BYJU'S Part Test for Board Term I
(CBSE Grade 12)

Date: 18/11/2021
Subject: Biology **Class:** Standard XII

ANSWER KEYS AND SOLUTIONS

BYJU'S Part Test for Board Term I (CBSE Grade 12)

Date: 18/11/2021

Subject: Biology

Topic : Section A

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1. A typical angiosperm anther has how many lobes?

   ✗ **A.** 1

   ✓ **B.** 2

   ✗ **C.** 3

   ✗ **D.** 4

   Typical angiosperm anther is bilobed with each lobe having two theca each. So, the angiosperm anther is dithecous. Hence, an anther has two lobes with four theca.

2. Emasculation is not required when flowers are

   ✗ **A.** bisexual

   ✗ **B.** intersexual

   ✓ **C.** unisexual

   ✗ **D.** hermaphroditic

   Emasculation is removal of anther from a bisexual or hermaphroditic flower to prevent self pollination. If the flower is unisexual, or has either one of the gametes, self pollination is not possible within the flower. Hence, emasculation is not required.

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3. Wind pollination is common in which of the following plants?

- ✗ **A.** *Oxalis*
- ✓ **B.** Corn
- ✗ **C.** *Viola*
- ✗ **D.** *Zostera*

Wind pollinated or anemophilous flowers have:
(1) Light, non-sticky pollen grains
(2) Well exposed stamen
(3) Large feathery stigma that easily traps pollen
(4) Single ovule in each ovary
(5) Inflorescence with numerous colourless and nectarless flowers
Eg- Corn, grasses. Corn flowers have tassles which help in trapping the pollen.

4. Which substance constitutes the outer hard layer of pollen grain?

- ✗ **A.** Exine
- ✗ **B.** Intine
- ✓ **C.** Sporopollenin
- ✗ **D.** Cellulose

Outer hard layer of pollen grain or the exine is made up of sporopollenin. It is the hardest organic substance known.
It can withstand high temperatures, strongly acidic and alkaline conditions. There is no known enzyme that can degrade it. So it is highly stable and tough.
Intine is a thin inner coat made of cellulose and pectin.

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5. How many meiotic divisions are required for formation of 100 functional megaspores?

- ✔ **A.** 100
- ✘ **B.** 50
- ✘ **C.** 25
- ✘ **D.** 75

Diploid megaspore mother cell undergoes meiosis and gives rise to four haploid megaspores. Three of the four megaspores degenerate and only one megaspore remains functional and develops into an haploid embryo sac or the female gametophyte. So, only 25 meiotic division is required for 100 megaspores. But, for 100 functional megaspores, 100 meiotic divisions are required.

6. In a hypothetical crossing, an angiospermic male plant has 2x chromosomes and the female plant has 4x chromosomes. Its endosperm will have _____ chromosomes.

- ✘ **A.** 4x
- ✔ **B.** 5x
- ✘ **C.** x
- ✘ **D.** 3x

Female plant $\rightarrow$ 4x
Central cell $\rightarrow$ 2x + 2x (Fusion of polar bodies)

Male plant $\rightarrow$ 2x
Male gamete $\rightarrow$ 1x (haploid)

Endosperm = Central cell + Male gametes
= 2x + 2x + 1x
= 5x
Hence, the endosperm will have 5x chromosomes.

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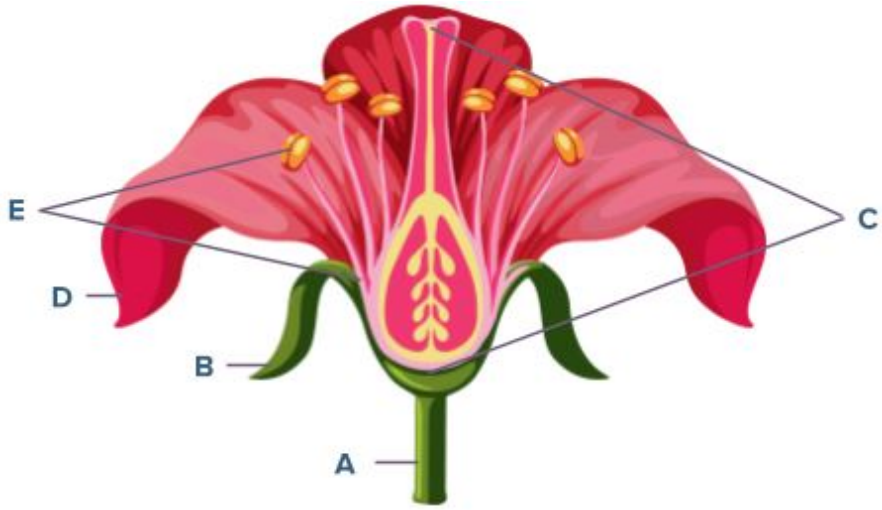
7. Which of the following parts of the flower are regarded as sterile and fertile?



✗ **A.**

Label	Sterile	Fertile
A	Thalamus	–
B	–	Corolla
C	–	Carpel
D	Calyx	–

✗ **B.**

Label	Sterile	Fertile
A	Receptacle	–
B	–	Corolla
D	Calyx	–
E	–	Stamen

✗ **C.**

Label	Sterile	Fertile
A	Pedicel	–
C	–	Carpel
D	Calyx	–
E	–	Stamen

✓ **D.**

Label	Sterile	Fertile
A	Pedicel	–
B	Calyx	–
C	–	Carpel
E	–	Stamen

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Angiosperm flowers bear both fertile parts which have the ability to reproduce and sterile parts which do not have the ability to reproduce. They are given below:

Label	Sterile	Fertile
A	Pedicel	–
B	Calyx	–
C	–	Carpel
D	Corolla	–
E	–	Stamen

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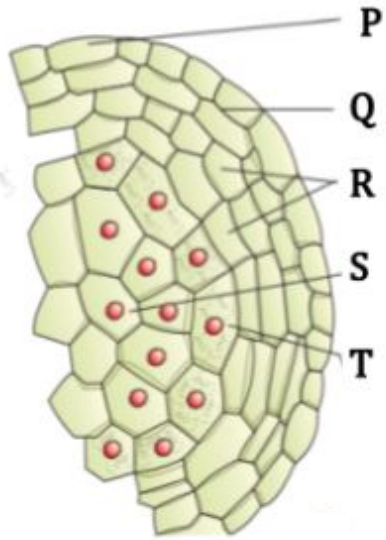
8. Match the labels with their correct description in the given diagram of microsporangium showing different layers of its wall.



✗ **A.**

Label	Name	Description
P	Epidermis	Outermost, protective
Q	Endothecium	Innermost wall layer
R	Microspore mother cells	Forms microsporess
S	Middle layers	Help in dehiscence of anther
T	Tapetum	Nourishes the developing pollen grains

✓ **B.**

Label	Name	Description
P	Epidermis	Outermost, protective
Q	Endothecium	Protective layer
R	Middle layers	Help in dehiscence of anther
S	Microspore mother cells	Forms microspore
T	Tapetum	Innermost layer of the wall

✗ **C.**

Label	Name	Description
P	Epidermis	Outermost, protective
Q	Tapetum	Nourishes the pollen grains
R	Middle layers	Help in dehiscence of anther
S	Microspore mother cells	Forms microspore
T	Endothecium	Innermost layer of the wall

✗ **D.** None of the above

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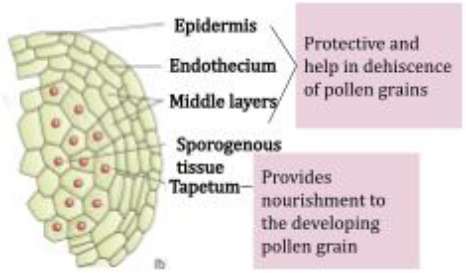
Microsporangia are sac-like structures present in angiosperm anthers. It has several wall layers as depicted in the diagram:



9. If zygote of an angiosperm has 15 pairs of chromosomes, what is the number of chromosomes in PEN?

- ✗ **A.** 15
- ✗ **B.** 30
- ✓ **C.** 45
- ✗ **D.** 60

Zygote is diploid and has 15 pairs of chromosomes. So, the gamete will have haploid number or 15 chromosomes.
PEN or Poly Endosperm Nucleus is triploid and contains 3 times the haploid or 45 chromosomes.

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10. The chromosome number in a root cell of a plant X is 30. What would be the chromosome number in the cell of (i) endothecium, (ii) primary sporogenous cells of microsporangium, (iii) microspore?

