



Population Planner App – Mini-Lesson

Free download on the Google Play or iTunes Stores

Overview:

Population Planner is a free, engaging, easy-to-use app for students and others to explore how populations can grow or decline over time. Students can change the initial population, death rate, and birth rate to see what happens over 100 years.

Materials:

- Mobile device(s) able to download free apps.
- Adapter to connect to projector (if using just one device)
- Handout (optional)

Recommended Ages:

4th-12th grade

Time Needed:

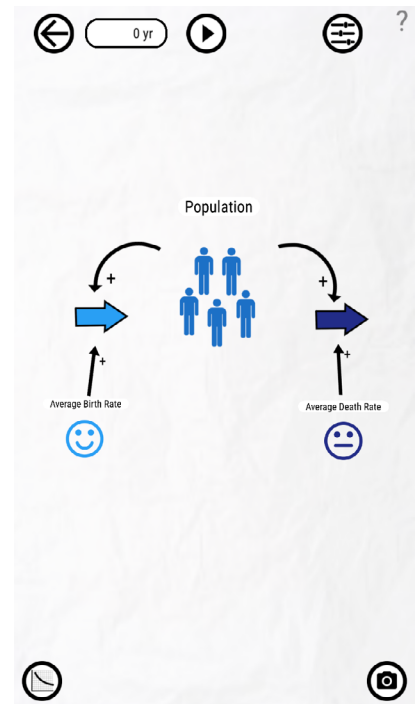
30-60 minutes

Connections to Curricular Standards:

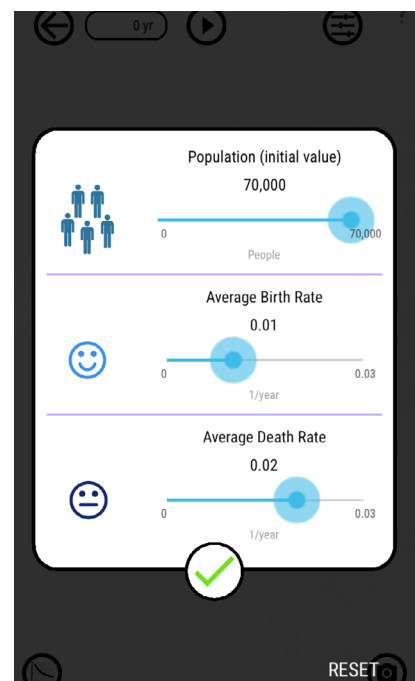
- National Social Studies Themes: II. Time, Continuity, and Change and III. People, Places, and Environments
- Common Core Math, CCSS.MATH.CONTENT.7.EE.B.3 Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- State and national Math standards, See article, [“Thinking Systemically About Common Core Mathematical Practice Standards.”](#)
- Next Gen. Science, MS-ESS4-4...how increases in human population and per-capita consumption of natural resources impact Earth’s systems

Suggested Instructional Sequence:

- Define terms, population, birth rate and death rate.
- Work through “The Story” in the app, either as a class or independently.
- Pause and discuss strategies used to increase the population of the colony to approximately 100,000 people.
- Using the handout, continue experimenting with “The Model” to consider different scenarios for population growth, decline or stability.
- Discuss students’ reflections from their handouts.
- Extend the exploration using the optional extension on the handout to look at trends for different countries’ populations. Discuss questions such as,
 1. How do various population trends in individual countries



Population Planner Model Screen



Population Planner Controls (sliders)

- impact the workforce, the economy, political influence, and availability of resources?
2. How does the global population impact other Earth systems?

Additional Ideas and Connections

- Algebra I or II: Use the model with resulting graphs to explore the concept of exponential growth or decay and the underlying equations.
- Surface, practice and discuss related mathematical practices.
 1. Make sense of problems and persevere in solving them.
 2. Reason abstractly and quantitatively.
 3. Construct viable arguments and critique the reasoning of others.
 4. Model with mathematics.
 5. Use appropriate tools strategically.
 6. Attend to precision.
 7. Look for and make use of structure.
 8. Look for and express regularity in repeated reasoning.
- Extend student learning with one or more of the optional related resources.

