

Question 3: Two Stimuli**7 points**

A (Point 1)	Identify an example of a culture trait. Acceptable identification: A1. Culture traits include such things as food preferences, art, architecture, language, religion, music, clothing, media, technology, and/or land use.	1 point
B (Point 2)	Describe the spatial pattern of cow's milk production in Africa, shown in Map 1. Examples of acceptable responses may include the following: - B1. Medium and/or high amounts of cow's milk production are concentrated or clustered in the north, east, and/or south. - B2. Low amounts of cow's milk production are concentrated or clustered in west, central, and/or southwest Africa.	1 point
C (Point 3)	Based on Map 1 and Map 2, compare the spatial patterns of cow's milk production and pork production in Asia. (Response must include both maps in the comparison.) Examples of acceptable responses may include the following: - C1. Map 1 shows that cow's milk is produced in most Asian countries at high or medium volumes, whereas Map 2 shows that pork is produced at high or medium volumes in East Asia and/or parts of Southeast Asia, or in low volumes in South and/or Southwest Asia. - C2. Cow's milk is produced in most Asian countries, whereas pork is not produced in regions with large Islamic populations, such as the Middle East (Southwest Asia), Central Asia, South Asia, and/or parts of Southeast Asia. - C3. Cow's milk production and pork production are low in insular Southeast Asia (e.g., Indonesia, Malaysia, East Timor, Papua New Guinea).	1 point

D (Point 4)	Describe one environmental effect of agricultural land use such as commercial animal farms. Examples of acceptable responses may include the following: • D1. Environmental effects of agriculture land use include pollution (e.g., air, water, waste), land cover change (e.g., soil erosion), nutrient depletion, desertification, and/or soil salinization. • D2. The reduction of water supplies for agricultural purposes, such as depleting reservoirs, lowering the local water table, and/or draining aquifers. • D3. The reduction of biodiversity from changes in land cover (e.g., deforestation, grassification, feed-crop monoculture). • D4. The spread of disease between domestic and wild animal populations or between animal populations and humans. • D5. Climate change and/or global warming because such farms produce greenhouse gases (e.g., carbon dioxide, methane, water vapor). • D6. Agricultural land use can promote the survival or the growth of environmentally beneficial species (e.g., pollinators, working animals, heirloom varieties).	1 point
E (Point 5)	Explain how the globalization of agriculture may affect local culture traits. Examples of acceptable responses may include the following: • E1. Globalization of agriculture and/or the global system of agriculture may lead to changes in food preferences. • E2. Globalization may lead to people preferring to eat foods imported from other countries that were not previously available to them (e.g., tropical fruits in temperate climates). • E3. Globalization may lead to the availability of less expensive imported foods that are substituted for more expensive local foods (e.g., imported wheat replacing locally grown corn). • E4. Consumers may resist the globalization of the food supply and in response buy domestically produced food, local food, and/or purchase food from community-supported agriculture. • E5. Globalization of agriculture may lead to a reduction in the number of small family farms, which can affect local cultural traits (e.g., settlement patterns by prompting rural-to-urban migration, social roles by having fewer people working in agriculture). • E6. Globalization may lead to changes in agricultural land use or agricultural production methods through the implementation of new technologies, architecture, and/or equipment (e.g., data analytics, drones, vertical farming, autonomous tractors), affecting local culture traits (e.g., crops, farming practices).	1 point