- ✗ **A.** i-30, ii-30, iii-30
- ✓ **B.** i-30, ii-30, iii-15
- ✗ **C.** i-30, ii-15, iii-15
- ✗ **D.** i-15, ii-15, iii-15

Root cells are diploid in nature. Microspores are haploid plant spores that mature into male gametophyte in angiosperms. Hence, they will have 15 chromosomes.
Primary sporogenous cells of the microsporangium contains diploid cells. These cells form the diploid microspore mother cells. Hence, these cells will have 30 chromosomes.
Endothecium is a layer present in microsporangium made up of diploid cells. They will have 30 chromosomes.

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11. Which of the following is the male gametophyte in angiosperms?

✗ A.

✗ B.

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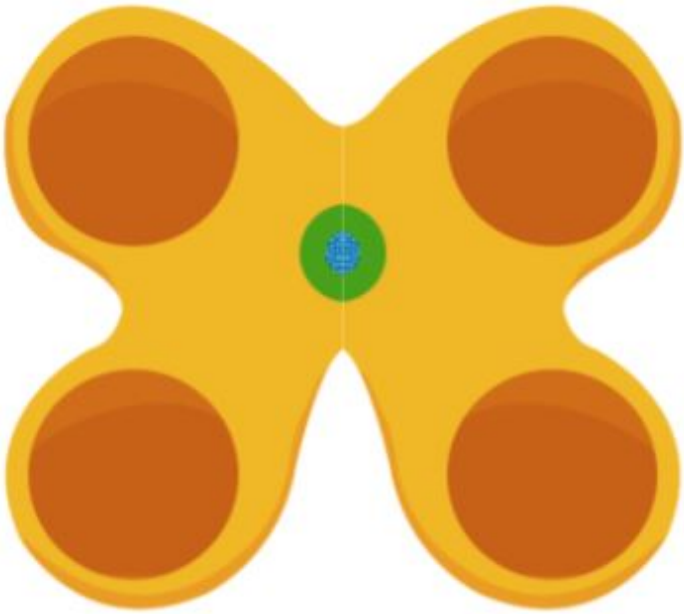
C.



D.

A male gametophyte is a gamete-producing haploid phase in a plant. In angiosperms, it is the pollen grains that are regarded as gametophytes.

Option (a) depicts a bisexual flower. In angiosperms, the flower is a sexual reproductive organ.

Option (b) depicts a bilobed anther.

Option (c) depicts the transverse section of the anther. It is the site of the production of microspore tetrad. The tetrad further develops into pollen grains.

Option (d) depicts the pollen grain.

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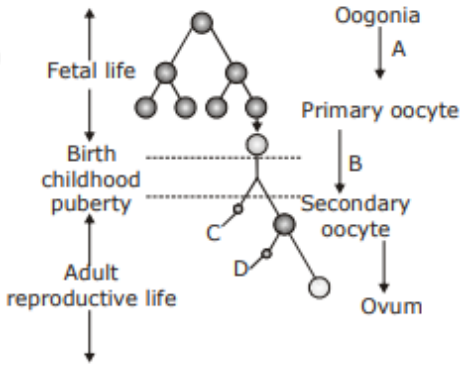
12. Androgen binding protein (ABP) is secreted by which cells?

- ✔ **A.** Sertoli cells
- ✘ **B.** Leydig cells
- ✘ **C.** Sperm
- ✘ **D.** Follicular cell

Androgen binding proteins (ABP) are glycoproteins produced by the sertoli cells in the seminiferous tubules. These proteins specifically bind to the testosterone and other androgens increasing its concentration inside the testes. This accumulation stimulates spermatogenesis.

13. Identify A, B, C and D in the schematic representation of oogenesis.



- ✘ **A.** A-Mitosis and differentiation, B-Meiosis I and II, C-Second polar body, D-First polar body
- ✘ **B.** A-Mitosis, B-Meiosis II, C-Ovum, D-First Polar Body
- ✔ **C.** A-Mitosis and differentiation, B-Meiosis I, C-First polar body, D-second polar body
- ✘ **D.** A-Meiosis I, B-Meiosis II, C- First polar body, D- Second polar body

Oogenesis (process of formation of mature female gamete) is initiated at embryonic stage to form oogonia. Oogonia undergoes mitosis and differentiation. These cells undergo prophase-I of meiosis-I and get arrested at this stage to form primary oocytes. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division. It is an unequal division resulting in the formation of a large haploid secondary oocyte and a tiny first polar body. Secondary oocyte completes meiosis to give ovum and secondary polar body.

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14. Extra embryonic membranes of embryo are derived from

- ✗ **A.** follicle cells
- ✗ **B.** inner cell mass
- ✗ **C.** formative cell
- ✓ **D.** trophoblast

Blastomeres in blastocyst are arranged into
1. an outer layer of cells called trophoblast
2. an inner group of cells attached to the trophoblast called the inner cell mass.
The trophoblast attaches to the endometrium and gives rise to the extra embryonic membranes of chorionic sac, amniotic sac, allantois and yolk sac.
The inner cell mass develops into an embryo.

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15. Study the image related to spermatogenesis and name the hormones involved at each stage of the following flow chart.

✗ **A.** 1 - GnRH, 2 - LH, 3 - FSH

✓ **B.** 1 - GnRH, 2 - LH, 3 - Testosterone

✗ **C.** 1 - LH, 2 - FSH, 3 - GnRH

✗ **D.** 1 - FSH, 2 - LH, 3 - GnRH

Spermatogenesis is the process of production of sperms and it is under the control of hormones.

Hypothalamus secretes gonadotropin releasing hormone or GnRH at the time of puberty in males.

GnRH stimulates the anterior pituitary to produce two gonadotropins, luteinising hormone (LH) and follicle stimulating hormone (FSH).

LH or luteinising hormone is also called interstitial cell-stimulating hormone (ICSH). It stimulates Leydig cells of testes to produce testosterone and other androgens.

Testosterone supports the process of spermatogenesis. Hence option b is correct.

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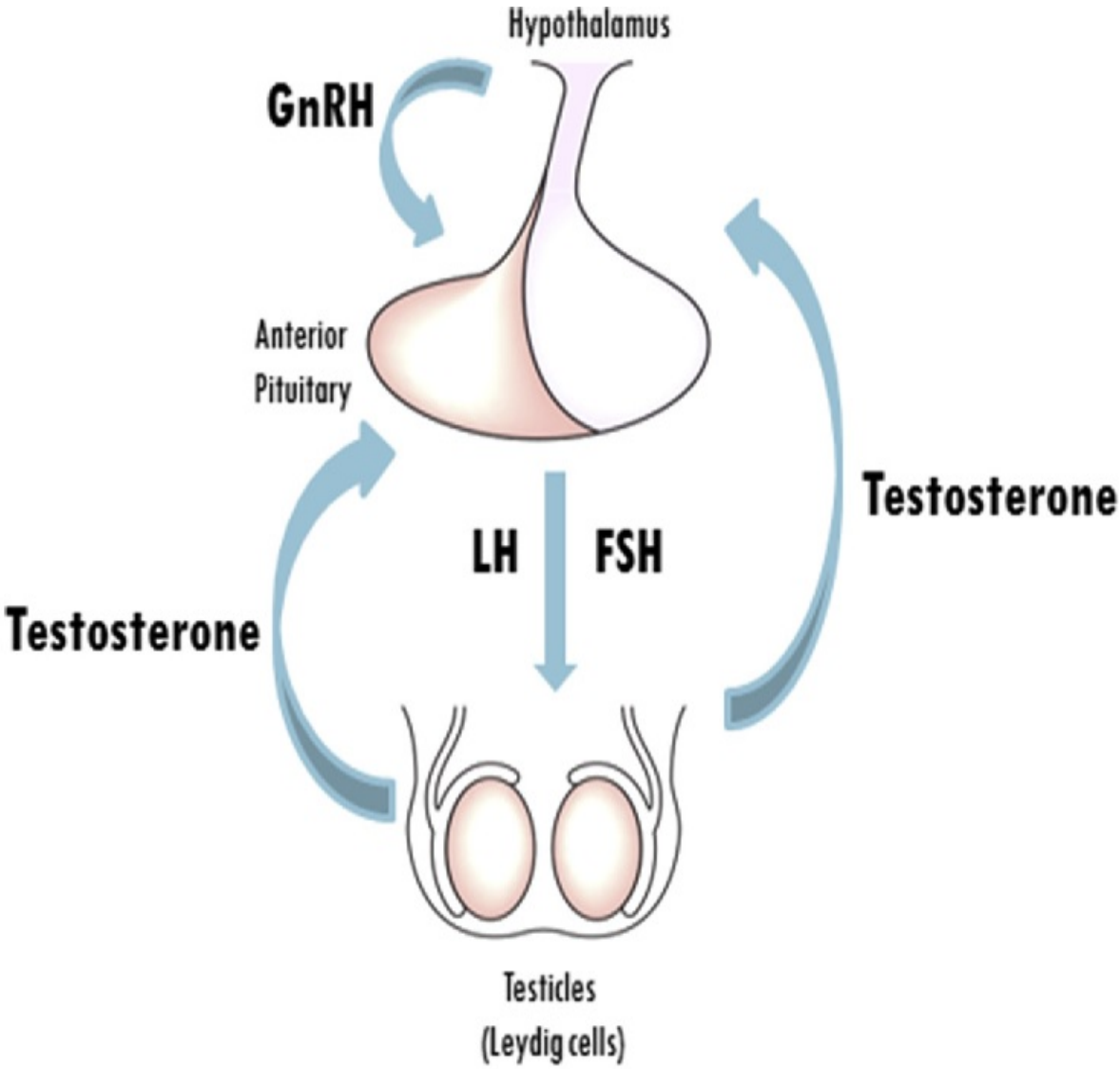

FSH or follicle stimulating hormone acts on Sertoli cells. Sertoli cells produce ABP and inhibin. ABP is an androgen binding protein which binds to testosterone and maintains high levels of androgens essential for spermatogenesis. Inhibin suppresses FSH synthesis.

