



CHAPTER 19

Growth and Development



- Exercise Short Answers
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Exercise Short Answers

Q:1 What is organizer and inducer substance?

Ans:

Organizer	Inducer substance
During development in amphibian the dorsal lip area is called as organizer because it is the only tissue capable of inducing development of secondary embryo in the host.	The capacity of some cells to initiate specific developmental response in other cells is termed as induction and the substance which causes induction is called as inducer substance.

Q:2 What is differentiation?

Ans: Differentiation:

The formation of specialized tissues from newly divided cell is called differentiation.

OR

Differentiation is the formation of specialized tissues.

- Once a seed has germinated, plant's further development depends on the activity of meristematic tissues, and roots and shoot apical meristem give rise, all cells of adult plant.

Q:3 Define embryonic induction.

Ans: Embryonic induction:

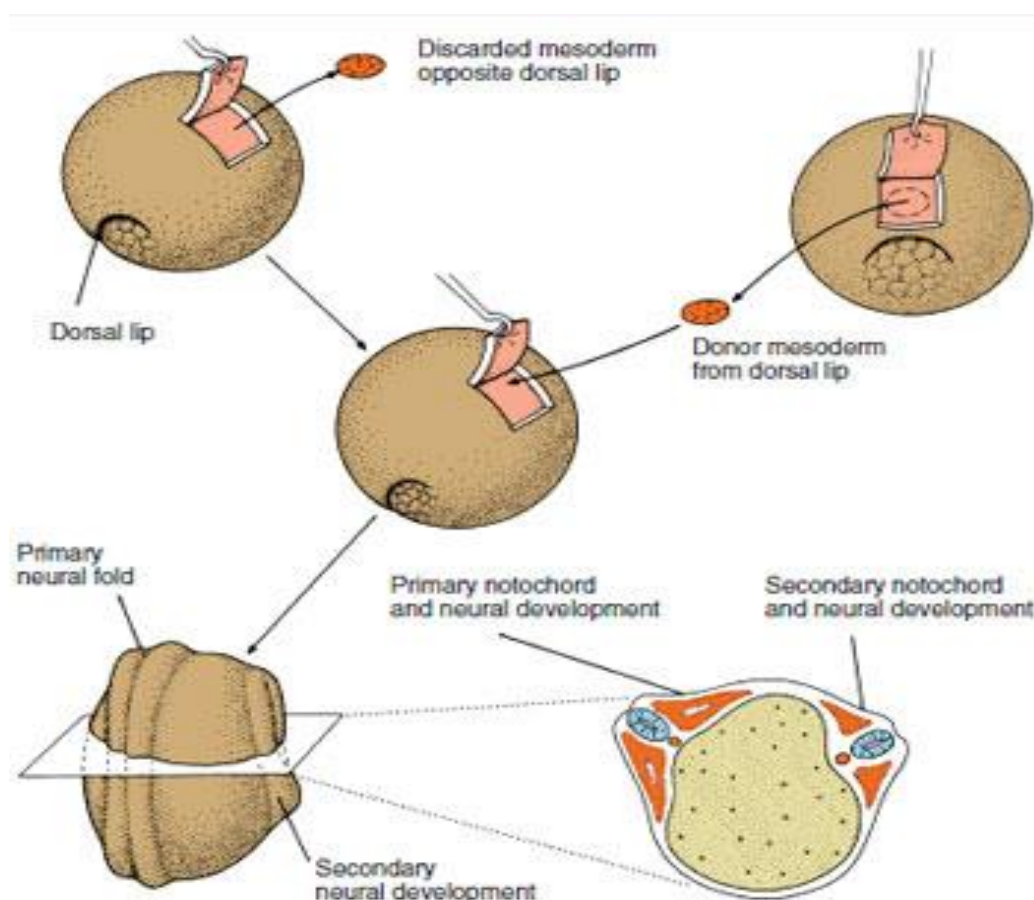
The capacity of some cells of embryo to evoke a specific developmental response in the other cells is called embryonic induction.

OR

The influence of notochordal cells on the ectodermal cells to become nervous system was called embryonic induction by Spemann.

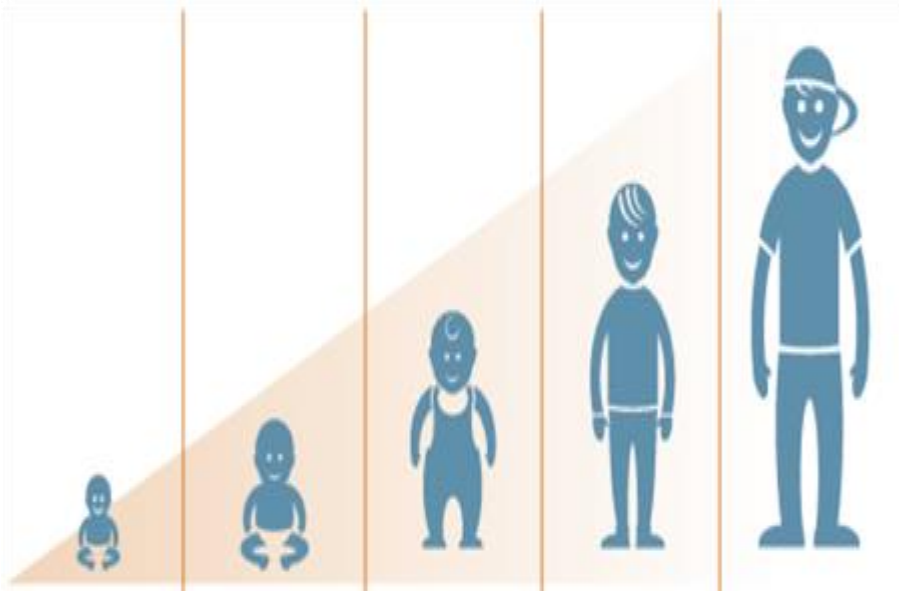
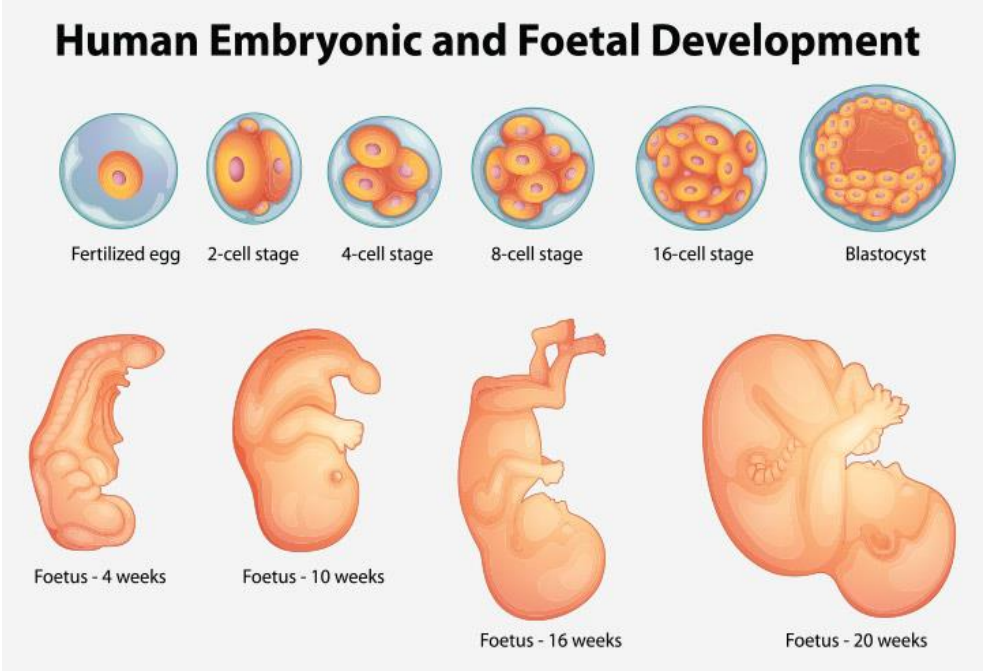
Explanation:

When a piece of dorsal blastopore lip from a salamander gastrula was transplanted into a ventral or lateral position of another salamander gastrula, it invaginated and developed a notochord and somites. It also induced the host ectoderm to form a neural tube. Eventually a whole system of organs developed where the graft was placed, and then grew into a nearly complete secondary embryo.



