BIOLOGY

Worksheet-16

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-16

(Genetics)

Q.1 Humans have X – linked recessive traits like:

A) Hemophilia

B) Vitamin D – resistant rickets

C) Hypophosphatemic rickets

D) SRY gene

Q.2 Many X – linked traits in man are also found X – linked in other mammals like:

A) Mouse and rabbit

B) Dog and Sheep

C) Donkey and horse

D) Mouse, rabbit, dog, sheep, donkey, cattle, kangaroo and chimpanzee all

Q.3 Gene is a basic unit of:

A) Inheritance C) Excretion

B) Coordination D) Respiration

Q.4 Genes are actually parts of _____ comprising its base sequence:

A) Chromosome C) RNA

B) DNA D) Chromatid

Q.5 _____ are responsible for producing startling inherited resemblances as well as distinctive variations among generations.

A) Chromosomes C) Genomes

B) Genes D) Nucleic acids

Q.6 When genes pass in the form of intact parental combination between generations:

A) Inherited similarities are conserved

B) Non-inherited similarities are conserved

C) Variations energy

D) Non-inherited variations emerge

Q.7 When genes shuffle, mutate or juggle with each other:

A) Genetic continuity is conserved

B) Inherited variations are conserved

C) Variations occur

D) Inherited similarities are conserved

Q.8 Genes form _____ on _____ of homologous chromosomes.

A) Pairs, Pairs C) Tetrads, pairs

B) Pairs, tetrads D) Tetrads, tetrads

Q.9 When an effect caused by a gene or gene pair at one locus interferes with or hides the effect caused by another gene or gene pair at another locus, such phenomenon of gene interaction is called:

A) Epistasis C) Over dominance

B) Pleiotropy D) Co dominance

Q.10 ABO locus is on chromosome number:

A) 19 C) 11

B) 9 D) 21

Q.11 The epistatic gene H changes a precursor substance into substance:

A) H C) A

B) D D) B

Q.12 Substance H produces an enzyme that inserts sugar into a precursor _____ on the surface of RBC:

A) Lipoprotein C) Glycoprotein

B) Nucleoprotein D) Glycolipids

Q.13 Insertion of antigen A and B on the surface of RBC depends upon the product of gene:

A) H C) I^B

B) I^A D) I^A or I^B

Q.14 A person with Bombay phenotype lacks:

A) Antigen A and B in blood

B) Antigen A and B in body

C) Antigen A and B on RBC

D) Antigen A and B in lymph

Q.15 Pick up the one which illustrate Bombay phenotype:

A) I^AI^A, HH C) I^AI^B, hh

B) I^AI^B, Hh D) ii, HH

Q.16 A phenomenon of gene interaction in which a gene interferes in the effect of another gene is called:

A) Pleiotropy C) Over dominance

B) Epistasis D) Co dominance

Q.17 Epistasis is an interaction between:

A) Different alleles of the same gene

B) Different genes occupying different loci

C) Same gene of the different loci

D) Different genes occupying same locus

Q.18 Bombay phenotype is an example of:

A) Dominance C) Epistasis

B) Pleiotropy D) Gene linkage

Q.19 The cells of _____ contains an enormous amount of DNA.

A) Prokaryotes C) Eukaryotes

B) Protists D) Fungi

Q.20 The mutation in _____ have little evolutionary consequence than germ line changes.

A) Sex cells

B) Gametes

C) Gamete mother cells

D) Somatic cells

Q.21 The mutation in _____ is passed to subsequent generations thus providing the raw material from which natural selection produces evolutionary changes.

A) Somatic cells

B) Non – reproductive cells

C) Germ line cells

D) Skin cells

Q.22 Mutations can broadly be classified as:

A) Chromosomal aberration of number and structure

B) Point mutation and gene mutation

C) Chromosomal aberration of number and point mutation

D) Chromosomal aberration and point mutation

Q.23 Allele I^A specifies production of antibodies:

A) Against A C) Against A and B

B) Against B D) Against O

Q.24 Allele i is recessive to:

A) I^A C) I^A and I^B both

B) I^B D) D

Q.25 Pick up the genotype which produces phenotype A:

A) I^AI^A C) I^AI^A or I^Ai

B) I^Ai D) ii

Q.26 The homozygous "ii" will produce phenotype:

A) A C) AB

B) B D) O

Q.27 The blood group alleles start their expression at early embryonic stage and keep on expressing themselves till:

A) Puberty C) Death

B) Old stage D) Eighties

Q.28 The blood serum of A phenotype contains:

A) Anti – A antibodies

B) No antibodies

C) Anti – B antibodies

D) Both antibodies

Q.29 B phenotype of blood contains:

A) Anti – A antibodies

B) Anti – B antibodies

C) Anti A and Anti B antibodies

D) No antibody

Q.30 Blood phenotype AB have:

A) Anti – A antibodies

B) Anti – B antibodies

C) Both Anti A and B antibodies

D) Neither anti – A nor Anti – B antibodies

Q.31 Any blood transfusion is ideally safe if it:

A) Does not cause agglutination in the recipient

B) Cause agglutination in the recipient

C) Does not cause agglutination in the donor

D) Cause agglutination in the donor

Q.32 Agglutination of blood leads to serious results because clumped blood cells cannot:

A) Carry O_2

B) Pass through fine capillaries

C) Carry CO_2

D) Carry food and wastes

Q.33 Before giving transfusion the blood samples of the donor and the recipient are:

A) Screened for compatibility

B) Cross matched for compatibility

C) Filtered for compatibility

D) Centrifuged for compatibility

Q.34 If incompatible blood is transfused, the RBCs of the:

A) Recipient are destroyed

B) Either recipient or donor or both are destroyed

C) Donor are destroyed

D) No body are destroyed

Q.35 Blood group A can be transfused only into:

A) A recipient

B) B recipient

C) AB recipient

D) A and AB recipient

Q.36 AB blood can be transfused only into:

A) B recipient

B) A recipient

C) AB recipient

D) B and AB recipient

Q.37 ABO blood system is encoded by a single:

A) Polymorphic gene

B) Homomorphic gene

C) Isomorphic gene

D) Amorphic gene

Q.38 The gene I at chromosome # 9 of human population have:

A) Two alleles C) Four alleles

B) Three alleles D) Five alleles

Q.39 If the alterations involve only one or a few base pairs in the coding sequence they are called:

A) Chromosomal mutations

B) Mega changes

C) Chromosomal aberrations

D) Point mutations

Q.40 Modern industrial societies are exposed to point mutations mainly by:

A) Mutagenic radiations

B) Spontaneous pairing errors

C) Chemical mutagens

D) Non-disjunction

Q.41 Sickle cell anemia and phenyl ketonuria are well known examples of:

A) Point mutations

B) Chromosomal aberrations

C) Chromosomal mutations

D) Non-disjunctions

Q.42 In sickle cell anemia a point mutations leads to the change of _____ at position 6 from N terminal end in hemoglobin β chain.

A) Glutamic acid into serine

B) Serine into glutamic acid

C) Glutamic acid into valine

D) Valine into glutamic acid

Q.43 Sickle cell hemoglobin have reduced ability to:

A) Carry CO_2 C) Release O_2

B) Carry O_2 D) Release CO_2

Q.44 Humans have:

A) 46 chromosomes

B) 46 pairs of chromosomes

C) 23 chromosomes

D) 22pairs of chromosomes

Q.45 In humans division of chromosomes is as under:

A) 23 autosome, one pair of sex chromosomes

B) 22 autosome, one pair of sex chromosomes

C) 23 pairs of autosome, one pair of sex chromosomes

D) 22 pairs of autosome, one pair of sex chromosomes

Q.46 The human female differs from human male in having:

A) X chromosome

B) Two X chromosomes

C) Y chromosome

D) XY chromosomes

Q.47 Human female differs from human male in having:

A) 22 homologous pairs of chromosomes

B) 22 homologous pairs of autosomes

C) 23 homologous pairs of chromosomes

D) One pair of sex chromosomes

Q.48 Human male differs from human female in having:

A) One non-homologous pairs of chromosomes

B) 23 non-homologous pairs of chromosomes

C) 22 homologous pairs of chromosome

D) 23 homologous pairs of chromosome

Q.49 The male determining gene of the Y – chromosome is called:

A) tfm C) SDRY

B) SRY D) TSDRY

Q.50 It is essential for triggering the development of maleness in humans:

A) Presence of Y chromosome

B) Presence of SRY gene on Y chromosome

C) X – Y balance

D) Autosome and X chromosome balance

Q.51 In humans:

A) Same type of gametes are produced

B) Same type of sperms are produced

C) Same type of eggs are produced

D) Different type of eggs are produced

Q.52 In humans, the chances of male and female offspring are theoretically:
A) 1:2:1 C) 1:1
B) 2:1 D) 3:1

Q.53 In humans, if X-carrying sperm fertilizes the egg, the offspring will be:
A) Female
B) Male
C) Abnormal male
D) Abnormal female

Q.54 All sixty four codons were tested by making artificial mRNA and triplet codons by:
A) Nierenberg
B) Leader
C) Khorana
D) Nierenberg, Leader and Khorana

Q.55 Many different alleles of a gene may be produced by:
A) Evolution C) Reshuffling
B) Mutation D) Crossing over

Q.56 All such altered, alternative forms of a gene, whose number is more than two, are called:
A) Allelomorphs C) Multiple alleles
B) Fixed alleles D) Pseudo alleles

Q.57 ABO blood system have:
A) Two different phenotypes
B) Four different phenotypes
C) Three different phenotypes
D) Five different phenotypes

Q.58 A person having antigen A on the surface of RBC, has:
A) Antibodies against A
B) Antibodies against O
C) Antibodies against B
D) Antibodies against A and B

Q.59 A person having neither antigen A nor B have:
A) No antibodies
B) Antibodies against B
C) Antibodies against A
D) Antibodies against A and B both

Q.60 In phenylketonuria:
A) Phenylalanine hydroxylase is not formed
B) Phenylalanine hydroxylase is not degraded
C) Phenylalanine is not formed
D) Adenosine deaminase is not formed

Q.61 In phenylketonuria, phenylalanine accumulates in the cells leading to mental retardation as the brain fails to develop:
A) During embryonic development
B) In childhood
C) In infancy
D) During puberty

Q.62 ABO locus is found on chromosome number:
A) 19 C) 11
B) 9 D) 21

Q.63 Genetics of wheat grain color was studied by:
A) Darwin C) Mendel
B) Nilsson–Ehle D) Correns

Q.64 When we cross a true breeding dark red grain wheat plant with a true breeding white grain wheat plant, all F_1 grains will have:
A) Pink color C) Red color
B) Light red color D) Dark red color

Q.65 Nilson–Ehle got seven shades of color in F_2 of wheat grain with ratio of:
A) 1:6:15:20:15:6:1
B) 1:2:3:04:03:2:1
C) 3:6:9:12:9:6:3
D) 5:10:15:20:15:10:5

Q.66 A wheat plant with Aabbcc genotype will have how many doses of red pigment in its grains:
A) One C) Three
B) Two D) Four

Q.67 Human skin color is also a quantitative trait which is controlled by:
A) Three gene pairs
B) Three to four gene pairs
C) Three to five gene pairs
D) Three to six gene pairs

Q.68 In polygenic traits majority of the population will represent the:
A) Extreme phenotypes
B) Any phenotype
C) Intermediate phenotype
D) Strange phenotype

Q.69 A continuously varying trait is encoded by:
A) Alleles of two or more different gene pairs
B) Alleles of a gene pair
C) Alleles of two or more genomes
D) Multiple alleles of two or more different gene pairs

Q.70 Pick up the discontinuously varying trait:
A) Human intelligence
B) Skin color in humans
C) Grain color of wheat
D) 4 O'clock flower color

Q.71 MN blood group system is an example of:
A) Complete dominance
B) Incomplete dominance
C) Over dominance
D) Co-dominance

Q.72 If both contrasting alleles of a gene are fully expressed in a heterozygous condition their mutual relation will be called as:
A) Dominance
B) Over dominance
C) Co-dominance
D) Incomplete dominance

ANSWER KEY (Worksheet-16)							
1	A	21	C	41	A	61	C
2	D	22	D	42	C	62	B
3	A	23	B	43	B	63	B
4	B	24	C	44	A	64	B
5	B	25	C	45	D	65	A
6	A	26	D	46	B	66	A
7	C	27	C	47	C	67	D
8	A	28	C	48	A	68	C
9	A	29	A	49	B	69	A
10	B	30	D	50	B	70	D
11	A	31	A	51	C	71	D
12	C	32	B	52	C	72	D
13	A	33	B	53	A		
14	C	34	B	54	D		
15	C	35	D	55	B		
16	B	36	C	56	C		
17	B	37	A	57	B		
18	C	38	B	58	C		
19	C	39	D	59	D		
20	D	40	C	60	A		