FSH acts directly on spermatogonia to stimulate sperm production.

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16. Which hormone is responsible for neuroendocrine reflex of parturition?

- ✗ **A.** Progesterone
- ✗ **B.** Estrogen
- ✗ **C.** Relaxin
- ✓ **D.** Oxytocin

The neural signal for parturition is initiated by the fully developed fetus and placenta as mild uterine contraction called foetal ejection reflex. Foetal ejection reflex stimulates the pituitary to release oxytocin, which results in stronger contractions. Contractions result in more secretion of oxytocin and further contractions which together result in expulsion of the baby or parturition.

17. Which among the following is not a constituent of semen?

- ✗ **A.** Fructose
- ✗ **B.** Citric acid
- ✗ **C.** Sperm
- ✓ **D.** RBC

Semen under normal conditions contains fructose, citric acid, sperm, acid phosphatase, fibrinolysin and Ca^{+2}. RBC is not a normal constituent of semen.

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18. Within which month of pregnancy is the foetal heart developed?

- ✔ **A.** 1st
- ✘ **B.** 2nd
- ✘ **C.** 3rd
- ✘ **D.** 6th

The heart of the foetus develops after one month of pregnancy and the beats can be heard using stethoscope.
By the end of second month, limbs and digits develop.
By the end of third month or the first trimester, all the major organs are formed.
By fifth month, fetus starts to move around. Hair appears on head.
By the end of second trimester, body is covered by fine hair, eye lids separate and eye lashes are formed.
By the end of ninth months, the foetus is fully developed and ready to be delivered.

19. Secretions of which gland is rich in enzymes, Ca^{+2} and fructose?

- ✔ **A.** Male accesory glands
- ✘ **B.** Liver
- ✘ **C.** Pancreas
- ✘ **D.** Salivary gland

Combined secretions of the accesory glands constitute the seminal plasma. It is rich in fructose, calcium and some enzymes. It is required for the maturation and motility of the sperm.

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20. Which of the following does not occur during implantation?

- ✗ **A.** The embryo secretes enzymes that digest away part of the endometrium
- ✓ **B.** The embryo is drawn into the placenta and becomes surrounded by it
- ✗ **C.** The embryo forms finger-like projections that burrow into the uterine wall
- ✗ **D.** The embryo develops a hollow ball around it with a fluid-filled interior

Implantation is the process by which the embryo gets embedded in the folds of the endometrium. After implantation, finger-like projections appear on the trophoblast called chorionic villi which are surrounded by the uterine tissue and maternal blood. During this process the embryo gets surrounded by hollow ball. Placenta does not surround the embryo.

21. The signals for parturition originates from the fully developed foetus and followed by placenta causing the mild contractions called:

- ✓ **A.** Foetal ejection reflex
- ✗ **B.** Embryo ejection reflex
- ✗ **C.** Blastocoel ejaculation reflex
- ✗ **D.** Still birth

Parturition is an induced complex neuroendocrine mechanism. In this, signals originate from a fully developed foetus and placenta. This leads to mild uterine contractions called foetal ejection reflex. Then, oxytocin is released from maternal pituitary and it acts on uterine muscles leading to strong uterine contractions. This further continues to stronger and stronger contractions leading to child birth.

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22. Which of the following hormones' level is increased during pregnancy in the maternal blood?
(a) FSH
(b) Progestogen
(c) hCG
(d) hPL
(e) LH
(f) Estrogen

✗ **A.** a, b, e, f

✗ **B.** a, b, c, d, e

✗ **C.** c, d, a

✓ **D.** b, d, c, f

During pregnancy, the levels of hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc. are increased several folds in the maternal blood. Increased production of these hormones is essential for supporting fetal growth, metabolic changes in the mother and maintenance of pregnancy.

LH and FSH increase gradually during the follicular phase in menstrual cycle.

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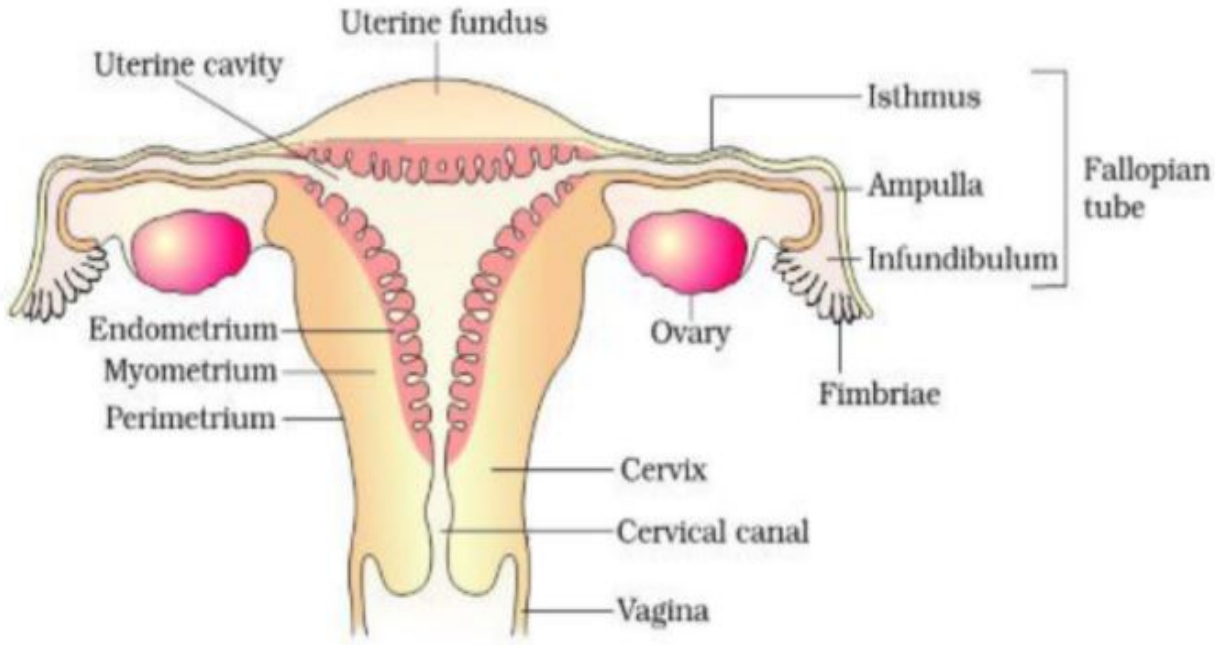
23. Which among the following are female genital organs?
(i) Vagina (ii) Penis (iii) Ovary (iv) Seminal vesicles (v) Uterus (vi) Cervix

- ✗ **A.** (i), (ii) and (v)
- ✗ **B.** (ii), (iii), (iv) and (v)
- ✓ **C.** (i), (iii), (v) and (vi)
- ✗ **D.** (iii), (iv), (v) and (vi)

The internal genital organs of the female include a pair of ovaries, a pair of fallopian tubes (oviducts), uterus, cervix and vagina.



Penis is the external genital organ in males.
The paired seminal vesicles are the accessory glands of the male reproductive system. The secretions of these glands contribute around 60% of the fluid that will eventually become semen.

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24. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from:

- **A.** Vagina to uterus
- **B.** Testes to epididymis
- **C.** Epididymis to vas deferens
- **D.** Ovary to the uterus

The key male reproductive organs include the testes, epididymis, urethra, vas deferens, prostate gland, seminal vesicle, and penis. The testes are composed of coiled structures called seminiferous tubules, which are the sites of sperm production. The structure on top of the seminiferous tubules in the testes is the epididymis. The function of vas deferens, also called ductus deferens, is to transport sperm from the epididymis to the ejaculatory ducts. The sperm migrates from of the seminiferous tubules to the epididymis. Within the epididymis, the sperm matures while they are stored in this structure. The path of transport of gametes is Seminiferous tubules → rete testis → vasa efferentia → epididymis. So, if vasa efferentia are blocked the gametes from testes will not enter epididymis.

