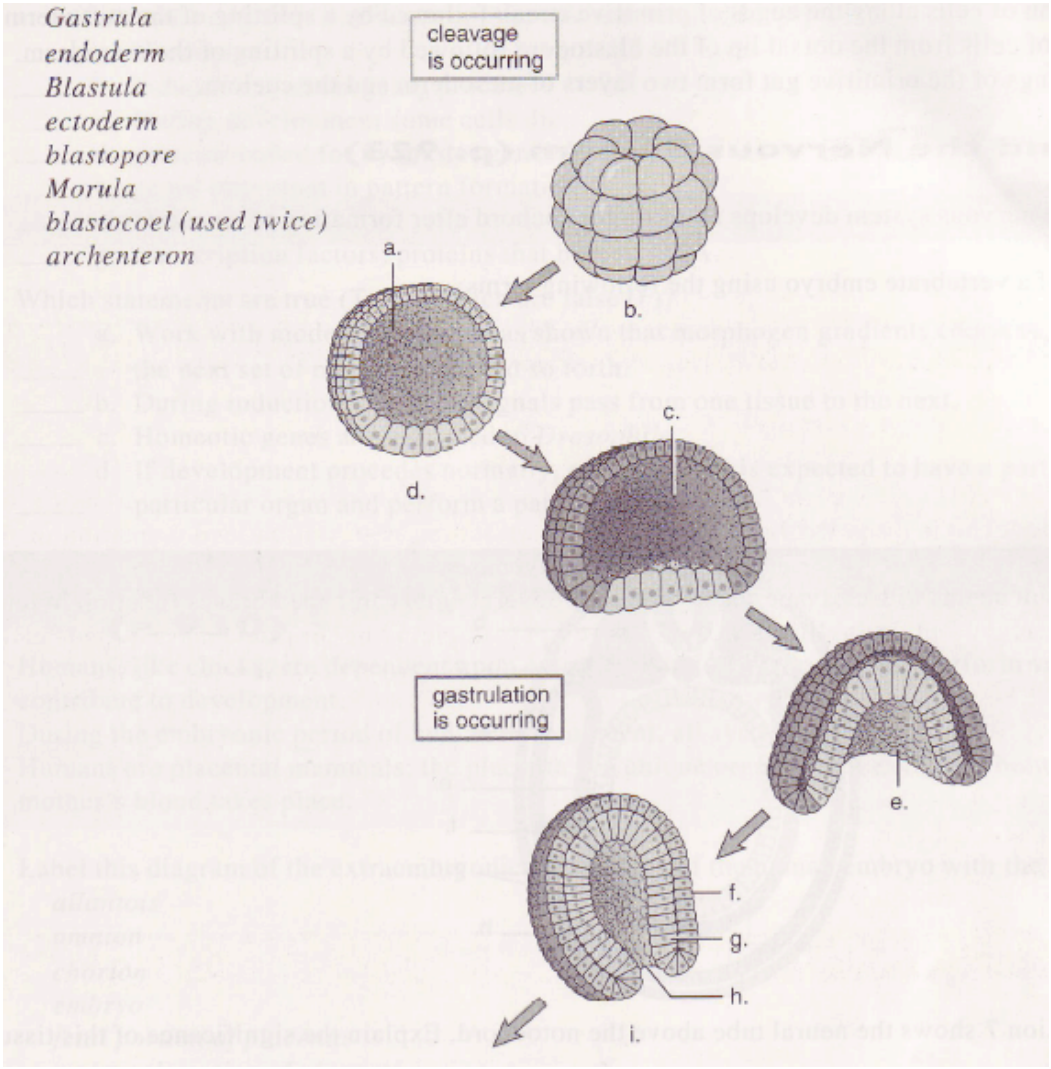
Name:
Date:
Period:

Early Development Stages:

- Development begins when a sperm fertilizes an egg.
- The first stage of embryonic development in animals lead to the establishment of the embryonic germ layers.
- The presence of the yolk affects the manner in which animal embryos go through the early development stages.