EXPLANATION

Q.1 Answer is "Hemophilia"

Explanation: The gene for hemophilia is located on X-chromosome and it is a recessive trait. However, vitamin D resistant rickets also called as hypophophatemic rickets is controlled by a dominant allele located on X – chromosome. SRY gene is located on short arm of Y – chromosome

Q.2 Answer is "Mouse, rabbits, dog, sheep, donkey, cattle, kangaroo and chimpanzee"

Explanation: As man along with mouse, rabbit, dog, sheep, donkey, cattle, kangaroo and chimpanzees belong to class mammalia of vertebrates and have close evolutionary link, their genetic similarity is no surprise.

Q.3 Answer is "Inheritance"

Explanation: Gene are physical units of inheritance located on chromosomes and control the traits of organisms.

Q.4 Answer is "DNA"

Explanation: The sequence of nucleotides that determines the amino acid sequence of a protein is called a gene. In fact DNA stores all sorts of biological information coded in the sequence of its bases in a linear order and genes are actually parts of DNA comprising its basic sequences.

Q.5 Answer is "Genes"

Explanation: As genes are basic units of biological information, so they are responsible for transmission of parental characters to their offsprings as well as for the creation of new characters by the combination of maternal-paternal genes i.e. non parental characters.

Q.6 Answer is "Inherited similarities are conserved"

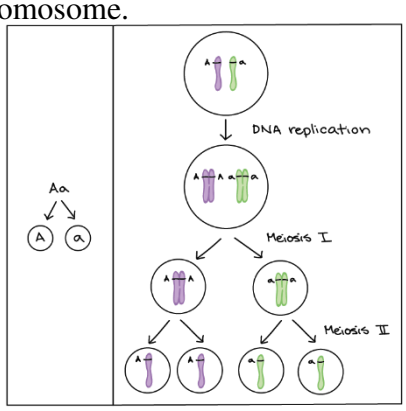
Explanation: If an entire set of genes of a parent are transferred to an offspring that offspring will be a clone of that parent i.e. it will have 100% similarities with that parent and as a result all parental characters will be conserved in offspring.

Q.7 Answer is "Variations occur"

Explanation: By reshuffling of genetic makeup of parents variants are produced and recombination occurs.

Q.8 Answer is "Pairs, Pairs"

Explanation: Gene pair occurs on pair of homologous chromosomes which indicates a parallelism in the behavior of gene and chromosome.



Q.9 Answer is "Epistasis"

Explanation: It is definition of epistasis.

Q.10 Answer is "9"

Explanation: It is a fact.

Q.11 Answer is "H"

Explanation: Substance H is associated with insertion of antigens on the surface of RBCs.

Q.12 Answer is "Glycoproteins"

Explanation: Glycoproteins develop particular receptor sites on cell surfaces.

Q.13 Answer is "H"

Explanation: As gene H will produce a receptor site for antigen A or/and B on the surface of RBCs.

Q.14 Answer is "Antigen A and B on RBC"

Explanation: Bombay phenotype is actually a person having AB antigen but laking the substance H which is required for insersion of antigens on the surface of RBC. Thus phenotypically he or she will be O.

Q.15 Answer is "I^AI^B,hh"

Explanation: Substance H is required for the insertion of AB antigen on the surface of RBCs and for that purpose at least on H (dominant) is required at locus H.

Q.16 Answer is "Epistasis"

Explanation: It is definition of epistasis.

Q.17 Answer is "Different genes occupying different loci"

Explanation: An interaction between the alleles of a same gene is called dominance relation, however, an interaction between alleles of two different genes is called epistasis and hypostasis.

Q.18 Answer is "Epistasis"

Explanation: In Bombay phenotype the phenotypic effect of AB gene located on chromosome number 9 is being interfered by H gene located on chromosome number 19.

Q.19 Answer is "Eukaryotes"

Explanation: They have more chromosomes.

Q.20 Answer is "Somatic cells"

Explanation: As they have no role in sexual reproduction.

Q.21 Answer is "Germ line cells"

Explanation: As germ line cells are involved in sexual reproduction.

Q.22 Answer is "Chromosomal aberrations or point mutation"

Explanation: Chromosomal aberrations occur at chromosome level while point mutations occur at nucleotide level.

