BIOLOGY

BOOKS - CENGAGE BIOLOGY

MENDELIAN INHERITANCE

Mandatory Exercise

1. Heredity

Watch Video Solution

2. Define the term genetics.

3. Define variations.

4. Define allele.

5. Why did Mendel choose pea plants for his experiments?

Watch Video Solution

6. A true breeding plant is

Watch Video Solution

7. What happened when Mendel crossed a true breeding green seeded plant with a true

breeding yellow seeded plant?

View Text Solution

8. Write all the possible genotypes for each pea plant given below:

A plant with round seeds. _____

View Text Solution

9. Monohybrid Cross|Dihybrid Cross

Watch Video Solution

10. Differentiate between back cross and test cross.

Watch Video Solution

11. Differentiate between homozygous and heterozygous organisms.

Watch Video Solution

12. Mendel's law that states that the inheritance of one trait does not affect the inheritance of another is called the

law of segregation

View Text Solution

13. Mendel's law that states that the inheritance of one trait does not affect the inheritance of another is called the

law of independence

View Text Solution

14. What is Mendel's first law ?

View Text Solution

15. According to Mendel's second law, in the crossing between homozygous individuals concerning two pairs of nonlinked alleles, AABB x aabb, what are the genotypical and phenotypical proportions in F_1 and F_2 ?

View Text Solution

16. In a certain mammal, erect ears are dominant over drooping ears. In a cross between the two types, out of the four offspring produced in F_2 generation, three had erect ears and one had drooping ears. What were the genotypes of the parents? (you may represent the dominant gene as E)

View Text Solution

17. A red-eyed heterozygous female fruit fly. Drosophila melanogaster is crossed with a white eyed male. Work out the possible genotypes and phenotypes of the progeny. Comment on the pattern of inheritance of eye colour in fruit fly.

View Text Solution

18. Incomplete Dominance

Watch Video Solution

19. In the case of snapdragon (Antirrhinum majus) a plant with red flowers was crossed with another plant with white flowers. Trace the inheritance of flower colour up to the F_2 generation indicating the genotypes and phenotypes at each level. What special features do you notice in the genotypic and phenotypic ratio in F_1 generations?

View Text Solution

20. Man with AB blood group has married a woman with O group .Show the possible genotype and phenotypes of the progeny.

Watch Video Solution

21. A cross between a black cat (BB) and a Tan cat (TT) results in a tabby cat (BT).

The Punnett square below shows a cross between a tabby cat and a tan cat. What is the probability of offspring with black fur, tabby

fur and tan fur?

	T	T
B	BT	BT
T	TT	TT

View Text Solution

22. For human blood type, the alleles for type A and B are co-dominant, but both are dominant over the type o allele. The Rh factor is separate from the ABO blood group and is located on a separate chromosome. The Rht

allele is dominant to Rh. Indicate the possible phenotypes from the mating of a woman, type O, Rh^-, with a man, type A, Rh

View Text Solution

23. A red snapdragon is crossed with a pink snapdragon. Make a Punnett square of the cross. List the possible genotypes and phenotypes of the offspring.

View Text Solution

24. Why two rabbits with the same genes might not be coloured the same if one is raised in northern Himalayan region and the other is raised in southern part of India?

View Text Solution

25. In polygenic inheritance

Watch Video Solution

Consolidated Exercise Comprehension

1. The table below summarizes four traits in human. Use the information to answer the questions given below.

Trait	Dominant allele	Recessive allele
Ear lobes	Free (F)	Attached (f)
Chin	Cleft (C)	No cleft (d)
Thumb	Straight (S)	Hitchhiker's (s)

What is the phenotype of a person with a genotype of Cc ?

View Text Solution

2. The table below summarizes four traits in human. Use the information to answer the questions given below.

Trait	Dominant allele	Recessive allele
Ear lobes	Free (F)	Attached (f)
Chin	Cleft (C)	No cleft (d)
Thumb	Straight (S)	Hitchhiker's (s)

What are the possible genotypes of a person with a straight thumb?

