APES -VS- EVERYBODY

APES Unit 3 Study Guide

Ultimate Review Packet (3.1 - 3.3)

3.1 - Generalists & Specialist Species

a. **Describe** the difference between specialist species and generalist species: specialist species have a very narrow ecological niche or specific food and habitat requirements, while generalists have a very broad ecological niche or a very wide range of food and habitat resources

b. **Explain** whether specialists or generalist species would be advantaged in a grassland ecosystem that is frequently disrupted by fires: generalist species would be advantaged in this ecosystem because they would be more likely to readily adapt to a new food or habitat resource if their preferred food or habitat resources were destroyed by fire

3.2 - r-selected & K-selected Species

a. **Describe** the reproductive strategy of r-selected species: producing a high number of offspring to compensate for the fact that not many of them will survive due to low energy invested in parental care

b. **Identify** THREE characteristics of r-selected species: quick to reach sexual maturity, low parental care, produce large number of offspring

c. **Describe** the reproductive strategy of K-selected species: producing a low number of offspring and investing a high level of parental care to ensure offspring survive

d. **Identify** THREE characteristics of K-selected species: slow to reach sexual maturity, high level of parental care, produce few offspring at a time, longer lifespans

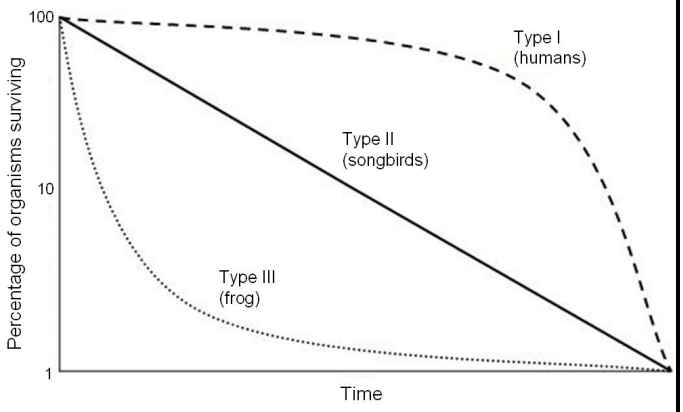
e. How can you remember the difference between r-selected and K-selected parents?:r for run away (little parental care) K for Care (high parental care)

f. **Explain** why r-selected species are more likely to become invasive species than K-selected species: r-selected species reproduce rapidly, allowing their populations to grow quickly, causing increased competition for limited food or habitat resources with K-selected species whose populations grow more slowly due to lower biotic potential and higher levels of parental care

3.3 - Survivorship Curves

a. **Define** survivorship: the percentage of individuals in a given species still surviving at any point in the typical species lifespan

b. Plot the three survivorship curves on the blank axis below. Be sure to add axis labels:



c. **Identify** a characteristic and example of each of the three survivorship types
   i. Type I - large, K-strategists such as whales, humans, or other mammals
   ii. Type II - smaller K-strategists such as birds or rodents that may be prey for larger predators
   iii. Type III - r-strategists that produce many offspring, but offer little parental care such as frogs, insects, or plants

APES Unit 3 Ultimate Review Packet (3.4 - 3.6)

3.4 - Carrying Capacity

a. **Define** carrying capacity: max. number of individuals of a given species that an ecosystem can support
b. **Describe** the factors that determine carrying capacity for a population: competition for limiting resources such as food, water, or shelter determine a population's carrying capacity since members of the population can't survive without these resources
c. **Explain** the concept of overshoot and die off, using a population of deer as an example: overshoot occurs when the deer population exceeds carrying capacity due to too many fawns being born. Die off occurs when some of the fawns don't survive due to limited food resources or increased predation with the larger population size

3.5 - Population Growth & Resource Availability

a. **Define** and provide an example of density-dependent factors: factors that limit population size as density increases; ex: competition for food, water, habitat, disease outbreak, predation
b. **Define** and provide an example of density-independent factors: factors that limit population size regardless of density; ex: natural disasters like drought, forest fire, etc.
c. **Describe** and provide an example of each of the three types of population distribution:
    i. Uniform: organisms spread out at consistent or regular intervals; ex: nesting birds or large mammals that defend a certain territory range
    ii. Random: organisms spread randomly based on seed dispersal such as trees
    iii. Clumped: organisms that cluster or congregate together; ex: schools of fish, herd/pack mammals that gain protection from predators or hunt together
d. **Identify** the type of growth populations can exhibit briefly when limiting resources are available in abundance: exponential growth
e. **Explain** why populations in natural ecosystems can't sustain this model of growth for long**:** limiting resources becomes scarce and population growth begins to slow, eventually reaching a carrying capacity when the ecosystem can't support any additional members of the population
f. **Identify** the model of growth that populations exhibit in natural ecosystems with limited resources: logistic growth

