Genes-Are-Us

SCIENCEOLYMPIAD

Exploring the World of Science

Eagle STEM Scrimmage

Team Name	
Team Number	
Student(s) Name	

Station 1

Use the vocabulary list to answer all parts.

Word Bank:
genes • alleles • genotype • phenotype • chromosomes • DNA • homozygous • heterozygous • dominant • recessive

Part A — Matching

Write the correct term.

1. _____ The *genetic instructions* for a trait
2. _____ A specific *form* of a gene (B vs b)
3. _____ The *observable trait*
4. _____ The *letter combination* that represents alleles
5. _____ Alleles that are the same (AA or aa)
6. _____ Alleles that are different (Aa)
7. _____ A trait that shows even if only one allele is present
8. _____ A trait that only appears when two copies are present
9. _____ Thread-like structures in the nucleus that carry DNA
10. _____ The molecule that carries genetic information

Part B — Short Answers (Reasoning)

11. Explain the relationship between **genes**, **alleles**, and **traits**.

12. Why is it impossible to determine a person's genotype *just by looking at them* in most cases?

Part C — Diagram

Draw:

- A chromosome
- DNA double helix on the chromosome
- Label "gene" on one section of DNA
  (Leave space)

Station 2

Part A — Inherited or Learned?

Write **I** (inherited) or **L** (learned).

1. ____ Hair texture
2. ____ Playing soccer skillfully
3. ____ Tongue rolling ability
4. ____ Knowing how to use a phone
5. ____ Dimples
6. ____ A parrot learning to say words
7. ____ Skin color

Part B — Instinct or Learned Behavior?

Write **IN** (instinct) or **L** (learned).

8. ____ Sea turtles moving toward the ocean after hatching
9. ____ A child brushing their teeth
10. ____ Birds building nests
11. ____ A dog learning "stay"

Part C — Explanation

12. Why are **instincts** considered inherited?

13. Choose ONE learned behavior from above and explain how practice or environment affects it.

Station 3

For each organism, name:

- One structural or behavioral adaptation
- How it helps survival
- What habitat it belongs to and *why that habitat requires that adaptation*

1. Polar Bear

Adaptation:

How it helps:

Habitat & Why:

2. Camel

Adaptation:

How it helps:

Habitat & Why:

3. Cactus

Adaptation:

How it helps:

Habitat & Why:

4. Owl

Adaptation:

How it helps:

Habitat & Why:

Challenge Question:

Why do organisms in different habitats often develop *different* adaptations, even when they share some features (like both having eyes)?

Station 4

Part A — Dominant or Recessive?

Write **D** or **R**.

1. Free earlobes _____
2. Attached earlobes _____
3. Tongue rolling _____
4. Cleft chin _____
5. ACHOO syndrome _____
6. No dimples _____

Part B — Data Interpretation

Below is a family chart showing which individuals can roll their tongue (R) and which cannot (NR).

- T (rolling) is dominant to t (non-rolling)

Person	Can Roll Tongue?
Mom	R
Dad	R
Child 1	NR
Child 2	R

7. What must Child 1's genotype be? _____

8. Because Child 1 is NR, what does this tell you about BOTH parents' genotypes?

Part C — Explanation

9. Explain why a person with a recessive phenotype must have a homozygous recessive genotype.

Station 5

Trait: **Widow's peak (W)** is dominant to **straight hairline (w)**.

Parents: **Ww × Ww**

Part A — Fill in the Punnett Square

	W	w
W	_____	_____
w	_____	_____

Part B — Genotype Ratio

- WW: _____
- Ww: _____
- ww: _____

Part C — Phenotype Percentages

- Widow's peak: _____%
- Straight hairline: _____%

Part D — Explanation

Why does a Ww individual have a widow's peak even though they also carry the "w" allele?

Station 6

Trait: **Freckles (F)** is dominant to **no freckles (f)**.

Two parents **both have freckles** and have **one child with no freckles**.

Part A

    1. What must the child's genotype be? _____

Part B

    2. What must BOTH parents' genotypes be? (Explain your reasoning.)

Part C — Punnett Square

Fill in the Punnett square for the parents' genotypes.

	F	**f**
F	_____	_____
f	_____	_____

Part D

    3. Probability their child has freckles: _____%
    4. Probability their child does NOT have freckles: _____%

Station 7

Answer **TRUE or FALSE** and explain why each statement is correct or incorrect.

1. ____ "If a trait is recessive, it will never appear if one parent is dominant."
   Explanation:

2. ____ "Two parents with straight hairlines (ww × ww) can have a child with a widow's peak."
   Explanation:

3. ____ "A heterozygous individual always shows the dominant phenotype."
   Explanation:

4. ____ "Two dominant phenotypes can still produce a recessive phenotype child."
   Explanation:

5. ____ "Phenotype is influenced by genotype, but genotype is never influenced by phenotype."
   Explain:

Station 8

Using the allele keys:

- H = Hitchhiker's thumb (dominant)
- h = Straight thumb (recessive)

Part A — Phenotypes → Possible Genotypes

1. Hitchhiker's thumb (dominant):
   - Genotype #1: _____
   - Genotype #2: _____

2. Straight thumb (recessive):
   - Genotype: _____

Part B — Create Your Own Scenario

Write your own Punnett square cross using H and h.

- Choose any two parents' genotypes
- Draw the Punnett square
- Write genotype and phenotype ratios

Parents: _____ × _____
Punnett Square:

Genotype ratio: _____
Phenotype ratio: _____

Part C — Reasoning

Why is designing a Punnett square helpful for predicting offspring traits?