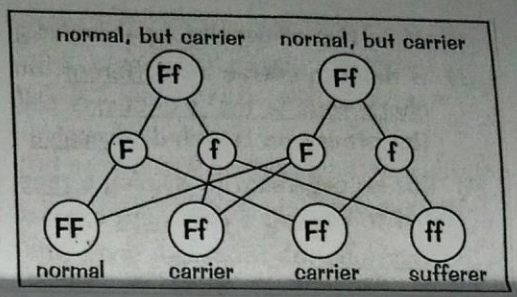
Genetic Diagrams and Genetic Disorders.

Cystic Fibrosis.

This is a **genetic disorder** of the **cell membranes**. It causes the body to produce **thick sticky mucus** in the **air passages, gut,** and **pancreas**. Symptoms include **breathing difficulties, lung infections, malnutrition** and **fertility** problems.

The allele which causes cystic fibrosis is **recessive** (f), so to have the disorder the sufferer must have **two copies** of the recessive allele (ff). People with only **one copy** of the recessive allele **won't** have the disorder, but will be **carriers** (Ff).

For a child to **inherit** the disorder both parent must either be **carriers** (Ff) or **sufferers** (ff).



The genetic diagram for cystic fibrosis shows that if **both** *parents are* **carriers** (Ff) *then there is a* **1 in 4** *chance of the child being a sufferer.*

Q1. *Using the diagram interpret the* **phenotype** *of the children in terms of percentage (%) chance.*

25% (Normal) (FF) Normal but carriers 50% (Ff) Sufferers 25% (ff)

You must describe their phenotype - don't simply give their genotype

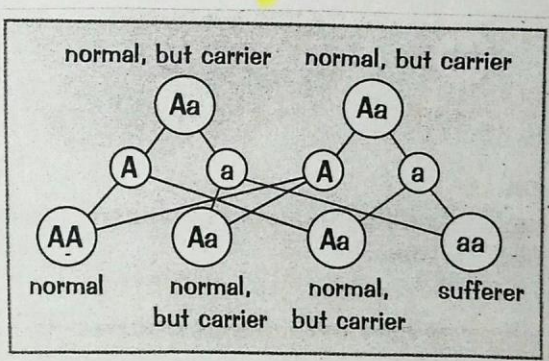
Sickle Cell Anaemia

This disorder causes the normally doughnut shaped **red blood cells** to become shaped like **sickles**. The sickle shaped blood cells get **stuck** in the capillaries, which **deprives** body cells of **oxygen**.

Symptoms of sickle cell anaemia include tiredness, painful joints and muscles, fever and anaemia.

Like most genetic disorders sickle cell is caused by inheriting **two recessive** alleles. The recessive alleles for sickle cell are **aa**. The normal allele is **A**.

If both parents are **carriers** for sickle cell the probability of each child suffering from the disorder is 1:4 – **25%**.
The ratio expected in the children is **3:1**, non-sufferer:sufferer.
When you see this ratio you know both parents are **carriers** (Aa) and have **two different alleles**.



However beware – the ratio 3:1 may be shown as a **1:2:1** ratio (normal:carrier:sufferer, but it still means the same thing.