View Text Solution

3. The table below summarizes four traits in human. Use the information to answer the questions given below.

Trait	Dominant allele	Recessive allele
Ear lobes	Free (F)	Attached (f)
Chin	Cleft (C)	No cleft (d)
Thumb	Straight (S)	Hitchhiker's (s)

A man with a genotype of FF marries a woman with a genotype of ff. What are the possible genotypes and phenotypes of their offspring?

View Text Solution

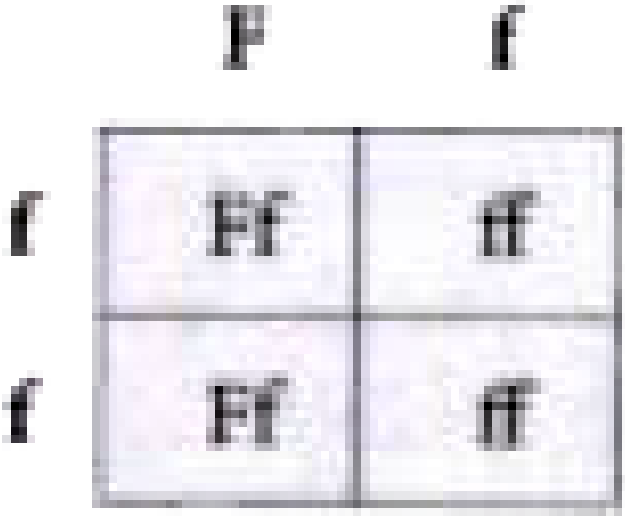
4. The table below summarizes four traits in human. Use the information to answer the questions given below.

Trait	Dominant allele	Recessive allele
Ear lobes	Free (F)	Attached (f)
Chin	Cleft (C)	No cleft (d)
Thumb	Straight (S)	Hitchhiker's (s)

A woman with a genotype of Cc marries a man with a genotype of Cc. What is the probability that their offspring will have a chin with no cleft?

View Text Solution

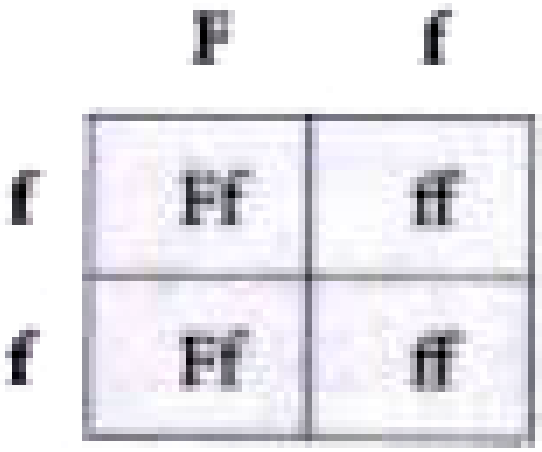
5. Use the Punnett square to answer the following questions:



What are the genotypes and phenotypes of the parents?

View Text Solution

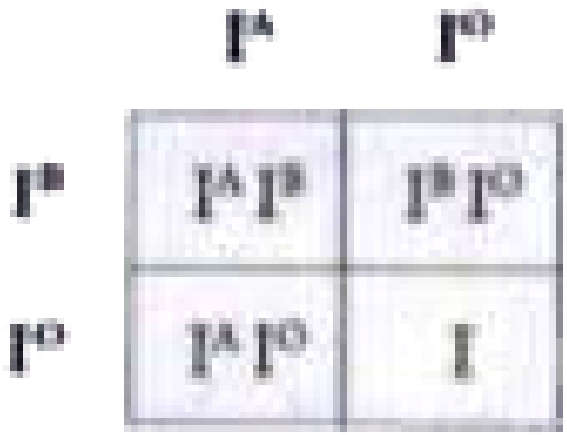
6. Use the Punnett square to answer the following questions:



What is the probability that their offspring will have free earlobes? Attached earlobes?

View Text Solution

7. Blood type is determined by three alleles, A, B and O. Use the punnett square below to answer the questions.



What are the genotypes and phenotypes of the parents?