Q:4 Differentiate between growth and development.

Ans:

Growth	Development
Growth is the permanent and irreversible increase in size that occurs as an organism matures.	The progressive changes which are undergone before an organism become adult constitute embryonic development.
In growth only the size of already formed organs increases.	It is ordered sequence of steps involving cell division and differentiation from a single fertilized egg up to the formation of complex and independent organism.
These changes include from birth or hatching to till adulthood.	These changes include from fertilized egg to till birth or hatching.
These changes are more obvious.	These changes are less obvious.
Growth is cellular.	Development is organizational.
Growth stops at maturation.	Development continues till death of the organism.
Growth is only quantitative in nature.	Development is qualitative as well as quantitative in nature.
Growth doesn't need development.	Development needs growth for its completion.
	Human Embryonic and Foetal Development 

Q:5 What is meristem?

Ans: Meristem:

Meristems are young tissues or population of cells that retain the potential to divide.

OR

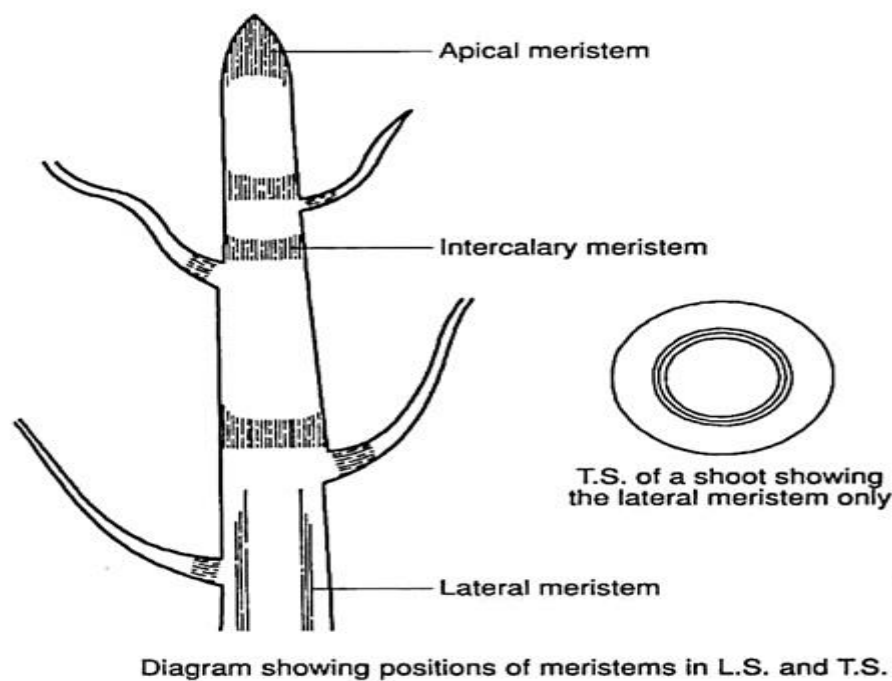
In plants growth is restricted to certain region known as growing points. These growing points consist of group of cells which are capable of division; these growing points are called meristem.

Important Short Answers

Q:1 Differentiate between apical meristem and intercalary meristem.

Ans:

Apical meristem	Intercalary meristem
The apical meristems are found at the tips of roots and shoot and are primarily concerned with the extension of plant body.	Intercalary meristems are the parts of apical meristem which get separated from apex by permanent tissues.
These are perpetual growth zones found at the apices of roots and stems.	They are situated at the bases of internodes in many plants.
They increase the number of cells at the tips of leaves, roots and stem.	They increase the number of cells specially at the joints of stem.
They play important role in primary growth.	They play important role in the production of leaves and flower. These are of temporary nature.



Q: 2 Define growth correlation.

Ans: Growth correlation:

The reciprocal relationship of growth between different parts of plants in which the one part affects the growth of the other part is called growth correlation.

- The development of plant is usually correlated with its growth.
- The different organs of plants grow at different rates in different directions.
- So development of different parts occurs.

Q:3 Briefly describe external and internal factors that affect growth in plants.

Ans:

External factors of growth	Internal factors of growth
Temperature: Growth increases with rise in temperature. Optimum temperature is 25-30°C. Light: Affects cell division, elongation, flowering etc. Oxygen: Necessary for respiratory activities. Carbon dioxide: For photosynthesis. Water: By absorbing water cell elongates. Nutrition: Nutrition supplies compounds for new organic matter. e.g. N, Mg etc.	Hormones: Influence the growth e.g. IAA causes cell elongation. Vitamins: Necessary for normal growth. In vitamin deficiency growth ceases. - Vitamins act as coenzymes, which are essential for proper functions of enzymes.

Q:4What are growing points?

Ans: Growing points:

In higher plants, growth is limited of certain regions known as growing points e.g., shoot apex and root tip.

Q:5 What is embryology?

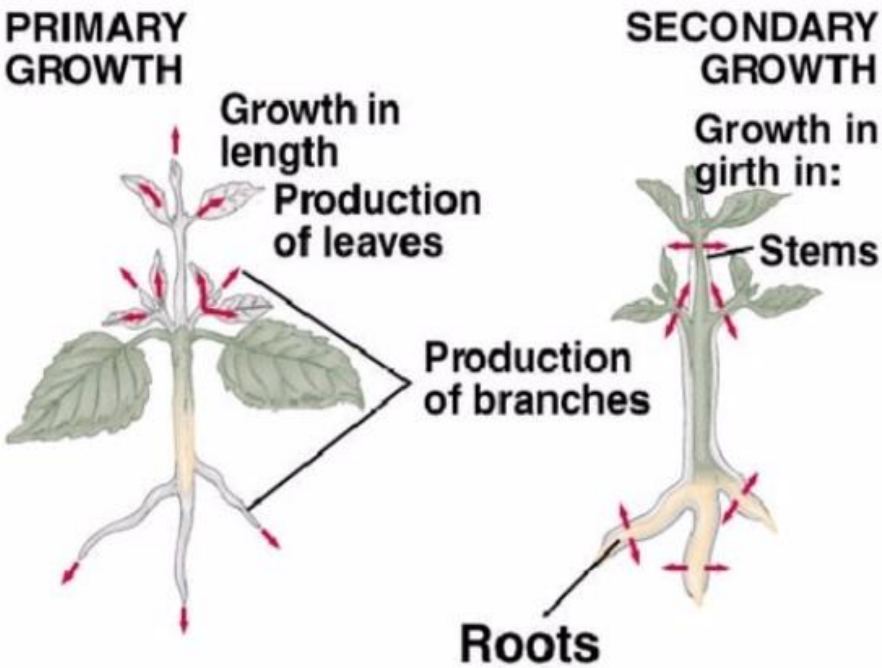
Ans. Embryology:

Embryology is the study of growth and differentiation undergone by an organism in the course of its development from a single fertilized egg into highly complex and an independent living being like his parents.

Q:6 Differentiate between primary growth and secondary growth.

Ans:

Primary growth	Secondary growth
A type of plant growth in which length of plant increases is known as primary growth.	A type of plant growth in which width or diameter of plant increases is known as secondary growth.
Primary growth occurs at primary meristems.	Secondary growth occurs at secondary meristems.
Apical meristem gives rise to primary growth.	Lateral meristem gives rise to secondary growth.



Q:7 Differentiate between inhibitory and compensatory effect.