F (Point 6)	Explain why regions of agricultural production may become interdependent. Examples of acceptable responses may include the following: • F1. Some regions and/or countries have become highly dependent on one or more export commodities, which causes different regions to depend on one another for specific agricultural commodities. • F2. Regions of agricultural production are connected through global food distribution networks that are affected by political relationships, infrastructure, and/or patterns of world trade. • F3. Global patterns of food-processing facilities and markets, economies of scale, distribution systems, and government policies all contribute to greater interdependence among agricultural production regions. • F4. Countries may develop comparative advantages, complementarity, specialty crops, and/or consumer markets that establish trade relationships and increase interdependence between two or more countries. • F5. Countries in a region may form trade relationships that result in increased trade in farm products (e.g., EU, ASEAN, MERCOSUR).	1 point
G (Point 7)	Explain how domesticated animals such as pigs spatially diffused to create the spatial pattern shown on Map 2. Examples of acceptable responses may include the following: • G1. Domesticated animals such as pigs diffused from their hearths of domestication through relocation diffusion (e.g., settlers bringing animals to new areas). • G2. Domesticated animals such as pigs diffused from their hearths of domestication through the Columbian Exchange. • G3. International trade, imperialism, and/or colonization introduced domesticated animals such as pigs that were transported to other regions of the world. • G4. Domesticated animals such as pigs spread through migration or expansion diffusion, altering food preferences and/or increasing demand for diverse animal products domestically and/or internationally. • G5. Domesticated animals such as pigs spread to areas where consumption of these animals was culturally acceptable and/or did not spread to areas where consumption of such animals was culturally unacceptable.	1 point

Question 1: No Stimulus**7 points****(A) Define the concept of carrying capacity.****1 point**

Accept one of the following:

- A1. The number of people a particular place, area, and/or the Earth can support.
- A2. Population size, distribution, and/or density affects how many people the environment and its natural resources can support.
- A3. The number of living organisms that an area or habitat can support without environmental degradation.
- A4. Changes in population density and/or population distribution may affect the capacity of the environment to meet the population's needs.

(B) Describe ONE way that humans have altered the environmental sustainability of agricultural lands.**1 point**

Accept one of the following:

Decreased environmental sustainability

- B1. Overuse or use of synthetic fertilizers, pesticides, and/or herbicides that harm ecosystems (e.g., water, air, soil) and/or increase pollution.
- B2. Overuse or use of resources (e.g., water, air), reducing productivity.
- B3. Overuse, erosion, or nutrient depletion of soil, reducing productivity.
- B4. Overuse of irrigation, depleting water resources, reducing soil nutrients (via runoff), or contributing to soil salinization.
- B5. Agricultural practices (e.g., monocropping, commercial agriculture, increased use of high-yield seeds, GMOs, and/or biotechnology) have reduced biodiversity and/or depleted soil nutrients.

OR

Increased environmental sustainability

- B6. Improved management of farm resources (e.g., water, soil, fertilizers, pesticides) has helped ecosystems.
- B7. Use of organic agricultural practices, including natural fertilizers, pesticides, and/or herbicides.
- B8. Restoration of environmentally damaged areas by implementing sustainable agricultural practices.
- B9. Crop rotation which supports soil health (fertility) and/or avoids large-scale environmental damage.
- B10. Decreased irrigation and/or extraction of water from aquifers or groundwater resources.
- B11. Conservation of farmland (e.g., fallowing, erosion control) and/or local resources (e.g., water supplies, native species).

(C) Explain how transportation technology has increased economies of scale in the agricultural sector of less developed countries. 1 point

Accept one of the following:

- C1. Trucks, trains, and/or shipping containers can move large and/or larger quantities of crops, increasing production and/or consumption.
- C2. Farm machinery (e.g., tractors, harvesters) has helped reduce the amount of human labor and/or increased the amount of production.
- C3. Farm machinery has allowed farms to increase the amount of farmland with reduced labor costs and/or improved efficiency.
- C4. Chemical herbicides, pesticides, and/or fertilizers applied by transportation technology (e.g., tractor, airplane) have reduced labor and/or increased crop yields.
- C5. Airplanes and/or ships are used to transport perishable products (e.g., flowers, fruits, vegetables), increasing their sales in other markets.

