

Pre-Lab Information

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| Purpose | Use a virtual lab to explore how the phenotypes within a population change over time. |
| Time | Approximately 30 minutes |
| Question | How does natural selection change the phenotypes within a population over time? |
| Hypothesis | If the color of the light in the environment changes, then the population of the light red walking beans increases because the red light makes the light red walking beans more difficult to see. |
| Variables | <i>Independent Variable:</i> the color of the light in the environment <i>Dependent Variable:</i> the population of the light red walking beans |
| Summary | You will explore how phenotypes in a population change over time by collecting different phenotypes of beans on an alien planet. An equal number of dark red walking beans and light red walking beans will be distributed in an area to represent the two different phenotypes. Your job is to collect and eat as many beans as you can in a set amount of time over the course of nine days. The surviving beans will reproduce at night. The first three days represent typical days on the alien planet. On Day 4, a volcano erupts, casting a red haze over the entire planet. Due to light pollution from the volcano, it becomes more difficult to see the light red walking beans on Days 4–6. However, on Days 7–9, the light pollution has cleared. You will collect data to see how the phenotypes of each bean type change after the volcano erupts. |
| Scenario | Planet Oopsa is experiencing volcanic activity, and Mount Kaboom is set to erupt. A species of land animal named zocco roams the planet eating walking beans. There are two phenotypes of beans: dark red walking beans and light red walking beans. When Mount Kaboom erupts, red ash is thrown into the air, covering Oopsa and causing red light pollution. The zocco continue to eat any walking beans they can find. Eventually, the red dust settles back to the surface of Oopsa and the red light pollution goes away. What effect, if any, did the red light pollution have on the population of walking beans? |

Lab Procedure

Step 1: Be a zocco and eat beans on Day 1.

- Eat as many walking beans as you can before the sun goes down.
- Eat fast; Oopsa spins very quickly on its axis, so you have only one minute to eat.
- In Table A, enter the number of dark red walking beans and light red walking beans you ate on Day 1.
- Wait for the sun to rise while repopulation occurs.

Step 2: Be a zocco and eat beans on Days 2 and 3.

- Repeat Step 1 for two more days. In Table A, be sure to enter the number of dark red walking beans and light red walking beans you ate on Days 2 and 3.

Step 3: Be a zocco and eat beans on Day 4, the day Mount Kaboom erupts.

- Eat as many walking beans as you can before the sun goes down.
- Eat fast; Oopsa spins very quickly on its axis, so you have only one minute to eat.

Student Guide (continued)

- c) In Table B, enter the number of dark red walking beans and light red walking beans you ate on Day 4.
- d) Wait for the sun to rise while the repopulation occurs.

Step 4: Be a zocco and eat beans on Days 5 and 6.

- a) Repeat Step 3 for two more days. In Table B, be sure to enter the number of dark red walking beans and light red walking beans you ate on Days 5 and 6.

Step 5: Be a zocco and eat beans on Day 7, the day the pollution goes away.

- a) Eat as many walking beans as you can before the sun goes down.
- b) Eat fast; Oopsa spins very quickly on its axis, so you have only one minute to eat.
- c) In Table C, enter the number of dark red walking beans and light red walking beans you ate on Day 7.
- d) Wait for the sun to rise while the repopulation occurs.

Step 6: Be a zocco and eat beans on Days 8 and 9.

- a) Repeat Step 5 for two more days. In Table C, be sure to enter the number of dark red walking beans and light red walking beans you ate on Days 8 and 9.

Step 7: Compile the data.

- a) Add the total number of dark red walking beans you ate for Days 1 through 3. Enter the total number in Table D. Repeat this process for the light red walking beans.
- b) Add the total number of dark red walking beans you ate for Days 4 through 6. Enter the total number in Table D. Repeat this process for the light red walking beans.
- c) Add the total number of dark red walking beans you ate for Days 7 through 9. Enter the total number in Table D. Repeat this process for the light red walking beans.

Step 8: Calculate the mean number of beans eaten per three-day period.

- a) Divide the total number of dark red walking beans found in Table D (for Days 1–3) by 3 to get the mean, or average. Enter the mean for the dark red walking beans in Table E. Repeat this process for the light red walking beans.
- b) Divide the total number of dark red walking beans found in Table D (for Days 4–6) by 3 to get the mean, or average. Enter the mean for the dark red walking beans in Table E. Repeat this process for the light red walking beans.
- c) Divide the total number of dark red walking beans found in Table D (for Days 7–9) by 3 to get the mean, or average. Enter the mean for the dark red walking beans in Table E. Repeat this process for the light red walking beans.

Student Guide (continued)

Data

Record your data either in your lab notebook or in the tables below.

Table A

| No Pollution | Day 1 | | Day 2 | | Day 3 | |
|--------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans |
| | | | | | | |

Table B

| Red Light Pollution | Day 4 | | Day 5 | | Day 6 | |
|---------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans |
| | | | | | | |

Table C

| No Pollution | Day 7 | | Day 8 | | Day 9 | |
|--------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans |
| | | | | | | |

Table D

| Summation Table | Days 1–3 | | Days 4–6 | | Days 7–9 | |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans |
| Totals | | | | | | |

Table E

| Mean Table | Days 1–3 | | Days 4–6 | | Days 7–9 | |
|-------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans | Dark red walking beans | Light red walking beans |
| Mean Values | | | | | | |