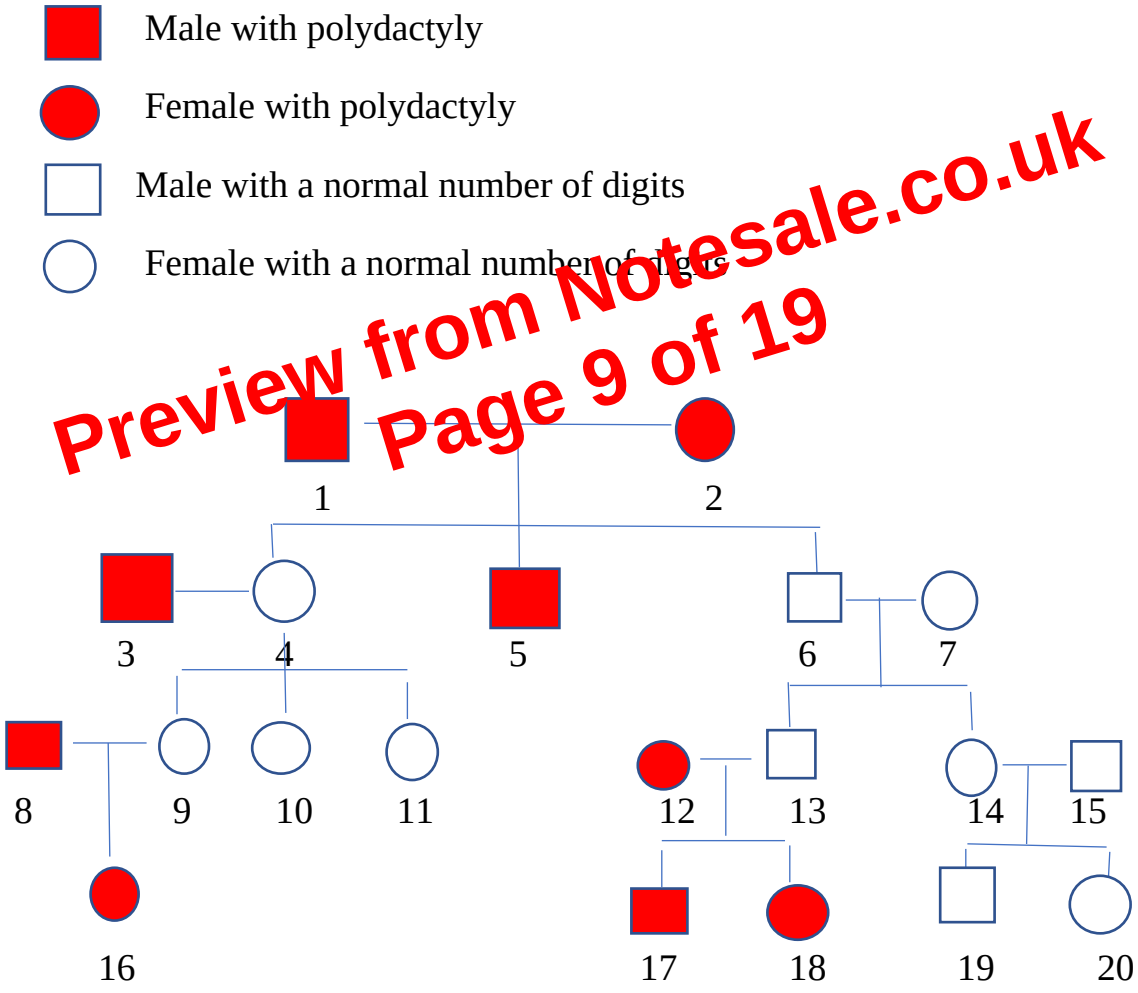
- The people with a normal number of digits must inherit 1 normal number allele from each parent, also people with a normal number of digits will pass 1 normal number allele to each of their children.
- We can work out that any person with polydactyly who has a normal number of digits must be heterozygous (child must have inherited 1 of their 2 normal number alleles from each of his parents).
- Individuals 1,2,3,16,17 & 18 must be heterozygous.
- Individuals 8 7 12 could be homozygous.
- It is impossible to distinguish between DD and Dd.



Pedigree showing the inheritance of polydactyly in a family

Hemophilia, etc. these characteristics are usually seen in men as compared to women. Females who carry only 1 recessive allele are carriers, but those who carry a homozygous recessive trait are affected by it. The Y chromosome is smaller than the X chromosome, so it contains fewer genes. This means that for some genes, a male will only have 1 allele of a pair present on his X chromosome. In males, the presence of the recessive trait in his X chromosome is sufficient for him to be affected by it.

HAEMOPHILIA

- Haemophilia is an inherited bleeding disorder where the blood does not clot properly. It is caused when blood does not have enough clotting factors. A clotting factor is a protein that controls bleeding.
- This results in people bleeding for a longer time after an injury, easy bruising, and an increased risk of bleeding inside joints or the brain.
- The allele for normal blood clotting is dominant and is given by the symbol (H).
- The gene is only found on the X chromosome, so a man needs to inherit only 1 allele of the gene to have the disease.
- The genotype for this is known as XhY. There is no allele on the Y chromosome.
- A woman with 2 X chromosomes would need to inherit 2 copies of the faulty allele, shown as XhXh.
- If a woman has only 1 copy of the hemophilia allele XH Xh, she will not have the disease because of the presence of the dominant H allele on one of her X chromosomes. However, she will be a carrier and can pass the disease to her children.
- Boys normally inherit the recessive allele from a carrier mother. It is possible for 2 healthy parents to have a son with hemophilia.
- For a girl to have hemophilia she would have to be a daughter of a hemophiliac father and a carrier mother.

- The thick mucus blocks the intestine, which causes poor absorption of nutrients and a low rate of growth.
- The mucus blocks the pancreatic duct so that enzymes from the pancreas cannot reach the small intestine. This affects the digestion of carbohydrates, lipids, and proteins.
- The mucus blocks the tubes leading from the testes so that most males with cystic fibrosis are infertile.

For a person to be infected with CF they must inherit a recessive allele from each parent, so both the mother & father must carry 1 recessive allele. Both parents will be heterozygous for cystic fibrosis.

Inheritance of cystic fibrosis

N = dominant normal allele resulting in the production of normal mucus.

N = recessive cystic fibrosis allele resulting in the production of viscous mucus.

Heterozygous non- sufferer = Nn

Genotypes of parents Nn Nn

Gametes N & n N & n

Genotypes of children female gametes

		XN	Xn
Male gametes	XN	NN	Nn
	Yn	Nn	nn

XNXN : XNXn : XNYn : XnYn

Female healthy : female healthy : healthy male : affected male