(D) Explain a likely negative economic outcome of Green Revolution agricultural practices on rural communities. 1 point

Accept one of the following:

- D1. Pollution of water, air, and/or soil resources harms economic productivity or livelihoods.
 - D2. Smaller farms may close, and/or farmers may sell land because they cannot compete with larger farms that can afford Green Revolution technologies.
 - D3. Loss of agricultural jobs and/or loss of access to farmland may result in loss of income or migration (e.g., rural-to-urban).
 - D4. Expensive farm inputs (e.g., high-yield seeds, agricultural chemicals, fossil fuels) increase the cost of agricultural production and/or reduce profits for farms.
 - D5. Changes in land ownership (tenure), land use patterns, and/or agriculture-related jobs may economically disadvantage subsistence farmers.
-

(E)	Explain ONE weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society.	1 point
------------	--	----------------

Accept one of the following:

- E1. Population growth has not outpaced food production, and/or populations have not run out of food.
- E2. Malthusian theory did not consider changing social, political, and/or economic factors that decrease fertility.
- E3. Improvements in agricultural technology (e.g., mechanization, Green Revolution) increased food production at a rate that outpaced population growth.
- E4. Advances in transportation have improved the global distribution of food.
- E5. The challenges of feeding the world's population have led to the opening of new agricultural lands or the development of new technologies that overcome the constraints of the environment and/or produce more food.
- E6. Farmers learned to farm more intensively with new agricultural practices and/or technologies to increase yields, increase carrying capacity, or increase the amount of cultivated land.
- E7. Growing populations have more resources to problem-solve and/or develop new methods of increasing food supplies.
- E8. Growing populations can move to areas with food surpluses or move away from areas of food insecurity.

(F)	Explain how surplus food production has changed the global market for local agricultural products.	1 point
------------	---	----------------

Accept one of the following:

- F1. Consumption patterns, changed diets, and/or increased popularity of certain foods (e.g., local foods, seasonal crops, specialty crops) have expanded the global sales of these foods.
 - F2. Surplus food drives global prices down, resulting in less expensive items, higher sales or exports, and/or increased competition with other goods.
 - F3. Increasing global sales of popular crops can increase local farm profitability, increase local investment, and increase or decrease the number or type of local products for sale (e.g., value-added products, value-added specialty crops).
-

-
- (G) Explain the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries. (Response must indicate the degree [low, moderate, high] and provide an explanation.) 1 point**

Statement of a moderate or high degree

AND

Supported by one of the following:

- G1. Food production increased due to high-yield seeds, chemical fertilizers, pesticides, irrigation, and/or mechanization.
- G2. Crop surpluses reduced food prices, making food items more accessible and/or more affordable.
- G3. More agricultural land came under cultivation, increasing food production.

OR

Statement of a moderate or low degree

AND

Supported by one of the following:

- G4. Green Revolution inputs (e.g., fertilizers, pesticides, high-yield seeds, irrigation, mechanization) were too expensive for many farmers, resulting in fewer farms and/or lower agricultural yields.
- G5. Irrigation systems led to the salinization of the soil, reducing food production.
- G6. The inputs (e.g., chemicals, fossil fuels) and/or land management techniques resulted in environmental degradation and/or abandonment of productive land, decreasing food production.

Total for question 1: 7 points

Question 2: One Stimulus**7 points**

(A) Describe the concept of an early hearth of domestication. 1 point

Accept one of the following:

- A1. A location where new practices develop and/or from which new practices spread.
- A2. A location where a particular type of plant or animal was first domesticated.
- A3. Locations where early civilizations domesticated plants or animals (e.g., Fertile Crescent, Indus River Valley, Southeast Asia, China, Andean Highlands, Amazonia, and/or Central America).
- A4. An ancient civilization whose farmers converted wild plants or animals into farmable and/or domesticated varieties over time.
- A5. A region (e.g., river valley) where a common wild plant or animal was cultivated into a farmable variant through selective breeding.

(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. 1 point

Accept the following:

- B1. Yams diffused the least.