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Date: 18/11/2021

Subject: Biology

Topic : Section B

Class: Standard XII

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1. Assertion: Tapetal cells usually possess dense cytoplasm and never more than one nucleus.
   Reason: Tapetal cells undergo mitosis which generally involves division of nucleus but cytokinesis does not happen.

   ✗ **A.** Both assertion and reason are correct and the reason is the correct explanation to the assertion

   ✗ **B.** Both assertion and reason are correct but the reason is an incorrect explanation to the assertion

   ✗ **C.** Only assertion is correct

   ✓ **D.** Only reason is correct

   Tapetum is the innermost layer of the anther wall. They provide nourishment to developing pollen grains. Its cells called tapetal cells contain dense cytoplasm generally along with more than one nucleus. Hence, the assertion is incorrect.

   This polynucleate condition arises since nuclear division is not followed by cytokinesis. Hence, the reason is correct.

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2. Assertion (A): The decision that the plant is going to flower is taken much before the actual flowering takes place.
Reason (R): Various hormonal and structural changes take place only after initiation of flowering.
Select the appropriate option:

✗ **A.** Both assertion and reason are correct statements and reason is the correct explanation of the assertion

✗ **B.** Both assertion and reason are correct statements and reason is an incorrect explanation of the assertion

✓ **C.** Only assertion is correct

✗ **D.** Both assertion and reason are incorrect

The decision that a plant is going to flower takes place much before the actual flowering takes place. Several hormonal and structural changes are initiated prior to the initiation of flowering.
Floral primordia grow into floral buds that are borne on inflorescence and flowering occurs.
Thus only assertion is correct whereas the reason is incorrect.

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3. Assertion: Government takes several measures to promote awareness about STDs.

Reason: Overcoming the social stigma and myths about STDs is a must to avoid consequences that can be dangerous to society.

- ✔ **A.** Assertion and reason are true and the reason is the correct explanation
- ✘ **B.** Assertion and reason are true but the reason is not the correct explanation
- ✘ **C.** Assertion is true but the reason is false
- ✘ **D.** Both the statements are false

The biggest myth about sexually transmitted diseases(STDs) is that it spreads only by sexual contact. These can spread by sharing syringes, needles, blades with an infected person.

It can also be transmitted from an infected mother to the fetus through the placenta.

The social stigma and myth about STDs refrain the infected persons from coming forward to get tested or seek appropriate help. This may lead to social isolation and depression. Moreover, if an infected individual does not get tested he/she may not be aware of it and may continue to spread it further.

The government has roped in celebrities to bring attention to the facts about STDs and help spread awareness thereby overcoming the stigma and myth about these helping the infected people to seek the appropriate help. Steps are also taken by the government to educate the public about the preventive methods of STDs.

Hence the reason is the correct explanation for the assertion.

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4. Assertion : When yellow bodied, white eyed Drosophila females were hybridised with brown-bodied, red eyed males; and F_1 progeny were intercrossed, F_2 ratio deviated from 9:3:3:1.
Reason : When two genes in a dihybrid are on the same chromosome, the proportion of parental gene combinations in the offsprings are much higher than the non-parental type.

✔ **A.** Both assertion and reason are true and reason is the correct explanation of the assertion

✘ **B.** Both assertion and reason are true but reason is not the correct explanation of the assertion

✘ **C.** Assertion is true but the reason is false

✘ **D.** Assertion and reason both are false

In Morgan's dihybrid cross in *Drosophila*, the genes for eye colour and body colour were found to be located on the same X chromosome.
When yellow bodied (y), white eyed (w) Drosophila females were hybridised with brown-bodied (y+), red eyed (w+) males; and F_1 progeny was intercrossed, the F_2 ratio deviated from 9:3:3:1. This is because the genes were situated on the same chromosome (X), on closer loci. The alleles did not get assorted independently. Hence, the proportion of offsprings with parental gene combinations was much higher than the non-parental types.

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5. One of the following did not constitute the seven contrasting pairs of characters studied by Mendel:

   ✗ **A.** Height of the plants

   ✓ **B.** Shape of the leaves

   ✗ **C.** Shape of a pod

   ✗ **D.** Colour of a pod

   Mendel selected *Pisum sativum* as the experimental plant for genetics. He chose seven characters of the pea plant. They are:

S.No.	Character	Dominant	Recessive
1.	Stem height	Tall	Dwarf
2.	Flower colour	Violet	White
3.	Flower position	Axial	Terminal
4.	Pod shape	Full	Constricted
5.	Pod colour	Green	Yellow
6.	Seed shape	Round	Wrinkled
7.	Seed colour	Yellow	Green

   Shape of the leaves was not studied by Mendel. So, the correct option is b.

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6. Which of the following is true for dominant and recessive relationship of allele is case of human blood groups?
(Here ' >' represents dominance over other and '=' represents co-dominance)

A. $I^A > I^B > I^O$

B. $I^A = I^B = I^O$

C. $I^A > I^B = I^0$

D. $I^A = I^B > I^O$

The gene for blood group is represented by letter I. It has 3 allelic forms - I^A, I^B, I^O.
It is a case of multiple alleles where a gene has more than two alternative alleles occupying the same locus on a chromosome or its homologue. I^A and I^B are co-dominant in nature. They express in both homozygous and heterozygous conditions. Whereas I^O express itself only in homozygous condition and so I^O is recessive in nature, i.e., I^A and I^B are dominant over I^O. Hence, the correction option is$I^A = I^B > I^O$.

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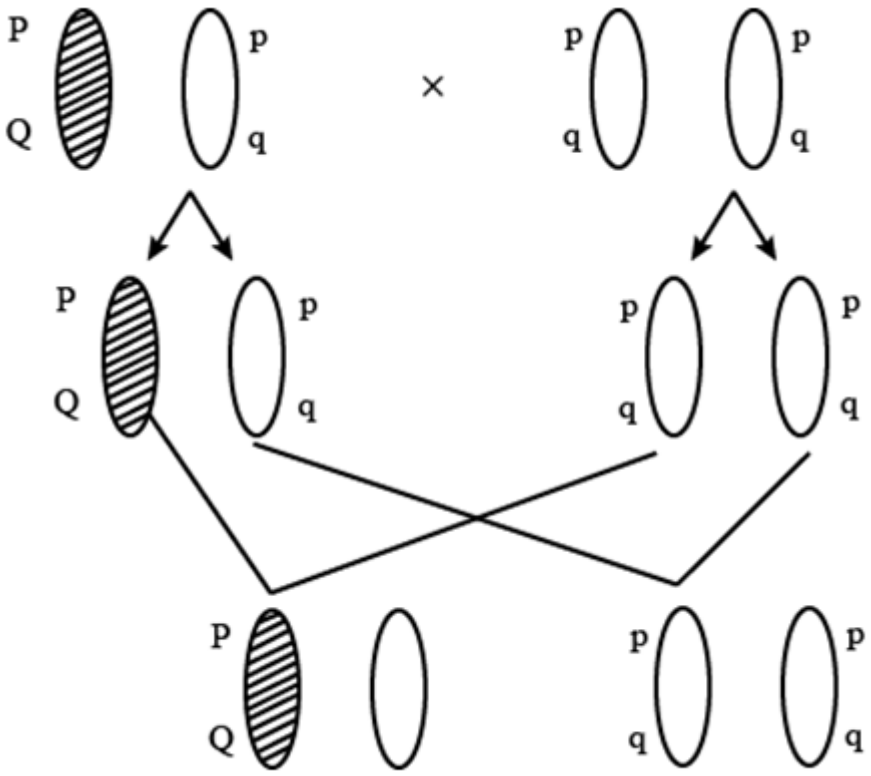
7. P and Q are linked genes. What shall be the genotype of progeny in cross between PQ/pq and pq/pq?

- ✗ **A.** PPqq and ppqq
- ✓ **B.** PpQq and ppqq
- ✗ **C.** PPQQ and ppqq
- ✗ **D.** None of the above

Explanation – Since P and Q genes are linked, there would not be crossing over on that chromosomes. So, the genotype of the progeny will be PpQq and ppqq.



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8. What is not correct with regard to Klinefelter’s syndrome?

- ✗ **A.** Testes are reduced
- ✗ **B.** Genitalia is like that of males
- ✓ **C.** Genetic constitution is like normal female
- ✗ **D.** Ovaries may be present in rudimentary state

Klinefelter's syndrome is a genetic disorder that affects males. Klinefelter's syndrome occurs when a boy is born with one or more extra X chromosomes. Most males have one Y and one X chromosome. Having extra X chromosomes can cause a male to have some physical traits unusual for males.

