

2023 AP HUGE Collaborative Rubric

- Keep adding bullet points if you have another idea!
- Add a ~~strikeout~~ if a response is totally off the mark and make a helpful note* why.
- Keep the color schemes for visual organization's sake.



FRQ SET #1

QUESTION 1

1. The rate of natural increase (RNI), also known as the natural increase rate, helps geographers assess annual population growth or decline.

a. Define the concept of RNI. (1pt)

- Rate of natural increase is the percentage that the population is expected to increase within a given year through birth/death rates only.
- Rate of natural increase is a measurement of population growth that includes subtracting crude birth rate from crude death rate within a country, *and not taking into consideration factors such as immigration and emigration. The formula used to calculate RNI is $RNI = (CBR - CDR) / 10$.

b. Describe how a country may have a negative RNI. (1pt)

- When the birth rate falls below the death rate, *as a country reaches stage 5 of the DTM. **I bet students will want to respond only with this (likely not accepted).*
- A country may have a negative RNI if the birth rate is low/below the replacement rate of 2.1 to maintain the current population number of said country. An example of this is Italy/Japan.
- In countries experiencing war or ethnic/political conflict, the death rate may be higher than the birth rate, leading to a negative RNI.
- If a country is experiencing a pandemic or a widespread disease, the death rate may be higher than the birth rate, leading to a negative RNI.
- More deaths than births lead to a negative RNI.
- ~~If the birth rate in a country is low, there will be fewer new individuals entering the population, which can lead to a negative RNI.~~ **Rate is different than total #.*

c. Compare one difference between RNI and the total fertility rate as indicators of population change. (1pt)

- Rate of natural increase is the percentage that the population is expected to increase within a given year, whereas the TFR is the number of babies that a woman is expected to have within her childbearing years.
- While the RNI shows a percentage growth rate for a population using birth and death rates, the TFR does not take into account death rates that can contribute to greater changes in a population's RNI.
- ~~RNI is generally an indicator of the total change in population over a period of a single year, while TFR takes into account a much longer period of time since it looks at average births/women over their entire period of childbearing years. It would be difficult to use TFR to measure population change on a year to year basis.~~ **TFR can be calculated based on the current population of women and the number of children they have. It is*

not necessary to wait until they are 45 to find out “their” number.”

d. Explain ONE reason why RNI in urban areas may vary significantly from RNI in rural areas in the same country. (1pt)

- Urban areas tend to have higher rates of educated (post-secondary) citizens than rural areas, including educated women. Women with access to education tend to have fewer children than women with less access to education, as typically seen in rural areas.
- Urban areas tend to have easier access to medical care and contraceptives than rural areas of NIC and LDC countries.
- In LDCs large segments of the population in rural areas are still working in the primary sector of food production, such as subsistence farming, and families need more children in order to have more “sets of hands” to help out on the farm.
- Rural-to-urban migration reduces the number of children being born due to the lack of space in urban areas compared to rural areas. Many people in cities live in small apartments/studios, with no room for a large family. The lack of adequate housing to accommodate a larger family is also tied to how expensive it is to get a bigger apartment/house in the city, and many families can not afford it. [**could be two separate ones; one about space and one tied to economics*].

e. Explain why there are often differences in doubling times between less developed countries and more developed countries. (1pt)

- CBR, TFR tend to be higher in LDC/developing countries than in developed countries. If there are more children being born, the population will increase more quickly in developing countries, causing a shorter doubling time than seen in developed countries.
- LDCs usually have higher RNIs due to less access to birth control and education, as well as being more agricultural and needing children for farm labor. Higher RNI lowers the doubling time for a country, so LDCs will have lower doubling times than developed countries where birth control, education, and smaller families are more common.

f. Explain ONE reason ethnonationalism might lead a government to promote pronatalist policies. (1pt)

- Have more babies to support a national agenda of a particular ethnic identity.
- Promoting a country with a singular ethnicity would lead to the government’s establishment of a pronatalist policy because the government would want to increase the population with others of that ethnicity, not immigrants from other countries.
- Ethnonationalism could be considered a form of extreme patriotism where governments promote pronatalist policies to ensure that one ethnic group maintains its political and cultural dominance.
- Pronatalist policies can be used to encourage members of the dominant group to have more children and maintain their numerical advantage.
- Some countries may not be open to immigrants because they want to maintain their ethnic “purity” and therefore the state government might promote pronatalist policies to encourage their population to increase primarily through infants being born of that ethnicity. A current example of this is Japan, a nation-state, which has not been very open to taking in immigrants despite their plummeting birth rates. An extreme example of this is Nazi Germany, where the government not only had programs where they produced “racially pure” babies based on desired Aryan traits, but committed genocide against Jewish people and other minorities that did not meet their ethnic standards. [**[not sure if that example is too old for human geography but I bet some of my students will mention this. I think it should count]*].

g. Explain the degree to which a unitary government may be more effective than a federal government in enforcing antinatalist policies. (1pt)

- To a greater degree, unitary states might have greater effectiveness in enforcing antinatalist policies if they are homogenous in cultural, racial, or ethnic identity.
- A unitary state may be more effective than a federal state in enforcing antinatalist policies to a high degree because unitary states only have one level of government which makes laws. The central government could pass an antinatalist policy, and all local governments would have to enforce it. In a federal system, each local government could choose their own natalist policy, which would likely not be uniform across the country.