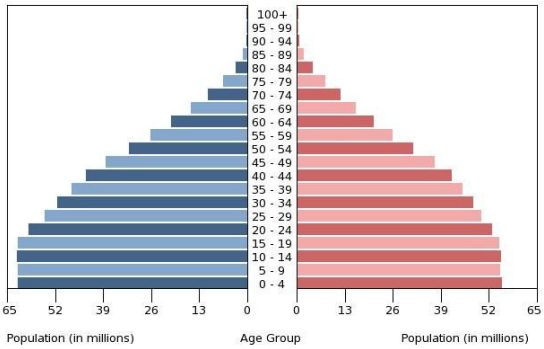
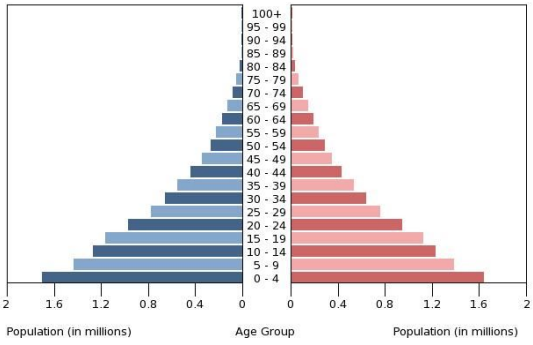
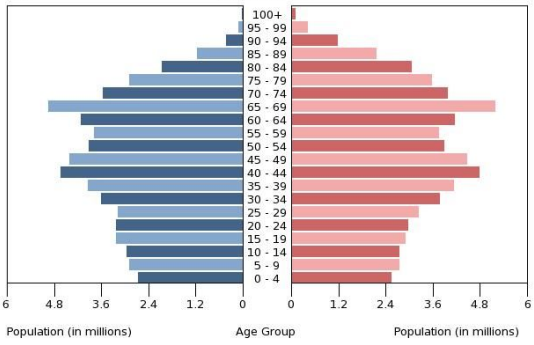
3.6 - Age Structure Diagrams

a. **Define** the term age cohort and **identify** the three key age cohorts used for interpreting age structure diagrams: age cohorts are groups of similarly aged individuals in a population
    i. Pre-reproductive age cohort: 0-14 years old; Reproductive age cohort: 15-44 years old; Post-reproductive age cohort: 45 years +
b. **Explain** what an age structure diagram with a larger portion of individuals in the pre-reproductive age cohort than any other age cohorts can tell you about the population: this indicates a high birth rate and high population growth rate. It also indicates a less developed country that may rely on child labor in an agrarian economy and or has fewer educational/economic opportunities for women
c. **Explain** what an age structure diagram with a slightly larger pre-reproductive age cohort than reproductive age cohort can tell you about the population: population is still growing, but birth rate is likely declining and population growth is slowing. Country is likely becoming industrializing, with increase access to health care, education, and increased per capita GDP
d. **Explain** what an age structure diagram with roughly equal pre-reproductive and reproductive age cohorts can tell you about the population: population growth is very slow, approaching or at a stable population size, economy is industrialized and birth rate has declined as women have more educational and economic opportunities.

3.6 Age Structure Diagrams - Continued

f. **Explain** what an age structure diagram with a greater portion of individuals in reproductive and post-reproductive age cohorts than pre-reproductive age cohorts can tell you about the population: birth rate has declined dramatically and population growth may even be negative. The country is highly developed and has widespread access to healthcare, leading to high life-expectancy

g. **Identify** the largest age cohort, **describe** the population growth rate, and provide an economic or societal characteristic of each of the following age structure diagrams:

	Largest age-cohort: pre-reproductive (slightly larger than reproductive) Growth rate: slow to moderate pop. growth	Economic/societal characteristic: developing/industrializing economy, increasing access to health care, education, decreasing death rate
	Largest age-cohort: pre-reproductive much larger than reproductive & post Growth rate: high birth rate and high pop. growth rate	Economic/societal characteristic: less-developed country, likely with high poverty and or agrarian economy, high birth rate due to low access to education for women and family planning, high death rate and infant mortality rate, low access to health care/clean water
	Largest age-cohort: post-reproductive; both reproductive & post larger than pre-reproductive Growth rate: negative	Economic/societal characteristic: highly developed, affluent country, high access to health care leading to high life-expectancy, high educational and economic opportunities to women/high access to family planning resources leading to low birth rate

