y a a a a a a a a a a a a a a a a a a a	*********	Points	to Remen	nber	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	*********	*****	
2 000000000000000000000000000000000000	Heredity is	s transmission of	characters fr	om one g	eneration	to the ne	xt genera	nin n
Heredity	 Gregor Johann Mendel discovered the basic principles of heredity. 						uion.	
	Phenotyne	· External expre	ession of a par	ticular tr	ait	1 11010 411		
• Genotype : External expression of a particular trait.							- - - - 	
 Homozygous : Plants having alike factors in their pairs Ex : TT-tall tt-dwarf 							f i	
Terminologies • <i>Heterozygous</i> : Plants having unlike factors in their pairs. <i>Ex</i> : Tt - tall								
• Alleles : 2 factors making up a pair of contrasting characters.								
	• <i>Dominant condition</i> : The character which expresses itself.							
	• <i>Recessive condition :</i> Character which is masked.							
Monohybrid Cross				Di	hybrid (Cross		
Cross between one pair of contrasting characters.			Cross betwe	en two p	airs of co	ntrasting	character	·s.
Parental TT (Tall) tt (Dwarf)			Dent	Rou	nd yellow see RRYY	eds Wrinkleo rrvv	l green seed	s
Generation	Generation		generatio	n				
	T	,t	B					
		\checkmark	I I RY rv		ry			
F1 Generation		•			\sim			
Genotype : Ail are Tt Tt Phenotype : Ail are tail Gametes			First					
			generation (F.) RrYy (Round yellow					
			(-1)			seeds)		
	$\overline{\}$	T t						1
ž V					D	D.W. (Salf	nollination	
F2 Generation	T T	r (Tall) Tt (Tall)	F2 Generat	ion	RrYy x	RrYy (Self	pollination)	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf =	T TI :2:1 3:1 t Ti	r (Tall) Tt (Tall) t (Tall) tt (Dwarf)	F2 Generat	ion RY	RrYy x	RrYy (Self	pollination) ľV	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf =	T TI :2:1 t TI	r (Tall) Tt (Tall) t (Tall) tt (Dwarf)	F2 Generat	ion RY RRYY	rY RrYy x	Rryy (Self	ry RrYy	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters	.2:1 t T s:1 t T of pea plan	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel	F2 Generat RY rY	ion RY RRYY RrYY	rY RrYy x RrYY rrYY	RrYy (Self Ry RRYy RrYy	ry RrYy rrYy	
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character	T T T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive	F2 Generat RY rY Ry	ion RY RRYY RrYY RRYy	rY rY RrYY rrYY RrYy	RrYy (Self Ry RRYy RrYy RRyy	ry RrYy rrYy Rrvy	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length	T T t T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short	F2 Generat RY rY Ry rv	rion RY RRYY RrYY RRYy RrYy	rY rY RrYY rrYY RrYy rrYy	RrYy (Self Ry RRYy RrYy RRyy Rryy	ry RrYy rrYy Rryy Rryy	
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position	$ \begin{array}{c} T \\ \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline \hline $	t (Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal	F2 Generat RY rY Ry ry	ion RY RRYY RrYY RRYy RrYy	RrYy x rY RrYY rrYY RrYy rrYy	RrYy (Self Ry RRYy RrYy RRyy Rryy	ry RrYy rrYy Rryy Rryy rryy	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour	$ \begin{array}{c} T \\ \vdots 2:1 \\ \vdots 1 \\ t \\ $	t (Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White	F2 Generat RY rY Ry ry Phenotypi	rion RY RRYY RrYY RRYy RrYy c ratio –	rY RrYY rrYY RrYY RrYy 9:3:3	RrYy (Self Ry RRYy RrYy RRyy Rryy : 1	ry RrYy rrYy Rryy rryy	
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour Pod shape	$ \begin{array}{c} T \\ \hline \hline \hline \hline \hline \hline $	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted	F2 Generat RY rY Ry ry Phenotypi • RRYY(1),	tion RY RRYY RrYY RRYy RrYy c ratio – RRYy(2),	RrYy x rY RrYY rrYY RrYY RrYy rrYY 9:3:3 RrYY(2),	RrYy (Self Ry RRYy RrYy Rryy Rryy : 1 RrYy(4)–F	ry RrYy rrYy Rryy rryy Ryy	l