View Text Solution

8. Match the following children with the best set of parents.

Column I (Mother and father)	Column II (Children)
(a) A blood, Rh^- mother and B blood, Rh^- father	(i) Child A: A blood, Rh^-
(b) AB blood, Rh^+ mother and AB blood Rh^+ father	(ii) Child B: O blood, Rh^-
(c) A blood, Rh^- mother and O blood, Rh^+ father	(iii) Child C: B blood, Rh^-
(d) O blood, Rh^+ mother and O blood, Rh^- father	(iv) Child D: AB blood, Rh^+

View Text Solution

9. Match the item under column I with one or more than one correct answer listed under

column II:

Column I	Column II
(a) tt	(i) Gene
(b) Tt	(ii) Allele
(c) Factor	(iii) Homozygous
(d) Punnett square	(iv) Heterozygous
(e) An alternative form of a gene	(v) Dominantallele
(f) F_1 generation	(vi) Diagram used by biologists to predict the outcome of a genetic cross.
	(vii) Recessive allele
	(viii) Hybrid
	(ix) The first offspring from a cross of two varieties in the parental generation

View Text Solution

Consolidated Exercise Multiple Choice Questions With One Or More Than One Correct Answer

1. In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F_2-generation of the cross RRYY $\times$ rryy ?

A. Round seeds with yellow cotyledon.

B. Wrinkled seeds with green cotyledon

C. Round seeds with green cotyledon.

D. Wrinkled seeds with yellow cotyledon

Answer: A::B::C::D

 Watch Video Solution

2. In a medico-legal case of accidental interchange between two babies in a hospital, the baby of the blood group A could not be rightly given to couple with

A. husband 'O group and wife of 'AB' group.

B. husband of "A group and wife of 'B' group

C. husband of 'B' group and wife of Ogroup

D. husband of 'O' group and wife of 'O' group.

Answer: A::C::D

View Text Solution

3. A dihybrid for qualitative trait is crossed with homozygous recessive individual of its type, the phenotypic ratio is:

A. $1:2:1$

B. $3:1$

C. $1:1:1:1$

D. $9:3:3:1$

Answer: C

Watch Video Solution

4. If a cross between two plants given 50% tall and 50% dwarf progeny, then the parents genotype are

A. $Tt \times Tt$

B. $Tt \times$

C. $\top \times Tt$

D. $\times$

Answer: B

View Text Solution

5. In case of incomplete deominance in F_2 generation

A. the genotypic ratio is 3 : 1

B. the phenotypic ratio is 3:1

C. there is no segregration in F_2 generation

D. the phenotypic ratio corresponds to genotypic ratio

Answer: D

Watch Video Solution

6. Select the statement/s that describes the charac teristics of genes.

A. Genes are specific sequence of bases in a DNA molecule.

B. A gene does not code for proteins.

C. In individuals of a given species, a specific gene is located on a particular chromosome.

D. Each chromosome has only one gene.

Answer: A::C::D

View Text Solution

7. Mendel conducted hybirdisation experiments on

A. Potato

B. Garden pea

C. Sweet pea

D. Wild pea

Answer: B

 Watch Video Solution

8. A cross between hybrid and its dominant parent is

A. Back cross

B. Dihybrid cross

C. Monohybrid cross

D. Reciprocal cross

Answer: A

Watch Video Solution

9. Multiple alleles control the inheritance of

A. Phenylketonuria

B. Blood group

C. Colour blindness

D. Sickle cell anaemia

Answer: B

Watch Video Solution

10. Father of genetic engineering is :

A. Mendel

B. Morgan

C. Darwin

D. Devries

Answer: A

Watch Video Solution

11. Father of modern botany is

A. Morgan

B. Mendel

C. Bateson

D. Darwin

Answer: C

 Watch Video Solution

12. Cross between hybrid and recessive parent is

A. Back cross

B. Test cross

C. Monohybrid cross

D. Dihybrid cross

Answer: B

Watch Video Solution

13. Monohybrid ratio is

A. $3:1$

B. $9:7$

C. $9:3:3:1$

D. $1:2$

Answer: A

Watch Video Solution

14. Genotypic ratio of a monohybrid cross is

A. $1:2:1$

B. $1:4:4$

C. $3:2:1$

D. $3:1$

Answer: A

Watch Video Solution

15. Phenotypic ratio of dihybrid test cross is:

A. $9:3:3:1$

B. $4:2:4$

C. $2:2:4$

D. $1:2:1$

Answer: A

Watch Video Solution

16. Mendel did not propose:

A. Dominance

B. Incomplete dominance

C. Segregation

D. Independent assortment

Answer: B

Watch Video Solution

17. The contrasting pairs of factors in Mendelian crosses are called

A. Multiple allele

B. Allelomorph

C. Genome

D. Pleomorphs

Answer: B

Watch Video Solution

18. Mendel chose contrasting traits in Pea

A. Three

B. Two

C. Seven

D. One

Answer: C

Watch Video Solution

19. Removal of anther from the floral bud is called

A. Heterosis

B. Emasculation

C. Breeding

D. Genetics

Answer: B

Watch Video Solution

20. Heredity || Traits and variations

A. Genetics

B. Cytology

C. Ornithology

D. Ophiology

Answer: A

Watch Video Solution

21. Mendel was born in

A. 1822

B. 1984

C. 1784

D. 1884

Answer: A

Watch Video Solution

22. G.J. Mendel died in

A. 1884

B. 1984

C. 1784

D. 1822

Answer: A

Watch Video Solution

23. Number of gamete produced from AABB is

A. 4

B. 1

C. 2

D. 0

Answer: B

View Text Solution

24. Multiple allelism is observed in:

A. Population

B. Individual

C. Both A and B

D. None of these

Answer: A

 Watch Video Solution

25. Genotypic ratio of dihybrid cross is:

A. $12:3:1$

B. $15:1$

C. $1:2:1$

D. $1:2:2:4:1:2:1:2:1$

Answer: D

Watch Video Solution

26. Gene term used by Mendel is

A. Phenotype

B. Factor

C. Trans segment

D. Allele

Answer: B

View Text Solution

27. How many different types of gametes can be formed by F_1 progeny resulting from the following cross?

AABBCC $\times$ aabbcc

A. 3

B. 8

C. 27

D. 64

Answer: B

Watch Video Solution

Watch Video Solution

28. The ability of a gene to have multiple phenotypic effects is known as

A. Pleiotropy

B. Co-dominance

C. Multiple allele

D. None of the above

Answer: A

Watch Video Solution

29. The term gene for Mendellan factor was coined by

A. Sutton

B. Morgan

C. Bateson

D. Johansen

Answer: D

 Watch Video Solution

30. Transmission of genetic characters from parents to offspring is

A. Variation

B. Heredity

C. Blending

D. Somatoplasm

Answer: B

Watch Video Solution

31. When dominant and recessive alleles express themselves together, it is called

A. Co-dominance

B. Dominance

C. Allele

D. Pseudo-Dominanc

Answer: A

Watch Video Solution

32. Genes controlling seven traits in Pea studied by Mendel were actually located on

A. 4 chromosomes

B. 7 chromosomes

C. 5 chromosomes

D. 6 chromosomes

Answer: A

Watch Video Solution

33. Two crosses between the same pair of genotypes or phenotypes in which the source of the gametes are reversed in one cross, is known as–