Related Curricular Resources:

See the Creative Learning Exchange website to download lessons, purchase materials and access additional online simulations for:

- [The Shape of Change – The Mammoth Game](http://www.clexchange.org/cleproducts/shapeofchange.asp), an exploration of patterns of extinction. Book available from the Creative Learning Exchange <http://www.clexchange.org/cleproducts/shapeofchange.asp>
- [Population Dynamics: Connecting Past, Present and Future](http://www.clexchange.org/curriculum/complexsystems/populationdynamics/), a set of four simulations that examines an important period of development within American history. Available from the Creative Learning Exchange at <http://www.clexchange.org/curriculum/complexsystems/populationdynamics/>
- Chapter 5, The Disappeared, [Model Mysteries](http://www.clexchange.org/curriculum/modelmysteries/), a lesson to build your own population/resource model to explore population dynamics in a broader context. Available from the Creative Learning Exchange at <http://www.clexchange.org/curriculum/modelmysteries/>
- “Japans falling birth rate posing serious problems for the economy, <http://www.independent.co.uk/news/world/asia/japans-falling-birth-rate-posing-serious-problems-for-economy-a7770596.html>

Acknowledgments and Sources:

- Lesson written by Anne LaVigne for the Creative Learning Exchange, <http://www.clexchange.org>
- BTN, <http://learnwithbtn.com/>
- Potash, Jeff, “Thinking Systemically About Common Core Mathematical Practice Standards.” http://static.clexchange.org/ftp/documents/implementation/IM2014_CommonCoreMath.pdf

Population Planner – Populations in Space (and on Earth)

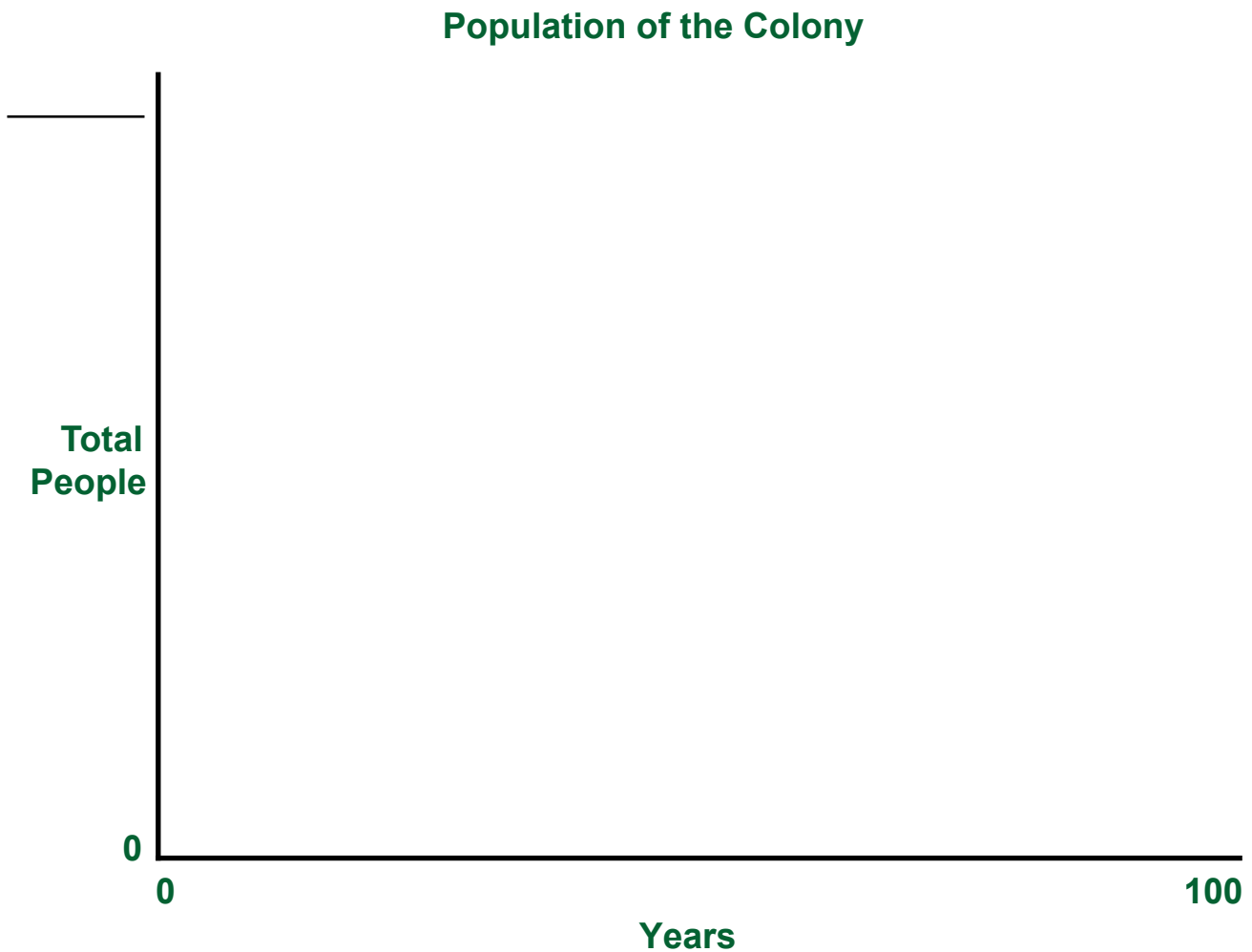
Name: _____

Population: _____
(initial value)

