Name: _____   Date: _____

Section: _____

Reproductive Isolation Activity

How New Species Form

Phase 1: ENGAGE (8 minutes)

Getting Started: Open peebedu.com and navigate to Natural Selection and Speciation Simulation

First Look: What two traits do the creatures have? _____

- Trait 1: _____ (ranges from _____ to _____)

Click 'Run 10 Generations' - what happens? _____

Think About It: How might a population of dogs become two different species over time?

Essential Question: How do new species form when populations are separated? _____

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Phase 2: EXPLORE (18 minutes)

Mission 1: Natural Selection in Action

Set up your first experiment:

- Population: 150

- Mean color: 128 (gray)

- Variation: 30

- Shapes: 50% each

Add a predator that hunts dark creatures:

- Enable predator for Population 1

- Set target to 0 (black)

- Set accuracy to 60

Data Table - Selection Pressure:

Observations:

- Which color survived best? _____

- Draw the population change:

Generation 0: Generation 50: _____ [Box] [Box]

Mission 2: Geographic Separation

Now model what happens when populations split:

Reset simulation Run 10 generations Click 'Split Population' Set different environments:

- Pop 1: Light background, predator hunts dark

- Pop 2: Dark background, predator hunts light

Tracking Separated Populations:

- ———

Key Discovery: What happened to the two populations?

Mission 3: Mating Preferences

Reset and explore how mate choice affects evolution:

Test these scenarios:

Random mating (None) Like prefers like (Assortative) Opposites attract (Disassortative)

Shape Evolution Data: ————- 50%

Phase 3: EXPLAIN (15 minutes)

Understanding Speciation

Natural Selection Process:

Fill in what happens at each step: _____ "' Variation exists → _____ →

Some survive better → _____ →

Population changes "'

Geographic Barriers:

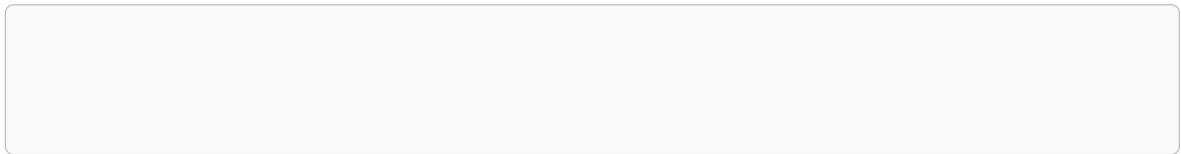Draw and label how one species becomes two:

[Drawing space]

Step 1: Original population Step 2: Barrier forms (river, mountain) Step 3: Populations adapt differently Step 4: Can't interbreed = New species!
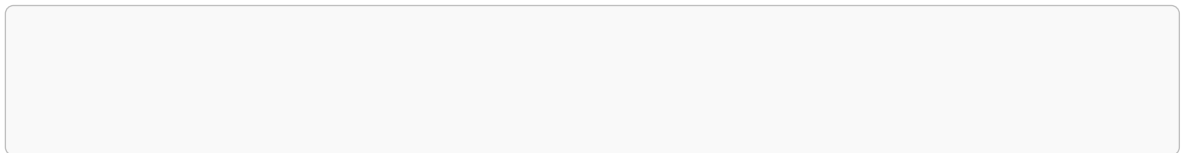
Reproductive Isolation:

Set color threshold to 40. Try to breed:

- Light creature (color 200) + Dark creature (color 50)

- Color difference: _____

Real Examples:

Match the simulation to real life: _____ "' Geographic split → _____ Color differences → _____ Shape preferences → _____ Can't mate → _____ "'

Options: Grand Canyon squirrels, Firefly flashes, Bird plumage, Different species

Phase 4: ELABORATE (7 minutes)

Apply Your Knowledge

Design an Experiment:

Question: Does population size affect speciation speed? _____

Your setup:

- Small population: _____ individuals

- Same selection pressure: _____

Predict Outcomes:

Starting with gray creatures in a forest that's becoming snowier:

- Without predators: _____

- If split by a river: _____

Human Impact:

How might human activities cause speciation? _____

- Habitat fragmentation: _____

- Introducing new predators: _____

Phase 5: EVALUATE (7 minutes)

Check Your Understanding

Sequence the Steps:

Number these in order (1-5): ___ Populations can no longer interbreed ___ Geographic barrier separates population ___ Different traits favored in each area ___ Original population varies ___ Populations become distinct species

Analyze the Graph:

If you see populations diverging like this:

What caused the split? _____ When did they become different species? _____

Problem Solving:

Island birds: Color 100, eat medium seeds Mainland birds: Color 180, eat small seeds Max mating difference: 50

- Can they still mate? _____

- Explain: _____

Make Connections:

Explain why islands have so many unique species:

Design Challenge:

Create settings to show fastest speciation:

- Population size: _____

- Mating preference: _____

Exit Reflection:

Three things I learned about speciation:

One question I still have: _____

- Darwin's finches

- African lake cichlids

- Hawaiian honeycreepers

- Present findings to class

Create a Story:

- Write about one creature's lineage

- Show evolution over generations

- Include environmental changes

- Illustrate with drawings

Data Analysis:

- Download CSV data

- Create graphs in spreadsheet

- Calculate rate of change

- Present patterns found

Key Terms to Remember:

- **Natural selection:** Survival of best adapted

- **Speciation:** Formation of new species

- **Reproductive isolation:** Can't interbreed

- **Adaptation:** Trait that helps survival

- **Population:** Group of same species

- **Generation:** One breeding cycle