1. Put these events in order to describe fertilization:
   a. The vitelline envelope becomes the fertilization envelope, which prohibits any more sperm from entering the egg.
   b. When released, these enzymes digest away the jelly coat around the egg, and the acrosome extrudes a filament that attaches attaches to a receptor on the vitelline envelope.
   c. A head of a sperm has a membrane-bound acrosome filled with enzymes.
   d. Now the sperm nucleus enters and fuses with the egg nucleus, and the resulting zygote begins to divide.
2. Label this diagram of early development with the following terms:

Gastrula
endoderm
Blastula
ectoderm
blastopore
Morula
blastocoel (used twice)
archenteron



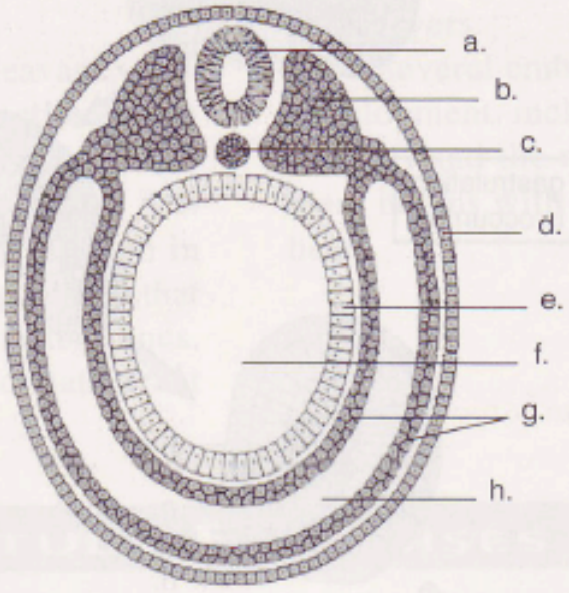
3. Indicate whether the following statements are true (T) or false (F):
_____ a. Cell division during cleavage does not produce growth.
_____ b. The blastula is a solid ball of cells.
_____ c. The ectoderm and endoderm form after the mesoderm on the gastrula.
_____ d. The germ layer theory states that the development of the later structures can be related to germ layers.

4. Indicate the germ layer (ectoderm, endoderm, mesoderm) of the vertebrate gastrula stage that is the source of the following:

epidermis of the skin a._____
nervous tissue b._____
lining of the stomach c._____
muscles of the forelimb d._____
blood e._____

5. Label the diagram of a vertebrate embryo using the following terms:

coelom
ectoderm
endoderm
gut
mesoderm
neural tube
notochord
somite



6. The diagram above shows the neural tube above the notochord. Explain the significance of this tissue relationship below:

Developmental Processes:

- Cytoplasmic segregation and induction help bring out cellular differentiation and morphogenesis.
- Developmental genetics has benefited from research into the development of *Caenorhabditis elegans*, a roundworm and *Drosophilia melanogaster*, a fruit fly.
- Homeotic genes are involved in shaping the outward appearance of animals.

7. Match C (for cytoplasmic segregation) or I (for induction) or both to each phrase.
_____ a. the parceling out of maternal determinants during cleavage and thereafter.
_____ b. embryos that receive a portion of the gray cresent develop normally.
_____ c. ability of one embryonic tissue to influence the development of another tissue.
_____ d. the nervous system develops above the notochord.
_____ e. the reciprocal development of the lens and optic vesicle.
_____ f. its importance is dependent on chemical signals which influence developing.

8. Which statements are true (T) and which are false (F)?
_____ a. Work with model organisms has shown that morphogen gradients coded for by the master genes turn on the next set of master genes and so forth.
_____ b. During induction, chemical signals pass form one tissue to the next.
_____ c. Homeotic genes are restricted to *Drosophilia.*
_____ d. If development proceeds normally, each new cell is expected to have a particular fate – be a part of a particular organ and perform a particular function.

