Genotype vs phenotype worksheet

4, 5, 6, 7, 8, 9, 10, 11, 12, HomeschoolPage 2 Each organism is a by-product of both its genetic makeup and the environment. To understand this in detail, we must first appreciate some basic genetic vocabulary and concepts. Here we present definitions of the terms genotype and phenotype, discuss their relationship and look at why and how we can choose to study them. What is the genotype definition? In biology, a gene is a section of DNA that encodes a trait. The exact distribution of nucleotide (each consisting of a group of phosphates, sugar and base) in the gene may differ between copies of the same gene. Therefore, the gene can exist in different forms in different organisms. These different forms are known as alleles. The exact fixed position on the chromosome that contains the specified gene is known as locus. The diploid organism either inherits two copies of the same allele or one copy of two different alleles from the parents. If a person inherits two identical alleles, their genotype is said to be homozygous in this locus. However, if they possess two different alleles, their genotype is classified as heterozygous for this locus. Alleles of the same gene are either autosomal dominant or recessive. The autosomal dominant allele will always be preferentially expressed by the recessive allele. The subsequent combination of alleles that a person possesses for a particular gene is their genotype. Examples of genotypesView of a classic example – eye color. The gene encodes the color of the eyes. In this example, the allele is brown or blue, with one inherited from the mother and the other inherited from the father. The brown allele is dominant (B) and the blue allele is recessive (b). If the child inherits two different alleles (heterozygous), then they will have brown eyes. For a child to have blue eyes, they must be homozygos for the blue allele of the eye. Figure 1: Inheritance chart details how a person can inherit blue or brown eyes depending on the allele carried out by his parents, with a brown allele the color of the eyes is dominant and the blue eye color of the allele is recessive. Other examples of the genotype are: The height of hair colorSoki sizesoching observable characteristics of the body is their phenotype. The key difference between phenotype and genotype is that while the genotype is inherited from the body's parents, the phenotype is not. While the phenotype has an effect on the genotype, the genotype is not equal to the phenotype. Phenotype is influenced by genotype and factors including:Epigenetic modificationsNewronical and lifestyle factors Figure 2: Flamingos are naturally white, these are the only pigments in the organisms they eat that cause them to become vibrant pink. Environmental factors that can affect the phenotype include nutrition, temperature, humidity and stress. Flamingos are a classic example of how the environment affects the phenotype. Although they are famous for being bright pink, the color is white – the pink color is caused by pigments in organisms in their diet. The second example is the color of a person's skin. Our genes control the amount and type of melanin we produce, but exposure to UV radiation in sunny climates darkens existing melanin and encourages increased melagenesis and thus darker skin. Observing the phenotype is simple – we will look at the external characteristics and characteristics of the body and draw conclusions about them. However, genotype observation is a little more complex. Genotyping is the process by which differences in an individual's genotype are analyzed by biological meanings. The resulting data can then be compared to the other person's sequence or sequence database. Previously, genotyping only allowed partial sequences to be obtained. Now, thanks to significant technological advances in recent years, state-of-the-art genome sequencing. Figure 3: Workflow showing the different stages of whole genome sequencing (WGS). (WGS) allows you to get whole sequences. An efficient process that is increasingly affordable, WGS relies on the use of high-intercept sequencing techniques such as real-time single molecule sequencing (SMRT) to identify the raw sequence of nucleotides that make up the body's DNA. WGS is not the only way to analyze the body's genome - different methods are available. Understanding the relationship between genotype and phenotype can be extremely useful in different research areas. A particularly interesting area is pharmacogenomics. Genetic changes can occur in liver enzymes required for the metabolism of drugs such as CYP450. Therefore, a person's phenotype, which is their ability to metabolize a particular drug, may vary depending on the form of the gene that encodes the enzymes they possess. For pharmaceutical companies and physicians, this knowledge is key to determining recommended drug dosages in different populations. The use of genotypes and phenotyping techniques in tandem appears to be better than using genotypic tests alone. In a comparative clinical pharmacogenic study, the multiplexing approach identified greater differences in the ability to metabolize drugs than predicted by genotyping alone. This has important implications for personalised medicine and stresses the need for caution when relying solely on genotyping. Using animal models such as mice, scientists can genetically modify the body so that it no longer expresses a specific gene – known as knockout mice. By comparing this animal's phenotype with the wild type phenotype (i.e. the phenotype that exists when the gene has not been removed), we can investigate the role of certain genes in the delivery of certain phenotypes. The Mgi initiative, dedicated to the mouse genome, has developed a database of thousands of phenotypes that can be created and studied and genes that need to be to produce each specific phenotype. A set of genes in our DNA that responsible for a specific characteristicSeservable characteristics of the body and characteristicsDigentigentic, such as WGSBrowping outside the body Gene sequences the body hasGenotype, PLUS epigenetics and environmental factorsJesNogenes coding eye colorPeople with brown eyes eyes