Name: Date: Section:

_____

Chi-Square Activity: Statistical Analysis in Biology

Understanding Chi-Square: When Data Matches Expectations

Phase 1: ENGAGE (3 minutes)

Getting Started:

Open peebedu.com and navigate to Chi-Square Test Practice

The simulation presents random genetic scenarios.

Essential Question:

How do we determine if observed genetic data matches expected patterns? _____

Key Understanding:

The chi-square test helps us decide if differences are due to:

- Random chance (accept hypothesis)
- Real biological factors (reject hypothesis)

Phase 2: EXPLORE (8 minutes)

Understanding the Components

Work through several problems, focusing on meanings rather than calculations.

For Each Problem:

1. **The Terms:**

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- Expected = What theory _____

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1. **The Decision:**

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- Large χ^2 means data _____ from expectations

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1. **Pattern Recognition:**

After trying 3-4 problems:

- When do you usually ACCEPT? _____

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Phase 3: EXPLAIN (7 minutes)

Understanding the Meaning

1. **What Chi-Square Tells Us:**

- It measures the SIZE of the difference between observed and expected
- It accounts for sample size
- It gives us confidence in our conclusions

1. **Biological Significance:**

When we REJECT a hypothesis, it means:

1. **Real Examples:**

- **Accepted hypothesis:** Genes segregating normally
- **Rejected hypothesis:** Genes might be linked, selected against, or showing unusual inheritance

1. **The Critical Value:**

This number represents:

- The boundary between "probably random" and "probably not random"
- Usually set at 95% confidence
- Different for different types of problems

Phase 4: EVALUATE (2 minutes)

Assessment

    1. **Interpreting Results:**

A very small chi-square value (near 0) means:

    1. **Biological Insight:**

If testing a 3:1 ratio gives a large chi-square, the genes might be:

Final Reflection:

Why do biologists need statistical tests instead of just looking at data? _____