Human and Kitten Embryonic and Fetal Development:

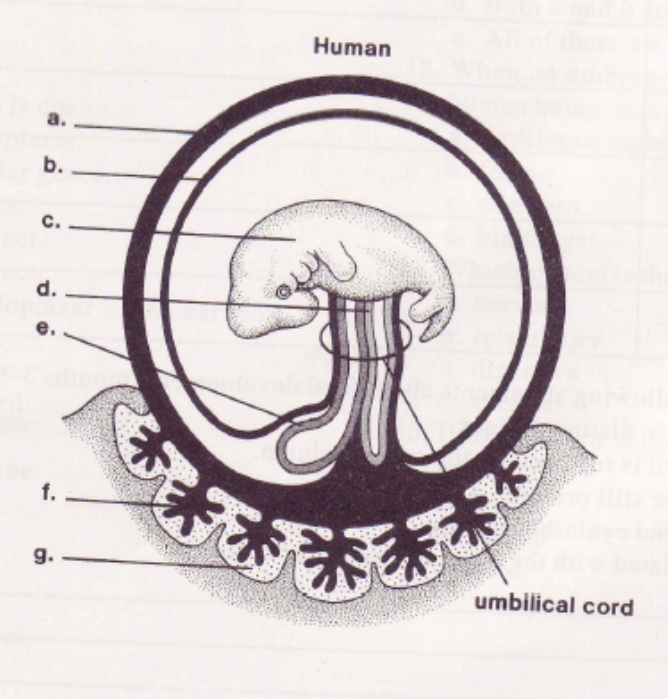
- Humans, like kittens, are dependent upon extraembryonic membranes that perform various services and contribute to development.
- During the embryonic period of human and kitten development, all systems appear.
- Humans and kittens are placental mammals; the placenta is a unique organ where exchange between fetal blood and mother's blood takes place.

9. Complete the following table:

Membrane	Human/ Kitten Function
Chorion	
Amnion	
Allantois	
Yolk Sac	

10. Label this diagram of the extraembryonic membrane of the human embryo with the following terms:

allantois
amnion
chorion
embryo
fetal portion of placenta
maternal portion of placenta
yolk sac



Embryonic Development:

- During fetal development, the fetus grows large enough to live on its own. Birth is a multistage process that includes delivery of the child and the extraembryonic membranes.

11. To describe human embryonic development, complete the table with the number of the event that occurs at each time indicated.

1. All internal organs formed; limbs and digits well formed; recognizable as human although still quite small
2. Fertilization; cell division begins
3. Limb buds begin; heart is beating; embryo has a tail
4. Implantation; embryo has tissues; first two extraembryonic membranes
5. Fingers and toes are present; cartilaginous skeleton
6. Nervous system begins; heart development begins
7. Head enlarges; sense organs prominent

Time	Events
a. first week	
b. second week	
c. third week	
d. fourth week	
e. fifth week	
f. sixth week	
g. two months	

12. Indicate whether the following statements about fetal development (months 3-9) are true (T) or false (F):
_____ a. It is possible to distinguish sex.
_____ b. The notochord is replaced by the spinal column.
_____ c. Limb buds are still present.
_____ d. Fingernails and eyelashes appear.

Kitten Birth and After Birth Development:

- The remaining questions refer to kitten birth and after birth development.

13. How long is a female cat pregnant before giving birth to kittens? _____

Mr. Doss found four kittens under a pile of rubble in the subarea of a house. Do research to answer the following questions:

-The kittens' eyes and ears were closed.
-Their umbilical cords were long and still attached.
-Movement was very limited, more wiggling than actually moving.
-Kittens weighed slightly over 2 oz. on the day they were found.

14. Look at the pictures and information above. Based on your research, how old were the kittens when Mr. Doss found them?_____

Explain your answer:

15. At what age do kitten umbilical cords fall off?_____

16. At what age do kitten ears open?_____

17. At what age do kitten eyes open?_____

18. How long will the kitten need to take breast milk (i.e. when can it be weaned off milk to regular food)?_____

19. When the kitten's eyes open, they will be _____ color. At what age will the kitten's eyes change to the adult color?_____

20. At what age can kittens pur?_____

21. Kittens digestive system is not developed enough upon birth to eliminate wastes voluntarily. Mom cat has to help kittens digest milk and remove waste by constant licking and cleaning. At what age are kittens digestive systems developed enough to eliminate waste voluntarily?_____

22. When do baby teeth start to form in kittens?_____

23. At what age is a kitten able to stand and walk (albeit wobbly)?_____

24. When will a kitten be ready to be adopted?_____

25. When do cats reach sexual maturity?_____