Breeding for balance • Population growth

**Year 9**

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| **Name:** |  |

# Population growth simulation

Animals use many different types of reproductive strategies to ensure that their offspring will survive to the next generation. Some animals produce many offspring, hoping that they survive to the next generation. Other animals produce only a few offspring. Both these approaches can affect the total size of a population. You can model how quickly a population changes by simulating the number of offspring that individual parents produce.

Assumption 1: Each member of the population is able to mate and produce offspring.

Assumption 2: The parents only survive to produce a single set of offspring.

Assumption 3: Each parent finds a mate outside of the population.

**Aim**

To compare how populations change when an animal produces many offspring or few offspring.

**Equipment**

* 6-sided die (to represent parents who produce many offspring)
* A counter (to represent parents who produce few offspring)
* Permanent marker
* Calculator

Optional: Computer data program (e.g. Excel) to calculate random numbers and the number of offspring in each generation.

**Procedure**

1. The counter can be used to represent parents who can produce up to 2 offspring in each generation. Mark one side of the counter ‘1’ and the other side of the counter ‘2’. This represents the number of offspring born to each set of parents.
2. Flip the counter and record the number of offspring born in generation 1 (either 1 or 2) in Table 1. This will also be the total in that population.
3. To identify the number of offspring born in generation 2, flip the counter for each individual in generation 1. For example, if there are two individuals born in generation 1, flip the counter twice—once for each individual.
4. Record the number on the counter for each flip in generation 2 and the total number of individuals now in the population in Table 1.
5. Repeat steps 2-4 until you reach four generations.
6. The die can be used to represent the parents who can produce up to 6 offspring in each generation. Toss the die to determine the number of offspring born in generation 1. Record this value in Table 2.
7. To identify the number of offspring born in generation 2, toss the die for each individual in generation 1. For example, if there are five individuals born in generation 1, toss the die five times—once for each individual.
8. Record the number for each toss of the die in generation 2 and the total number of individuals now in the population in Table 2.
9. Repeat steps 7-9 until you reach four generations.
10. Draw one chart displaying the results for both types of population growth. Create a legend or label that clearly identifies each reproductive approach.

**Results**

Table 1: Population growth in species that have few offspring (flip the counter)

|  |  |  |
| --- | --- | --- |
| **Generation** | **Number of offspring born to each member of the population** | **Population total in each generation** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

Table 2: Population growth in species that have many offspring (toss the die)

|  |  |  |
| --- | --- | --- |
| **Generation** | **Number of offspring born to each member of the population** | **Population total in each generation** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

**Discussion**

1. Describe the shape of the population graph for animals that have few offspring.
2. Describe the shape of the population graph for animals that have many offspring.
3. Predict how the size of the populations could change if each reproductive strategy was continued.
4. Describe the possible impacts on the habitat if a population continued to produce many offspring each generation.
5. Compare the challenges of animal parents caring for many offspring versus few offspring.
6. Three assumptions are made in this simulation. Select one assumption and predict how the results could change if the assumption was incorrect.