

Genetics

Geneticist use a Punnett Square to determine the probability of a person inheriting a particular gene.

A Punnett Square can be used as a predictive tool for couples wanting to start a family.

		parent genes	
Parent genes	X	child	child
	y	child	child

males have 'x' and 'y' chromosomes

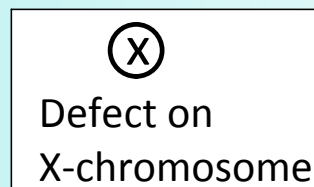
		Mother	
Father		X	X
	X	XX	XX
	y	Xy	Xy

females have 'x' and 'x' chromosomes

Colour blindness is a gene defect on the X-chromosome. To get colour blindness a male has the defect gene on X only. For a female to get colour blindness the gene must be on both X-chromosomes.

If the Female has one defect then she is a carrier.

Male
X y
not colour blind



Female
X X
not colour blind

 y
colour blind

 
colour blind

X 
female carrier

Determine the probability that a couple will have a child with colour blindness if

- a) the father is not colour blind and the mother is a carrier
- b) the father is not colour blind and the mother is colour blind
- c) the father is colour blind and the mother is a carrier
- d) the father is colour blind and the mother is not a carrier

Create the Punnett Square to show the possibilities of each child
 Determine the Probability of children, boys and girls being colour blind.

a) the father is not colour blind and the mother is a carrier

		mother is a carrier	
		x	⊗
father not colour blind	x	x x	x ⊗
	y	x y	⊗ y

Punnett Square is a table (looks like tic-tac-toe)

Probability of children
 colour blind = 1/4 or 25%

Probability of boys colour blind = 1/2 or 50%

- b) the father is not colour blind and the mother is colour blind
- c) the father is colour blind and the mother is a carrier
- d) the father is colour blind and the mother is not a carrier

⑤

female colour blind

	X	X
Male	X	X
	Y	Y

probability of girls being carriers: $\frac{1}{2}$ or 50%

probability of boys being colour blind: $\frac{1}{2}$ or 50%

⑥

Female carrier

	X	X
Male colour blind	X	X
	Y	Y

The probability of a girl being colour blind is $\frac{1}{2}$

The probability of being a boy as colour blind is $\frac{1}{2}$

⑦

	X	X
	X	X
	Y	Y

girls being carriers $\frac{2}{2}$ or 100%

Boys being colour blind or carriers $\frac{0}{2}$ or 0%