

Chromosome Instructions

Trace how genes in chromosomes influence inherited traits.

8.13.B "describe the function of genes within chromosomes in determining inherited traits of offspring; and"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the sentences that explain how an offspring receives genes or alleles from its parents, and circle words or phrases that explain what genes do to influence traits.

How Traits Are Passed On

- ① Inside most body cells, chromosomes are long packages of DNA. DNA contains genes, which are sections with instructions for making proteins or regulating when proteins are made. Proteins help build and run an organism's cells. A gene's place on a chromosome is called its locus. In a rabbit, genes on chromosomes help direct features such as fur pigment, ear shape, and how some cells use nutrients. Genes do not act as tiny visible traits. They provide biological instructions that can influence traits.
- ② Most animals have chromosome pairs in their body cells. One chromosome in each pair came from the mother, and the other came from the father. The chromosomes in a pair carry genes for many of the same kinds of traits at matching loci. However, the versions of a gene can differ. These versions are called alleles. For example, a rabbit may inherit one allele related to fur pigment from each parent. The two alleles together affect which pigment-related instructions the rabbit's cells receive.
- ③ When rabbits produce offspring, reproductive cells carry one chromosome from each pair, rather than both. Which chromosome enters a reproductive cell is partly random. At fertilization, one reproductive cell from each parent joins, so the offspring receives a new pair of chromosomes. This process gives the offspring a combination of alleles from both parents. Its inherited allele combination can influence its traits, but environment also matters. Food, disease, and conditions can affect how traits develop. Therefore, genes within chromosomes help determine traits, but they do not always determine every outcome alone.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What is the function of a gene within a chromosome?

2 How can the two chromosomes in a pair carry different information related to the same trait?

3 Describe how fertilization gives a rabbit offspring chromosomes from both parents.

4 Why might an inherited allele combination not fully determine how a trait develops?

3 YOUR TURN _____ Your own words

Invent a fictional offspring trait, such as leaf color in a plant or coat texture in a mammal. In 3 or 4 sentences, describe how genes on chromosomes could give the offspring alleles from two parents, explain how those alleles could influence the trait, and name one environmental factor that could also affect trait development.

PART 1 • READ AND MARK

Underline the sentences that explain how an offspring receives genes or alleles from its parents, and circle words or phrases that explain what genes do to influence traits. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What is the function of a gene within a chromosome?	A gene is a section of DNA that contains instructions for making proteins or regulating when proteins are made. These instructions can influence traits.
2	How can the two chromosomes in a pair carry different information related to the same trait?	They carry genes for the same kinds of traits at matching loci, but the versions of a gene can differ. Different versions are called alleles.
3	Describe how fertilization gives a rabbit offspring chromosomes from both parents.	A reproductive cell from each parent joins at fertilization. Each reproductive cell carries one chromosome from each pair, so the offspring receives a new pair of chromosomes and alleles from both parents.
4	Why might an inherited allele combination not fully determine how a trait develops?	Environmental factors also affect trait development. Examples from the passage include food, disease, and other conditions.

PART 3 • YOUR TURN (SAMPLE ANSWER)

A fox kit receives one chromosome of a pair from its mother and one from its father, bringing alleles for coat texture. The gene instructions from its allele combination can influence proteins involved in hair growth, so its coat may develop a certain texture. Nutrition is one environmental factor that can also affect hair growth and coat development.

Accept answers that connect genes on chromosomes to protein-related instructions and traits. For the open response, accept any plausible fictional trait if the student explains inheritance from two parents, allele influence, and one environmental factor.