QUESTION 2

**PER CAPITA PRODUCTION OF STAPLE FOOD CROPS
IN HEARTH-OF-DOMESTICATION COUNTRIES**

Country	Corn (maize) (pounds per capita)	Potato (pounds per capita)	Rice (pounds per capita)	Yam (pounds per capita)	Cassava (manioc or yuca) (pounds per capita)
	Hearth: Mexico	Hearth: Peru	Hearths: China and Mali	Hearth: Niger River basin	Hearth: Amazon River basin
Brazil	1,056	39	108	3	183
China	412	145	333	0	52
Mexico	471	31	4	0	0
Nigeria	121	15	93	549	618
Peru	107	362	216	0	13

Source: Food and Agriculture Organization of the United Nations

2. Staple food crops provide most of the carbohydrates in people's diets, and some staples are also used as animal feed or in the distillation of ethanol. Cassava is a root crop (tuber) that is the source of farinha, tapioca, and the pearls in bubble tea.

a. Describe the concept of an early hearth of domestication. (1pt)

- An early hearth of domestication refers to the place where a crop (or animal) was first planted (raised) intentionally by humans.
- River valleys that provided annual and consistent patterns of climate allowed for agricultural trial and error.

b. Identify the crop listed in the table that has diffused the least from its hearth of domestication to the countries listed in the table. (1pt)

- Yams were domesticated in the Nigeria River Basin and is the only country on the chart with a significant amount of yams today (only 3 pounds in Brazil and zero everywhere else).

c. Explain how food preferences can be a cultural trait. (1pt)

- Food preferences can be a cultural trait based on taboos regarding food consumption. For example, Muslims do not eat pork, which has an impact on their culture as a whole.
- Food preferences may have a religious/mythological connection

d. Explain how the Columbian Exchange contributed to a crop's diffusion beyond its hearth of domestication. (1pt)

- During the Columbian Exchange crops and livestock from Europe, Africa, and the Americas were transferred

from each location to the other two. This cross-Atlantic movement of agricultural products diffused the items from those hearths of domestication to places on the other side of the world.

e. **Explain how the data in the table support the concept of a crop's consumption pattern being the result of globalization. (1pt)**

- Using rice as an example, the table supports the crop's consumption pattern being the result of globalization. Through globalization, crops have diffused all over the world. Rice's domestication hearth was in Mali and China, but there are large amounts in Peru and Brazil, on the other side of the world.

f. **Explain why a crop may be farmed intensively in a less developed country and be farmed extensively in a more developed country. (1pt)**

