Linked genes

Population shifts

Hardy

Predicted

Punctuated equilibrium

chi square

Homologous vs chromatids

Polygenic

Independent assortment

Chiasmata, when

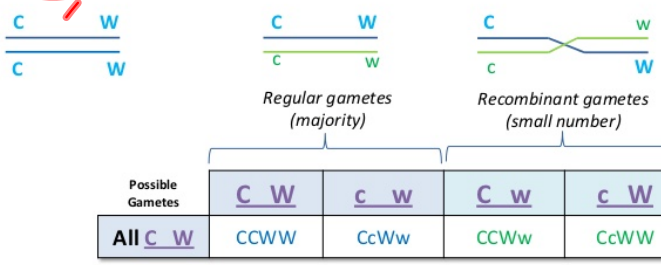
Gene Linkage & Recombination

The genes for kernel colour and waxiness are linked in the corn plant (*Zea mays*). In a cross between a plant that is homozygous dominant at both loci (CW/CW) with a plant that is heterozygous at both loci (CW/cw), identify the following genotypes as:

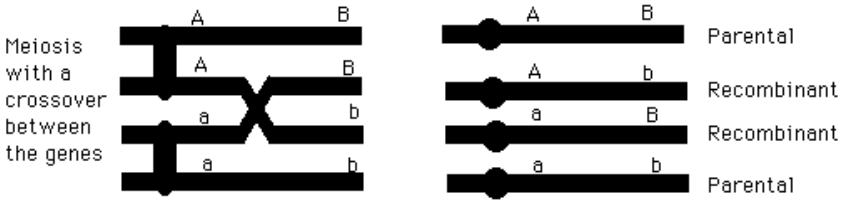
a: regular b:recombinants c: impossible

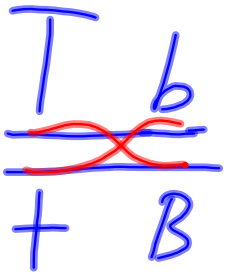
Key to alleles:
C = coloured c = no colour
W = waxy w = not waxy