Many men who have Klinefelter's syndrome do not have obvious symptoms. Others have sparse body hair, enlarged breasts, and wide hips. In almost all men the testicles remain small. In some men the penis does not reach adult size. Their voices may not be as deep. They usually cannot father children. But they can have a normal sex life.

Some boys with Klinefelter's syndrome have language and learning problems.

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9. In case of seed colour in *Pisum sativum*, yellow colour is dominant over green colour. If the F_1 generation has 75% offspring producing yellow coloured seeds and 25% offspring producing green coloured seeds, then, which of the following statements is true about the genotype of the parents?

   ✗ **A.** Both the parents are homozygous

   ✓ **B.** Both the parents are heterozygous

   ✗ **C.** one of the parents is heterozygous and the other one is homozygous

   ✗ **D.** Difficult to predict

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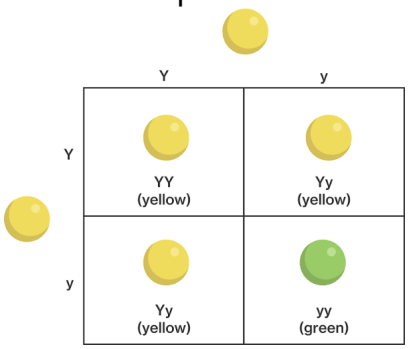
Let us assume that the allele responsible for imparting yellow colour to seeds is Y and the allele responsible for imparting green colour to seeds is y.

It is given in the question that 75% offspring produce yellow coloured seeds and 25% offspring produce green coloured seeds in the F_1 generation. Hence the ratio is 3 : 1 (yellow : green)

This ratio is possible when both the parents are heterozygous for seed colour.



Hence, genotype of both the parents is Yy.

In other words, both the parents are heterozygous.
If both the parents are homozygous (YY and yy), then all the offspring obtained will produce yellow coloured seeds.

If one of the parents is heterozygous (Yy) and the other parent is homozygous dominant (YY), then all the offspring obtained will produce yellow coloured seeds.

If one of the parents is heterozygous (Yy) and the other parent is homozygous recessive (yy), then the offspring producing yellow and green coloured seeds will be obtained in the ratio of 1 : 1.

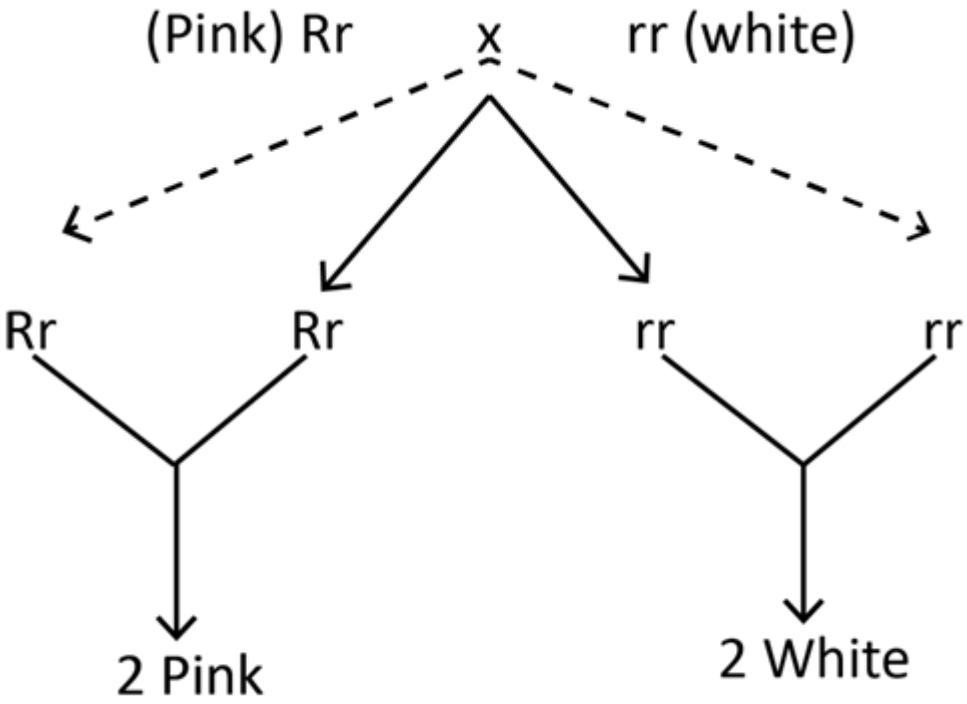
Hence, 75% offspring produce yellow coloured seeds and 25% offspring produce green coloured seeds in the F_1 generation when both the parents are heterozygous (Yy).

BYJU'S Part Test for Board Term I (CBSE Grade 12)

10. In a genetic cross involving *Antirrhinum majus*, a pink flowered plant was crossed with a white flowered one. Which among the following options are correct about the ratio of the progeny?

- ✗ **A.** 1 Red : 1 Pink : 1 White
- ✓ **B.** 2 Pink : 2 White
- ✗ **C.** 3 Pink : 1 White
- ✗ **D.** 4 White

Alleles coding for flower colour in *Antirrhinum majus* exhibit incomplete dominance. So,
RR $\rightarrow$ Red
Rr $\rightarrow$ Pink
rr $\rightarrow$ White



BYJU'S Part Test for Board Term I (CBSE Grade 12)

11. Which of these is not a Mendelian disorder?

- ✗ **A.** Cystic fibrosis
- ✗ **B.** Sickle-cell anaemia
- ✗ **C.** Colour blindness
- ✓ **D.** Turner's syndrome

Genetic disorders may be grouped into two categories – Mendelian disorders and chromosomal disorders.

- Mendelian disorders are mainly determined by alteration or mutation in the single gene. These disorders are transmitted to the offspring on the same lines as in the principle of inheritance. Examples - cystic fibrosis, sickle cell anaemia, colour blindness and haemophilia.
- Chromosomal disorders on the other hand are caused due to absence or excess or abnormal arrangement of one or more chromosomes. Example - Turner's syndrome is due to chromosomal abnormality. It is characterized by 44 autosomes and only one X-chromosome.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

12. A woman heterozygous for haemophilia marries a haemophilic man. What will be the ratios of carrier daughters, haemophilic daughters, normal sons and haemophilic sons in F_1 generation?

- **A.** 1: 2: 2:1
- **B.** 2: 1: 1: 2
- **C.** 1: 1: 1: 1
- **D.** 1: 2: 1: 2

As haemophilia is a sex-linked recessive disorder, it gets expressed when genes are altered on both the X chromosomes, allosomes (XX) in females. If out of the two X chromosomes, any one is altered and the other X chromosome is normal, then the females will not have haemophilia, but they could be the carriers and pass the disease to their offsprings.
While in males, as they have only one X chromosome in their allosomes (XY), alteration in that one X chromosome can cause the disease to get expressed.

Thus, the genotype of allosomes of a haemophilic man will be X^hY.
The genotype of allosomes of normal man will be XY.
The genotype of allosomes of a normal woman will be XX.
The genotype of allosomes of a carrier woman will be X^hX.
The genotype of allosomes of a haemophilic woman will be X^hX^h.

According to the question, a woman heterozygous for haemophilia will be a carrier with genotype X^hX. She marries a haemophilic man whose genotype will be X^hY .

Let's find out their F_1 progenies genotypes by Punnett square method.

X^hX X X^hY

Gametes	X^h	Y
X^h	X^hX^h(affected female)	X^hY(affected male)
X	X^hX(carrier female)	XY (normal male)

	Genotype	
Carrier daughter	X^hX	1
Haemophilic daughter	X^hX^h	1
Normal son	XY	1
Haemophilic son	X^hY	1

Hence, the ratio is 1:1:1:1.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

13. Phenylketonuria is an _____ disorder.

- **A.** autosomal recessive
- **B.** autosomal dominant
- **C.** X - linked recessive
- **D.** X - linked dominant

Phenylketonuria or PKU is a Mendelian autosomal recessive disorder which is also an inborn error of metabolism. Patients lack the enzyme phenylalanine hydroxylase which converts phenylalanine into tyrosine. This eventually results in mental retardation.

14. If gene for A and B blood group becomes incompletely dominant instead of co-dominant then how many blood groups are possible?

- **A.** 2
- **B.** 3
- **C.** 4
- **D.** 5

Explanation –
ii - O
$I^AI^A, I^Ai - A$
$I^BI^B, I^Bi - B$
I^AI^B - New blood group instead of AB blood group.
RBCs in this new blood group would have a hybrid antigen showing half properties of A antigen and half properties of B antigen instead of RBC of AB blood group which has complete A and B antigen individually.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

15. In mice, Y is the dominant allele for yellow fur and y is the recessive allele for grey fur. If Y is lethal when homozygous, then the result of cross Yy × Yy will be

- **A.** 3 Yellow: 1 Grey
- **B.** 2 Yellow: 1 Grey
- **C.** 1 Yellow: 1 Grey
- **D.** 1 Yellow: 2 Grey

Explanation – As homozygous Y is lethal, YY mouse cannot live.