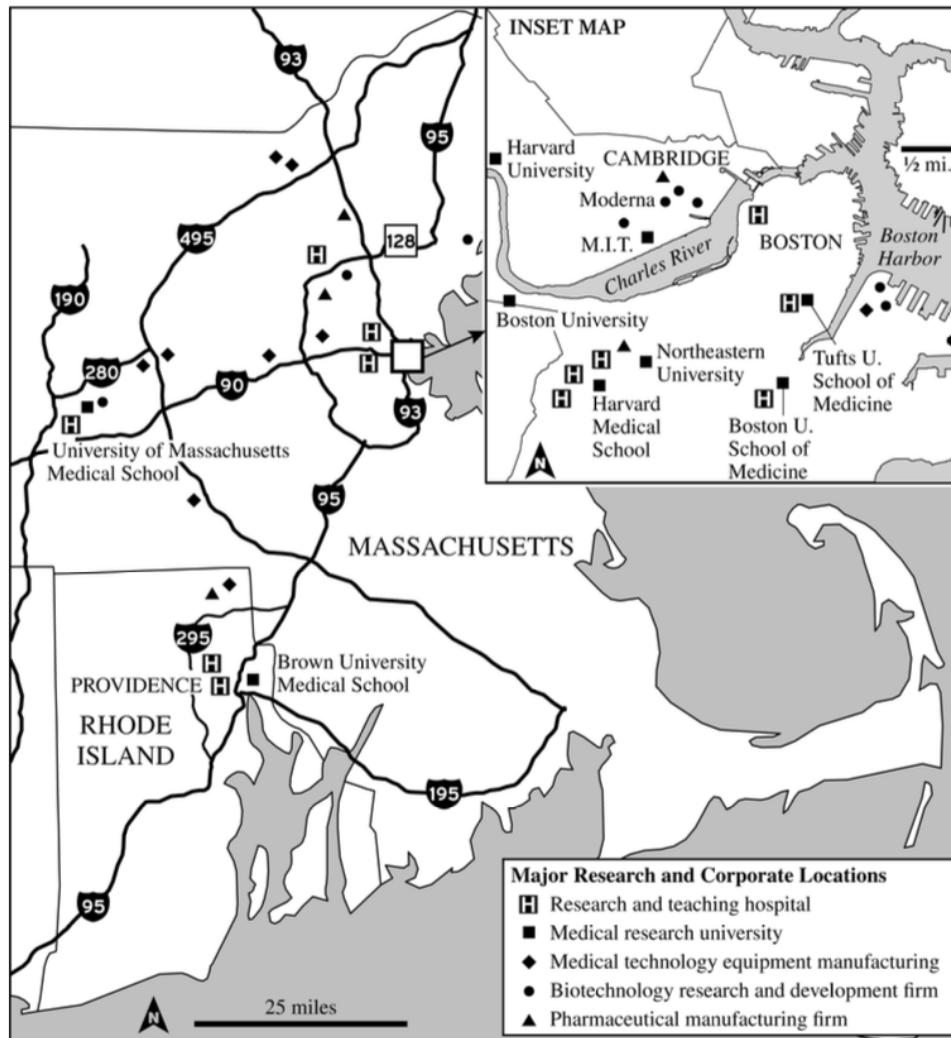
- LDCs tend to see higher levels of subsistence farming and lack of advanced machinery. Subsistence Farmers in LDCs often must use manual labor to farm crops which could be done more efficiently in an MDC where there is more access to machinery.
- In less developed countries, where land and resources may be scarce, farmers may be forced to farm crops intensively in order to maximize production in order to generate a sufficient income. In contrast, MDC may have access to more land and resources and therefore decide to farm extensively.

g. **Explain ONE way the global supply chain links crops such as those listed in the table to consumers in other countries. (1pt)**

- Some food products cannot be grown in countries that do not have the climate - example, US can't grow much cassava

QUESTION 3

MAJOR MEDICAL AND BIOTECHNOLOGY COMPANIES AND INSTITUTIONS IN THE BOSTON AND PROVIDENCE REGION



Source: National Institutes of Health

The inset map shows the downtown areas of Boston and Cambridge, Massachusetts.

SELECTED TECHNOLOGY RESEARCH AND DEVELOPMENT AREAS IN THE MEDICAL FIELD

Category	Product or Service
Biotechnology:	• Genetic engineering research • Biochemistry research • Diagnostic and testing science
Gene therapies:	• Cancer treatments • Neurological treatments • Rare and genetic disease treatments • Antiviral treatments and vaccines (e.g., Moderna)

3. Since the 1980's, the northeastern United States has developed into a major global center of high-technology industry that specializes in the medical field.

a. Describe the spatial pattern of the companies and institutions shown in the inset map. (1pt)

- The companies and institutions on the inset map are clustered in several areas.

- The research, medical, and biotechnology companies and institutions have formed an agglomeration around the Boston area.

b. Describe the concept of a growth pole. (1pt)

- Growth poles are locations where specific industries, usually high tech, will cluster together. The medical research facilities near Boston are an example. The agglomeration of the industries causes growth of service industries supporting the high tech workers, leading to population growth in the area.

c. Explain ONE way education infrastructure affects a region's potential for high-technology development. (1pt)

- High-technology development is a skilled task. The skill is acquired through education, so being in an area with good education infrastructure provides a greater potential for high-technology development.

d. Explain how the pattern shown on the map resembles the Galactic city model. (1pt)

- According to the map, the city of Boston is surrounded by the 495 beltway and there is a high concentration of medical and biomedical companies in the city of Boston. The area between the city of Boston and the beltway is made up of residential settlements. This pattern of beltway to residential settlements, to industrial zones, surrounds the Central Business District which resembles the standard Galactic city model.

e. Explain ONE way local economic changes may be a result of deindustrialization. (1pt)