(C) Explain how food preferences can be a culture trait. 1 point

Accept one of the following:

- C1. Many foods have distinct characteristics (e.g., ingredients, preparations) that are indicative of a specific culture group.
 - C2. Many culture groups identify with one or more national dishes that represent the typical food culture of a society.
 - C3. Many foods contain an ingredient or crop that is local to the region inhabited by a culture group.
 - C4. Many foods are part of a way of life, and/or are forbidden for a group of people, as represented in the belief systems, religion, tools, material goods (artifacts), calendars, and/or holidays of a culture.
-

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

Accept one of the following:

- D1. The Columbian Exchange led to the relocation or movement of crops from one part of the world to another part of the world through conquest, ecological imperialism, colonization processes, and/or along trade routes.
- D2. The Columbian Exchange was a process by which crops moved from one part of the world to another part of the world because of changing food preferences, cultural assimilation, and/or changing agricultural practices.
- D3. The Columbian Exchange may have accidentally or unintentionally introduced a new crop beyond its hearth of domestication (e.g., seeds or plants that may have been “stow-aways” in containers).

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

Accept one of the following:

- E1. The high per capita production of corn, potatoes, rice, and/or cassava in locations far from the hearth (e.g., Brazil produces 1,056 pounds of corn per capita) supports the idea of this crop being a globalized crop.
 - E2. The high consumption of corn, potatoes, rice, and/or cassava in locations far from the hearth (e.g., rice consumed outside of China) supports the idea of this crop being a globalized crop.
 - E3. Globalized food culture, popularized food culture, global media coverage of food, and/or globalized consumer food preferences can be represented in the data where a crop is commonly produced away from its hearth of domestication.
 - E4. Globalized populations, multicultural societies, global migration patterns, and/or cultural syncretism can be represented in the data where a crop is commonly produced away from its hearth of domestication.
 - E5. Globalized trade and transportation facilitated by free-trade policies, neoliberal policies, complementarity, comparative advantage, competitive advantage, containerization, and/or bulk rail and ship transport can be represented in the data where a crop is commonly produced away from its hearth of domestication.
 - E6. A globalized economy, increases in economic development, and/or the growth of a global middle class of consumers can be represented in the data where a crop is commonly produced away from its hearth of domestication.
-

(F) Explain why a crop may be farmed intensively in a less developed country and be farmed extensively in a more developed country. 1 point

Accept one of the following:

- F1. Subsistence or intensive farming of a staple crop in less developed countries may be done on small farm plots used to feed a household, whereas extensive or commercial farming in more developed countries would be practiced on large farms for a company's consumers.
- F2. Some farming of staple crops in less developed countries is based on intensive manual labor (e.g., using hand tools, animal power), whereas most farming in more developed countries is mechanized and/or uses limited human or animal labor inputs and is extensive.
- F3. Farmers in less developed countries may not be able to afford or have access to the investment capital, labor-saving equipment, seed supplies, and/or agricultural chemicals needed for extensive farm production, and thus use intensive human labor, whereas farmers in more developed countries tend to have financial resources for investments in extensive farming inputs.
- F4. Many farms in less developed countries use available local resources to feed families or local communities, whereas farms in more developed countries take advantage of economies of scale to produce for large populations.

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

Accept one of the following:

- G1. Crops are transported internationally to consumers, with one of the following steps: storing, processing, packaging, wholesaling, and/or retailing.
- G2. Crop use in the global restaurant and fast-food industries, crops are cultivated and/or processed in one country and are then distributed through supply chains to local restaurants and/or chain restaurants for cooking in another country.
- G3. Due to the increased global consumption of frozen foods, dried foods, canned foods, and/or dehydrated foods, crops can be cultivated and processed into different preserved forms and then distributed to other countries for long-term storage by wholesalers, grocery stores, household consumers, and/or in restaurants until needed for cooking.
- G4. Crops are sent to facilities that process them into other forms (e.g., corn for ethanol, animal feed) which are shipped to wholesalers, retailers, and/or sold to consumers in other countries.

Total for question 2: 7 points