PEEBEDU Environmental Effects on Phenotype Lab

Name: _____ **Period:** _____ **Date:** _____

> Open **peebedu.com** and navigate to **Environmental Effects on Phenotype Lab**. Read the introduction popup, which explains how environmental conditions influence gene expression and can lead to **phenotypic plasticity**. Then click **Begin Experiments** to enter the lab.

Free Response Questions

Question 1 — Conceptual Analysis

> **Simulation Task:** *In Experiment 1, tap each planter to plant a genetically identical hydrangea seed, then click* **Grow All Plants***. Observe how flower color changes across the pH gradient from 4.0 (Very Acidic) to 8.5 (Very Alkaline). Record the flower colors at pH 4.0, pH 6.5, and pH 8.5.*

(A) (1 pt) **Describe** the relationship between soil pH and flower color observed across the genetically identical hydrangea plants grown in the pH gradient.

(B) (1 pt) **Explain** why genetically identical hydrangea plants produce blue flowers at pH 4.0 and pink flowers at pH 8.5.

(C) (1 pt) **Predict** whether selecting and breeding only blue-flowered hydrangeas over many generations would increase the proportion of blue-flowered offspring when all plants are grown in alkaline soil (pH 8.5).

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *In Experiment 2, set the genotype to ZZ and run trials at three different incubation temperatures: 26°C, 30°C, and 34°C. Record the sex ratio of offspring at each temperature.*

(A) (1 pt) **Describe** the relationship between incubation temperature and the sex ratio of offspring produced from eggs with the same ZZ genotype.

(B) (1 pt) **Explain** why eggs with identical ZZ genotypes develop into males at one incubation temperature but into females at a different incubation temperature.

(C) (1 pt) **Draw** a diagram showing how a single ZZ genotype produces different sex phenotypes at two different incubation temperatures, including the genotype, the two temperatures, and the resulting phenotypes at the molecular or cellular level.

Draw your diagram here.

(D) (1 pt) **Explain** how a sustained increase in average environmental temperature could change the sex ratio of a reptile population with temperature-dependent sex determination over many generations.

5.5.A.1

© PEEBEDU — Free for educational use.