 52-53

30) Limb buds emerge in the human embryo about

- A) day 9.
- B) day 15.
- C) day 28.
- D) day 60.

Answer: C

Diff: 2 Page Ref: 56

31) Based on the proportions of the adult body, the 3-month fetus still shows disproportionately large

- A) hands.
- B) stomach.
- C) head.
- D) heart.

Answer: C

Diff: 2 Page Ref: 58

32) Division of cells in a zygote is called

- A) blastulation.
- B) cleavage.
- C) gastrulation.
- D) induction.

Answer: B

Diff: 2 Page Ref: 48

33) The gonads arise from what embryonic structure?

- A) notochord
- B) endoderm
- C) splanchnic mesoderm
- D) intermediate mesoderm

Answer: D

Diff: 2 Page Ref: 57

34) Which of the following is endodermal in origin?

- A) liver
- B) spleen
- C) blood vessels
- D) skin

Answer: A

Diff: 2 Page Ref: 55

35) Somites differentiate into

- A) the epidermis.
- B) myotomes.
- C) the gastrointestinal lining.
- D) muscles.

Answer: B

Diff: 3 Page Ref: 55

36) The sclerotome will develop into the

- A) peritoneum.
- B) visceral serosa.
- C) vertebrae.
- D) heart.

Answer: C

Diff: 2 Page Ref: 55

37) Splanchnic mesoderm forms the

- A) heart.
- B) notochord.
- C) brain.
- D) skin.

Answer: A

Diff: 2 Page Ref: 57

38) Approximately _____ percent of all children have some birth defect.

- A) 0.01
- B) 1
- C) 3
- D) 20

Answer: C

Diff: 2 Page Ref: 60

- 39) A transverse section through the 24-day embryo, dorsal to ventral, would first contact the
- A) neural tube.
 - B) notochord.
 - C) somites.
 - D) myotomes.

Answer: A

Diff: 2 Page Ref: 55

- 40) The embryonic layer that invades the lining of the uterus and forms the placenta is the
- A) trophoblast.
 - B) embryoblast.
 - C) inner cell mass.
 - D) endometrium.

Answer: A

Diff: 2 Page Ref: 48

- 41) The expression "breaking water" during birthing refers to the
- A) amnion.
 - B) allantois.
 - C) chorion.
 - D) yolk sac.

Answer: A

Diff: 2 Page Ref: 50

- 42) Which characteristic is *not* true of a blastocyst?
- A) It contains a fluid-filled cavity.
 - B) It develops 24-36 hours after conception.
 - C) It has an inner cell mass and an outer trophoblast.
 - D) It implants into the uterus.

Answer: B

Diff: 3 Page Ref: 48

- 43) The solid mass of cells that results from cleavage of the zygote is the
- A) trophoblast.
 - B) blastocyst.
 - C) morula.
 - D) gastrula.

Answer: C

Diff: 2 Page Ref: 48

44) Which of the following does *not* distinguish mesoderm from either endoderm or ectoderm?

- A) It is a mesenchyme tissue.
- B) It is derived from the epiblast.
- C) It is the last of the three germ layers to develop.
- D) Its cells can migrate widely within the embryo.

Answer: B

Diff: 3 Page Ref: 50

45) The term *bilaminar disc* refers to the embryonic _____ and _____.

- A) epidermis; dermis
- B) ectoderm; mesoderm
- C) epiblast; hypoblast
- D) inner cell mass; trophoblast

Answer: C

Diff: 2 Page Ref: 50

46) Mesenchyme would refer to _____ but not _____.

- A) mesoderm; ectoderm
- B) ectoderm; mesoderm
- C) endoderm; ectoderm
- D) ectoderm; endoderm

Answer: A

Diff: 2 Page Ref: 51

47) Male and female fetuses can first be distinguished by their genitalia at

- A) 1 week.
- B) 3 weeks.
- C) 3 months.
- D) 7 months.

Answer: C

Diff: 2 Page Ref: 58

48) Thalidomide, once used to alleviate morning sickness in pregnant women, resulted in

- A) severe limb abnormalities.
- B) heart defects.
- C) mental retardation.
- D) multiple births.

Answer: A

Diff: 2 Page Ref: 60

49) Chemical, physical, or biological agents that can induce birth defects are called

- A) mutagens.
- B) teratogens.
- C) free radicals.
- D) carcinogens.

