

Unit 4.5 Handout 1 (4 pages total)

The Reproduction of Living Things

Brief #3: Traits and Genes (cont.)



Traits

You know that during sexual reproduction, an organism receives half of its chromosomes from a female parent and the other half from a male parent. This is why you don't look exactly like your mother or your father but are more of a combination of the two of them.

Each generation of offspring inherits traits from their parents. But what determines which traits are seen and which are not? For example, let's say that a male parent has blue eyes and a female parent has brown eyes. What factors determine what color eyes the offspring will have?



Traits can either be dominant or recessive. If a trait is dominant, it means that it is seen in the offspring. If a trait is recessive, it means that it is not seen. Many traits are made by a pair of genes. If a trait is dominant, it is shown like this: RR . If a trait is recessive, it is shown like this: rr . The chart below shows some common dominant and recessive traits.

So the blue eyes of a male parent is a recessive trait (rr), and the brown eyes of a female parent is a dominant trait (RR). Any offspring from these two parents will get one copy of the dominant gene (R) from their female parent and one copy of the recessive gene (r) from their male parent. The offspring will be Rr . In this case, the "R" stands for brown eyes, so the offspring will have brown eyes.

Traits

Dominant (RR)	Recessive (rr)
brown eyes	blue eyes
widow's peak	no widow's peak
six fingers	five fingers
freckles	no freckles

But what might happen if two people, each having one dominant gene for brown eyes and one recessive gene for blue eyes, reproduced? Their offspring would be either RR , Rr , or rr . Only the rr combination would have blue eyes.

If an organism has two copies of the same dominant or recessive gene, it is called purebred. If an organism has one dominant gene and one recessive gene for a trait, then it is called a hybrid.

Lesson 4.5: Life Science – Traits & Genes

The Reproduction of Living Things

Brief #3: Traits and Genes (cont.)



Punnett Square

A Punnett square is a diagram that illustrates all of the possible genetic combinations that can occur during sexual reproduction. Let's say that "T" stands for a dominant gene for tallness and that "t" stands for a recessive trait for shortness. The Punnett square below shows the possible outcomes. This pattern is called the dominant-recessive pattern.

		Height from Parent 1	
		T	t
Height from Parent 2	T	TT	Tt
	t	Tt	tt

The dominant-recessive pattern is not the only way that genes and their traits can work in an organism. Say, for instance, that both parents of an organism have two recessive traits for a gene. In that case, the genes would have dominance.

Let's say that two black and white cats mated. A black and white cat would have a recessive gene for whiteness and a recessive gene for blackness (bw). What color would the kittens be?

By looking at this Punnett square on the right, you can see the possible outcomes for the color of the kittens.

		black and white cat 1	
		b	w
black and white cat 2	w	bw	ww
	b	bw	bw

Sometimes when the parents of organisms have two recessive copies of a gene, the traits that are produced are a kind of blend of both. For example, pink flowers are often produced by the sexual reproduction of a white flower and a red flower.