A. Test cross

B. Reciprocal cross

C. Dihybrid cross

D. Out cross

Answer: B

 Watch Video Solution

34. If a character is controlled by six alleles of a gene, then the possible genotypes would be

A. 21

B. 729

C. 64

D. 42

Answer: A

 Watch Video Solution

35. Which one of the following cross would have ratio

A. T+RRx ttrr

B. TTRR x ttrr

C. Trans segment

D. TrRR xTT

Answer: C

View Text Solution

36. Presence of intermediate character during stage is called

A. Co-dominance

B. Pleiotropy

C. Incomplete dominance

D. Pseudo-dominance

Answer: C

View Text Solution

37. In sickle cell anaemia, Glutamic acid is replaced by

A. Glycine

B. Valine

C. Tryptophan

D. Alanine

Answer: B

View Text Solution

38. The phenotypic ratio of incomplete dominance is ..... .

A. Same

B. Different

C. Not possible

D. Both A and B

Answer: A

Watch Video Solution

39. ABO blood group were discovered by :

A. Mendel

B. Bateson

C. Landsteiner

D. De Vries

Answer: C

Watch Video Solution

40. A person with blood group AB has which of the antigens in RBCs.

A. A

B. B

C. A and B

D. O

Answer: C

 Watch Video Solution

41. Possible blood groups of children born to parents having A and AB groups are

A. O,A

B. A,B, AB

C. O,A,B

D. O,A,B,AB

Answer: B

Watch Video Solution

42. Mendel's law of independent assortment is applicable for

A. Monohybrid

B. Dihybrid

C. Both A and B

D. None of these

Answer: B

Watch Video Solution

43. Variations occur mostly due to:

A. Monohybrid

B. Crossing over

C. UV-rays

D. Sunlight

Answer: B

 Watch Video Solution

44. Gregor Johann Mendel, the father of gentics was

A. Austrian Monk

B. British Monk

C. Italian Monk

D. German Scientist

Answer: A

Watch Video Solution

Olympiad And Ntse Level Exercises

1. In garden pea, yellow colour of cotyledon (Y) is dominant over green colour (y) and round seed shape (R) is dominant over wrinkle (r). A heterozygous yellow round seeded plants for both the traits is self-pollinated, then the ratio of yellow wrinkle would be

A. $9/16$

B. $1/4$

C. $3/16$

D. $1/16$

Answer: C

View Text Solution

2. Two pea plants, one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds, when crossed produce F1 progeny that have round yellow (RrYy) seeds. When F1 plants are selfed, the F2 progeny will have new combination of characters. Choose the new

combination from the following which is not present in the parents and grandparents.

A. Round, wrinkled

B. Round, green

C. Wrinkled, yellow

D. Wrinkled, green

Answer: D

View Text Solution

3. In 4-o'clock plants, the crossing of red- and white flowered pure parental stocks produced pinkflowered plants. This type of genotypic expression is called

A. dominance

B. co-dominance

C. incomplete dominance

D. gene polymorphism

Answer: C

View Text Solution

View Text Solution

4. In rabbits, black (B) coat colour is dominant over white (b) coat colour. Which Punnett it square correctly represents a cross between a rabbit heterozygous for coat colour and a white rabbit?

A.

	B	b
B	BB	Bb
b	Bb	bb

B.

	B	B
b	Bb	Bb
b	Bb	Bb

C.

	B	b
b	Bb	bb
b	Bb	bb

D.

	B	b
b	Bb	Bb
b	Bb	bb

Answer: C

View Text Solution

5. Which of the following is a deviation from Mendelian principle?

A. inheritance of AB blood groups in man

B. inheritance of flower colour in Mirabilis jalapa

C. inheritance of cotyledon colour in Pisum sativum

D. inheritance of AB blood group in man and flower colour in Mirabilis jalapa

Answer: D

View Text Solution

6. Which of the following statement is correct?

A. Blood antigens are found in the cell membrane of RBCs and antibodies in plasma.

B. Blood antibodies are found in the cell membrane of RBCs and antigens in plasma.

C. Both blood antibodies and antigens are found in the cell membrane of RBCs.

D. Both blood antibodies and antigens are found in plasma.

Answer: A

View Text Solution

7. In which of the following plants were mutations discovered by Hugo De Vries?

A. Mirabilis jalapa

B. Oenothera lamarckiana

C. Melandrium album

D. Morus alba

Answer: B

View Text Solution

8. In a cross of a round hybrid pea with a true breeding round parent (Rr x RR), what genotypic proportions would be observed in the offspring?

