APES Unit 4: Populations Review Packet

Part 1: Surface Layer

Population Biology Concepts

1. What is the difference between k and r- selected species? What type of growth do these species usually exhibit? What type of survivorship curve do they have?
2. Diagram exponential growth
    a. What is biotic potential?
3. Diagram logistic growth.
    a. What is carrying capacity?
    b. What is environmental resistance?
4. How do you calculate the following. **Remember you will have no equations**.
    a. Birth rate
    b. Crude Birth rate
    c. Death rate
    d. Crude Death rate
    e. Crude immigration
    f. Crude emmigration
    g. **Population Growth Rate**
    h. **Doubling Time**
    i. **Percent Change**
5. What is a density dependent limiting factor? A density independent limiting factor?
6. What are the three dispersion patterns, and why do they occur?
7. Describe the method of the capture-mark-recapture study.

Human Population Growth

1. How many people are on the planet? What are the three most populous nations?
2. Define TFR (total fertility rate). What is replacement level fertility?
    a. What countries are above replacement level fertility? What are their family planning policies?
    b. What countries are below replacement level fertility? What are their family planning policies?
3. Which time period has experienced the most population growth?
4. Diagram and label the demographic transition model.
    a. Which stage experiences the highest population growth?
    b. Is this transition universal?
5. What are the three different types of age structure pyramids?
    a. Which structure indicates growth? Stability? Zero growth?
6. What factors influence the total fertility rate in a country? Which countries generally have a higher total fertility rate? Lower TFR?
7. How does affluence of a country affect environmental impact? Think IPAT...
8. **Don't forget your population math...**

Part 2: Application - Multiple Choice

1. Populations have all of the following characteristics EXCEPT:
    a. Density
    b. Dispersion
    c. Habitat
    d. Gene pool
    e. Size

2. A population has a growth rate of 2% per year. How long will it take for the population to double?
    a. 70 years b. 40 years c. 35 years d. 15 years e. 2 years

3. A population cycle that is marked by regular increases and decreases in its numbers is correctly said to be:
    a. Boom-and-bust
    b. Irruptive
    c. Stable
    d. Logistic
    e. Irregular

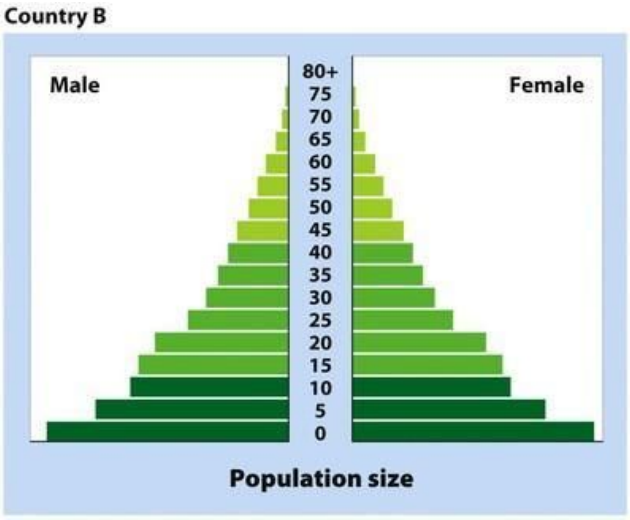
4. When a population encounters environmental resistance it is most likely to
    a. Continue its high growth rate
    b. Mutate to form and continue growing
    c. Slow down its growth rate
    d. Move to a higher growth rate
    e. Have no effect on the growth rate

5. According to the theory of demographic transition, countries move through phases in which order?
    a. Stable growth, rapid growth, slow growth, declining growth
    b. Rapid growth, slow growth, stable growth, declining growth
    c. Slow growth, declining growth, rapid growth, stable growth
    d. Slow growth, rapid growth, stable growth, declining growth
    e. Stable growth, rapid growth, declining growth, slow growth

6. Which of the following does NOT support the theory that humans can devise ways to expand their carrying capacity on Earth?
    a. The development of CFC's for use in refrigeration
    b. The development of hydraulic fracturing to reach natural gas reserves
    c. The use of arrows for hunting animals
    d. The use of horse driven plows
    e. The use of waste methane

7. A metropolitan region of 100,000 people has 2,000 births, 500 deaths, 200 emigrants, and 100 immigrants over a 1 year period. Its population growth rate is
    a. 1.2%
    b. 1.4%
    c. 1.6%
    d. 1.8%
    e. 2.0%

Use the following age structure diagram to answer question 9.