Answer: B

Diff: 2 Page Ref: 60

50) The most common cause of mental retardation in the United States is

- A) anencephaly.
- B) spina bifida.
- C) fetal alcohol syndrome.
- D) thalidomide.

Answer: C

Diff: 2 Page Ref: 60

51) Implantation of the blastocyst on the uterine lining takes about

- A) 1 week.
- B) 2 weeks.
- C) 3 weeks.
- D) 4 weeks.

Answer: A

Diff: 2 Page Ref: 49

52) Fertilization is to zygote as

- A) egg is to sperm.
- B) oocyte is to ovary.
- C) cleavage is to morula.
- D) birth is to parturition.

Answer: C

Diff: 3 Page Ref: 48

53) In human embryos, the yolk sac is important because it

- A) stores yolk.
- B) gives rise to earliest blood cells and blood vessels.
- C) stores nitrogenous wastes.
- D) allows for gas exchange through the placenta.

Answer: B

Diff: 2 Page Ref: 50

54) The body's axis of development is determined by the

- A) blastomeres.
- B) epiblast.
- C) notochord.
- D) primitive streak.

Answer: C

Diff: 2 Page Ref: 51

55) Most organ systems are fully formed and ready to function in the fetus by the sixth month. Which of the following systems is the exception to this generalization because it takes longer to finish development?

- A) the circulatory system
- B) the respiratory system
- C) the urinary system
- D) the integumentary system

Answer: B

Diff: 3 Page Ref: 59

56) The urinary bladder is derived from which embryonic layer?

- A) ectoderm
- B) mesoderm
- C) endoderm
- D) neural crest

Answer: C

Diff: 2 Page Ref: 57

57) A teratogen is

- A) a deformed baby.
- B) a specific sedative used in the 1950s in Europe.
- C) a chemical agent, infectious agent or environmental factor that causes birth defects.
- D) a stage of development in the mid-fetal period.

Answer: C

Diff: 2 Page Ref: 60

58) The primary germ layer that ultimately produces the hair, fingernails, and toenails is

- A) ectoderm.
- B) mesoderm.
- C) endoderm.
- D) neural crest.

Answer: A

Diff: 2 Page Ref: 55, 57

59) The primary germ layer that ultimately forms the serous membranes of the peritoneum is

- A) ectoderm.
- B) mesoderm.
- C) endoderm.
- D) neural crest.

Answer: B

Diff: 2 Page Ref: 56

60) The neural tube of the embryo develops into the

- A) spinal cord.
- B) neural crest.
- C) sensory neurons.
- D) dorsal skin.

Answer: A

Diff: 1 Page Ref: 52

61) Somatic mesoderm gives rise to all of the following *except*

- A) some bones.
- B) some serous membranes.
- C) dermis of the skin of the belly.
- D) epidermis of the upper limb.

Answer: D

Diff: 3 Page Ref: 54

62) Production of surfactant begins during week 22-26 of the gestational period. Premature infants born after week 26 will

- A) not survive.
- B) will not need medical assistance for breathing.
- C) will need medical assistance for breathing.
- D) will be at increased risk for visual disorders and mental impairment.

Answer: B

Diff: 2 Page Ref: 59

63) Another name for birth defect is

- A) birth illness.
- B) teratogenesis.
- C) congenital abnormality.
- D) prenatal pathology.

Answer: C

Diff: 2 Page Ref: 60

64) Which of the following adult structures derives from neural crest?

- A) all the nerve cells in the brain
- B) all the nerve cells in the spinal cord
- C) all the pigment-producing cells in the body
- D) all bones

Answer: C

Diff: 2 Page Ref: 55

65) As a result of folding, the embryo acquires a tadpole shape by

- A) day 9.
- B) day 12.
- C) day 15.
- D) day 24.

Answer: D

Diff: 3 Page Ref: 54

66) The amniotic sac is derived from the epiblast, while the placenta develops from the

- A) bilaminar disc.
- B) hypoblast.
- C) neural crest.
- D) trophoblast.

Answer: D

Diff: 2 Page Ref: 48

67) Identical (monozygotic) twins are

- A) formed from splitting of the inner cell mass.
- B) formed from splitting of the zygote.
- C) formed from the release of two eggs.
- D) formed from two sperm fertilizing one egg.