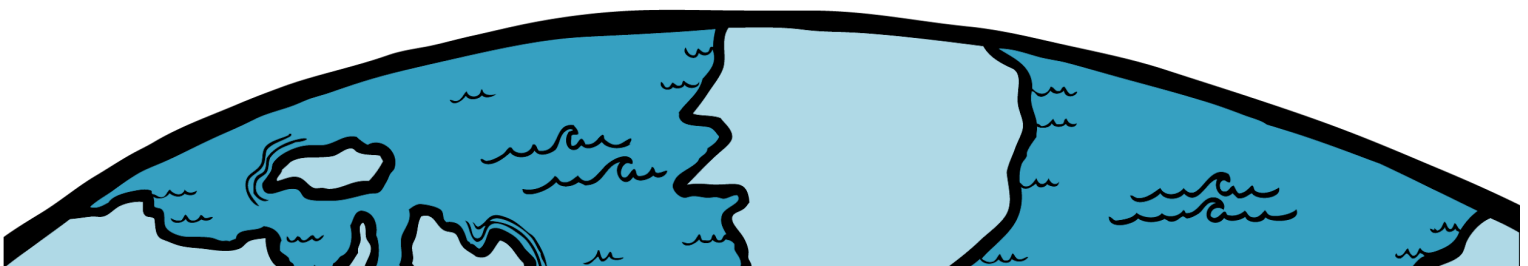
- An area that was once an industrial stronghold would have been centered around that industry. As the area deindustrializes, the local economy will change. It may shift to a more tertiary economy, or suffer from brownfields and a lack of economic opportunities that cause the population to move out of the area.

f. Explain how the products and services listed in the table demonstrate that this economy has moved into the quaternary sector. (1pt)

- Quaternary sector jobs are a subset of tertiary sector services which center around research and education. These jobs in medical research, teaching hospitals, and biotechnology are prime examples of quaternary sector activities.

g. The map focuses on a regional scale. Explain a possible limitation of drawing country scale conclusions from a regional scale map (1pt)

- Scale of analysis affects perception. The larger the scale of the map, the more detail you can see, giving you a very specific conclusion. The smaller the scale map, the less detail you can see, giving you a "generalized" conclusion that may only be true of a part of the country, but appears to be true of all of it.
- The information on a detailed map such as these can neglect variations in geography, climate, culture, economic development, etc., within a country.



FRQ SET #2

QUESTION 1

1. Political geographers analyze territoriality and sovereignty at a variety of scales, including regional, state, substate regional, and local.

a. Define the concept of territoriality in terms of political geography. (1pt)

- Defined area of land or water that is claimed by a group or individual as their own and is protected from external interference.
- Territoriality is often tied to ideas of ownership, sovereignty, and jurisdiction, and it is often used as a means of establishing and maintaining power and control.
- Territoriality can be expressed through physical means, such as fences, walls, and other types of barriers, or through more symbolic means, such as flags, symbols, and other forms of national identification
- The attempt by an individual or group to affect, influence or control people, phenomena and relationships, by delimiting and asserting control over a geographic area.
- Territoriality in political geography refers to the control and ownership of a specific geographic area by a particular political entity. It involves the exercise of power and authority over a defined space, often through the establishment of borders and the enforcement of laws and regulations. Territoriality is an essential concept in political geography, as it helps to shape the distribution of political power and influence at different scales.

b. Describe the concept of sovereignty as it relates to the state. (1pt)

- States regulate their own internal & external affairs
- Ability of a state to govern its territory free from control of its internal affairs by other states
- a state has the supreme authority to govern itself and make decisions within its own borders without interference from other states or international organizations.
- Self-rule
- Principle of international relations that holds that final authority over social, economic and political matters should rest with the legitimate rulers of independent states
- Sovereignty is the authority and power of a state to govern itself and its people. It is the ability to make and enforce laws and regulations within its own territory without interference from other states. In other words, sovereignty is the foundation of modern states and their ability to maintain order and control within their borders.

c. Compare ONE difference in territorial organization between the governments of unitary states and the governments of federal states. (1pt)

- Unitary states have only one central government which can make laws, which are then enforced by local governments. Federal states allow local governments to make and enforce their own laws, which may not be the same across the country. Unitary states have one centralized government. Federal states have power that is passed down to regional governments.
- One key difference in territorial organization between unitary states and federal states is that in a unitary state, power is centralized and the central government holds ultimate authority over all regions and subdivisions, while in a federal state, power is divided between the central government and regional or state governments that have a degree of autonomy and authority over their own affairs.

- d. **Recently, the United Kingdom decided to withdraw from the European Union. Explain ONE possible reason why sovereignty would play a role in the United Kingdom's decision to withdraw from the European Union. (1pt)**

- The EU is a supranational organization that is both a political union and an economic union. Brexit was partially caused by fears about the economy & immigration which the UK wanted more sovereignty over.
- Membership in the EU requires the UK to give up sovereignty over some policies to EU policymakers. Brexit supporters want to reclaim control over policy from the EU.
- Beliefs that open borders allow immigrants to take jobs from Brits/ security concerns about who is entering
- UK thinks they can create better trade agreements for themselves than EU can

- e. **During the United Kingdom's withdrawal from the European Union, some people in Scotland proposed independence from the United Kingdom. Explain one possible reason why territoriality would play a role in the devolution of a state. (1pt)**