APES Unit 3 Ultimate Review Packet (3.7 - 3.8)

3.7 - Totally Fertility Rate (TFR)

a. **Define** TFR: average number of children a woman in a population will give birth to in her lifetime
b. **Identify** THREE factors that influence TFR and for each, **describe** how the factor impacts TFR:
   1. Age of first child birth - the earlier the age of first childbirth for women the higher the TFR
   2. Agrarian/farming society - higher TFR due to value of child labor
   3. Less educational access for women - higher TFR due to earlier marriage/less reproductive health knowledge
   4. Cultural/religious values favoring larger families - increase TFR

c. **Explain** TWO reasons that developed nations typically have lower TFR than developing nations: as their economies industrialize, there's less demand for child labor on family farms, increased educational opportunities for women causing them to delay having children to pursue schooling or careers, increased access to family planning resources leading to fewer unplanned pregnancies or delayed age of first childbirth for women

d. **Describe** an approach that a national government may take to decrease TFR: public education campaigns to increase awareness of and access to family planning knowledge and or resources, micro-credit or business loan opportunities for women who delay having children, harsh tax penalties for families that have more than a specified number of children

3.8 - Population Dynamics

a. **Define** the terms Crude Birth Rate (CBR) and Crude Death Rate (CDR): number of births and deaths, respectively, per 1,000 people in a population
b. What is the formula for calculating percent growth rate of a country using CBR and CDR?
   (CBR - CDR)/10 = % growth rate
c. **Calculate** the global population growth rate using the CBR and CDR data from 2019:
   CBR: 17.89 CDR 7.52
   (17.89 - 7.52)/10 = 1.037%
d. What is the rule of 70? 70/growth rate % = doubling time of a population in years
e. **Calculate** the doubling time of the United Stats, based on its 2019 CBR (11.4) and CDR (8.7)
   (11.4 - 8.7)/10 = 0.27% growth rate → 70/0.27% growth rate = 259.26 years
f. **Describe** Malthusian theory and **explain** why Malthus's prediction didn't come true: Malthusian theory is the idea that Earth's population was growing exponentially, but food supply was growing linearly, leading to a food shortage that would cause famines and die off in the human population. Malthus didn't account for the agricultural advancements of the green revolution that increased Earth's food supply and carrying capacity for humans
g. **Describe** the relationship between infant mortality rate and replacement level fertility. Infant mortality rate increases replacement-level fertility since children dying during infancy leads to parents having more total children in order to replace them.
h. Explain why developed nations have lower infant mortality and replacement level fertility rates: higher access to clean drinking water and health care means fewer children die during infancy in developed nations. This lowers replacement level fertility since families are less likely to have additional children to replace those dying during infancy.
i. Define GDP and **describe** what it indicates about a country: total market value of all finished goods and services produced in a country; the higher GDP, the more developed the country is and the higher the standard of living for its population

APES Unit 3 Ultimate Review Packet (3.9)

3.9 - Theory of Demographic Transition

a. Summarize the basic transition human populations go through in the Theory of Demographic Transition: over time countries undergo industrialization which leads to a falling death rate, rapid population growth, then a falling birth rate and stabilization of population size

b. **Describe** the birth rate, death rate, population growth rate, and economic/societal characteristics of countries during each phase of transition:

Phase 1	Birth rate: high Death rate: high Growth rate: low or none	Cause for birth/death rate changes: low access to health care and clean drinking water leads to high death rate, high IMR & need for child labor leads to high birth rate Economic/societal characteristics: agrarian economy, less developed, low educational and economic opportunities for women
Phase 2	Birth rate: high Death rate: declining Growth rate: rapidly increasing	Cause for birth/death rate changes: increasing access to clean water and health care decreases death rate while birth rate stays high due to cultural momentum and or lack of educational or career opportunities for women Economic/societal characteristics: industrializing economy with increasing manufacturing and service jobs, rising GDP but wealth growth concentrated in cities/industrial regions
Phase 3	Birth rate: declining Death rate: low Growth rate: slowing or stabilizing	Cause for birth/death rate changes: increased educational, career opportunities for women/family planning access leads to declining birth rate, increasing affluence delays first childbirth Economic/societal characteristics: developed/industrialized economies with majority of pop. working in manufacturing or service sector, high per capita GDP, TFR approaching replacement-level fertility
Phase 4	Birth rate: very low Death rate: very low Growth rate: none or negative	Cause for birth/death rate changes: affluence/education/career opportunities for women and high access to family planning decrease TFR below replacement-level fertility, leading to negative growth rate Economic/societal characteristics: highly developed economy, high affluence/per capita GDP, aging population due to high quality health care system and long life expectancy