Ans:

Inhibitory effect	Compensatory effect
Growth of lateral buds is inhibited by the growth of apical buds in apical dominance.	Removal of apex releases the lateral buds from apical dominance and they start growing rapidly. This is called compensatory effect.
Thimann and Skoog-1934 performed experiments and showed that apical dominance is caused by Auxins. Terminal bud produces auxins which diffuse to lateral bud from apical buds and produces inhibitory effects.	Researchers showed that cytokinins also play important role in apical dominance. Its role is opposite to auxins. If cytokinin is applied directly on the inhibited bud, it releases lateral buds from apical dominance.

Q:8 What are Lateral meristems?

Ans: Lateral Meristems

Lateral Meristems are cylinders of dividing cells present in dicots and gymnosperms.

- Vascular and cork cambium are the examples of lateral meristems.
- They play an important role in the increases in diameter of stem and root and are involved in secondary growth.

Q: 9 Differentiate between determinate growth and indeterminate growth.

Ans:

Determinate growth	Indeterminate growth
A secondary growth in which certain structures grow certain size then stop.	A secondary growth in which certain structures grow by meristems that continuously replenish themselves; reaming youthful.
Examples: Leaves, flowers, fruits show determinate growth.	Examples: Vegetative growth of root and stem.

Q:10 Define apical dominance. Name hormones that cause apical dominance.

Ans: Apical dominance:6

Active controlling of shoot apex area to the development of lateral buds is called apical dominance.

Hormones effecting apical dominance:

1) Auxin (IAA):

Thimann and Skoog -1934 performed experiments and showed that apical dominance is caused by auxins.

- So the auxin of terminal bud is responsible for inhibiting the growth of lateral bud.
- Terminal bud produces auxin. It diffuse to lateral bud from apical buds and produces inhibitory effects.

2) Cytokinins:

Researches showed that cytokinins also play an important role in apical dominance.

- Its role is opposite to the auxins.
- If cytokinins are applied to inhibited bud, it releases lateral buds from apical dominance.

Q:11 Write applications of Apical dominance.

Ans: Applications of apical dominance: These are

(1) Tap Root Development:

Apical dominance plays an important role in the tap root development.

(2) Inhibition of Lateral Buds:

It inhibits the sprouting or opening of lateral bands e.g. if auxin is applied on the lateral buds (eyes) of potato tuber, its buds (eyes) are not formed. So the sprouting of eyes is prevented and storage period of potato is increased from 1 to 3 years.

(3) The plants have dense growth of lateral branches have very little apical dominance.

Q:12 Due to what factors normal process of development is disturbed?

Ans:

The normal process of development is disturbed by:

- 1) Abnormalities inherited from parents
- 2) Abnormalities due to chromosomes or genes
- 3) Environmental factors
- 4) Metabolic defects.

Q:13 What is open growth?

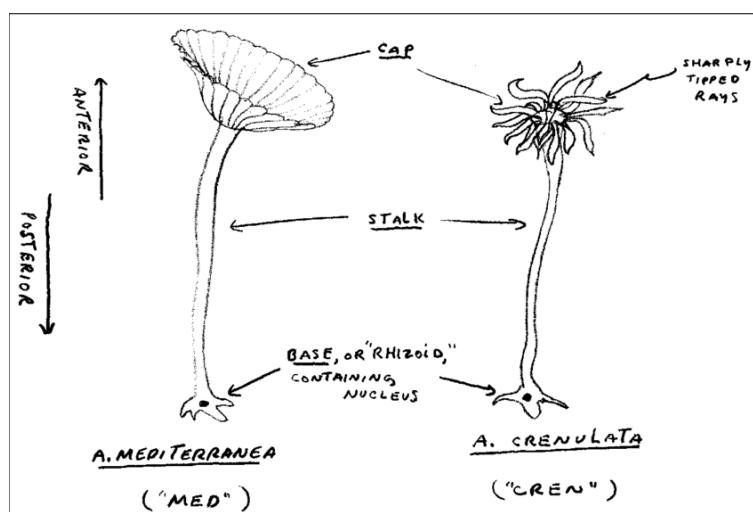
Ans: Open growth:

A plant has a growth pattern called open growth because throughout life, the plant adds new organs, such as branches, leaves and roots, enlarging from the tips of roots and shoots.

Q:14 What is Acetabularia?

Ans: Acetabularia:

It is multicellular alga. It consists of rhizoid, which is attached to the grounds, from which arises a long stalk with an umbrella shaped cap at its top. Two species of Acetabularia have been identified; Acetabularia mediterranea and A. crenulata.



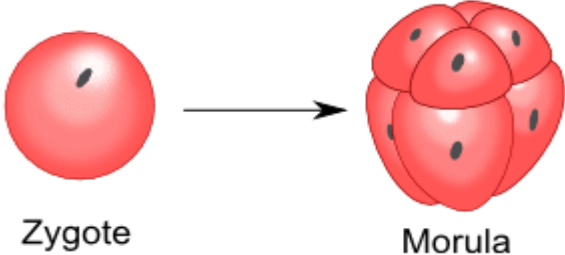
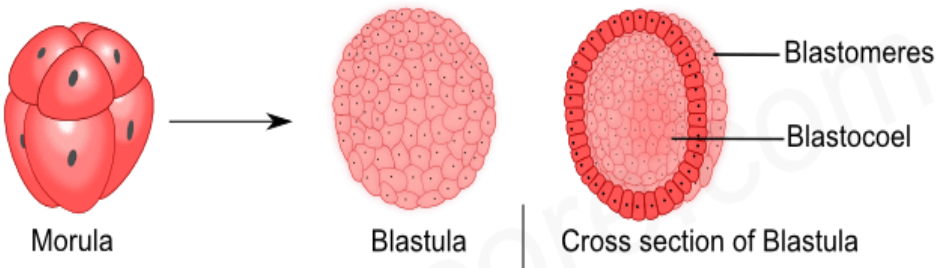
Q:15 What is the temperature for incubation for chick egg?

Ans:

In incubating eggs artificially, the incubators are usually regulated at temperature between 36-38°C. At this temperature, the chick completes development and is hatched on the twenty first day.

Q:16 Differentiate between morulla and blastula.

Ans:

Morulla	Blastula
Cleavage results in the formation of a rounded closely packed mass of blastomeres. This is morulla.	Blastula is disc-shaped of blastomeres resulting from division of morulla.
Zygote transforms to morulla.	Morulla transforms to Blastula.
The cells inside the morulla are larger than the cells that form blastula.	The number of blastula is larger than that in morulla.
Morulla is a solid structure with no fluid-filled cavity is inside.	Blastula is a hollow structure, due to the presence of fluid-filled space called blastocoel.
Morulla consists of an inner and outer cell masses.	Trophoplast cells are present in blastula unlike in morulla.
Duration of the formation of morulla is lower than the formation of the balstulla.	Duration of the formation of blastula is more than the formation of the morulla.
Morulla is short lived.	Blastula is long lived.
 Zygote Morula	 Morula Blastula Cross section of Blastula Blastomeres Blastocoel

Q:17 What is gastrula stage.

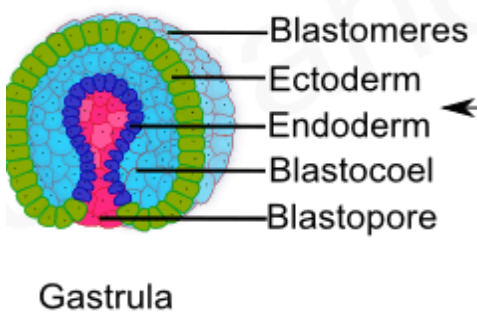
Ans: Gastrula stage:

Formation of blastula is followed by gastrula.

OR

The movement and rearrangement of cells into germinal layers in embryo is called gastrulation and embryo stage is called gastrula.

- Formation of gastrula is called gastrulation.
- Slow mitotic divisions of blastula results gastrula.
- During the formation of gastrula, cell masses move by morphogenetic movements.
- Three primary germ layers are present in gastrula.
- Gastrula has more differentiated cells.