- Devolution occurs when states fragment into autonomous regions or semi-autonomous subnational political territorial units, such as those within Spain, Belgium, Canada, and Nigeria
- Scotland is a semi-autonomous territory within the UK with its own language and customs- nation of people. With defined borders, flag, identity. As a result of Scottish nationalism in the 90s, it has its own devolved parliament with limited powers.
- Larger percentage of Scots wanted to stay in EU- decision to leave by UK doesn't represent their interests
- Scotland could use Brexit as basis for their desire to leave (Scots have same issues of sovereignty w UK as UK has w EU)

- f. **Local Governments often divide cities into representative electoral districts. Explain how the process of redrawing district boundary lines may affect election results within a city. (1pt)**

- Through the ~~illegal~~ process of Gerrymandering, this may limit the power of voters in certain areas of the city. Legislators may try to maintain their power over a long period of time by attempting to dilute the power of the opposing party by packing them into an individual district, allowing the political party in power to win all of the remaining districts in the city.
- Cracking or packing to keep the party in power in power

- g. **Explain why neighboring local governments may face challenges in providing transportation services to residents of a rapidly growing metropolitan area. (1pt)**

- Transportation services or RR lines serve functional regions that span multiple municipalities. Infrastructure like transportation is funded by taxes. Tax base varies by local municipality so each local government may have varying abilities to pay for construction
- Right-of-way for train lines- creation of routes may go through greenspaces, neighborhoods, privately held land
- When a metropolitan area grows rapidly, it typically grows outward to suburbs. Suburbs are not connected through public transportation systems with the main city, so these neighboring local governments have no existing infrastructure to work from.
- Neighboring local governments may face challenges in providing transportation services to residents of a rapidly growing metropolitan area due to various reasons. Some of these reasons include insufficient funding, lack of coordination and communication among the different local governments, and difficulty in planning and implementing transportation infrastructure projects that span across multiple jurisdictions. Additionally, population growth may lead to increased traffic congestion, making it harder for residents to access transportation services.

QUESTION 2

DEVELOPMENT INDICATORS FOR SELECTED COUNTRIES, 2020

Country	Gross National Income per Capita	Percent of Workforce in Agriculture	Total Fertility Rate	Mean Years of Schooling Women/Men	Life Expectancy	Air Pollution Mortality Rate (per 100,000 people)	Percent of Population with Access to Clean-Burning Fuels
Afghanistan	\$1,976	39%	4.5	1.9 / 6.0	61	211	32%
Brazil	\$10,857	9%	1.7	8.0 / 7.7	69	30	96%
Finland	\$46,343	3%	1.6	12.6 / 12.3	81	7	100%

Source: World Bank, UNICEF

2. In 1990 the United Nations (UN) began using the Human Development Index (HDI) to measure levels of development. In 2015 the UN established the Sustainable Development Goals (SDGs) to set targets for environmental quality, economic development, and social programs.

a. Using the data categories in the table, identify ONE indicator that is used to calculate HDI scores. (1pt)

- Gross National Income per Capita
- Mean Years of Schooling Women/Men
- Life Expectancy
- TFR is directly connected to the education of girls/women and family planning, the lower the TFR the higher the development and the HDI will be closer to the perfect score of 1.0,

b. Using a different indicator than the one identified in part A, explain why Brazil's HDI score is higher than that of Afghanistan. (1pt)

- Brazil has a GNI per capita nearly six times that of Afghanistan. This means that citizens of Brazil have significantly more income for housing, food, etc. than those in Afghanistan.
- Brazil is a semi-periphery country while Afghanistan is a peripheral country. Brazil is a democracy. Afghanistan is a failed state with the Taliban in control. Impact of taliban and terrorism on Afghanistan-women's rights issues/girls cant go to school; cost of war and impact on economy of terrorist org in control-decreases business; life expectancy impeded by war, denial of healthcare
- Brazilian women attend school at four times the rate of Afghani women. This difference in expected years of schooling greatly contributes to Brazil having a higher HDI score than Afghanistan.
- Beyond the obvious of Afghanistan being a war torn nation, controlled by a totalitarian brutal regime...One possible explanation for why Brazil's HDI score is higher than Afghanistan's is the difference in access to education. Brazil has a higher mean years of schooling and expected years of schooling than Afghanistan, which are both indicators used in calculating HDI. Additionally, Brazil has a higher Gross National Income per capita than Afghanistan, another factor that contributes to HDI. Educating women and girls is key to economic development and an increase in a nation's HDI score.

c. The UN and many countries have promoted sustainability principles. Describe ONE specific way that sustainability goals can respond to economic challenges. (1pt)

- One of the UN's Sustainable Development Goals (SDGs) is ending poverty. Poverty is the greatest economic challenge, so the attempt to end poverty is an effort to eradicate the problem.
- Ecotourism is one way that sustainability goals can respond to economic challenges. Ecotourism involves travel to natural or rural areas with a focus on environmental conservation and sustainable development. It aims to promote responsible travel and sustainable tourism practices, while also providing economic benefits to local communities.
- One specific way that sustainability goals can respond to economic challenges is by promoting the transition to a circular economy. This involves designing products and production processes that minimize waste and

maximize the use of resources, which can lead to cost savings and increased efficiency in the long term. Additionally, a circular economy can create new business opportunities and jobs in areas such as recycling, remanufacturing, and repair. Batteries and computer chip components are a few examples of products in this industry as well as dyed fabric threads

d. **Explain ONE reason why increasing women's access to education is likely to affect a country's total fertility rate. (1pt)**