A. Half heterozygous, half homozygous dominant.

B. Half round, half wrinkled

C. All are heterozygous

D. All are homozygous

Answer: A

View Text Solution

9. If a person has 0-ve group of blood, which type of antibodies will be present in his serum?

A. anti-A, B and D antibodies

B. anti-A and B antibodies

C. anti-D antibodies

D. no antibodies

Answer: B

View Text Solution

Challenging Exercise

1. Dr Navya is a geneticist who studies fruit-flies. She crossed long winged fruit flies with a

short winged fruit flies. She found that 776 fruit flies had long wings and 266 had short wings.

What was the ratio of long winged fruit flies to short winged fruit flies?

View Text Solution

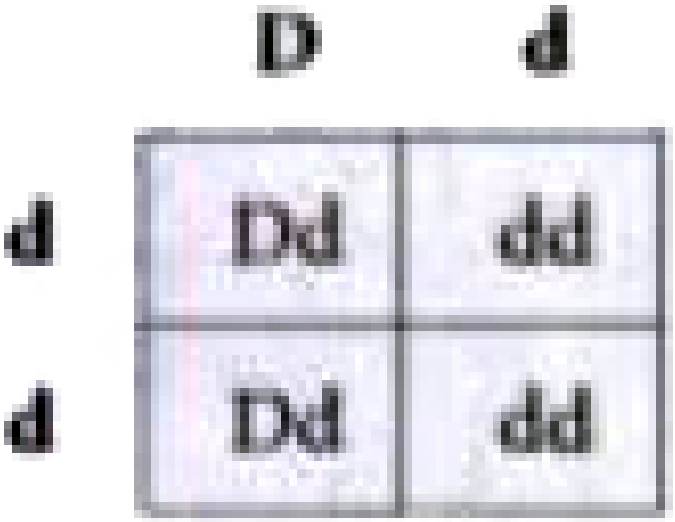
2. Dr Navya is a geneticist who studies fruit-flies. She crossed long winged fruit flies with a short winged fruit flies. She found that 776 fruit flies had long wings and 266 had short

wings.

Which is the dominant allele - long or short wings?

View Text Solution

3. Dark fur (D) is dominant to light fur (d) in dogs. Use the Punnett square of the test cross shown below to answer these questions:



What are the genotypes and phenotypes of the parent?

View Text Solution

4. Dark fur (D) is dominant to light fur (d) in dogs. Use the Punnett square of the test cross

shown below to answer these questions:

What is the most likely ratio of dark fur to light fur dogs in the offspring?

View Text Solution

5. Dark fur (D) is dominant to light fur (d) in dogs. Use the Punnett square of the test cross shown below to answer these questions:

What is the probability that the offspring will have dark fur? Light fur?

View Text Solution

6. Dark fur (D) is dominant to light fur (d) in dogs. Use the Punnett square of the test cross shown below to answer these questions:

Explain why this cross could never produce a DD offspring.

View Text Solution

7. A man with type 'O' blood marries a woman with type AB blood. Among their children, what proportion would you expect to have

blood types like one or the other of these parents? What proportion you would expect to have blood types different from both parents? Explain.

View Text Solution

8. Why was Mendel's understanding of mathematics and science important for this research?

View Text Solution

9. Radishes may be long, oval or round: long is dominant, round is recessive and oval a mixture of the two. If a farmer has all oval plants in his garden, what will be the phenotypes of the F_1 generation?

View Text Solution

10. Persons with sickle-cell anemia have a problem with the blockage of capillaries due to a mutation in the haemoglobin gene. This usually causes death before reproductive age.

This trait is produced by the homozygous recessive. The heterozygous condition of this trait produces people of generally good health, but some sickle shaped cells. These people are called carriers. Two heterozygous individuals are planning a family and have asked you to tell them their chances of having a sickle-cell child. What would you tell them?

View Text Solution

11. Some dogs bark when trailing, others are silent. The barking trait is due to a dominant allele. Erect ears are dominant to dropping ears. What kind of pups would you expect from a heterozygous, erect-eared barker mated to a droop-eared silent trailer?

View Text Solution

12. Why cannot you always identify the genotype of an organism from its phenotype?

View Text Solution