

Question 2: One Stimulus**7 points**

- A**
(Point 1) **Using the data in the charts, identify the largest food export category between the two countries.** **1 point**
- Acceptable identification:**
- A1. Grains, fruits, vegetables.
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- B**
(Point 2) **Using the data in the charts, describe the difference between the two countries in the meat, dairy, and seafood category.** **1 point**
- Examples of acceptable responses may include the following:**
- B1. The amount of exports or trade from Country X is larger.
 - B2. The amount of exports or trade from Country Y is smaller.
 - B3. Exports or trade from Country X is \$5.1 billion, while exports or trade from Country Y is \$2.3 billion.
 - B4. The amount of exports or trade from Country X is approximately twice as much as exports or trade from Country Y.
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- C**
(Point 3) **Define the concept of comparative advantage.** **1 point**
- Examples of acceptable responses may include the following:**
- C1. Comparative advantage describes a situation in which an individual, business, or country can produce a good or service more efficiently and/or at a lower opportunity cost than another producer.
 - C2. Comparative advantage occurs when countries choose to specialize in producing goods or services that they can produce more efficiently, effectively, and/or that have a lower opportunity cost.
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- D**
(Point 4) **Describe one effect of Green Revolution technologies on food supplies in developing countries.** **1 point**
- Examples of acceptable responses may include the following:**
- D1. Green Revolution technologies (e.g., high-yield seeds, increased use of chemicals, mechanized farming) increased food supplies.
 - D2. Green Revolution technologies increased the amount of farm production and/or the agricultural yield of food crops and/or animals.
 - D3. Pesticide use led to pesticide resistance in some species, decreasing food production.
 - D4. Irrigation and/or the use of mechanized equipment led to soil erosion and/or loss of soil fertility, decreasing food production.
 - D5. Monocropping, mechanization, and/or the decrease in smaller farms changed the types of food produced and/or affected food supplies.

- E**
(Point 5) **Explain how advances in agricultural technology may increase the carrying capacity of land.** **1 point**
- Examples of acceptable responses may include the following:**
- E1. Advances in agricultural chemicals (e.g., fertilizers, pesticides) may allow an area of land to produce more resources and support a larger population.
 - E2. Carrying capacity may increase through mechanization (e.g., tractors, vehicles, irrigation, processing equipment), which may allow an area of land to produce more resources and support a larger population.
 - E3. Carrying capacity may increase through the use of high-yield seeds, which may allow an area of land to produce more resources and support a larger population.
 - E4. Carrying capacity may increase if agricultural technology is used to bring areas with low population density into agricultural production leading to higher population density.
 - E5. Carrying capacity may increase through the use of agricultural technology (e.g., precision agriculture, GPS) that improves growing conditions or optimizes agricultural practices, leading to the production of more food and the ability to support a larger population.

F (Point 6) **Explain the degree to which the economies of Country X and Country Y are interdependent. (Response must indicate the degree [low, moderate, high] and provide an explanation.)** **1 point**

Examples of acceptable responses may include the following:

Statement of a moderate or high degree

AND

- F1. Country X and Country Y are highly interdependent due to the billions of dollars of agricultural trade occurring between the two.
- F2. Both countries are dependent upon one or more export commodities traded with each other (exports, imports) and/or agriculture is used as an economic strategy for both countries.
- F3. Trade in agricultural goods between Country X and Country Y is part of the global supply chain and/or part of the global food distribution network that links producers and consumers.

OR

Statement of a moderate or low degree

AND

- F4. The amount of trade between the two countries for agriculture may be small in comparison to the trade in other sectors (e.g., manufacturing, services).
- F5. The agricultural trade data in the charts do not provide enough information to demonstrate interdependence because agriculture is only a portion of the total amount of trade (of all goods and services).

G (Point 7) **Explain how the charts provide limited information about economic development.** **1 point**

Examples of acceptable responses may include the following:

- G1. The charts provide data for only one sector of the economy and/or do not include other measures of social and/or economic development (e.g., GDP, GNP, GNI per capita, sectoral structure, population data).
- G2. Export data indicate the production of goods for international trade but not the production of goods for the domestic economy.
- G3. Export data do not include non-food products (e.g., cotton) which contribute to economic development.
- G4. The charts do not have a temporal or spatial dimension (e.g., a year, timeframe, variation by different areas) which is essential for understanding trends or making comparisons (e.g., uneven development).
- G5. The charts show that Country Y has higher agricultural exports than Country X, but the charts do not show that Country X has a more developed economy.

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 3: Two Stimuli

7 points

- (A) Describe the spatial pattern of the companies and institutions shown in the inset map. 1 point

Accept one of the following:

- A1. Agglomeration of similar economic activities.
- A2. Cluster or clustering of similar economic activities.
- A3. The concentration of similar activities along transportation routes (e.g., rivers, arterial roads).
- A4. There is a concentration of similar economic activities within a metropolitan area in Massachusetts.