- The more education a woman has, the lower the total fertility rate will be; women enter the workforce and have less children.

e. **SDG 8 is to “promote sustained, inclusive and sustainable growth, full and productive employment and decent work for all.” Explain ONE way in which a country's development of ecotourism might affect economic growth. (1pt)**

- Peripheral countries with places of interest to those in core areas can use ecotourism to attract tourists, thus helping the economy of the country. The influx of visitors brings in money through lodging, food, and tourist attractions.
- Ecotourism employs local people as guides, hosts, and entertainers. This gives local people more disposable income that they can then use within their community to increase economic growth.
- Ecotourism can contribute to economic growth by creating new job opportunities and generating income for local communities. This can stimulate economic activity in areas that were previously underdeveloped. Additionally, ecotourism can promote sustainable development by encouraging conservation efforts and reducing negative environmental impacts. This struggle is seen in Brazil with the Ecotourism popularity of the rainforest against the cattle industry's clear-cutting of the rainforest to provide grazing and cattle pen regions for large beef industries. The profit of the cattle industry is larger than the eco-tourism industry in this regard even though it is not sustainable. Costa Rica is an example of ecotourism of a the rainforest region that is approached with a sustainable plan to preserve the rainforest and lessen the impact of people as much as possible with specific zoned regions for eco-tourism

f. **Using data from the table, explain how access to clean-burning fuels for people's homes relates to the life expectancy of a country's population. (1pt)**

- There is a correlation between access to clean-burning fuels for people's homes, pollution, and life expectancy. The less access to clear-burning fuels, the more pollution, and the lower the life expectancy. The opposite is also true.
- The less access to clear-burning fuels decreases life expectancy, usually due to a higher number of air pollution deaths. The chart shows that Afghanistan has only 32% of its population that has access to clean-burning fuels, which is why its air pollution mortality rate is 211 and its life expectancy is lower than both Brazil and Finland, who have better access to clean-burning fuels. In less developed countries like Afghanistan, wood and debris are often burned in order to cook, heat water, and heat the home. This causes people to breathe in the smoke and ash, which can cause health issues that drastically reduce their life expectancy.
- In many developing countries, people rely on traditional fuels such as wood and charcoal for cooking and heating. These fuels are often burned indoors in poorly ventilated spaces, leading to high levels of indoor air pollution which in turn lowers life expectancy.
- Access to clean-burning fuels for people's homes has a positive correlation with the life expectancy of a country's population. This is supported by evidence that shows countries with higher rates of access to clean-burning fuels have longer life expectancies. Brazil at 96% and Finland at 100% are examples that prove this correlation. This is likely due to the fact that exposure to indoor air pollution from burning fuels such as wood and charcoal can lead to respiratory illnesses and other health problems that can shorten life expectancy as seen with the data from Afghanistan at only 32% access to clean fuel correlating to

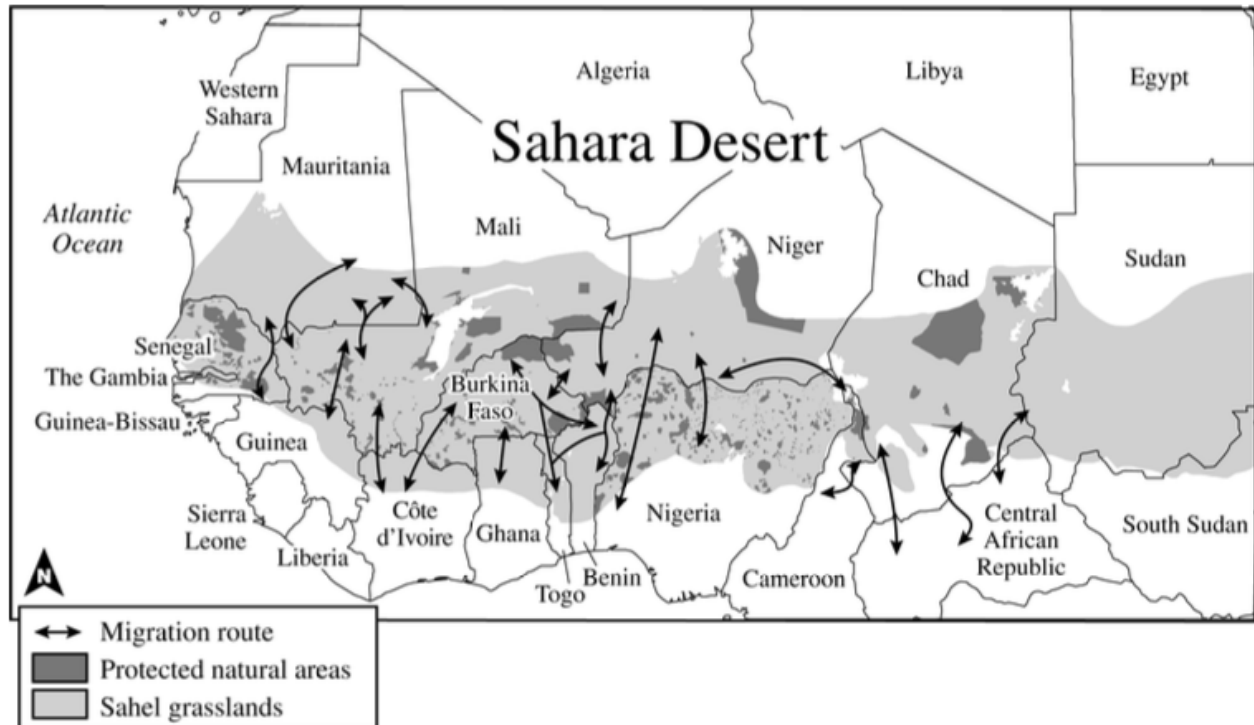
211:100,00 people mortality rate or death from air pollution.