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour Pod shape Pod colour	T T :2:1 t T of pea plan Dominant Long Axillary Blue Inflated Green	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRyy (1), F	rion RY RRYY RrYY RRYy RrYy c ratio – RRYy(2), Rryy(2) – F	rY rY RrYY rrYY RrYy 9:3:3 RrYY(2), I Round gree	RrYy (Self Ry RRYy RrYy RRyy Rryy : 1 RrYy(4)–F en – 3 	ry RrYy rrYy Rryy rryy rryy	 ow - 9
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape	T T T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), I • RRyy (1), I • rrYy(2), rrY • rray(1), w	rion RY RRYY RrYY RRYy C ratio – RRYy(2) – F Y(1) - wrin rinkle groe	rY rY RrYY rrYY RrYy 9:3:3 RrYY(2), Round gree hkled yellov	RrYy (Self RRYy RRYy RrYy RrYy Rryy Rryy Rryy Rryy Rryy Rryy N - 3 3	ry RrYy rrYy Rryy rryy	l ow - 9
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour	T T T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRyy (1), I • rrYy(2), rrY • rryy(1) – w	rion RY RRYY RrYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrin rinkle gree	rY RrYY RrYY RrYY P:3:3 RrYY(2), Round green kled yellow en – 1	RrYy (Self Ry RRYy RRYy RRyy Rryy : 1 RrYy(4)–F en – 3 v – 3	ry RrYy rrYy Rryy rryy	low - 9
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour	T T T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRyy (1), F • rrYy(2), rrY • rryy(1) – w	tion RY RRYY RrYY RRYy C ratio – RRYy(2) – F (Y(1) - wrin rinkle gree	rY rY RrYY rrYY RrYy 9:3:3 RrYY(2), Round gree hkled yellow n – 1	RrYy (Self Ry RRYy RrYy Rryy Rryy Rryy Rryy Rryy Rryy Rryy Rryy Rry Rr	ry RrYy rrYy Rryy rryy	l
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity	T T T t T T T T T T T T T T T T T	t (Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green cominance egregation or La	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRYY(1), I • rrYy(2), rrY • rryy(1) – w	rion RY RRYY RrYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrin rinkle gree of gamete	rY RrYY RrYY RrYY 9:3:3 RrYY(2), Round green kled yellow en – 1	RrYy (Self Ry RRYy RRYy Rryy Rryy Characteristic for the self of the se	ry RrYy rrYy Rryy rryy	low - 9
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity	T T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green cominance egregation or La	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRyy (1), F • rrYy(2), rrY • rryy(1) – w	tion RY RRYY RrYY RRYy C ratio – RRYy(2), Rryy(2) – F $\Upsilon(1)$ - wrin rinkle gree	RrYy x rY RrYY rrYY RrYY RrYy rrYy 9:3:3 RrYY(2), Round gree nkled yellow n 1	RrYy (Self Ry RRYy RrYy Rryy Rryy Rryy Rryy Rryy Rryy(4) - F en - 3 N - 3	rry RrYy rrYy Rryy rryy Round yel	low - 9
F2 Generation Genotype - TT : TT : H = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity	T T T t T T T T T T T T T T T T T	T(Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green oominance egregation or La adependent assocration s of each cell condition	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRYY(1), • RRYY(1), • rrYy(2), rrY • rryy(1) – w w of purity or rtment	rion RY RRYY RrYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrin rinkle gree of gamete	rY RrYY RrYY RrYY P: 3 : 3 RrYY(2), Round green kled yellow en – 1 S	RrYy (Self Ry RRYy RRYy RRyy Rryy : 1 RrYy(4)-F en - 3 N - 3	ry RrYy rrYy Rryy rryy Round yel	low - 9
