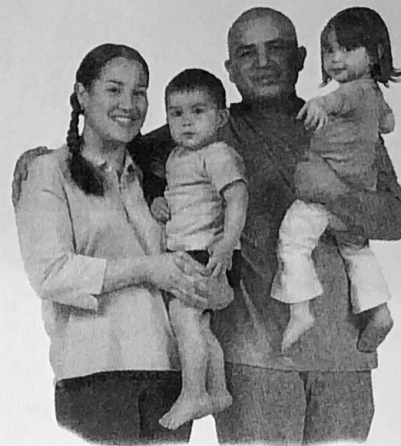


### Dominant allele in humans

A rare form of rickets in humans is determined by a **dominant** allele of a gene on the **X chromosome** (it is not found on the Y chromosome). This condition is not successfully treated with vitamin D therapy. The allele types, genotypes, and phenotypes are as follows:

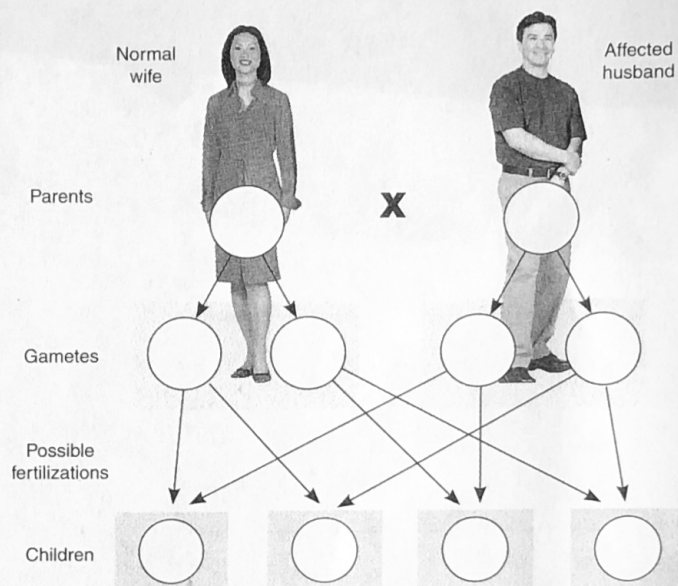
Allele types	Genotypes	Phenotypes
$X_R$ = affected by rickets	$X_RX_R, X_RX$	Affected female
$X$ = normal	$X_RY$	Affected male
	$XX, XY$	Normal female, male



As a genetic counselor you are presented with a married couple where one of them has a family history of this disease. The husband is affected by this disease and the wife is normal. The couple, who are thinking of starting a family, would like to know what their chances are of having a child born with this condition. They would also like to know what the probabilities are of having an affected boy or affected girl. Use the symbols above to complete the diagram right and determine the probabilities stated below (expressed as a proportion or percentage).

4. Determine the probability of having:

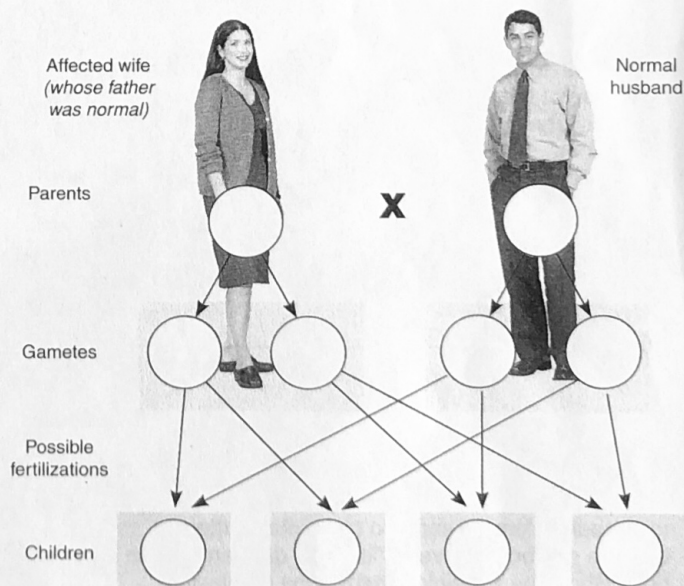
- (a) Affected children: \_\_\_\_\_
- (b) An affected girl: \_\_\_\_\_
- (c) An affected boy: \_\_\_\_\_



Another couple with a family history of the same disease also come in to see you to obtain genetic counseling. In this case the husband is normal and the wife is affected. The wife's father was not affected by this disease. Determine what their chances are of having a child born with this condition. They would also like to know what the probabilities are of having an affected boy or affected girl. Use the symbols above to complete the diagram right and determine the probabilities stated below (expressed as a proportion or percentage).

5. Determine the probability of having:

- (a) Affected children: \_\_\_\_\_
- (b) An affected girl: \_\_\_\_\_
- (c) An affected boy: \_\_\_\_\_



6. Describing examples other than those above, discuss the role of **sex linkage** in the inheritance of genetic disorders:

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