g. **Explain how ONE of the countries in the table would be classified according to Rostow's stages of economic growth. (1pt)**

- Finland would be classified in Stage 5 of Rostow's Development Model: Age of Mass Consumption. As a core country, they have moved through all other stages as they industrialized, then shifted to tertiary activities.
- Afghanistan would be classified in Stage 2 of Rostow's Development Model. They have infrastructure such as roads and airports. They have basic levels of healthcare and education, but only within the most urbanized areas.
- Brazil would be classified in Stage 4 of Rostow's Development Model. They have high levels of industrialization, participate in global trade, and are making improvements to infrastructure such as energy, transportation, and communication systems. Higher level of investments in social infrastructure, such as schools and hospitals.
- According to Rostow's stages of economic growth, Finland would be classified as a post-industrial society, with a highly developed economy and a focus on services and innovation as a country in "the age of high mass consumption". Afghanistan would be classified as a traditional society, with an economy based on subsistence agriculture and limited modernization, labeled as a country with a "traditional society". Brazil would be classified as a developing country, with a growing industrial base and a focus on export-oriented industries, a country labeled as in a "drive to maturity".

QUESTION 3

PASTORAL NOMADISM IN THE SAHEL REGION OF AFRICA



Source: Food and Agriculture Organization

The Sahel is an environmental transition zone between the Sahara desert and the wet tropical forest regions of Africa. The landscape is a semi-arid grassland, having distinct dry and wet seasons, and the region is interspersed with shrubs and small woodlands.

SOURCES OF TENSION RELATED TO PASTORAL NOMADISM

Groups	Potential Sources of Tension
Nomadic herders versus crop farmers	• Damage to fields by migrating herds • Overgrazing by migrating herds • Competition for access to water • Increasing size of crop farms
Nomadic herders versus conservation organizations	• Grazing of protected areas • Degradation of natural habitats
Nomadic herders versus government officials	• Failure to follow regulations on cross-border migration • Activities such as smuggling foreign goods

Source: Organisation for Economic Co-operation and Development

3. Pastoral nomadism is widely practiced in the Sahel region of Africa. The map and table provide information about spatial patterns and social tensions associated with this type of agriculture.

a. Describe ONE reason for the migration patterns shown on the map. (1pt)

- North-South patterns; migration all allows tribal groups to move herds to where they can graze as wet/dry seasons change.
- Nomadic herders are migrating back and forth, following the patterns of rainfall to areas that will have more grass available for their animals
- One reason for the migration patterns shown on the map could be related to seasonal changes (wet/dry seasons) in rainfall and vegetation, as pastoral nomads move in search of grazing land and water sources for

their herds.

b. Describe ONE cause of desertification in the Sahel region. (1pt)

- Overgrazing- herds eating and traveling. Large numbers of livestock graze in an area for extended periods of time, which leads to soil degradation and loss of vegetation cover.
- Deforestation- firewood/timber/ farmland conversion
- Climate change- hotter/drier
- ~~Lack of fertile soil~~ *Not a cause.

c. Explain how pastoral nomadism may affect the cultural landscape of the Sahel region. (1pt)