Answer: A

Diff: 2 Page Ref: 49

68) If a mutation occurs in the hypoblast cells of a bilaminar embryo, one might expect birth defects to be present in the

- A) blood cells or vessels.
- B) brain and spinal cord.
- C) hair and skin.
- D) musculoskeletal system.

Answer: A

Diff: 3 Page Ref: 50

69) Which of the following is *not* a property of mesenchyme?

- A) It is present before birth.
- B) Its cells migrate.
- C) Its cells are star-shaped.
- D) Its cells attach closely to one another and form sheets.

Answer: D

Diff: 2 Page Ref: 51

70) The ability of one cell to influence the development of its neighboring cells is called

- A) blastulation.
- B) cleavage.
- C) gastrulation.
- D) induction.

Answer: D

Diff: 2 Page Ref: 53

71) Which of the following appears latest in human development?

- A) limb buds
- B) somites
- C) heart
- D) separate fingers

Answer: D

Diff: 2 Page Ref: 58-59

72) Conjoined twins occur as a result of

- A) complete separation of cells in the early morula.
- B) failure of the blastocyst to implant in the uterine lining.
- C) incomplete division of the inner cell mass.
- D) fertilization of the ovum by two different sperm

Answer: C

Diff: 2 Page Ref: 49

73) The cavity in the mesoderm that ultimately develops into the peritoneal, pericardial, and pleural cavities is called:

- A) an antrum.
- B) a blastocoel.
- C) a coelom.
- D) a dermatome.

Answer: C

Diff: 2 Page Ref: 54

74) Which of the following is *not* a germ layer?

- A) ectoderm
- B) mesoderm
- C) epidermis
- D) endoderm

Answer: C

Diff: 2 Page Ref: 50-51

75) The correct sequence for embryonic development is

- A) zygote, blastocyst, morula.
- B) zygote, morula, blastocyst.
- C) blastocyst, morula, zygote.
- D) zygote, fetus, embryo.

Answer: B

Diff: 2 Page Ref: 48-49

3.2 True/False Questions

1) Spina bifida results when the neural tube fails to close in the head.

Answer: FALSE

Diff: 2 Page Ref: 53

2) The fetal period is the longer and later of the prenatal growth periods.

Answer: TRUE

Diff: 2 Page Ref: 47

3) The inner cell mass will form the embryo, and the trophoblast will form the placenta.

Answer: TRUE

Diff: 2 Page Ref: 48

4) The outer membrane of the amniotic sac is called the amnion.

Answer: TRUE

Diff: 2 Page Ref: 50

5) The epiblast gives rise to the three primary germ layers.

Answer: TRUE

Diff: 2 Page Ref: 50

6) The developing embryo, about 72 hours after fertilization, is called the zygote.

Answer: FALSE

Diff: 2 Page Ref: 48

7) During the blastocyst stage, there are three cell layers evident.

Answer: FALSE

Diff: 2 Page Ref: 48

8) It is easy to remember that in humans, 3 weeks after fertilization, there are three germ layers.

Answer: TRUE

Diff: 1 Page Ref: 50-51

9) The three primary germ layers are the endoderm, myotome, and exoderm.

Answer: FALSE

Diff: 1 Page Ref: 50-51

10) The yolk sac, formed from the hypoblast, has little yolk in the human embryo.

Answer: TRUE

Diff: 2 Page Ref: 50

11) Premature birth is one that occurs 38 weeks after conception.

Answer: FALSE

Diff: 3 Page Ref: 60

12) Endoderm forms many glands, such as those associated with the gastrointestinal tract.

Answer: TRUE

Diff: 2 Page Ref: 57

13) The embryonic notochord gives rise to part of the intervertebral discs in the adult human.

Answer: TRUE

Diff: 2 Page Ref: 55

14) Identical twins arise from the splitting of a three-layered embryo.

Answer: FALSE

Diff: 3 Page Ref: 49

15) The ability of one group of cells to influence development of neighboring cells is called gastrulation.

Answer: FALSE

Diff: 2 Page Ref: 53

3.3 Short Answer Questions

1) The embryonic _____ ultimately form the arms and legs of the adult.

Answer: limb buds

Diff: 2 Page Ref: 56

2) By the end of week 3, the mesoderm has divided into the somites, intermediate mesoderm, and _____.

Answer: lateral plate

Diff: 2 Page Ref: 54

3) Splanchnic mesoderm gives rise to components of the cardiovascular system, including _____.