F2 Generation Genotype - TT : TT : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity	T T T t T T T T T T T T T T T T T	r (Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green cominance egregation or La dependent associated Structure or Structure	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRyy (1), F • rrYy(2), rrY • rryy(1) – w w of purity of rtment	rion RY RRYY RrYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrin rinkle gree of gamete read like s me	rY rY RrYY rrYY RrYy 9:3:3 RrYY(2), Round gree hkled yellow en – 1 s tructures	RrYy (Self Ry RRYy RRYy Rryy Rryy ryy Rryy Rryy Rryy Called ch	ry RrYy rrYy Rryy rryy Round yel	low - 9
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity Chromosomes They are thin, long i) Primary constri	T T :2:1 t T of pea plan Dominant Long Axillary Blue Inflated Green Round Yellow i) Law of D ii) Law of So iii) Law of in S: The nucleu	T(Tall) Tt (Tall) t (Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green oominance egregation or La adependent assocration s of each cell con Structure e structures with t ere : The two arms	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRYY(1), • RRYY(1), • rrYy(2), rrY • rryy(1) – w w of purity or rtment	rion RY RRYY RRYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrint rinkle greet of gameter read like states read like states R	RrYy x rY RrYY RrYY RrYy 9:3:3 RrYY(2), Round green kled yellow n - 1 S s tructures at this po	RrYy (Self Ry RRYy RRYy Rryy Rryy Rryy Rryy Rryy Rryy Rryy Chromatia	ry RrYy RrYy Rryy rryy Round yel	low - 9
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity Chromosomes They are thin, long i) Primary constri ii) Secondary constri	T TT : 2:1 t TT : 2:1 t TT of pea plan Dominant Long Axillary Blue Inflated Green Round Yellow i) Law of D ii) Law of Se iii) Law of se	T(Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green oominance egregation or La adependent assoc Structure e structures with t ere : The two arms ar zone / Nucleolal	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRYY(1), • RRYY(1), F • rrYy(2), rrY • rrYy(2), rrY • rryy(1) – w wo f purity of rtment • of Chromoson wo identical st s of a chromoson r organizer : It	rands call occur at a	\mathbf{RrYy} \mathbf{r} \mathbf{RrYY} \mathbf{rrYY} \mathbf{RrYy} \mathbf{rrYy} \mathbf{RrYy} \mathbf{rrYy} $\mathbf{9:3:3:3}$ $\mathbf{RrYY(2)}$ \mathbf{RrYy} $\mathbf{0:3:3:3}$ $\mathbf{RrYY(2)}$ R	RrYy (Self Ry RRYy RRYy Rryy	ry RrYy rrYy Rryy rryy Round yel	low - 9
F2 Generation Genotype - TT : Tt : tt = 1 Phenotype - Tall : Dwarf = 7 Characters Character Stem length Flower position Flower colour Pod shape Pod colour Seed shape Seed colour Mendel's Laws / Laws of Heredity Chromosomes They are thin, long i) Primary constri ii) Secondary const iii) Telomere: End	T T T T T T T T T T T T T T	T(Tall) Tt (Tall) t(Tall) tt (Dwarf) t by Mendel Recessive Short Terminal White Constricted Yellow Wrinkled Green oominance egregation or La adependent assoc s of each cell con Structure e structures with t ere : The two arms ar zone / Nucleolar ome that provides	F2 Generat RY rY Ry ry Phenotypi • RRYY(1), • RRYY(1), • RRYY(1), • RRYY(1), F • rrYy(2), rrY • rryy(1) – w wo of purity of rtment mtains thin thr • of Chromoson wo identical st s of a chromoson r organizer : It stability	rion RY RRYY RRYY RRYy C ratio – RRYy(2), Rryy(2) – F Y(1) - wrint rinkle greet of gameter read like some trands callowe meet occur at a	rY rY $RrYY$ $rrYY$ $RrYy$ $rrYy$ $9:3:3$ $RrYY(2)$,Round green $rkled$ yellow $n-1$ rs $rructures$ $rtructures$ $rtructures$ $rtructures$ $rtructures$ $rtructures$	RrYy (Self Ry RRYy RRYy Rryy Rryy ryy ryy ryy ryy ryy	ry RrYy RrYy Rryy rryy Round yel	low - 9