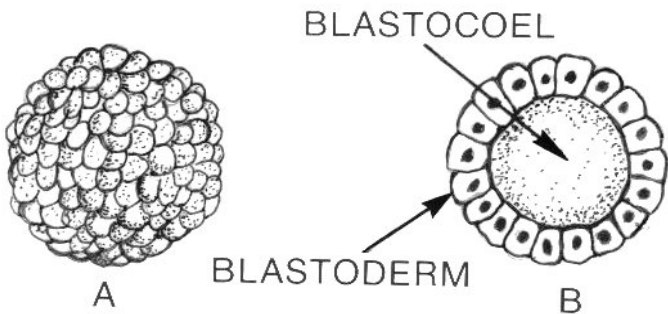
Q18 What is blastoderm. Differentiate between epiblast and hypoblast.

Ans: Blastoderm:

Morulla consists of two disc shaped mass of cells which are two or more layers in thickness. These layers are called blastoderm.

OR

The discoidal cap of cells above the blastocoele is called blastoderm.



Epiblast	Hypoblast
The upper layer of cells of blastoderm is called epiblast.	The lower layer of cells of blastoderm is called hypoblast.
Epiblast is mainly presumptive ectoderm and mesoderm.	Hypoblast is mainly presumptive endoderm.
It will form skin, nervous system, notochord and heart etc.	It will form digestive system etc.

Q:19 Differentiate between area opaca and area pellucida.

Ans:

Area opaca	Area pellucida
- In gastrulation, the peripheral part of the blastoderm where the cells lie unseparated from the yolk is termed as area opaca. - OR - Area consisting of peripheral part of blastoderm is not separated from the yolk.	In gastrulation, the central cells of blastoderm can be separated from the yolk, under these central cells a pool of fluid develops, raising them off the yolk and giving the area a translucent appearance - the area pellucida.
It is the white area that transmits light.	This area gives a translucent appearance.

Q:20 What is zone of junction in developing chick embryo?

Ans:

The marginal area of the blastoderm in which the cells remain undetached from the yolk and closely adherent (supporting) to it, is called the zone of junction.

Q:21 What is Germ wall?

Ans: Germ wall:

In sections of embryo incubated from 18-20 hours, it is seen that ectoderm has spread and become organized into a coherent layer of cells merging peripherally with the yolk and the marginal area where the expanding germ layers merge with the under lying yolk is known as germ wall.

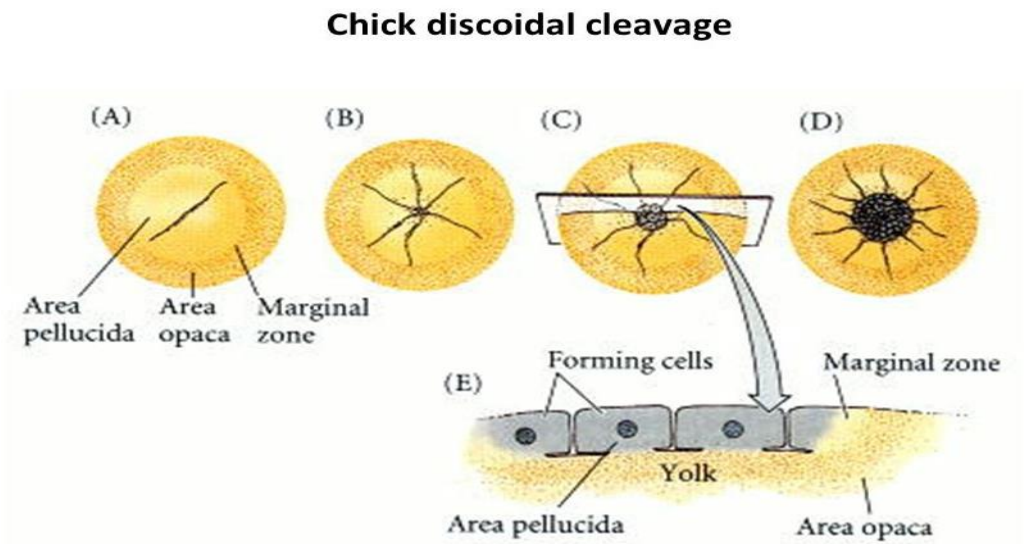
Q:22 In chick development, what is meant by discoidal cleavage?

Ans: In bird’s egg, immediately after fertilization, the egg undergoes a series of mitotic divisions called cleavage.

Discoidal cleavage:

The process of cleavage or cell division is confined to small disc of protoplasm lying on the surface of the yolk at the animal pole. This type of cleavage is termed as discoidal cleavage.

- **Example:** Takes place in chick embryo.

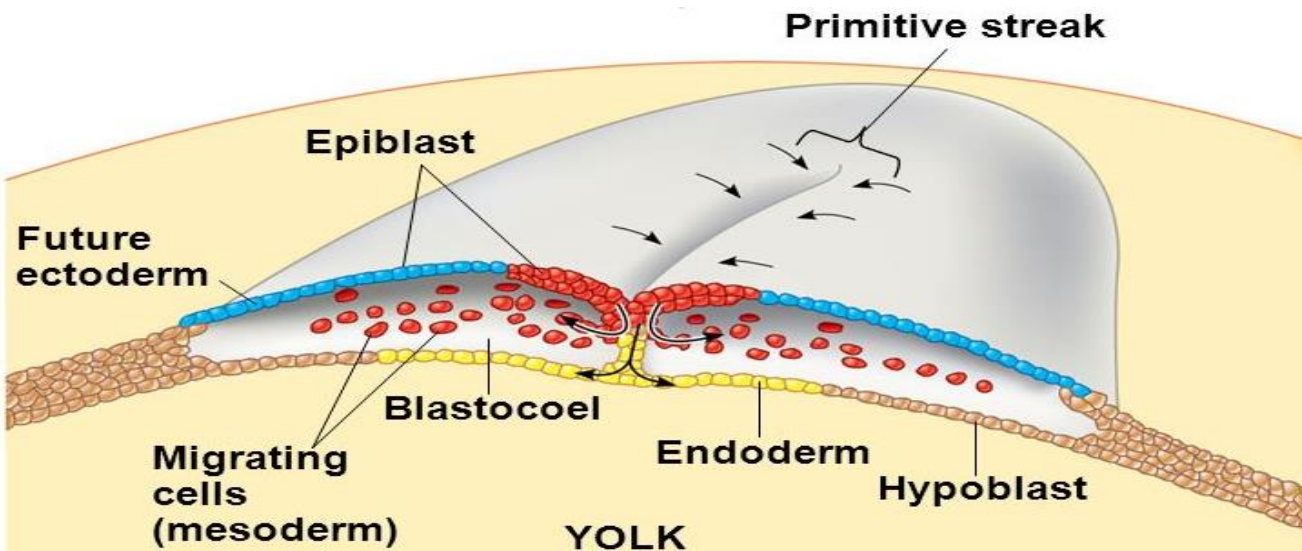


Q:23 How primitive streak is formed?

Ans: Primitive steak:

During chick embryo development, the mesodermal cells migrate medially and caudally and form a midline thickening called primitive steak.

- Anterior end of primitive streak is occupied by an aggregation of notochordal cells. While rests of the cells are mesodermal.
- So primitive streak represents the dorsal and both lateral lips of blastopore as in amphibians.



Q:24 Differentiate between gastrulation and neurulation.

Ans:

Gastrulation	Neurulation
• It is the embryological process that results in the formation of gastrula. It eventually results in the formation of the embryonic gut (endoderm), ectoderm and mesoderm. • It is characterized by the movement and rearrangement of cells in the embryo.	• During the process of embryological development, the development of the nervous system is known as neurulation and they embryo at this stage is called neurula. • It is characterized by the formation of neural tube at the mid-dorsal line.

Q:25 Differentiate between gastrocoel and neurocoel.

Ans:

Gastrocoel	Neurocoel
The cavity between yolk and the endoderm is called primitive gut. It was earlier called Gastroccoel.	When neural plate infolds and neural folds merge to form neural tube. It encases a cavity in between called neurocoel.
It will form the lumen of the gut.	So the formation of the cavity enclosed in the neural tube of nervous system is known as neurocoel. It will form the ventricles of brain and central canal of the spinal cord.
Gastrocoel usually contains food (e.g; yolk).	Neurocoel usually contains CSF (Cerebrospinal fluid).