Average Birth Rate: _____

Average Death Rate: _____

Label and draw your most successful run on the graph.



Reflection

What worked best and was also realistic to increase the population to the desired level? Why?

What other situations could you study using this app?

Extension

Instructions

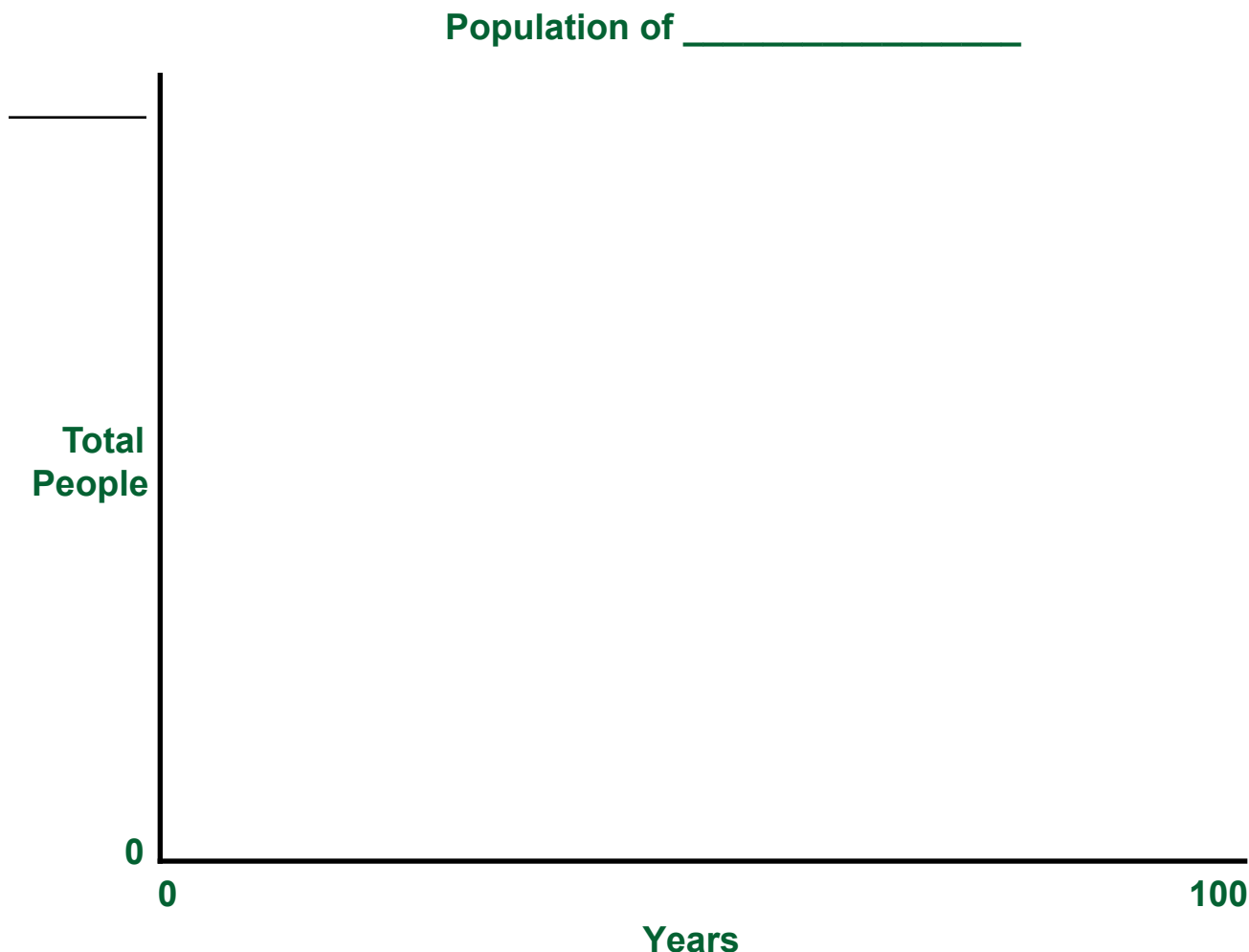
Run the model for each of the scenarios, which are based on current birth and death rates. Then try some of your own ideas. You can find the data for other countries here: <http://apps.who.int/gho/data/view.main.CBDR2040>. To keep the numbers small, we'll imagine that one person in the model is really 10,000 people in the population.