- Pastoral nomadism may affect the cultural landscape through the specific architecture of the tents and huts they set up at their temporary camps as they move with their animal herds through the Sahel region.
- Nomadic communities have a deep understanding of the environment and its resources, which has led to the development of unique cultural practices and traditions. For example, nomads in the Sahel region have traditionally used mobile housing structures such as tents and yurts, which are designed to be easily assembled and disassembled as they move from one place to another. This has influenced the design of settlements and infrastructure in the region, with many communities incorporating similar mobile structures into their architecture. ~~Additionally, the movement of nomadic communities can impact the natural environment, as overgrazing and soil erosion can occur with frequent grazing in one area. This can lead to changes in the vegetation and landscape of the region, which can in turn impact the livelihoods of both nomadic and settled communities. Overall, pastoral nomadism has played a significant role in shaping the cultural landscape of the Sahel region, as well as its social and economic systems.~~

d. Explain ONE way mixed-crop farming could be affected by climate conditions. (1pt)

- As climate change occurs, some places become much hotter, resulting in severe droughts. These droughts could cause crops to die due to lack of fresh water, resulting in less food for animals, who could then also potentially die.
- Climate change has extended the growing seasons in some climates, which would allow crops to be grown for longer periods, feeding many more animals and allowing mixed-crop farming to increase.
- Mixed-crop farming, which involves planting multiple crops on the same field, can be affected by climate conditions in several ways. One way is through changes in temperature and precipitation patterns, which can impact crop growth and yield. For example, if there is a prolonged drought, crops may not receive enough water to grow and produce a good harvest. Similarly, if there is excessive rainfall, crops may be damaged or destroyed by flooding. Climate conditions can also affect the timing of planting and harvesting, as well as the choice of crops that can be grown successfully in a particular region. Overall, climate conditions have the potential to significantly impact the success and sustainability of mixed-crop farming.

e. Using the map and the table, explain why expanding protected natural areas may affect the migration routes of nomadic herders in the Sahel region. (1pt)

- Protected natural areas take up previous land that was available to nomadic herders for grazing and prevent them from using it for their livestock. As these areas expand, nomadic herders will have to avoid going onto protected land and will have to find alternate migration routes to continue feeding and grazing their livestock. This could drastically change migration patterns as herders take new routes to stay off protected natural areas.
- Expanding protected natural areas in the Sahel region may affect the migration routes of nomadic herders due to the fact that many of these areas overlap with traditional grazing lands. The map shows that these protected areas are often located in areas that are also used by nomadic herders for grazing their livestock. Additionally, the table highlights the importance of these grazing lands for livestock production and the

livelihoods of herding communities. Therefore, expanding protected natural areas may limit access to grazing lands and water sources, resulting in decreased productivity and potentially forcing herders to alter their migration routes.

f. **Using the information in the table, explain why farmers' increased use of irrigation may increase conflicts with nomadic herders. (1pt)**

- Increased use of irrigation will increase conflicts between farmers and nomadic herders because it will consume more water that is also needed by nomadic herders for their animals and families to use. This may cause nomadic herders to need to migrate much further than they previously had in order to find access to fresh water, causing conflict.
- Increased use of irrigation will increase conflict as it will allow the size of crop farms to expand as the irrigation will allow them to grow crops in previously unusable land. This will lessen the amount of land nomadic herders have for grazing their livestock, which will cause conflict.
- An increase in the use of irrigation can lead to the pollution of natural water sources through the runoff of fertilizers and other agricultural chemicals. When fertilizers are applied to crops, they can be washed away by rain or irrigation water and enter nearby streams, rivers, and other bodies of water.
- Farmers' increased use of irrigation may lead to conflicts with nomadic herders because it can lead to reduced availability of water and grazing land for the herders' livestock. The irrigation systems may divert water from rivers or underground sources that the herders rely on for their animals, and the fenced-off crop fields may limit the available grazing land. This can create tension and competition for resources between the two groups, leading to conflicts over water and land use.

g. **Explain the degree to which increased access to communication technologies may create cultural convergence among nomadic herders. (1pt)**

- To a **great degree**... if nomadic herders have greater access to communication technologies, they can better discuss their problems, solutions, movements, and all aspects of their trade among themselves. This would allow for a coordinated effort and more similar actions.
- To a **lesser degree**... if Berbers cannot afford the technologies to participate in this form of communication.
- to **some degree**... if using to search for water spots in the Sahel, then many ethnic groups will interact at watering hole; however since they are nomads their interaction will be temporary as herders will move on at varying rates to various destinations. Will not stay in same place or w regularity so unlikely to have meaningful cultural convergence that would likely cause syncretism or pidgin language.
- Increased access to communication technologies may create **some degree** of cultural convergence among nomadic herders by facilitating the exchange of ideas, information, and values that could lead to the adoption of similar beliefs, practices, and lifestyles. However, the impact of communication technologies on cultural convergence would depend on various factors such as the extent of connectivity, the diversity of cultural backgrounds, and the level of openness to change. Therefore, while communication technologies may promote cultural convergence among nomadic herders to some extent, it is unlikely to erase the unique identities and traditions of different communities.

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