IB Biology Topic 10 – Genetics HL A3 Revision Sheet

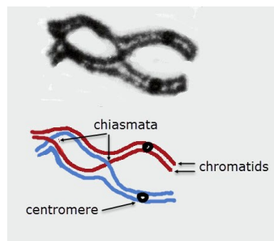
Meiosis

- Homologous chromosomes are chromosomes which share the same genes, size
- Chiasmata are crossing over points which occur during prophase I
- Non-sister chromatids are the single chromatid strands of different chromosomes in a
- Independent assortment of alleles occurs because of random orientation of chromoso
- During anaphase spindle fibres are responsible for pulling chromosomes / chromatids to
- A difference between meiosis I and meiosis II is Meiosis I reduces chromosome number, but meiosis II splits chromatids, the overall

Arrange the following chromosomes movements from meiosis in the right order:

- Double stranded chromosomes line up on the spindle #
- Homologous chromosomes separate as they move to opposite poles of the cell #
- Centromeres split & single stranded chromosomes more to opposite poles of the cell #
- Pairs of homologous chromosomes form tetrads #
- Homologous chromosomes line up on the equator of the spindle #
- Nuclear membrane forms and four haploid cells are produced. #

Annotate the diagram to explain how crossing over increase variation?



Parts of each chromosome are exchanged

This promotes recombination of genes in dihybrid crosses

Dihybrid Inheritance

Gene locus (pl. loci) is The position on a specific chromosome where the gene is always

Unlinked genes segregate independently because they are found on different chromoso

Discrete variation in a phenotype can be identified because there are few phenoty

Continuous variation is when the phenotype varies gradu or there are many Phenoty

Polygenic characteristics have phenotypes which show continuous variati

Human height is an example of a polygenic characteristic, which shows continuous

Dihybrid crosses can have 4 x 4 Punnett square. Eg. AaBb x AaBb

	AB	Ab	aB	~~Ab~~
AB	AABB	AABb	Aa	Aa
Ab	AA	AA	Aa	Aa
aB	Aa	Aa	AA	aa
ab	Aa	Aa	aa	aa

If one parent is homozygous then one row is enough. AaBb x AABB

	AB	Ab	aB	Ab--
AB	AABB	AABb	Aa	Aa

AABB only has one possibletype of gamete "AB"

In a cross between a brown rabbit with long fur and a white rabbit with short fur there were 4 phenotypes of offspring

- White short fur
- Brown short fur
- White long fur
- Brown long fur

Which are recombinants, explain why..

Brown short fur and White long fur are recombinants

Linkage notation

Morgan did some crosses with Drosophila flies. He crossed ebony body, scarlet eyed flies (eess) with wild type (genotype EESS) Because both the alleles are on chromosome 3 he used "linkage notation" Complete a punnet square using this notation.

$$\frac{es}{es} \times \frac{ES}{ES}$$

Legend
E= allele for wildtype body
e= allele for ebony body
S= wild type allele - red eyes
s= allele for scarlet eyes

Recombinant phenotypes would be wildtype body with and ebony body with wild

Explain why recombinant phenotypes would be lower in number than normal medelian ratios with linked genes.

There is a tendency for the two linked alleles to be

Why is it also likely that these will always be some recombinants, even with linked genes?

Crossing over will usually create some

Chi-squared test can be used to see if there is a significant difference between observed and expected values. Explain why you have to look up a probability once X^2 has been calculated?

the Chisquared statistic gives a measure of the cumulative difference between observed and expected

~~The probability of getting this difference depends on~~

Gene pools

A "gene pool" is all the alleles for a gene in the whole

Evolution involves allele frequencies changing in time. Explain why.

As natural selection occurs - the alleles from individuals which don't

Compare the 3 methods of reproductive isolation below.

Cause of reproductive isolation	How it works.
Geographical	populations of a species can't reporduce because they are separated by a
Behavioural	populations don't reproduce because theit
Temporal	populations don't reproduce because they

- Explain how natural selection can be 'stabilizing'

If the middle value of a feature is the most successful (fittest) and the values different from

- Describe what happens in a gene pool exposed to directional selection

In directional selection one allele is selected against and this allele reduces in frequency.

- What is disruptive selection? When the middle value is selected against, forming two forms of a feature, but not the middle value,

Explain how reproductive isolation leads to speciation?

If two population of a species are isolated then their alleles/genes don't mix any more.

Over time, many generations, there is a gradual accumulation of small genetic differences between the two populations.

Eventually the genetic makeup of the two populations