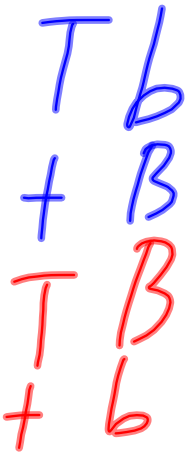
CcWw CCWw CcWW CCWW CCww ccWW

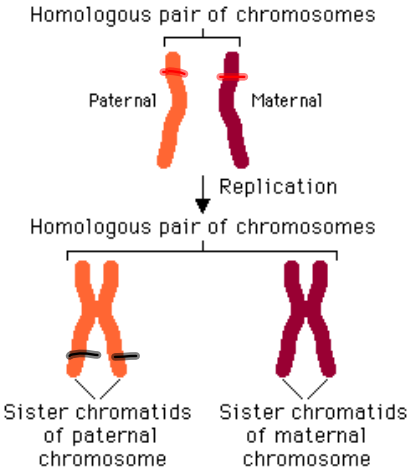


Possible Gametes	C W	c w	C w	c W
All C W	CCWW	CcWw	CCWw	CcWW

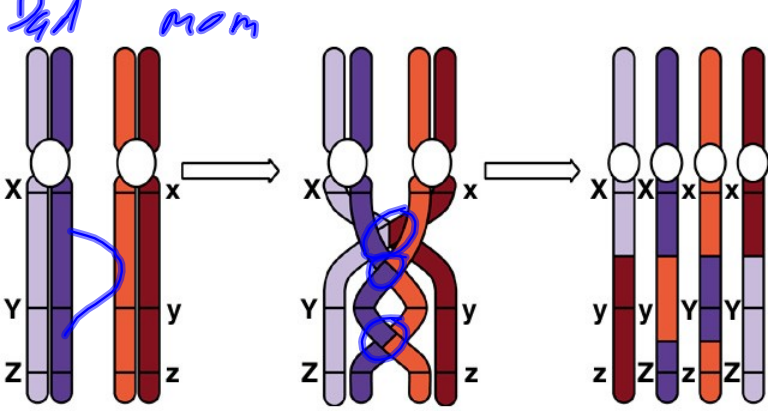








Crossing over during meiosis



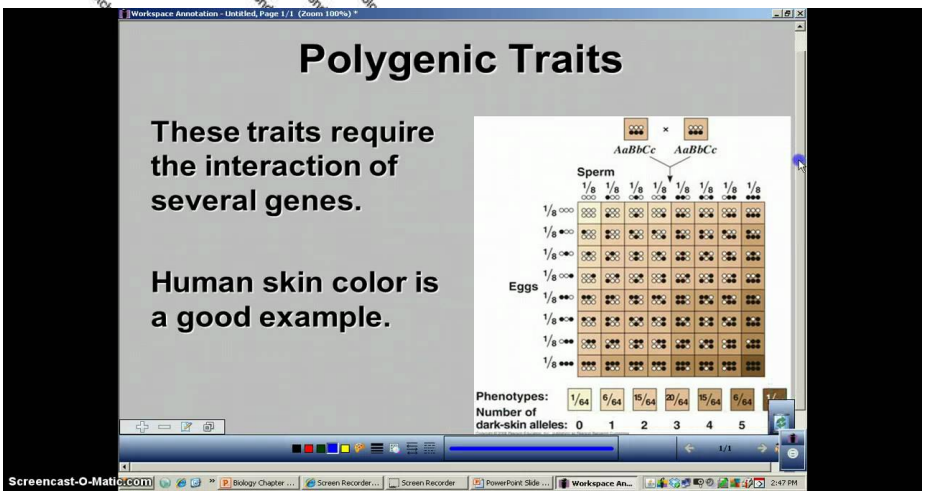
dad mom

XYZ

xyz

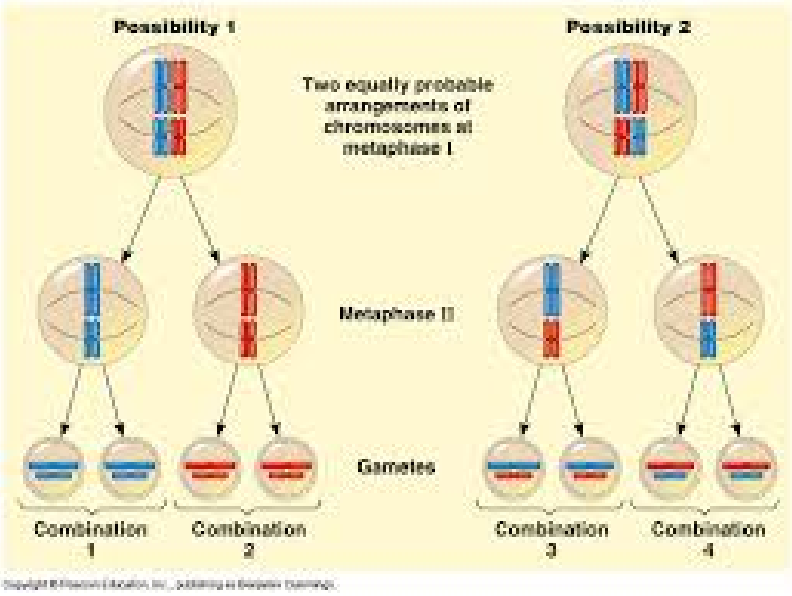
2 Chiasmata

AA BBCC DD
Aa Bb Cc Dd x
aa bb cc dd



Independent assortment

Random Orientation



Hardy Weinberg Equilibrium - used to measure the alleles in a population

States that a population will not change as long as all 5 of these conditions are met

1. The breeding population is large
2. Mating is random
3. There is no mutation of the alleles
4. No migration occurs
5. There is no selection

No population on planet meets all 5 conditions

You do a test cross with a heterozygous for both traits plant.

The results come back as follows:

SsYy - 184

Ssyy - 191

ssYy - 326

ssyy - 299

$$X^2 = \sum \frac{(o-e)^2}{e}$$

$X^2 =$

Accept Hypothesis | Reject Hypothesis

Percentage Points of the Chi-Square Distribution

Degrees of Freedom	Probability of a larger value of x^2								
	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01
1	0.000	0.004	0.016	0.102	0.455	1.32	2.71	3.84	6.63
2	0.020	0.103	0.211	0.575	1.386	2.77	4.61	5.99	9.21
3	0.115	0.352	0.584	1.212	2.366	4.11	6.25	7.81	11.34
4	0.297	0.711	1.064	1.923	3.357	5.39	7.78	9.49	13.28
5	0.554	1.145	1.610	2.675	4.351	6.63	9.24	11.07	15.09

What are the expected ratios?

Are the genes linked?

$p^2 + 2pq + q^2 = 1$ (AA, Aa, aa) $p + q = 1$

Within a population of butterflies, the color brown (B) is dominant over the color white (b). And, 40% of all butterflies are white. Given this simple information, which is something that is very likely to be on an exam, calculate the following:

of recessive $= q^2$

A. The percentage of butterflies in the population that are heterozygous. $2pq$ 47%

B. The frequency of homozygous dominant individuals. p^2 13

~~$p^2 + q^2 = 1$~~

$.4 = q^2$

$.63 = q$

$.37 = p$

A very large population of randomly-mating laboratory mice contains 35% white mice. White coloring is caused by the double recessive genotype, "aa". Calculate allelic and genotypic frequencies for this population.