Q.23 Answer is "Against- B"

Explanation: As that person lacks antigen B

Q.24 Answer is "I^A or I^B both"

Explanation: These are alleles of same gene located on some locus.

Q.25 Answer is "I^A I^A or I^A i"

Explanation: As 'i' is recessive to I^A a person with 'iI^A' will be heterozygous for blood type A. A person with I^AI^A will be homozygous for blood type-A.

Q.26 Answer is "O"

Explanation: As there will be neither antigen A nor antigen B.

Q.27 Answer is "Death"

Explanation: As the antigens persist throughout life.

Q.28 Answer is "Anti-B antibodies"

Explanation: A person with A blood type lacks antigens B thus antigen B is foreign to him/her and it will produce antibodies against it.

Q.29 Answer is "Anti-A antibodies"

Explanation: A person having blood group 'B' will lack antigen 'A' and thus produce antibodies against 'A'.

Q.30 Answer is "Neither Anti-A nor Anti-B antibodies"

Explanation: As it contains both antigens.

Q.31 Answer is "Does not cause agglutination in the recipient"

Explanation: It means donor blood either matches to that of recipient or it lacks any antibodies i.e O type. (a universal donor)

Q.32 Answer is "Pass through fine capillaries"

Explanation: It is life threatening situation as blood vessels will be choked by it.

Q.33 Answer is "Cross matched for compatibility"

Explanation: Cross matching is carried out to check the compatibility whereas screening is carried out to ensure that it is infection free.

Q.34 Answer is "Either recipient or donor or both are destroyed"

Explanation: It is consequence of incompatibility which means either donor's blood have antibodies against that of recipient or vice versa or both have antibodies against each other's blood.

Q.35 Answer is "A and AB"

Explanation: AB is universal recipient and A is same blood group.

Q.36 Answer is "AB recipient"

Explanation: AB blood lacks any antibody, thus is can be transfused to only 'AB' recipient because any other blood type will have antibodies against it and its agglutination will occur.

Q.37 Answer is "Polymorphic gene"

Explanation: Having more than two morphological (Phenotypic) manifestations or having more than two alleles.

Q.38 Answer is "Three alleles"

Explanation: I^A, I^B or i

Q.39 Answer is "Point mutation"

Explanation: As it occurs at nucleotide level or molecular level and is called point mutation or molecular mutation of gene mutation.

Q.40 Answer is "Chemical mutagens"

Explanation: Such chemicals which cause point mutations are called chemical mutagens.

Q.41 Answer is "Point mutations"

Explanation: These genetic disorders are consequence of a change in the nucleotide sequence of DNA which results in a change in amino acid sequence of proteins and as a result the function of that associated with that protein is stopped.

Q.42 Answer is "Glutamic acid into valine"

Explanation: Glutamic acid is replaced by valine as thymine have been replaced by adenine in gene regulating the synthesis of hemoglobin.

Q.43 Answer is "Carry O_2"

Explanation: As it have modified β chains.

Q.44 Answer is "46 chromosomes"

Explanation: 44 autosomes and 2 sex chromosomes.

Q.45 Answer is "22 pairs of autosomes, one pair of sex chromosome"

Explanation: T.H. Morgan classified the chromosomes into two functional categories i.e. autosomes and sex chromosomes.

Q.46 Answer is "Two X chromosomes"

Explanation: Female have XX chromosomes whereas male have XY chromosome.

Q.47 Answer is "23 homologous pairs of chromosomes"

Explanation: Sex chromosomes are also homologous in female (XX) whereas autosomes are homologous in both male and females both. However in male sex chromosomes (XY) are non-homologous.

Q.48 Answer is "One non-homologous pair of chromosomes"

Explanation: Sex chromosomes are also homologous in female (XX) whereas autosomes are homologous in both male and females. However in male sex chromosomes (XY) are non-homologous.

Q.49 Answer is "SRY"

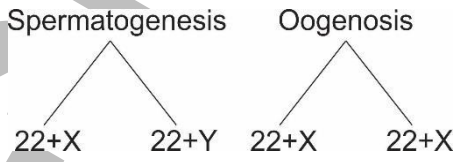
Explanation: Sex determining region of the Y-chromosome.

Q.50 Answer is "Presence of SRY gene on Y chromosome"

Explanation: Presence of SRY on the short arm of Y-chromosome is inevitable for triggering male development in the embryo.