- (B) Describe the concept of a growth pole. 1 point

Accept one of the following:

- B1. A location where research, development, and/or innovation (e.g., new product or process) generate new products and/or services.
- B2. An institution (e.g., university, hospital, laboratory) where scientific discoveries, inventions, and/or innovations create new economic opportunities.
- B3. An area where new businesses start up and/or businesses locate to participate in the emerging market and/or attract investment for a new product and/or service.
- B4. An area where new businesses start up and/or businesses locate to access a specifically skilled or educated pool of labor.
- B5. An area designated by a government to facilitate economic activity for a specific purpose.

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

Accept one of the following:

- C1. Graduates of educational institutions, who remain in the region throughout their careers, can promote regional economic development, create innovative products or services, and/or create a source of wealth for investment in the region's high-technology businesses.
- C2. Educational institutions can develop a labor force with specialized capabilities that make an area better suited to attract high-technology businesses and/or investors from outside of the region to open new facilities and/or move existing facilities or headquarters into the region.
- C3. Educational institutions can sponsor research for new high-technology products and/or services that can be put into production or operation, thus creating new value, investment, and/or employment for the region's economy.
- C4. Public investment in technical or specialized worker training, businesses, infrastructure, and/or equipment may divert funds away from investment in other community and social programs that support economic development.
- C5. Lack of educational infrastructure can negatively affect a region's potential for high-technology development because there may not be a highly educated workforce, a specialized labor force, and/or sponsored research for high-technology products or services.

(D) Explain how the pattern shown on the map resembles the galactic city model. 1 point

Accept one of the following:

- D1. The region has multiple development centers (e.g., edge cities, central business districts [CBDs], suburban CBDs), which are based on a specialized product or service.
- D2. The pattern of business development is decentralized or spread across the region in different locations.
- D3. The region has a circumferential, circular belt, or radial highway pattern associated with a galactic city's transportation landscape.
- D4. The region contains several highway intersections that serve as nodes for new business districts, central business districts, or development centers.

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

Accept one of the following:

- E1. Deindustrialization may cause the local economy to shift from a manufacturing or industry-based economy (secondary sector) to a service and/or technology-based economy (tertiary, quaternary, or quinary sector).
- E2. Outsourcing of manufacturing or industrial jobs to other countries can lead to a decline in local employment levels and/or an increase in the percentage of the workforce that is unemployed or receiving unemployment benefits.
- E3. Increased unemployment in the central business district (CBD), declining investment, and/or declining real estate values may result from the loss of manufacturing firms, jobs, and/or services that were once supported by the former industrial economy.
- E4. Increases in the local use of post-Fordist methods of production (e.g., highly specialized firms, just-in-time delivery supply chains, flexible production methods) by manufacturing firms can indicate a response to deindustrialization to make industrial production more efficient.
- E5. Gross national income (GNI) per capita in the area may decrease as local people lose employment in manufacturing and/or are unable to find similar-paying jobs in another economic sector.
- E6. Unemployment rates or underemployment may increase as local people lose employment in manufacturing and/or are unable to find similar-paying jobs in another economic sector.
- E7. Cities and communities may see decreased tax revenues due to higher unemployment and/or a decrease in population as people move away to search for jobs elsewhere (e.g., backwash effects, migration).

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

Accept one of the following:

- F1. The high-technology nature of the products and services listed demonstrates that the economy has moved into the quaternary sector.
- F2. The products and services rely on the knowledge and/or intellectual capabilities of the firms, institutions, and/or workforce that develop these advanced technologies.
- F3. The products and services are the outcomes of a highly educated, specialized, and/or creative class of employees who develop innovative solutions to consumer needs.
- F4. The products and services are dependent on the use of information technology for firms, institutions, and/or the workforce to be more productive, efficient, and/or cost-effective.

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- (G) The map focuses on a regional scale. Explain a possible limitation of drawing country scale conclusions from a regional scale map. 1 point

Accept one of the following:

- G1. Attempts to analyze research data from one scale of analysis to make claims about another scale of analysis may be inaccurate due to the change in scale's effect on spatial analysis.
- G2. Making research assumptions from map data at one scale of analysis to make claims about another scale of analysis may result in an incorrect calculation or an ecological fallacy due to the change in scale.
- G3. The region can be specialized in a sector or type of production that is different from the economic sectors or production types found in other regions of the country.
- G4. The region can have a long and continuing tradition of valuable or productive sectors that are very different from the changing mix of economic sectors that characterize the country's economy.

Total for question 3: 7 points