Scenario 1: Japan

Crude birth rate: 8.4/1000 or 0.008

Crude death rate: 9.5/1000 or 0.01

Initial population: $127,000,000/10000 = 12,700$ model people (input 12,600 for app)



How many people were there at the end? (remember to multiply the number in the app by 1000.) _____

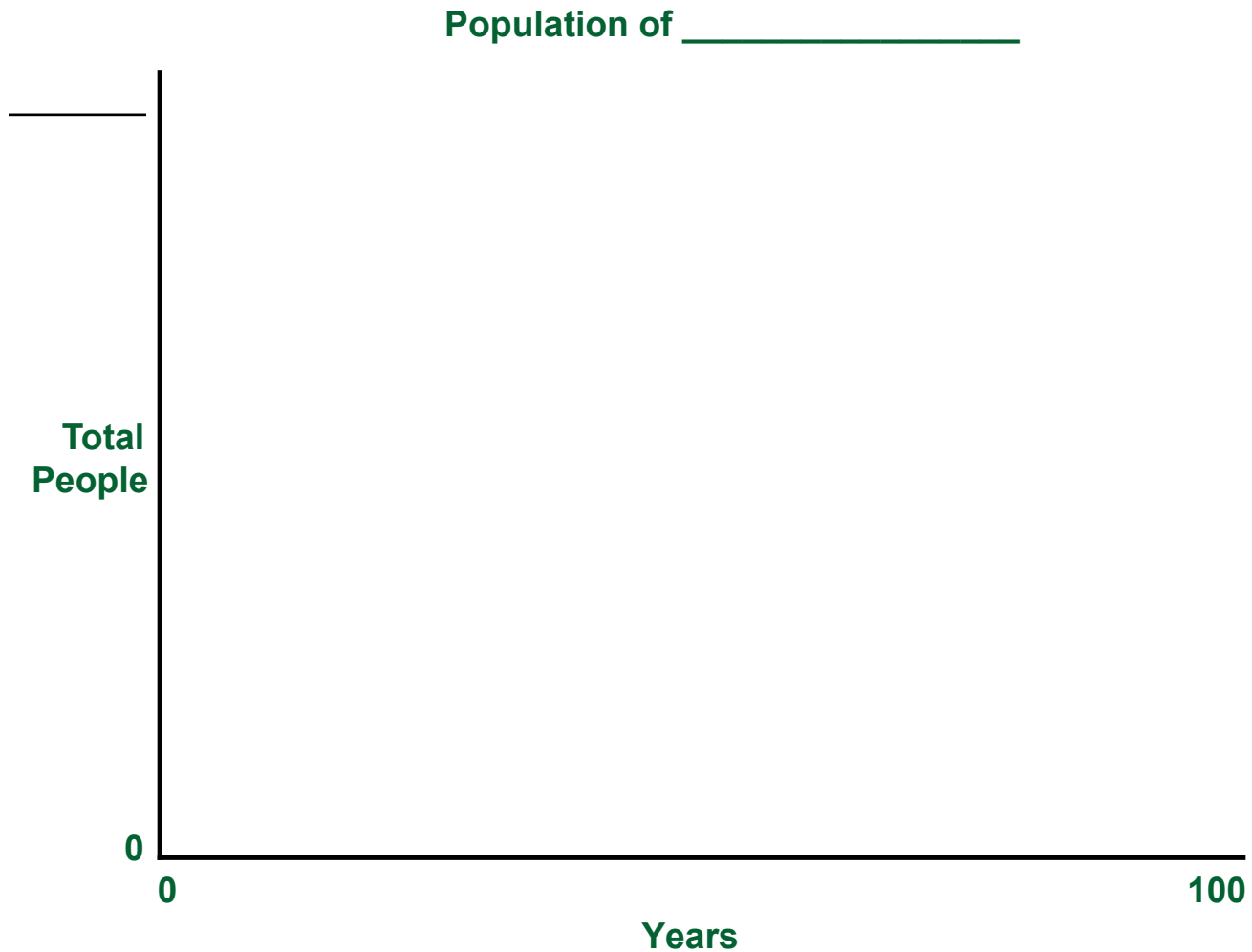
How might the population trend for this country affect it over time?