↓ MICE 1/MICE 2 →	Y	y
Y	YY; Die(Homozygous dominant)	Yy; Yellow
y	Yy; Yellow	yy; Grey

BYJU'S Part Test for Board Term I (CBSE Grade 12)

16. An exception to Mendel's law of dominance was found in which of the following plants?

A. Sweet pea

B. Snapdragon

C. Garden pea

D. All of the above

Mendel performed hybridisation experiments on garden peas and came up with some postulates. He proposed that something was getting transmitted from the parent to offspring through the gametes. He called these things as factors. The 'factors' represent the genetic basis of inheritance.

Mendel's law of dominance states that: When parents with pure, contrasting traits are crossed together, one form of parental trait appears in the F_1 generation out of the two traits. The trait that appears in the F_1 hybrid is called the dominant trait. Hence the F_1 hybrid resembles either of the two parents.

When Mendel's experiments were repeated in different plants, it was found that sometimes the F_1 had a phenotype that did not resemble either of the two parents and was intermediate between the two.

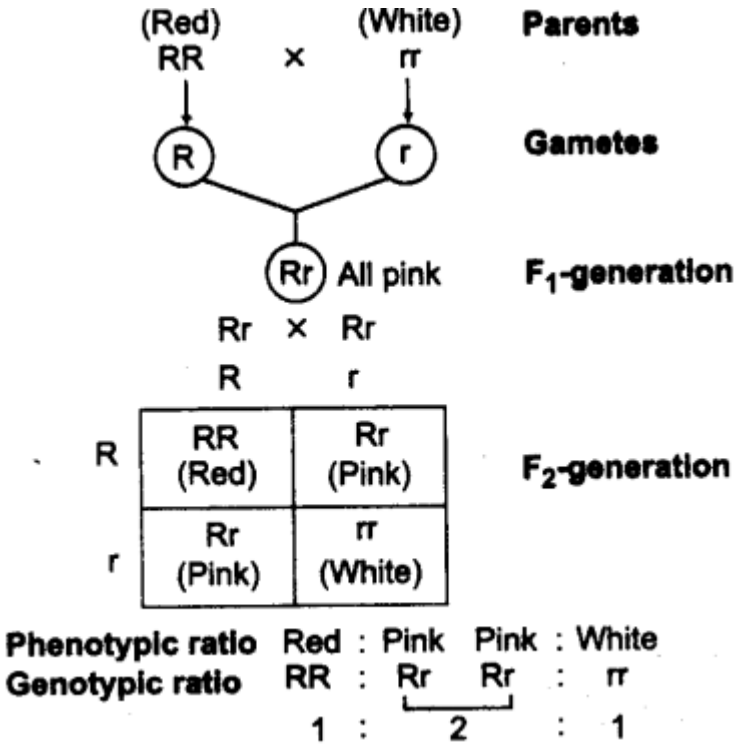
The inheritance of flower colour in the dog flower (snapdragon or *Antirrhinum* sp.) is a good example for this.

In a cross between true-breeding red-flowered (RR) and true-breeding white-flowered plants (rr), the F_1 offspring was pink-flowered (Rr). When the F_1 undergoes self-pollination, the F_2 generation has offspring in the following ratio.

1 (RR) Red: 2 (Rr) Pink: 1 (rr) White.

This phenomenon is known as incomplete dominance.

BYJU'S Part Test for Board Term I (CBSE Grade 12)



Hence, an exception to Mendel's law of dominance was found in snapdragon.

17. A daughter has B blood group and her mother has O blood group. Her mother is allegedly accusing that Mr. X is her father. But court found that Mr. X is innocent directly on basis of his blood group. What blood group Mr. X would have:

- **A.** A
- **B.** O
- **C.** B
- **D.** Either A or O

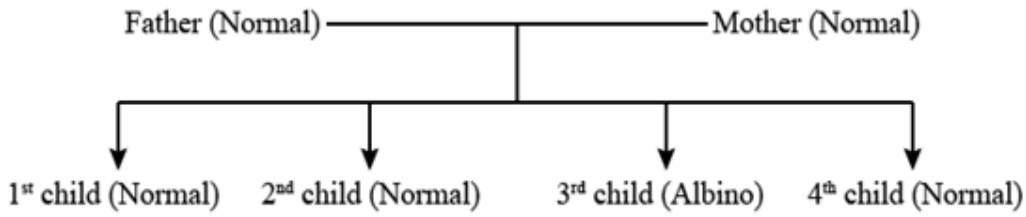
If both parents have blood group O (*ii*) then the daughter should also be having blood group O

If father has blood group $A(I^AI^A)$, *ii*) and mother has O (*ii*) then daughter can have either $A(I^Ai)$ or O (ii) blood group.

So, the father cannot be a person with the blood group O or A.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

18. Refer to the figure and give answer



If A = Normal allele and a = Albino allele then genotypes of father and mother are respectively

- **A.** Aa and Aa
- **B.** AA and Aa
- **C.** Aa and AA
- **D.** Aa and aa

Albinism is an autosomal recessive disease. Reproduction between Aa and Aa will result in 1 Homozygous normal (AA), 2 Heterozygous normal (Aa) and 1 Albino child (aa).

Male ↓ /Female →	A	a
A	AA; Homozygous Normal	Aa; Heterozygous Normal
a	Aa; Heterozygous Normal	Aa; Albino

BYJU'S Part Test for Board Term I (CBSE Grade 12)

19. A family has 5 daughters. Probability of 6th child being boy will be:

- ✓ **A.** 1 in 2
- ✗ **B.** 1 in 5
- ✗ **C.** 1 in 3
- ✗ **D.** 1 in 6

Chances of a baby to be either boy or girl is always 50% or 1 in 2 because there are 22 pairs of autosomes and one pair of sex chromosomes in human beings.

Female is homozygous while male is heterozygous and genetically responsible for sex of the child. Sperms are of two types, i.e., sperms having X-chromosome responsible for producing a girl and sperms having Y-chromosome responsible for producing a boy.

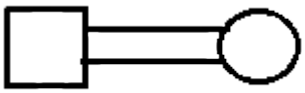
20. When one gene affects more than one phenotype, the phenomenon is called ___**(A)**___. When more than two genes affect one phenotype, the phenomenon is called __**(B)**__. Identify (A) and (B).

- ✗ **A.** (A) - polygenic inheritance, (B) - pleiotropism
- ✓ **B.** (A) - pleiotropism, (B) - polygenic inheritance
- ✗ **C.** (A) - multiple allelism, (B) - pleiotropism
- ✗ **D.** (A) - pleiotropism, (B) - multiple allelism

Pleiotropism refers to the effect of one gene on more than one character. So, (A) is pleiotropy.
Polygenic inheritance refers to the condition in which one character is controlled by multiple genes and each of them contributes some amount to the overall phenotype. In this case, the cumulative effect of these genes (polygenes) control the expression of the resultant phenotype. So, (B) matches with polygenic inheritance.
The phenomenon in which a gene has more than two alleles responsible for a phenotype is called multiple allelism. Those alleles are called multiple alleles. However, only two of them give the combination in a diploid individual.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

21. Which one is the incorrect match?

A. 

congsanguineous mating

B. 

female

C. 