Q.51 Answer is "Same type of eggs are produced"

Explanation: As all pairs of chromosomes are homologous in female. However, sperms are of two types.



Q.52 Answer is "1:1"

Explanation: According to probability rule, the chances for two types of sperms in fertilizing the single type of egg are fifty fifty.

Q.53 Answer is "Female"

Explanation: All the eggs of human female carry X-chromosome. However male produces two types of sperms; half having X-chromosomes and half having Y-chromosomes. Thus the gender of the offspring will depend upon the type of sperm used in fertilization. If X chromosome carrying sperm fertilized the egg the offspring will be female (XX) otherwise male XY.

Q.54 Answer is "Nierenberg, Leader and Khorana"

Explanation: As a historical fact.

Q.55 Answer is "Mutation"

Explanation: Mutation is a source of formation of multiple alleles.

Q.56 Answer is "Multiple alleles"

Explanation: If a gene have more than two alternate forms or allelomorphs it is called a multiple alleles e.g. ABO blood

type. Such multiple variants of a gene come into being by mutation.

Q.57 Answer is "Four different phenotypes"

Explanation: A, B, AB and O.

Q.58 Answer is "Antibodies against B"

Explanation: Antibodies are formed against that antigen which is absent in that body.

Q.59 Answer is "Antibodies against A and B both"

Explanation: A person lacking both antigen A and B will produce antibodies against both antigens as both antigens are foreign to him or her.

Q.60 Answer is "Phenylalanine hydroxylase is not formed"

Explanation: Phenylalanine hydroxylase enzyme is required to degrade phenylalanine. As a result phenylalanine accumulates in the cells leading to mental retardation, as the brain fails to develop in infancy. So synthesis of phenylalanine hydroxylase is inevitable and any mutation causing its deficiency will result in a disease called phenylketonuria.

Q.61 Answer is "in infancy"

Explanation: Phenylalanine accumulates during infancy in post embryonic development as during embryonic phase phenylalanine is metabolized by mother and fetus gets metabolized food. Thus phenylketonuria occurs in infancy as an in born error of metabolism.

Q.62 Answer is "9"

Explanation: It is a fact.

Q.63 Answer is "Nilsson–Ehle"

Explanation: Nilsson – Ehle studied the genetics of wheat grain color. When he crossed a true breeding dark red grain plant with true breeding white grain plant, all F_1 grains had light red color, intermediate between two parental shades. It seemed as if it was a case of incomplete dominance. But when F_1 grains were grown to mature to mature plants and crossed with each other. F_2 grains had exactly seven shades of color in the ratio of 1 dark red : 6 modestly dark red: 15 red :20 light red : 15 pink : 6 light pink : 01 white.

Q.64 Answer is "Light red color"

Explanation: See explanation of Q # 63.

Q.65 Answer is "1:6:15:20:15:6:1"

Explanation: See explanation of Q # 63.

Q.66 Answer is "One"

Explanation: Alleles A, B and C code for equal amount (dose) of red pigment, which is a positive effect. But none of a, b, and c code red pigment.

Q.67 Answer is "Three to six gene pairs"

Explanation: Human skin color is also a quantitative trait which is controlled by three to six gene pairs. The greater the number of pigment specifying genes, the darker the skin. A child can have darker or lighter skin than his parents.

Q.68 Answer is "Intermediate phenotype"

Explanation: It is evident from the ratio obtained by Nilsson-Ehle in F_2 i.e.;

1 : 6 : 15 : 20 : 15 : 6 : 1

Q.69 Answer is "Alleles of two or more different gene pairs"

Explanation: A continuously varying trait is encoded by two or more different gene pairs found at different loci all influencing the same trait in an additive way. These quantitative traits are called polygenes. Each polygene has a small positive or negative effect on the character.

Q.70 Answer is "4 O'clock flower color"

Explanation: Human intelligence, human skin color and grain color of wheat are continuously varying polygenic traits however flower color in four O clock plants is a single gene controlled trait with incomplete dominance and three phenotypes.

Q.71 Answer is "Co-dominance"

Explanation:

Dominance relations	Examples
Traits of pea studied by Mendel	Complete dominance
Flower color in four O clock plant	Incomplete dominance
MN and ABO blood groups	Co-dominance
Eye color in *Drosophila*	Over dominance

Q.72 Answer is "Incomplete dominance"

Explanation: See explanation of Q # 71.

STEP

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