Q:26 Name two layers of lateral plate mesoderm.

Ans: The lateral plate mesoderm splits into two sheets like layers.

1) Somatic mesoderm

It forms inner or lower Hansen’s node and layer of skin (ectoderm). It is also called parietal mesoderm.

OR

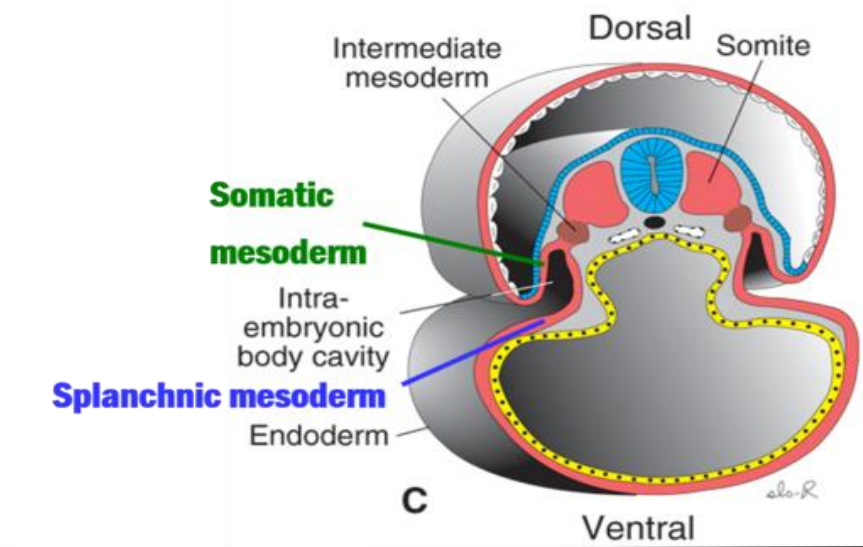
The outer layer of coelom is called somatic mesoderm.

2) Splanchnic mesoderm:

It forms outer layer of gut (endoderm). It is also called visceral mesoderm.

OR

The inner layer of coelom is called splanchnic mesoderm.

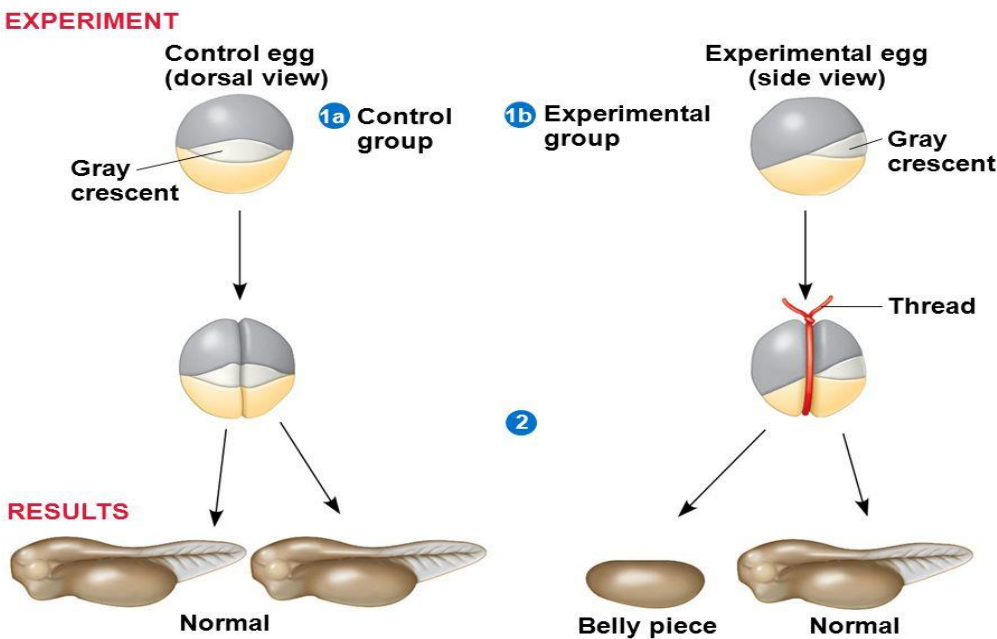


Q:27 What is gray crescent? Give its role?

Ans: Gray crescent:

Gray crescent is the pigment free area that appears at the time of fertilization found in amphibians. So development will not take place in the half lacking gray crescent.

- Later studies revealed that the development depends on the position of Gray crescent. In an experiment, the side of zygote lacking gray crescent became an unorganized piece of belly tissue while the other side developed normally.



Q:28 What are neoblasts; write its function.

Ans: Neoblasts:

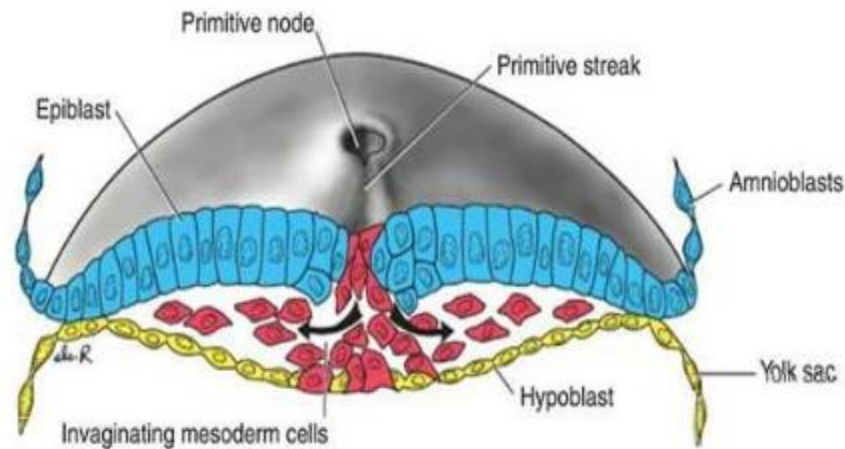
Organisms like flatworms and planaria have unspecialized or undifferentiated cells. These cells are called neoblast.

- Neoblasts are always present in the body of adult.
- They are mobilized and migrate to the sites of amputation (cut), where they differentiate into specialized cell type.

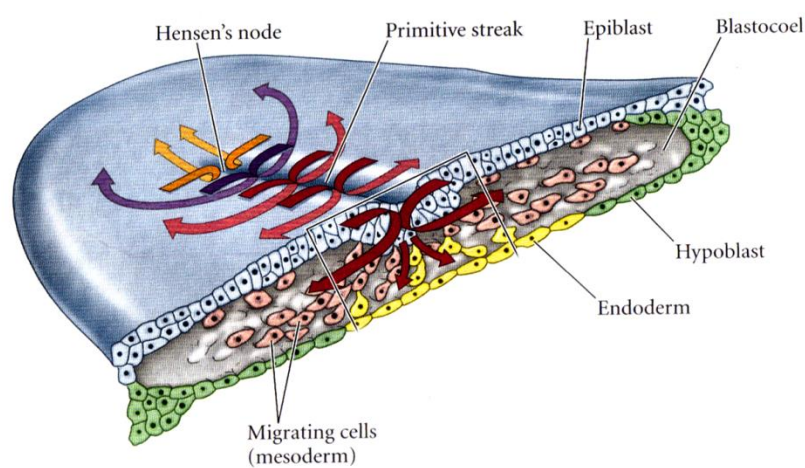
Q:29 What are primitive node and Hensen's node.

Ans: Primitive node:

The anterior end of the primitive streak is occupied by an aggregation - the primitive node or notochordal cells while rests of cells are mesodermal cells.

**Hensen's node:**

At the cephalic end of primitive streak, closely packed cells form a local thickening known as Hensen's node.



Q:30 write down the role of morphogenetic determinants in development with example.

