

4 **Purple-eyed fruit flies were mated to heterozygous red-eyed flies. If red is dominant deduce what the genotype and phenotype of the offspring were.**

Let R = red, r = purple.

Parent phenotypes
Parent genotypes

red Rr purple rr

We are told the red parent is heterozygous.

Gametes G₁

R r r

F₁ genotype
F₁ phenotype

Rr red rr purple

Half of the offspring have the genotype rr and therefore have purple eyes.

Half of the offspring have the genotype Rr and therefore have red eyes.

The ratio is 1 red-eyed : 1 purple-

5 **A mouse with grey fur was mated with a mouse with white fur. The grey mouse was heterozygous and the white mouse homozygous. Deduce which is the dominant allele if half the offspring had white fur.**

Since the white mouse was homozygous all of the offspring would have a white allele. If white was dominant then all the offspring would be white, but we are told that only half are. This means that grey must be the dominant allele. Let G = grey, g = white.

Parent phenotypes
Parent genotypes

grey Gg white gg

We are told the white mouse is homozygous but it has to be since the white allele is recessive.

Gametes G₁

G g g

We are told that the grey mouse is heterozygous.

F₁ genotypes
F₁ phenotypes

Gg grey gg white

Half of the offspring have the genotype gg and therefore are white.

Half of the offspring have the genotype Gg and therefore are grey.

The ratio is 1 grey : 1 white.

6 **A Quoll with blue eyes met a Quoll with green eyes and soon they had several baby Quolls. Blue is recessive to green. Some of the babies had blue eyes and some had green eyes. Deduce the proportion of each.**

Since blue is the recessive allele let G = green, g = blue.

Some of the F₁ had blue eyes and therefore must have had the genotype gg. This means that the green-eyed parent must have been heterozygous in order for it to give a g allele.

Parent phenotypes
Parent genotypes

green Gg blue gg

The green-eyed Quoll is heterozygous.

Gametes G₁

G g g

F₁ genotypes
F₁ phenotypes

Gg green gg blue

Half of the offspring have the genotype Gg and therefore are green-eyed.

Half of the offspring have the genotype gg and therefore are blue-eyed.

The ratio is 1 green : 1 blue.