Scenario 2: United States

Crude birth rate: 13.2/1000 or 0.013

Crude death rate: 8.4/1000 or 0.008

Initial population: $323,000,000/10000 = 32,300$ model people (input 32,200 for app)



How many people were there at the end? (remember to multiply the number in the app by 1000.) _____

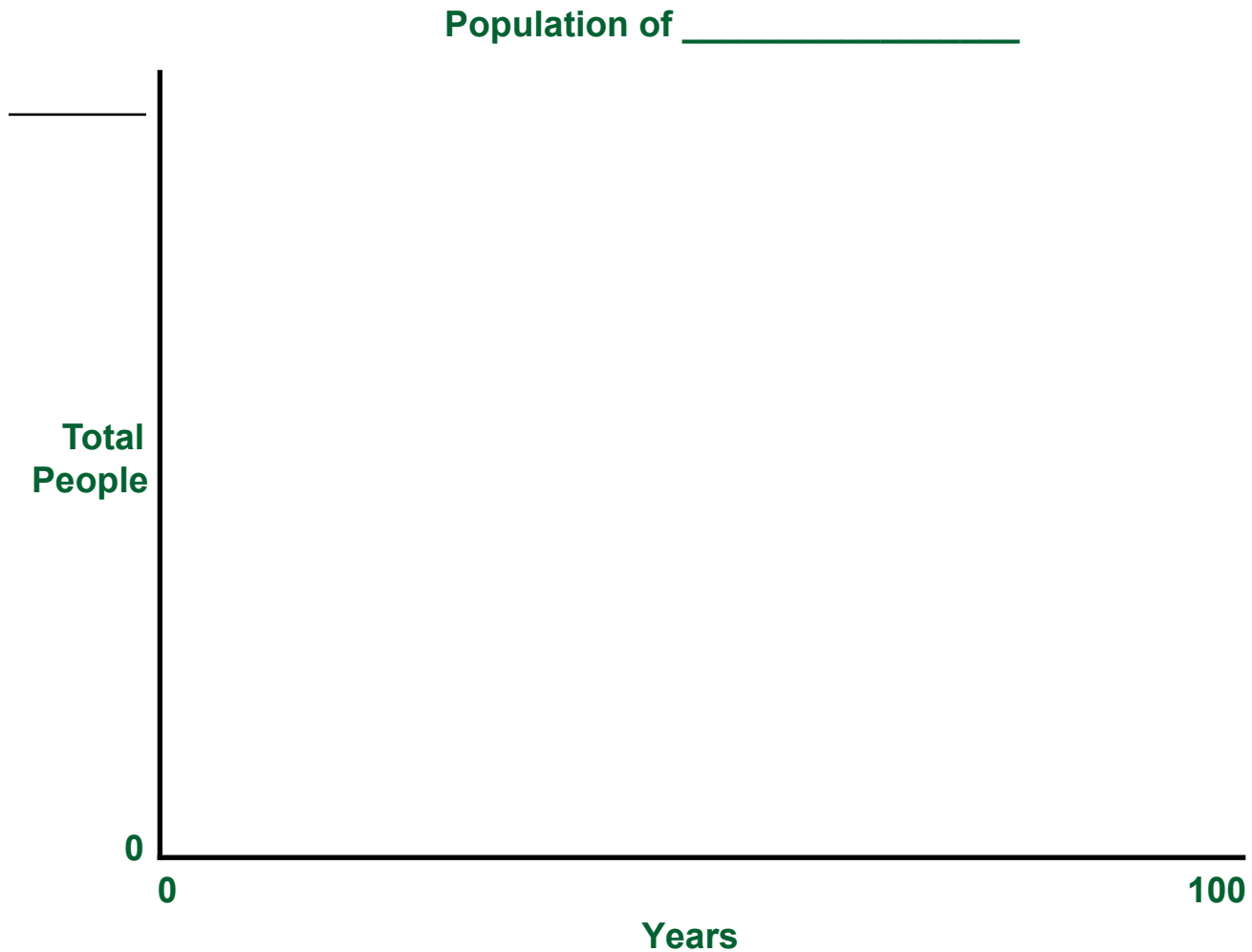
How might the population trend for this country affect it over time?