Ans: Morphogenetic determinants:

Different cytoplasmic components contain different morphogenetic determinants. These morphogenetic determinants are responsible for cell differentiation. These determinants are present in blastomeres.

Example:

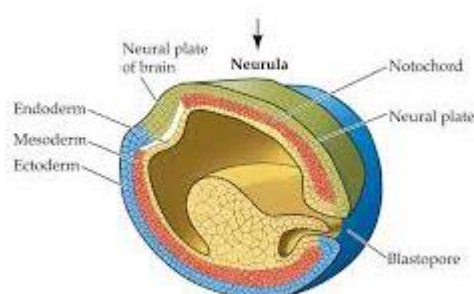
A fertilized egg of ascidian (lower chordate) contains cytoplasm of four different colors. These cytoplasm are:

- Clear cytoplasm: produce larval epidermis.
- Yellow cytoplasm: gives rise to muscle cells.
- Gray-vegetal cytoplasm: gives rise to gut.
- Gray-Equatorial cytoplasm: produces notochord and neural tube.

Q:31 What are Neurula and neuropores?

Ans: Neurula

In 24 hour chick embryos, the folding of neural plate is clearly visible. The embryo is now termed as neurula.



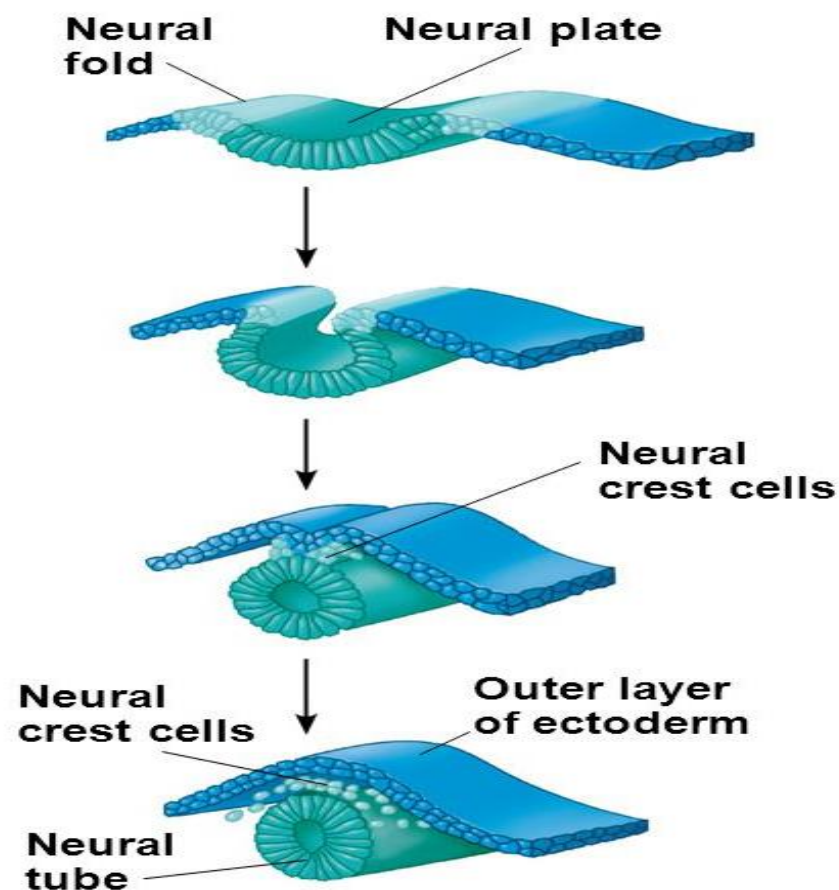
Neurospores:

At each end of neural tube, a small opening called anterior and posterior neuropores are also seen, which close later on.

Q:32 How neural tube is formed in chick embryo?

Ans: Neural tube formation:

- Neural plate sinks and neural folds grow towards one another. These neural folds meet at mid-dorsal line.
- They fuse and convert the neural groove into neural tube.
- At each end of the neural tube, a small opening called anterior and posterior neurospores are present. These spores close later on.



Q:33 Define abnormal development?

Ans: Abnormal development:

Sometimes, under unfavorable conditions, some parts of the body do not develop normally and this is called abnormal development.

Q:34 Define aging and write its symptoms.

Ans: Aging:

Negative physiological changes in our body are called aging.

- It is an inevitable process, which cannot be inhibited or stopped.

Symptoms:

We identify the individual by following signs of old age,

- Loss of hair pigment
- Loss of agility
- Poor vision
- Forgetfulness
- Decreased body immunity
- Arthritis
- Arteriosclerosis
- Dryness and wrinkling of skin
- General weakness etc.

Q:35 What are the causes of process of aging?

Ans: Causes of aging:

The exact process of aging is still unknown but the following points are of worth consideration.

- Individual might have reached the finite number of mitotic divisions.
- Intra cellular substances change causing hardening and loss of elasticity and resilience.
- Spontaneous mutations causing degeneration of tissues.

Q:36 How aging can be slowed down?

Ans:

Aging is an inevitable process but can be slowed down through:

- Better nutrition
- Regular meals
- Regular exercise
- Adequate sleeps
- Abstinence from smoking
- Maintaining ideal weight

All the above measures can prolong life by an average of 11 years.

Q:37 Define regeneration and give examples?

Ans: Regeneration:

The ability of an organism to regain or recover the lost or injured part of the body is called regeneration.

Examples:

- Any piece of sponge can grow into a complete sponge.
- Lizard can regenerate its tail by special feature of regeneration.
- Lobsters may regenerate the lost pincer claw.
- Starfish can regenerate the lost arm in all cases and regenerate lost central disc in some cases.
- Earthworm can regenerate the removed head.
- In plants regeneration is basic mode of propagation.
- In human healing of wounds, regrowing of hair and healing of fractured bone is also regeneration.

Q:38 Define teratology. What are teratogens?

Ans: Teratology:

It is the branch of biology which deals with the study of abnormal development and causes for such development.

Teratogens:

Teratogens are a group of environmental factors which causes or contribute to the abnormal development.

Example of teratogens:

- Ionizing radiations (X-rays) are well known for their teratogenic action.
- They often have their effect on the developing ovum or spermatozoan.
- They damage or change the genes causing mutation.

Q:39 What is gerontology? Also give future plan of gerontology.

Ans: Gerontology:

The branch of biology, which deals with the study of aging, is called gerontology.

- Its present goal is not to increase the life span but to increase the health span.

Future plan of Gerontology:

- Today, there is great interest in gerontology; the numbers of older individuals are expected to rise.
- In the next half century, the number of people over age 75 will rise from the present 8 million to 14.5 million, and the number over age 80 will rise from 5 million to 12 million.
- The human life span is judged to be maximum of 120-125 years.

Q:40 What are Microcephaly and Cleft palate?

Ans: Microcephaly and Cleft palate are due to metabolic defects.

Microcephaly:

It is a defect in which the individuals are born with small skull.

Cleft palate:

It is an abnormality in which individuals have their upper lips folded or the individual has harelip.

Exercise MCQ's

❖ Encircle the correct answer from the multiple choices.