unspecified sex

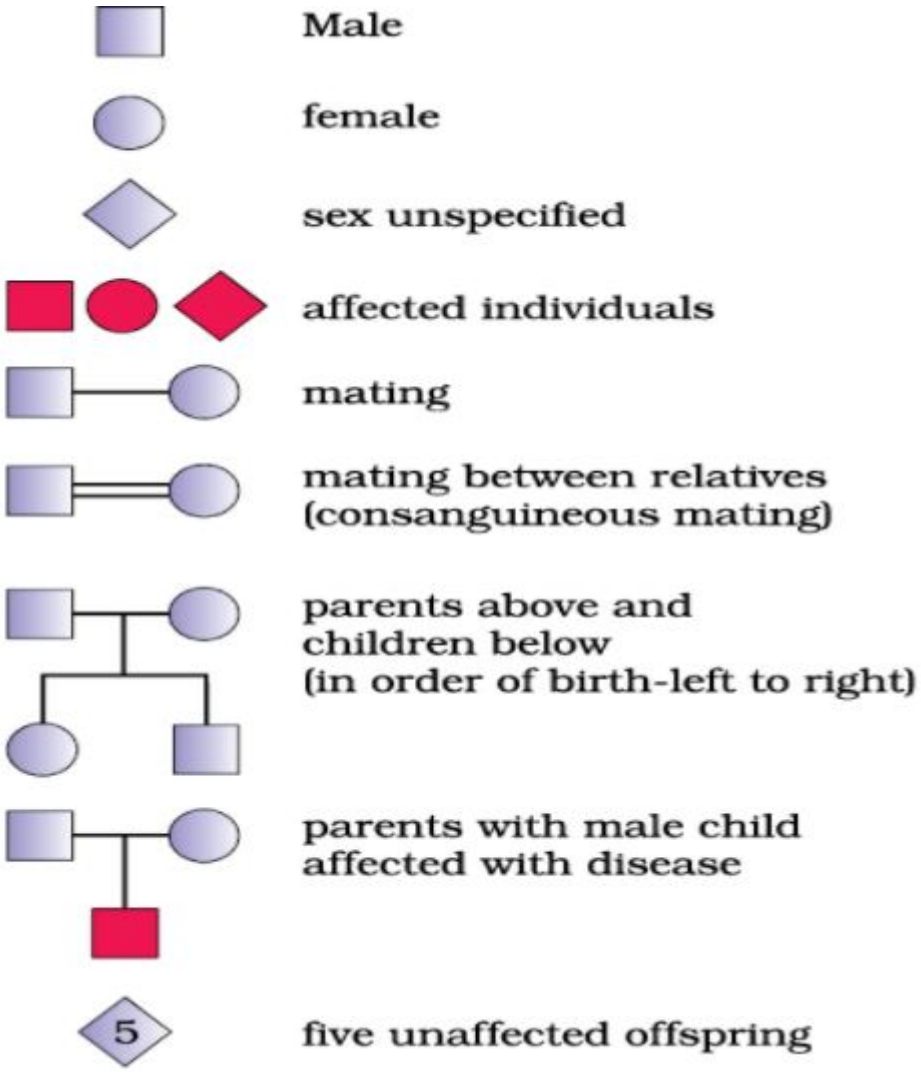
D.  unaffected individuals

Pedigree analysis is the study and analysis of the inheritance pattern of a particular trait in several generations of a family. It helps to understand the pattern of inheritance for a particular trait. It also helps in knowing the possibilities of prospective parents transmitting heritable disorders to their children. It is widely used in genetic counselling and medical research.

The diagramatical representation of the inheritance pattern of a particular trait in a family for several generations is known as the pedigree chart.

In a pedigree chart, a female is represented by a circle and not a box.
Consanguineous mating is marriage between two close relatives.
Sex unspecified means sex of the person is not mentioned.
Unaffected individuals are the ones who are not diseased. They are represented by symbols which are not filled with solid colours.
The following are some of the symbols used in pedigree analysis.

BYJU'S Part Test for Board Term I (CBSE Grade 12)



22. Mendel selected *Pisum sativum* for hybridisation experiments because of:

- ✔ **A.** Clear contrasting characters and short life span
- ✘ **B.** Long life span and non-fertile hybrids
- ✘ **C.** Presence of unisexual flowers
- ✘ **D.** Infertile hybrids and production of large number of seeds by each plant

Mendel selected *Pisum sativum* plant for hybridisation experiments due to following characters:
1. Clear contrasting characters that were easy to detect
2. Shorter life span produces faster results.
2. Bisexual flowers facilitate cross pollination with desired traits.
3. The hybrids are fertile and can produce large numbers of seeds.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

23. Mark the correct option:
i) An oral contraceptive for females developed by CDRI, Lucknow is _____.
ii) Family planning programmes were initiated in _____.
iii) There is statutory ban (regulated by law) on _____ in India for sex determination to check increasing female foeticides.

A. i-Saheli, ii-1941, iii-amniocentesis

B. i-Saheli, ii-1951, iii-amniocentesis

C. i-Mala-D, ii-1961, iii-amniocentesis

D. i-Mala-D, ii-1971, iii-amniocentesis

Saheli (also called Centchroman) is a non-steroidal contraceptive (prevents pregnancy) pill containing ormeloxifene which acts on estrogen receptors.

It was first developed by the Central Drug Research Institute (CDRI) in Lucknow, India.

India was one of the first countries to adopt reproductive health as a social goal. These programmes were termed ‘family planning’ programmes which kickstarted in 1951.

Amniocentesis is a medical procedure which is employed primarily in diagnosis of chromosomal abnormalities in foetus, foetal infections as well as for sex determination. There is statutory ban (regulated by law) on amniocentesis in India for sex determination to check increasing female foeticides (killing of female foetus). This procedure can only be used for checking up on health of developing foetus when necessary and not for sex determination.

Mala-D is a medicine used to prevent pregnancy. It does so by preventing the release of the egg and thereby its subsequent fertilisation by the sperm.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

24. Lactational amenorrhea is a natural method of birth control and is usually effective upto _____ after parturition.

- ✗ **A.** two months
- ✗ **B.** six years
- ✓ **C.** six months
- ✗ **D.** one year

Lactational amenorrhea is the absence of menstruation in the females. After parturition, the mother is in an intense lactation period during which ovulation and menstrual cycle does not occur.

This natural birth control method is effective upto a maximum period of six months after parturition. Moreover, this method has high chances of failure.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

Date: 18/11/2021

Subject: Biology

Topic : Section C

Class: Standard XII

1. GIFT is recommended for females with inability to

   ✔ **A.** produce ovum

   ✘ **B.** retain the foetus inside uterus

   ✘ **C.** provide suitable environment for fertilisation

   ✘ **D.** all of these

Gamete intra fallopian transfer (GIFT) is a technique in which ovum from a donor is transferred into the fallopian tube of the female who cannot produce ova.
It is carried out in females who cannot produce ova but can provide a suitable environment for fertilisation and development.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

2. Case: Purebred shorthorn cattle of white coat (WW) were crossed with purebred cattle of red coat (RR). The F_1 cattle had coats with patches of white and red side by side.
What is the phenomenon responsible for this feature?

- ✔ **A.** Co-dominance
- ✘ **B.** Multiple alleles
- ✘ **C.** Incomplete dominance
- ✘ **D.** Independent assortment

Co-dominance is a phenomenon in which both the alleles of a gene are dominant and are expressed independently in a heterozygous condition. As a result, traits associated with each allele are displayed simultaneously. The red and white coat colour in shorthorn cattle are controlled by co-dominant alleles and due to this, their hybrid (F_1 generation) is of roan coat colour (RW) i.e., patches of white and red.

Incomplete dominance is when a dominant allele does not completely mask the effects of a recessive allele, and the organism's resulting physical appearance shows a blending of both alleles. The case given above does not show a blending of both alleles, rather both are expressed equally.

Multiple alleles refer to the occurrence of more than two alleles for a particular gene. The given case does not mention the presence of more than two alleles for coat colour in shorthorn cattle populations. Hence, this is not a case of multiple alleles.

Independent assortment is applicable for the inheritance of two genes. Since the given example discusses inheritance of one gene only it is not applicable for independent assortment.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

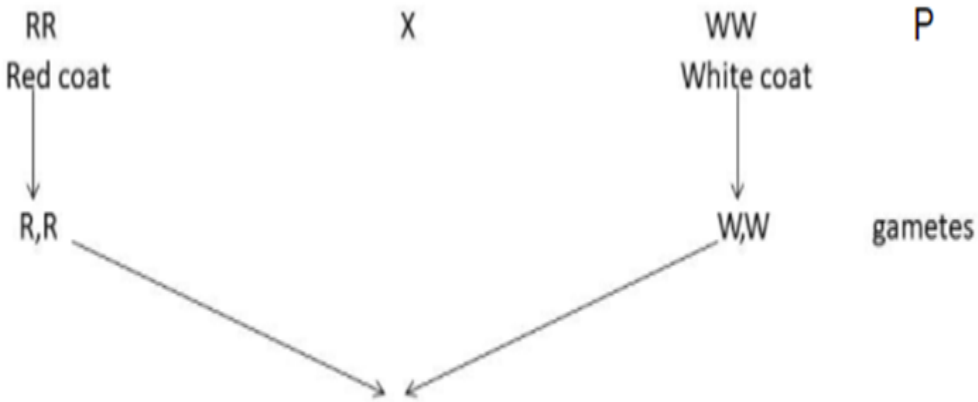
3. Case: Purebred shorthorn cattle of white coat (WW) were crossed with purebred cattle of red coat (RR). The F_1 cattle had coats with patches of white and red side by side.
What will be the phenotypic ratio of F_2 generation?

- **A.** 2 : 1 : 1
- **B.** 1 : 1 : 2
- **C.** 1 : 2 : 1
- **D.** 1 : 1 : 1

The F_2 generation is obtained by crossing the F_1 hybrids.

The F_2 generation will have 1 white, 2 roan and 1 red coat offspring. The cross is shown below.