Answer: the heart and blood vessels

Diff: 2 Page Ref: 57

4) Somites differentiate into dermatomes, myotomes, and _____.

Answer: sclerotomes

Diff: 2 Page Ref: 55

- 5) The sex of the fetus can be determined externally by approximately month _____.
Answer: 3
Diff: 2 Page Ref: 58
- 6) The hand develops with _____ between the fingers.
Answer: webs (webbing)
Diff: 2 Page Ref: 58
- 7) This is the most common preventable cause of mental retardation in the United States.
Answer: fetal alcohol syndrome
Diff: 2 Page Ref: 60
- 8) Defects in the development of the neural tube may be linked to inadequate dietary intake of _____.
Answer: folic acid
Diff: 2 Page Ref: 53-54
- 9) _____ is a clinical procedure that provides a genetic profile for a fetus.
Answer: Amniocentesis
Diff: 2 Page Ref: 61
- 10) A _____ abortion is one in which the fetus dies and is naturally aborted.
Answer: spontaneous
Diff: 2 Page Ref: 61
- 11) The wall and lining of the gut develop from the mesoderm and _____, respectively.
Answer: endoderm
Diff: 2 Page Ref: 57
- 12) Name three primary germ layers in the embryo.
Answer: endoderm, ectoderm, and mesoderm
Diff: 2 Page Ref: 51-52
- 13) The _____ is the embryonic stage that implants in the uterus.
Answer: blastocyst
Diff: 2 Page Ref: 48
- 14) A primitive characteristic that an adult human retains only in part, but is important in determining bilateral symmetry is the _____.
Answer: notochord
Diff: 3 Page Ref: 51
- 15) The intermediate mesoderm forms the _____.
Answer: kidneys and gonads
Diff: 2 Page Ref: 57

3.4 Essay Questions

1) Explain how conjoined twins may occur.

Answer: Conjoined twins result with the incomplete division of the inner cell mass during the twinning process. The twins may be joined at any/multiple body regions and often share organs.

Diff: 2 Page Ref: 49

2) Briefly describe the two cellular layers that comprise the bilaminar embryonic disc and explain their importance in embryonic development.

Answer: Cells within the inner cell mass of the blastocyst begin to differentiate into two separate layers approximately nine days after fertilization occurs. These two layers will give rise to all of the cell types of the body. The epiblast will give rise to the three primary germ layers; ectoderm, mesoderm and endoderm. The hypoblast gives rise to the yolk sac, which will develop into part of the digestive tube and tissue around the yolk sac gives rise to the earliest blood cells and blood vessels.

Diff: 2 Page Ref: 50

3) Describe the types of tissues that make up the endoderm, ectoderm, and mesoderm, and explain how these tissues relate to their developmental processes.

Answer: Both endoderm and ectoderm are epithelial tissues. These cells are joined together in sheets that form external or internal linings of the body. The mesoderm consists of mesenchyme tissue whose cells don't stick together. Instead, the cells and groups of cells are free to migrate within the embryo to eventually give rise to muscles, bones, and viscera.

Diff: 3 Page Ref: 50-51

4) Define the term *teratogen*, and explain why exposure to teratogens during the first 8 weeks of pregnancy is particularly dangerous.

Answer: A *teratogen* is any chemical, biological, or physical factor that disrupts normal embryo development. Exposure to teratogenic agents is most dangerous during the first 8 weeks of embryo development because it is during this time that most of the major organ systems initially develop. Disruption to these early cell lines may either be inconsistent with life and cause spontaneous abortion or may cause significant malformations that will persist throughout the fetal period.

Diff: 2 Page Ref: 60

5) Briefly describe the formation of the nervous system.

Answer: The nervous system develops by an infolding of ectodermal cells from the neural plate. These cells continue to fold toward each other, forming initially the neural groove, which then becomes the completed neural tube. The cranial region of the neural tube becomes the brain, the caudal portion becomes the spinal cord. Just lateral to the developing neural groove, on either side, a ridge begins to form called the neural crest, again formed by ectodermal cells. These lateral ridges fuse; forming a superficial layer of ectoderm, surrounding the hollow, deeper neural tube. Migratory neural crest cell derivatives will later become sensory nerve cells, pigment-producing cells, and bone-forming cells of the face.

Diff: 2 Page Ref: 52-53, 57