- 1) Growth rate is influenced by:

a) Hormones

b) Water

c) Vitamins

d) All of these
- 2) Neurula is the stage in which embryo has:

a) Blastocoele

b) Neural tube

c) The germ layers

d) Archenterons
- 3) The mesodermal cells do not invigilate but migrate medially and caudally from both sides and create a midline thickening called:

a) Henson's node

b) Primitive streak

c) Epiblast

d) Hypoblast
- 4) The negative physiological changes in our body are called:

a) Degeneration

b) Abnormalities

c) Aging

d) Regeneration

Answer key:

1	d	2	b	3	b	4	c
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Important Additional MCQ's

❖ **Encircle the correct answer from the multiple choices.**

Plant portion

- 1) **Young tissues retaining the potential to divide:**
 - a) Meristem
 - b) Xylem
 - c) Phloem
 - d) Cork
 - 2) **Growth process is:**
 - a) Irreversible
 - b) Reversible
 - c) Sometimes reversible sometimes irreversible:
 - d) Temporary
 - 3) **A plant has a growth pattern called:**
 - a) Closed growth
 - b) Open growth
 - c) In between the two
 - d) None of these
 - 4) **Speed of growth is:**
 - a) Rapid throughout
 - b) Slow throughout
 - c) First slow then rapid then slow again
 - d) First rapid then slow
 - 5) **Meristems are group of cells that:**
 - a) Allow the surrounding region to divide
 - b) Provide nutrition
 - c) Help in movement
 - d) Retain the potential to divide
 - 6) **Higher plants grow through:**
 - a) Growing points
 - b) Whole plant body is capable of growing
 - c) Only roots grow
 - d) None of these
 - 7) **Meristems are of:**
 - a) Two types
 - b) Three types
 - c) Four types
 - d) Five types
 - 8) **Apical meristems are located at:**
 - a) Tips of leaves
 - b) Tips of flowers
 - c) Tips of roots and stems
 - d) Tips of roots only
 - 9) **Function of intercalary meristems is:**
 - a) Increase in length
 - b) Increase in diameter
 - c) Production of leaves and flowers
 - d) None of these
 - 10) **Lateral meristems are present in:**
 - a) All plants
 - b) Gymnosperms and dicots
 - c) Monocots
 - d) In aquatic plants only
 - 11) **Intercalary meristems are of:**
 - a) Permanent nature
 - b) Temporary nature
 - c) Some are permanent some temporary
 - d) None of these
 - 12) **Vegetative roots and shoots grow by:**
 - a) Determinate growth
 - b) Primary growth only
 - c) Indeterminate growth
 - d) None of these
 - 13) **In plants growth is of:**
 - a) Four types
 - b) Five types
 - c) One type
 - d) Two types
 - 14) **Secondary growth is actually:**
 - a) Extension of plant body
 - b) Increase in thickness
 - c) Production of leaves and flowers
 - d) None of these
 - 15) **Cambium are examples of:**
 - a) Apical meristems
 - b) Intercalary meristems
 - c) Lateral meristems
 - d) None of these
 - 16) **Growth of multicellular plants occur in:**
 - a) Two phases
 - b) Three phases
 - c) Five phases
 - d) Four phases

17) In multicellular plants cell division occur by:

- | | | | |
|-------------------|----------------|------------|------------|
| a) Binary fission | b) Conjugation | c) Meiosis | d) Mitosis |
|-------------------|----------------|------------|------------|

18) Cells elongate by:

- | | | | |
|------------|--------------------|---------------|---------------------------|
| a) Mitosis | b) Uptake of water | c) Stretching | d) Formation of cell wall |
|------------|--------------------|---------------|---------------------------|

19) Plasticity of cell wall increases during:

- | | | | |
|--------------------|--------------------|-------------------------|------------------|
| a) Cell maturation | b) Cell elongation | c) Cell differentiation | d) Cell division |
|--------------------|--------------------|-------------------------|------------------|

20) Cells of fibers and tracheids elongate during:

- a) Phase of cell division
- b) Phase of cell elongation
- c) Phase of cell maturation
- d) Phase of cell differentiation

21) During cell differentiation:

- a) Walls of cells become thick
- b) Walls of cells become pitted
- c) Both of these
- d) None of these

22) Which one is incorrect:

- a) Red light favors elongation of cells
- b) Blue light retards cell enlargement
- c) UV rays retards cell elongation
- d) UV rays retard cell division

23) Light duration plays a role in inducing or suppressing flowering, phenomenon is called:

- | | | | |
|-------------------|-------------------|-----------------|------------------|
| a) Photosynthesis | b) Photoperiodism | c) Phototropism | d) Photogenetics |
|-------------------|-------------------|-----------------|------------------|

24) Root primordial develop from:

- | | | | |
|---------------------|--------------------------|--------------|--------------|
| a) Apical meristems | b) Intercalary meristems | c) Pericycle | d) Epidermis |
|---------------------|--------------------------|--------------|--------------|

25) Growth of apical buds suppressing lower axillary buds is:

- | | | | |
|----------------------|---------------------------|---------------------|-----------------|
| a) Lateral dominance | b) Compensatory dominance | c) Apical dominance | d) Both a and b |
|----------------------|---------------------------|---------------------|-----------------|

26) Primary growth in plants is caused by:

- | | | | |
|--------------------|---------------------|-------------------------|-----------------|
| a) Apical meristem | b) Lateral meristem | c) Intercalary meristem | d) Rib meristem |
|--------------------|---------------------|-------------------------|-----------------|

27) Intercalary meristems are situated at:

- | | | | |
|--------------|---------------|----------------------|---------------------|
| a) Root Apex | b) Shoot Apex | c) Base of Internode | d) Top of internode |
|--------------|---------------|----------------------|---------------------|

28) During elongation the cell volume increases up to folds/times:

- | | | | |
|------------|-------------|-------------|-------------|
| a) 50 fold | b) 100 fold | c) 150 fold | d) 200 fold |
|------------|-------------|-------------|-------------|

29) Name the internal factor of growth in plants:

- | | | | |
|-------------------|-------------|----------|--------------|
| a) Carbon dioxide | b) Hormones | c) Water | d) Nutrition |
|-------------------|-------------|----------|--------------|

30) In plants elongation of cells is favored by light:

- | | | | |
|-------------|--------|---------|----------------|
| a) Infrared | b) Red | c) Blue | d) Ultraviolet |
|-------------|--------|---------|----------------|

31) The light that enhances cell division but retard cell enlargement:

- | | | | |
|---------------|--------------|----------------|-----------------|
| a) Blue light | b) Red light | c) Green light | d) Yellow light |
|---------------|--------------|----------------|-----------------|

32) Optimum temperature for growth of plants is:

- | | | | |
|------------|------------|------------|------------|
| a) 30-40°C | b) 25-30°C | c) 10-20°C | d) 20-40°C |
|------------|------------|------------|------------|

33) Cambium is formed in stage:

- | | | | |
|--------|--------|----------|-----------|
| a) One | b) Two | c) Three | d) Fourth |
|--------|--------|----------|-----------|

34) The removal of apex releases the lateral buds from the Apical Dominance, it is called:

- | | | | |
|----------------------|-----------------|------------------------|---------------------|
| a) Inhibitory effect | b) Reproduction | c) Compensatory effect | d) Apical dominance |
|----------------------|-----------------|------------------------|---------------------|

Animal portion

35) In chicks fertilization is:

- | | | | |
|-------------|-------------|-----------------|------------------|
| a) Internal | b) External | c) Both a and b | d) None of these |
|-------------|-------------|-----------------|------------------|

36) Incubation temperature for chick is:

- | | | | |
|------------|------------|------------|------------|
| a) 20-30°C | b) 40-45°C | c) 36-38°C | d) 25-35°C |
|------------|------------|------------|------------|

37) After providing 36-38°C temperature, chick's egg is hatched on:

- | | | | |
|--------------|--------------|--------------|--------------|
| a) 20th days | b) 25th days | c) 23rd days | d) 21st days |
|--------------|--------------|--------------|--------------|

38) Early development of chick is similar to:

- | | | | |
|---------|--------------|-------------|--------------|
| a) Fish | b) Amphibian | c) Reptiles | d) Mammalian |
|---------|--------------|-------------|--------------|

39) The shell of chick egg is secreted as egg passes through:

- | | | | |
|------------|-----------|----------|-------------------|
| a) Oviduct | b) Uterus | c) Ovary | d) Fallopian tube |
|------------|-----------|----------|-------------------|

40) The chick embryo completes its development in (Hatching period of chick is):

- | | | | |
|------------|------------|------------|------------|
| a) 26 days | b) 24 days | c) 21 days | d) 20 days |
|------------|------------|------------|------------|

41) Immediately after fertilization, the egg undergoes a series of mitotic divisions called:

- | | | | |
|-----------|-----------------|-------------|-------------|
| a) Morula | b) Gastrulation | c) Cleavage | d) Blastula |
|-----------|-----------------|-------------|-------------|

42) Cleavage results in the structural called:

- | | | | |
|-------------|---------------|-----------|--------------|
| a) Blastula | b) Blastoderm | c) Morula | d) Glastrula |
|-------------|---------------|-----------|--------------|

43) Which one is incorrect?