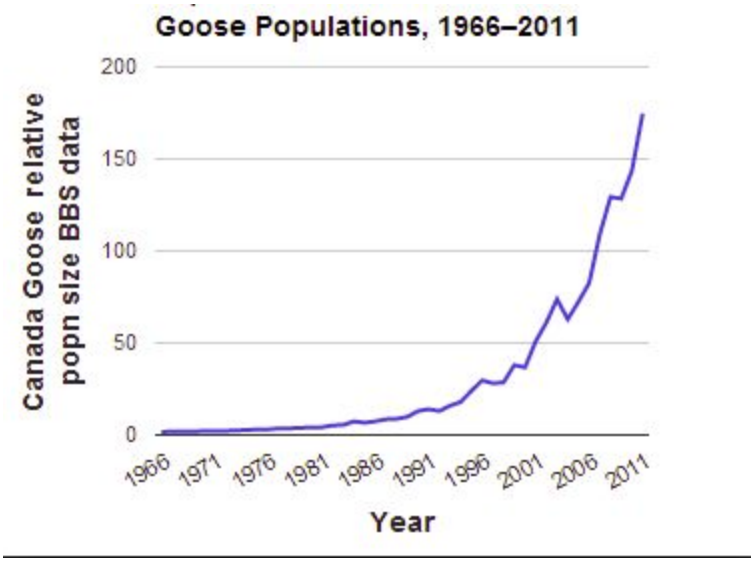


8. A country with an age structure diagram like the one shown is most likely experiencing
    a. A high life expectancy
    b. Slow population growth
    c. A short doubling time
    d. A low infant mortality rate
    e. Replacement level fertility

9. As the size of a white tailed deer population increases,
    a. The carrying capacity of the environment for white tailed deer will be reduced
    b. A volcanic eruption will have a greater proportional effect than it would on a smaller population
    c. The effect of limiting resources will decrease
    d. The number of gray wolves, a natural predator of white tailed deer will increase
    e. White tailed deer are likely to become extinct

10. Which is NOT a true statement based on the logistic growth model?
    a. Population growth is limited by density dependent factors
    b. Future population growth cannot be predicted mathematically
    c. Population growth slows as the number of individuals approaches the carrying capacity
    d. A graph of population growth produces an S-shaped growth curve over time

11. The following graph shows population growth of Canadian geese in Ohio between 1966 and 2011



This graph can best be described as:

a. An exponential growth curve
b. A logistic growth curve
c. A stochastic growth curve
d. Oscillation between overshoot and die off
e. Approaching carrying capacity

12. Which of the following have contributed to increased family planning worldwide?

i. Women's education
ii. Increased income
iii. Advertising campaigns

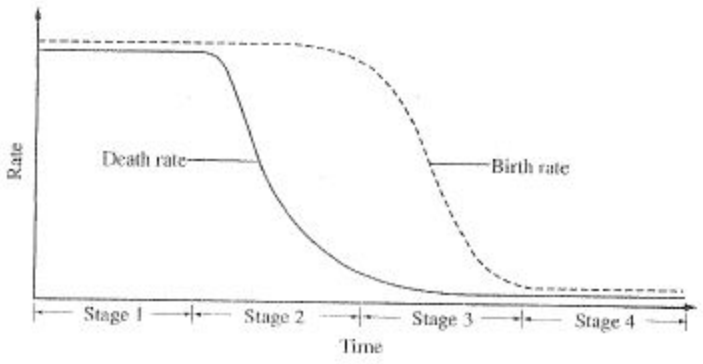
a. I and II only
b. I and III only
c. II and III only
d. I and III only
e. I, II, and III

13. Which of the following are exhibited by k-selected organisms

i. Slow maturation
ii. Many small offspring
iii. Reproduction occurs later in life

a. I only
b. II only
c. III only
d. I and II only
e. I and III only

15. During which stage of the demographic transition shown below does a population begin to experience an explosive increase in growth?



a. Stage 1
b. Stage 2
c. Stage 3
d. Stage 4
e. After stage 4

Part 3: Extra Math Practice

1. A village of 20, 000 people has 2,000 births and 500 deaths. What is the growth rate for this village?

2. A small country of 700, 000 people has 45,000 immigrants and 13,000 emigrants. They also experience 16,000 deaths and 35,000 births. What is the growth rate of this small country?

    A. How many years will it take for this country to double its population?

3. At the end of 2002, there were 1,284.53 million people living in China. China is the third largest country in the world with an area of 9.6 million square kilometers. **YOU CAN USE A CALCULATOR HERE….**

    A. China has 130.04 million hectares of land under cultivation. What is the average amount of cultivated land in sq km that supports each person? (100 hectares = 1 sq km = 247 acres)

    B. At the end of 2002, there were 502 million urban residents. What percent of the total population were living in cities?

    C. At the end of 2002, there were 661.15 million males in China. What percentage of the total population were males?

    D. In 2002, 16.47 million babies were born in China. What was the birth rate (as a percentage and per 1000)?

E. In 2002, 8.21 million people died in China. What was the death rate (as a percentage and per 1000)?

F. What was the total overall growth rate of China's population in 2002?

G. Using the rate from the previous question, how many years will it take for China's population to double?