## Heredity and Genetics Notes- Enriched

Def: $\qquad$

## Law of Segregation or independent assortment

Def: $\qquad$
Ex: $\quad B B$
Bb
bb

## Dominance and recessive

|  | Trait |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Stem <br> length | Seed <br> shape | Seed <br> colour | Seed coat <br> colour | Pod shape | Pod <br> colour |
| Dominant | tall | round | yellow | coloured | inflated | green |
| Recessive | short | wrinkled | green | white | constricted | yellow |

Write the possible alleles for each example below using the table above.
a) tall stems? $\qquad$ d) constricted pods? $\qquad$
b) short stems? $\qquad$ e) green pods?
f) yellow pods?
$\qquad$
c) inflated pods? $\qquad$

## Determining possible offspring

Ex 1- In pea plants, tall plants are dominant over short plants. A heterozygous plant is crossed with a short plant. Draw the punnett square that would result and give the genotype and phenotype ratios.

Ex 2-In pea plants, yellow seeds are dominant over green seeds. A homozygous yellow seed is crossed with a heterozygous yellow seed. Draw the punnett square that would result and give the genotype and phenotype ratios.

Generations:

| $\mathrm{F}_{1}$ |  |
| :--- | :--- |
| $\mathrm{~F}_{2}$ |  |
| $\mathrm{~F}_{3}$ |  |

## Word problems

1. Albinism is a recessive disease where the person has no pigmentation. If a heterozygous female reproduces with a homozygous dominant male, what are the phenotype and genotype \% and ratios?
2. Huntington's is a dominant disease where a person's nervous system starts to degenerate. A heterozygous male mates with a normal female.
a- What are the chances of their offspring having the disease?
b- Explain if it is possible for the $F_{2}$ generation to have it.
3. Two brown eyed parents had three children with brown eyes and one child with blue eyes. If brown eyes are dominant over blue eyes, determine the genotype of the parents.

Explain if the brown eyed children of the $F_{1}$ generation can have kids who are blue eyed? What would this generation be called?

## Sex Linked traits

Def: $\qquad$

- $\qquad$
- 


## Possibilities

| xx | $\mathrm{x}^{\mathrm{c} x}$ | $\mathrm{x}^{\mathrm{c}} \mathrm{x}^{\mathrm{c}}$ | xy | $\mathrm{x}^{\mathrm{c}} \mathrm{y}$ | $\mathrm{xy}^{\mathrm{c}}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

- Colour blindness, hemophilia and baldness are all carried on 'x' chromosome
- Hairy ears on 'y' chromosome.

Ex 1- A colour blind male mates with a female who is a carrier. What are the chances of the offspring being colourblind?

Ex 2- A bald female and a non-bald male mate. What are the chances the child will be bald as an adult?

Ex3- A couple had two girls and a boy. One girl is colourblind and the other two are not. What were the genotypes of the parents?

Ex4- Three brothers feel very depressed because they are doomed to have hairy ears like their dad. They are jealous because their three sisters will not have this problem. Explain why all the boys are doomed and none of the girls are.

## Crossing 2 traits at once - use foil

Ex 1-Curly hair is dominant over straight hair and brown eyes are dominant over blue eyes.
Give the percentage of the phenotype and genotype of the offspring when a homozygous curly haired blue eyed female mates with a heterozygous male for both hair and eyes.

Parent 1:

Possible gametes:

Parent 2:

Possible gametes:

|  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Ex 2-Being able to tongue roll is dominant over not tongue rolling. Free earlobes are dominant over attached earlobes.

What will the genotype and phenotype be for the $F_{1}$ generation when a heterozygous tongue roller with attached ears mates with a homozygous recessive tongue rolling and heterozygous for earlobes.

Parent 1:

Possible gametes:

## Parent 2:

Possible gametes:

|  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Is it possible for the $F_{2}$ generation to be homozygous dominant or homozygous recessive for both traits?