- a) Epiblast is presumptive ectoderm and mesoderm
- b) Hypoblast is presumptive endoderm
- c) Hypoblast is presumptive mesoderm
- d) Upper layer of cells in blastoderm is epiblast

44) Cleavage results in formation of a rounded closely packed mass of blastomeres called:

- a) Morula
- b) Blastula
- c) Gastrula
- d) Neurula

45) Blastomere are formed during:

- a) Cleavage
- b) Gastrulation
- c) Growth
- d) Fertilization

46) The hypoblast is mainly presumptive:

- a) Endoderm
- b) Mesoderm
- c) Ectoderm
- d) Blastoderm

47) Movement and rearrangement of the cells in the embryo is called:

- a) Cleavage
- b) Gastrulation
- c) Organogenesis
- d) Fertilization

48) In which development stage, germ layers are formed:

- a) Morula
- b) Blastulation
- c) Gastrulation
- d) Neurulation

49) Peripheral part of blastoderm making contact with yolk is called:

- a) Area pellucida
- b) Area opaca
- c) Blastocoel
- d) Area plana

50) Mechanism of development was explained by:

- a) Hans Dietrich
- b) Spemann
- c) Both a and b
- d) Haemmerling

51) Which statement is correct about gray crescent?

- a) A pigmented area that appears at time of fertilization
- b) A pigment free area that disappears at the time of fertilization
- c) A hyperpigmented area that is present in the embryo
- d) A pigment free area that appears at time of fertilization

52) Which statement is incorrect?

- a) Fertilized egg of an ascidian contains cytoplasm of four colors
- b) Yellow cytoplasm gives rise to gut
- c) Grey equatorial cytoplasm gives rise to notochord
- d) Grey vegetal cytoplasm gives rise to gut

53) Which statement is correct?

- a) Ectodermal cells have effect on mesodermal cells to induce differentiation
- b) Mesodermal cells stimulate ectodermal cells to form nervous system
- c) Endodermal cells stimulate ectodermal cells
- d) All are correct

54) During gastrulation, blastoderm splits into 2 layers, an upper layer of cells is called:

- a) Hypoblast
- b) Area pellucida
- c) Epiblast
- d) Area opaca

55) The mesodermal cells do not invaginate but migrate medially and caudally from both sides and create a midline thickening called:

- a) Henson's node
- b) Primitive streak
- c) Epiblast
- d) Hypoblast

56) At the cephalic end of primitive streak, closely packed cells from local thickening are known as:

- a) Primitive gut
- b) Primitive ridges
- c) Splanchnic mesoderm
- d) Hansen's node

57) The somites are formed and organized by:

- a) Endoderm
- b) Mesoderm
- c) Ectoderm
- d) Blastoderm

58) The cavity formed between somatic and splanchnic mesoderm is:

- a) Archenteron
- b) Henson's node
- c) Coelom
- d) Neurocoel

59) Neural plate is formed from.....:

- a) Ectoderm
- b) Mesoderm
- c) Endoderm
- d) Notochord

60) What is the feature of cells in gastrulation?

- a) Division
- b) Migration
- c) Differentiation
- d) All of these

61) Vertebral column is formed from:

- a) Ectoderm
- b) Endoderm
- c) Mesoderm
- d) None of these

62) Liver and pancreas arise from:

- a) Foregut
- b) Midgut
- c) Hindgut
- d) None of these

63) The pigment free area that appears at the time of fertilization is called:

- a) Embryo
- b) Yolk
- c) White cytoplasm
- d) Gray crescent

64) Clear cytoplasm of fertilized egg of an ascidian produces:

- a) Larval epidermis
- b) Muscle cells
- c) Gut
- d) Neural tube

65) Yellow cytoplasm of ascidians zygote gives rise to:

- a) Muscle cells
- b) Larval epidermis
- c) Neural tube
- d) Gut

66) Gray vegetal cytoplasm gives rise to:

- a) Gut
- b) Muscle cells
- c) Notochord
- d) Neural tube

67) Gray equatorial cytoplasm gives rise to:

- a) Notochord and neural tube
- b) Muscle cells and guts
- c) Skeleton and muscles
- d) Gut and neural tube

68) Acetabularia is a/an:

- Epiphyte
- Alga
- Fungus
- Angiosperm

69) During regeneration in Flatworms and Planaria, the unspecialized cells present are:

- Neoblast
- Osteoblasts
- Osteoclasts
- Chondrocytes

70) The unspecialized cells, neoblasts are always present in the body of:

- Salamander
- Planaria
- Lizard
- Newt

71) Study of aging is called:

- Teratology
- Gerontology
- Paleontology
- Cell biology

72) The negative physiological changes in our body are said to be:

- Maturation
- Childhood
- Aging
- Death

73) Branch of biology that deals with the study of abnormal development and their causes is called:

- Teratology
- Gerontology
- Paleontology
- Cell biology

74) Abnormality in which individuals have their upper lip folded/harelip is:

- Microcephaly
- Cleft palate
- Klinefelter's syndrome
- Brachydactyly

75) The condition in which an individual has a small head is termed as:

- Harelip
- Microcephaly
- Diabetes
- Epilepsy

76) The ability to regain or recover the lost or injured part of body is:

- Aging
- Regeneration
- Abnormal development
- Primary induction

77) Among invertebrates who possess great power of regeneration:

- Arthropods
- Molluscs
- Sponges
- Nematodes

78) Which statement is incorrect?

- Earthworm can regenerate its head
- Salamander can regenerate its limbs
- Lizard can regenerate its head
- Man can regenerate his skin

79) Growth is basically an increase in:

- Number of cells
- Size of cells
- Both a & b
- None of these

80) The German scientist Spemann worked on differentiation in:

- 1924
- 1929
- 1915
- 1940

81) Inducer substances are produced by:

- Notochord
- Somite
- Archenteron
- Coelom

82) Environmental factors causing abnormal development are grouped together as:

- Toxins
- Carcinogens
- Mutagens
- Teratology

83) Which of the following sex chromosomes abnormalities leads to tallness, aggressiveness and antisocial behavior?

- XYY
- XXY
- XO
- XXXY

84) Hemophilia is:

- Excessive bleeding due to defective gene on sex chromosome
- Due to extra sex chromosome
- Due to structural deviation during organogenesis
- Due to nutritional deficiencies

Answer key:

1	a	2	a	3	b	4	d	5	d	6	a	7	b	8	c	9	c	10	b
11	b	12	d	13	d	14	b	15	c	16	d	17	d	18	b	19	b	20	a
21	c	22	d	23	b	24	c	25	c	26	a	27	c	28	c	29	b	30	b
31	a	32	b	33	d	34	c	35	a	36	c	37	d	38	d	39	b	40	c
41	c	42	c	43	c	44	a	45	a	46	a	47	b	48	c	49	b	50	c
51	d	52	b	53	b	54	c	55	b	56	d	57	b	58	c	59	a	60	b
61	c	62	a	63	d	64	a	65	a	66	a	67	a	68	b	69	a	70	b
71	a	72	c	73	a	74	b	75	b	76	b	77	c	78	c	79	c	80	a
81	a	82	d	83	a	84	a												

Past MDCAT MCQ's

2009

1) At the cephalic end of primitive streak, closely packed cells form a local thickening known as:

- a) Henson's Node b) Primitive Ridge c) Gastrocoele d) Primitive Gut

2010

2) Grey equatorial cytoplasm produces:

- a) Muscle cells
b) Notochord and neural tube
c) Gut
d) Larval epidermis

Answer key:

1	a	2	b
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