2018 USGO Nationals Map Examination - Key and Marking Scheme

Section 1 [11 marks]

1. What languages are represented by areas 1 and 3 on the map above? Identify the reason for the light brown areas labeled 2 on the map. Why are these areas likely located in the areas in the parts of the country that they are?

2. Identify and explain three ways in which countries like Canada promote bilingualism through public policies at the national level.

3. Give one reason for the high level of bilingualism or multilingualism in each of the following countries or areas – a) Hong Kong; b) Indonesia; c) Kazakhstan; d) Kenya

Grading notes: This question is partly in honor of our 2018 hosts for iGeo in Quebec, and is also adapted from a FRQ on the 2015 AP Human Geography examination. All parts of the question are point marked.

Expected answers:
1. [4 marks] Area 1 – English; Area 3 – French; Area 2 is known as the 'bilingual belt', and is the only area of Canada where there is a high percentage of bilingualism in surveys since 1961. In most instances, the bilingualism in this area involves native French speakers who are fluent in English, but a much lower percentage of Anglophones are able to speak French. [other reasonable answers accepted]

2. [3 marks] national government required to conduct business in both languages; encouraging or requiring provincial and / or local governments to conduct business in both languages; regulating businesses to mandate services and labeling are provided in both languages; education policies that promote dual-language instruction or mandate teaching of both languages in schools [other reasonable answers accepted]

3. [4 marks] Acceptable answers include increased sex education; education about the benefits family planning; increased educational opportunities for girls and women; increased educational opportunities for all young people to increase economic development [other reasonable answers accepted]

4. [4 marks] Hong Kong – former British colony only recently returned to Chinese control [Chinese (Cantonese) and English are official languages]; Indonesia – very large, linguistically diverse nation with over 700 spoken languages, uses Indonesian as a linking language, but most Indonesians know at least one other, especially Javanese and Sundanese [Indonesian is official language]; Kazakhstan – former Soviet Republic, thus a very large number of Russian speakers, and Russian is used in many areas of life in addition to Kazakh [Kazakh is 'state' language, Russian is 'official' language]; Kenya – large, multilingual country and former British colony, Swahili and English are commonly spoken, but many Kenyans know these in addition to native languages [Swahili and English are official]

Section 2 [12 marks]
1. Given the locations of these coffee producing nations, briefly describe the optimal climate for coffee growing. Identify and describe two likely effects of global warming on coffee cultivation in these areas.

2. Identify and explain one positive impact and two negative impacts of coffee production on coffee producing nations.

3. Is most coffee in the world grown on small farms or plantations? Identify two factors that might account for this method of production.

4. In developed nations, coffee shops are often indicators of changes in urban environments. Identify and briefly explain the connection between coffee shops and – a) gentrification; b) the emergence of the 'gig economy'.

Grading notes: This questions is partly adapted from a question on the 2014 AP Human Geography exam. This represents the type of mixed question common on recent iterations of the iGeo WRT exam.

Expected answers:
1. [4 marks] Coffee grows optimally in cool to warm tropical climates, usually at higher altitudes, with rich soil and few pests. Temperature range for Arabica coffee (the most commonly grown variety) is an annual mean of 64-70 degrees. Global warming will likely greatly decrease suitable growing area across these coffee producing countries, as much as 40-90% in areas of Central and South America by 2050. Other suitable areas of production would likely emerge, but not enough to offset loss of production elsewhere. In addition, the minimum altitude for production would increase in many areas, further diminishing productive areas. Coffee pests will also likely increase in warmer climates.

2. [3 marks] Economic development is the main positive impact (reasonable explanations may vary); negative impacts include dependence on a single cash crop, environmental impacts including deforestation and water usage, and changes in agricultural land use (reasonable explanations may vary)

3. [3 marks] Between 70-80% of world coffee production is done on small farms; factors include labor-intensive nature of coffee production, terrain favorable to production not conducive to plantation agriculture, cultivation and harvesting methods difficult to mechanize, sustainable cultivation methods (including shade cultivation) also difficult to mechanize or produce on a large scale (other reasonable answers accepted)

4. [2 marks] gentrification – in many cities, the presence of coffee shops is seen as a harbinger of gentrification, often signaling an increase in property values and a decrease in crime (academic studies have linked opening of Starbucks stores to increase in property values in American cities, as well as lower violent crime rates in areas with high numbers of coffee shops); gig economy – workers in the gig economy often use coffee shops as work spaces and meeting places (other reasonable answers accepted)

Section 3 [13 marks]
1. Identify the ocean currents on Map 1 marked 1, 2, 3, and 4.