TelocentricCentromere is found on the proximal end. Rod shaped.AcrocentricCentromere is found at one end with a short arm and a long arm. Rod-shaped.SubmetacentricCentromere is near the centre of chromosome & form two unequal arms, J shaped / L shaped.MetacentricCentromere is in the centre of the chromosome and form two equal arms V shaped.Types of Chromosomes based on function						
AcrocentricCentromere is found at one end with a short arm and a long arm. Rod-shaped.SubmetacentricCentromere is near the centre of chromosome & form two unequal arms, J shaped / L shaped.MetacentricCentromere is in the centre of the chromosome and form two equal arms V shaped.Types of Chromosomes based on function						
SubmetacentricCentromere is near the centre of chromosome & form two unequal arms, J shaped / L shapedMetacentricCentromere is in the centre of the chromosome and form two equal arms V shaped.Types of Chromosomes based on function						
MetacentricCentromere is in the centre of the chromosome and form two equal arms V shaped.Types of Chromosomes based on function						
Types of Chromosomes based on function						
Autosomes They determine the somatic (body) characters. Male & female have equal number of autosomes.						
Allosomes / They determine the sex of an individual. <u><i>Types</i></u> : X and Y- chromosomes.						
Sex hormones / # Human male - one X and one Y chromosome						
Hetero chromosomes # Human female - two X chromosomes						
It is the number, size and shape of chromosomes in the cell nucleus of an organism.						
Hanloid – Single set of chromosome Dinloid – Occur in pairs						
a a a a a a a a a a a a a a a a a a a						
Deoxy1100 Nucleic Acid(DNA) is the hereattary material that have genetic information.						
Chemical Nucleotide = Nucleoside + Phosphate						
Composition of						
DNA molecule						
Purines - Adenine & Guanine Pyrimidines - Cytosine & thymine						
It is a process in which DNA molecule produces exact copies of its own structure.						
DNA replication Steps involving DNA replication :						
1) Origin of replication 11) Unwinding of DNA molecule iii) Formation of RNA primer iv) Synthesis of new complementary strand						
Sex Determination • The formation of zygote into male or female sex during development is called sex determination						
• Human beings have 23 pairs of chromosomes 22 pairs of autosomes and 1 pair (23rd pair) is sex chromosome.						
Homogametic Er : Female gametes or Egg (i) (22+X) (ii) (22+X) chromosomes						
Heterogametic <i>Ex</i> : Male gametes or Sperms. (i) (22+X) (ii) (22+Y) chromosomes						
Nutation is an inheritable sudden change in the genetic material (DNA) of an organism.						
Sudden change in the structure or number of chromosomes.						
<i>i) Changes in the structure of chromosomes:</i> Due to errors in cell division.						
ii) <i>Changes in the number of chromosomes(Ploidy):</i> Addition or deletion of chromosomes.						
Chromosomal (a) Euploidy: It bears more than the usual number of diploid chromosomes.						
mutation <i>Ex:</i> Triploidy (3n), Tetraploidy (4n)						
(b) Aneuploidy: It is loss or gain of one or more chromosomes in a set. <i>Er:</i> Monosomy (2n, 1). Trisomy (2n, 1) and Nullisomy (2n, 2).						
<i>Down's syndrome:</i> Condition of having extra copy of chromosome 21 (Trisomy 21).						
Down's synarome: Condition of naving extra copy of chromosome 21 (Trisomy 21).						
Down's syndrome: Condition of naving extra copy of chromosome 21 (Trisomy 21).Gene (or)It is the changes occurring in nucleotide sequence of a gene. It involves substitution,						