BYJU'S Part Test for Board Term I (CBSE Grade 12)



RW ╳ RW
Roan coat

F_1

↓

	R	W
R	RR Red coat	RW Roan coat
W	RW Roan coat	WW White coat

F_2

F_2 phenotypic ratio 1: (red) : 2 (roan) : 1 (white)

F_2 genotypic ratio 1: (RR) : 2 (RW) : 1 (WW)

BYJU'S Part Test for Board Term I (CBSE Grade 12)

4. Case: Purebred shorthorn cattle of white coat (WW) were crossed with purebred cattle of red coat (RR). The F_1 cattle had coats with patches of white and red side by side.
What will be the genotypic ratis of F_2 generation?

A. 1 : 1 : 2

B. 1 : 2 : 1

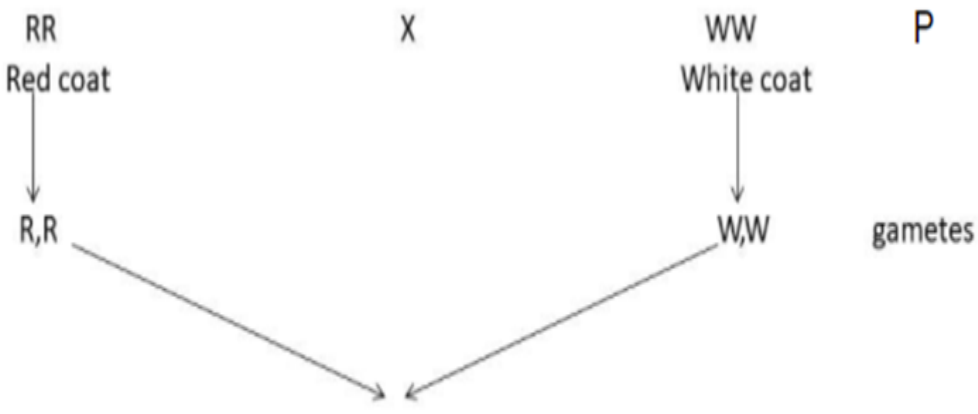
C. 2 : 1 : 1

D. 9 : 3 : 3 : 1

The F_2 generation is obtained by crossing the F_1 hybrids.

The F_2 generation will have 1 white, 2 roan and 1 red coat offsprings, with the genotypes WW (1), RW (2) and RR (1). Hence, the genotypic ratio is 1 : 2 : 1.

BYJU'S Part Test for Board Term I (CBSE Grade 12)



RW ╳ RW
Roan coat

F_1

	R	W
R	RR Red coat	RW Roan coat
W	RW Roan coat	WW White coat

F_2

F_2 phenotypic ratio 1: (red) : 2 (roan) : 1 (white)

F_2 genotypic ratio 1: (RR) : 2 (RW) : 1 (WW)

BYJU'S Part Test for Board Term I (CBSE Grade 12)

5. Case: Purebred shorthorn cattle of white coat (WW) were crossed with purebred cattle of red coat (RR). The F_1 cattle had coats with patches of white and red side by side.

   But in certain condition, if a shorthorn cattle of white coat (WW) was crossed with a cattle of red coat (RR) resulted in all pink coated cattles. Then, what are the chances of the appearance of red coat in a cross between pink coated and white coated cattles?

   ✗ **A.** 25%

   ✗ **B.** 50%

   ✗ **C.** 75%

   ✓ **D.** 0%

   If the red and white coated cattles produce pink colour on a cross then, they exhibit incomplete dominance in the inheritance of coat colour due to which they produce pink coloured coat upon hybridisation.

   If pure breeding red coated cattles are represented as ‘RR’ and pure breeding white coated as ‘WW’, then the pink coated cattles are ‘RW’.

   A cross between ‘RW’ and ‘WW’ would produce pink coated cattles (RW) and white coated catlles (WW) in the ratio of 1 : 1

   Hence, there are zero chances of getting a red coated cattle (RR).

   Parents: RW (Pink) X WW (White)
   Gametes: R W W

	R	W
W	RW (Pink)	WW (White)

BYJU'S Part Test for Board Term I (CBSE Grade 12)

6. Case: Purebred shorthorn cattle of white coat (WW) were crossed with purebred cattle of red coat (RR). The F_1 cattle had coats with patches of white and red side by side.
The same phenomenon is seen in:

✗ **A.** Height of pea plant

✗ **B.** Flower colour of snapdragon

✓ **C.** AB blood group of human

✗ **D.** All the above

Co-dominance is a phenomenon in which both the alleles of a gene are dominant and are expressed independently in a heterozygous condition. As a result, traits associated with each allele are displayed simultaneously. The red and white coat colour in shorthorn cattle are controlled by co-dominant alleles and due to this, their hybrid (F_1 generation) is of roan coat colour (RW) i.e., patches of white and red.
The same phenomenon is seen in AB blood group of human where both the alleles of A and B are co-dominance.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

7. Which of the following statements are true about HIV?

i) HIV can be transmitted through body fluids.
ii) HIV can be transmitted by sharing food with the infected person.
iii) HIV can be transmitted by infected needles.
iv) HIV can be transmitted by hugging an infected person.

✗ **A.** 1,2,3

✗ **B.** 1,4

✗ **C.** 2,4

✓ **D.** 1,3

HIV spreads by certain body fluids.
It can spread through
(a) Sexual contact with an infected person,
(b) By transfusion of contaminated blood and blood products,
(c) By sharing infected needles as in the case of intravenous drug abusers and
(d) Transplacental means i.e. from infected mother to her child through the placenta.
It is important to note that HIV/AIDS is not spread by mere touch or physical contact; it spreads only through certain body fluids.
Thus, hugging or sharing food will not lead to the transmission of the virus from an infected person to a healthy person.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

8. What is the purpose of contraceptive pills?

I. They inhibit ovulation and implantation.

II. They alter the quality of cervical to prevent or retard the entry of sperms.

III. They prevent the ejaculated semen from entering the female vagina.

IV. They inhibit spermatogenesis.

- ✗ **A.** I, II and IV
- ✗ **B.** I, II and III
- ✓ **C.** I and II
- ✗ **D.** I, II, III and IV

Oral administration of the small doses of either progestogens or progestogen oestrogen combinations is one of the contraceptive method used by the females. They are used in the form of tablets and hence, are popularly called the pills. They inhibit ovulation and implantation as well as alter the quality of cervical mucous to prevent or retard entry of sperms. Pills are very effective with lesser side effects and are well accepted by the females.
Contraceptive pills do not inhibit spermatogenesis nor they prevent the ejaculated semen from entering the female vagina.

9. Which period of a menstrual cycle is the fertile period?

- ✗ **A.** 5 - 10 days
- ✓ **B.** 10 - 17 days
- ✗ **C.** 25-28 days
- ✗ **D.** 1 - 5 days

Ovulation occurs at the 14th day of a menstrual cycle. Viability of an ovum is about 24 hours. Sperms can remain viable in the female reproductive tract for 2-3 days. So the period around 14th day of a menstrual cycle is considered as the fertile period as chances of fertilisation are higher.

BYJU'S Part Test for Board Term I (CBSE Grade 12)

10. According to the census of May 2011, the population of India was approximately:

- ✗ **A.** 10 billion
- ✓ **B.** 1.2 billion
- ✗ **C.** 1 million
- ✗ **D.** 1.2 million

Better living conditions and improved medical facilities have an explosive impact on the population growth.

The world population in 1900 was around 2 billion which rocketed to 6 billion by 2000.

The population growth followed the same trend in India too. India's population which was approximately 350 million at the time of independence has crossed the 1.2 billion mark according to the census of May 2011.

11. Tubectomy is to prevent:

- ✓ **A.** Fertilization
- ✗ **B.** Coitus
- ✗ **C.** Egg formation
- ✗ **D.** Embryonic development

Sterilization provides permanent and sure birth control. It is called vasectomy in men and tubectomy in women. It involves the removal of a short segment of vas deferens in the male and fallopian tubes in females, respectively and tying up of the remaining ends tightly with surgical thread. So, tubectomy is a surgical procedure for sterilization in which a woman's fallopian tubes are clamped and blocked, or severed and sealed, which blocks egg from sperm, thereby preventing fertilization.

12. In IVF technique, a fusion of ovum and sperm occurs in:

A. Uterus

B. Vagina

C. Fallopian tube

D. Laboratory under simulated conditions

IVF (in vitro fertilisation) refers to the fusion of an egg and a sperm outside the woman's body. In IVF technique, fusion of ovum and sperm takes place in the laboratory under simulated conditions. The fertilized ovum or egg is then allowed to grow for some time in a special culture medium, before being implanted in the womb of the woman who is to undergo the pregnancy.