Scenario 3: Rwanda

Crude birth rate: 35.2/1000 or 0.035

Crude death rate: 6.4/1000 or 0.006

Initial population: $11,920,000/10000 = 1192$ model people (input 1400 for app)



How many people were there at the end? (remember to multiply the number in the app by 1000.) _____

How might the population trend for this country affect it over time?

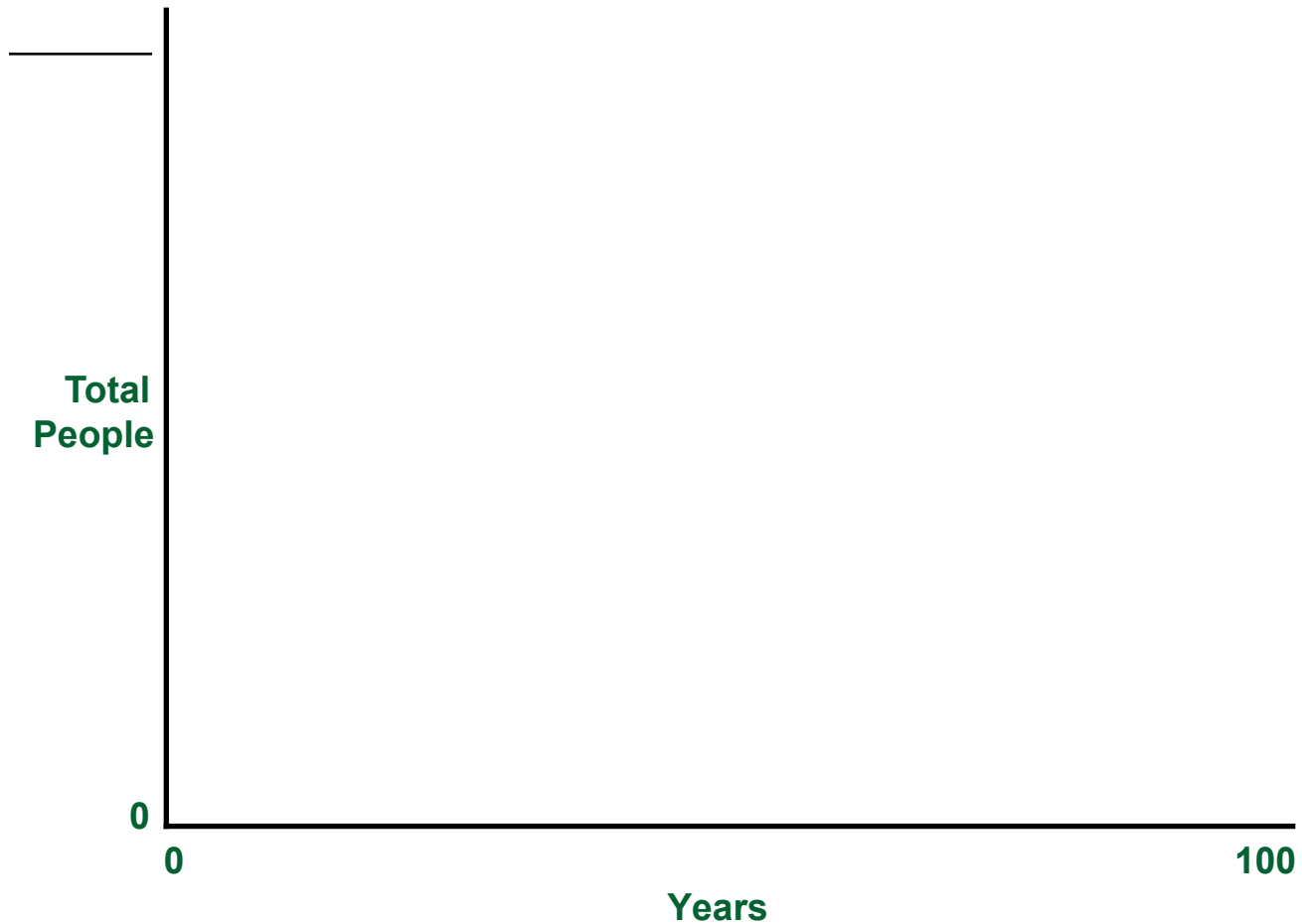
Scenario 4: Choose another country _____

Crude birth rate:

Crude death rate:

Initial population: _____/10000 = _____ model people

Population of _____



How many people were there at the end? (remember to multiply the number in the app by 1000.) _____

How might the population trend for this country affect it over time?

Available at www.clexchange.org

Working in K-12 education to develop Systems Citizens

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