2. Given the information in Map 1, describe in detail the formation of the Great Pacific Garbage Patch. Include in your response why the Patch is roughly divided into an Eastern and Western Patch, and how trash moves between the two sides.

3. From what part of the world does most of the trash in the Great Pacific Garbage Patch come? Based on the current flow, in what part of the Patch does much of that waste end up?

4. Based on the information in Map 2, which of the following most closely approximates the size of the most concentrated area of the Eastern Pacific Garbage Patch (outlined in bold) - 100,000 square kilometers; 700,000 square kilometers; 1,500,000 square kilometers; or 15,000,000 square kilometers

Grading notes: Due to recent studies on the size and concentration of the Great Pacific Garbage Patch, this topic has been much in the news in the last few months. This type of oceanography question commonly appears on the iGeo Written Examination. Questions 1,3, and 4 are point marked, Question 2 is level marked.

Expected answers:
1. [4 marks] 1. North Pacific; 2. California; 3. North Equatorial; 4. Kuroshio

2. [6 marks] The Great Pacific garbage patch formed gradually as a result of ocean or marine pollution gathered by ocean currents. The garbage patch occupies a large and relatively stationary region of the North Pacific Ocean bound by the North Pacific Gyre (commonly referred to as the horse latitudes). The gyre's rotational pattern draws in waste material from across the North Pacific Ocean, including coastal waters off North America and Japan. As material is captured in the currents, wind-driven surface currents gradually move floating debris toward the center, trapping it in the region.

The patch is actually comprised of the Western Garbage Patch, located near Japan, and the Eastern Garbage Patch, located between the U.S. states of Hawaii and California. These areas of spinning debris are linked together by the North Pacific Subtropical Convergence Zone. This convergence zone is where warm water from the South Pacific meets up with cooler water from the Arctic. The zone acts like a highway that moves debris from one patch to another. (reasonable or equivalent answers accepted)

3. [2 marks] Eleven of the top twenty countries producing plastic waste in the world are in Asia, with China at number one. Much of the waste generated in Asian countries will end up in the Eastern Patch.

4. [1 mark] approximately 700,000 sq km

Section 4 - [13 marks]

1. Zebra mussels are in invasive species in the United States, first discovered in the Great Lakes in 1988. How do scientists believe these mussels likely made it to US waters?

2. Identify and explain two reasons why the zebra mussel infestation is concentrated in the areas of the Eastern United States shown on the map.

3. Identify and explain two human-influenced ways and two natural ways that zebra mussels can be spread to isolated waterways and lakes.

4. Briefly describe the effect of zebra mussel infestation on native mussels.

5. Choose one of the other invasive species listed below, and describe – a) what the species is; b) one specific area in the US affected by its invasion; c) one major effect of this species on that area.
Kudzu   Nutria   Boll weevil   Sea lamprey

Grading notes: This question set is adapted from a question set on the 2010 AP Environmental Science examination and is reflective of the type of environmental science question that appears on the iGeo WRT exam. All questions are point marked.

Expected answers:
1. [2 marks] The most likely explanation for their transmission to US waters is in the water ballast of ocean-going ships.

2. [2 marks] Possible answers include – this is where the infestation started and is heaviest there; more surface waters in the eastern US as opposed to the west; mountain ranges serve as natural barrier to the western US; greater population density in the East

3. [4 marks] human-influenced – transport of boats or boat trailers, carried in water inside boats, carried from infected bodies of water through canals; natural – flooding from infected waterways, transported by animals (birds, fish, etc.) [other reasonable answers accepted]

4. [2 marks] Zebra mussels compete for resources with native mussels which results in lower populations of native mussels; zebra mussels also grow on top of and cover native mussels, which kills them [other reasonable answers accepted]

5. [3 marks] kudzu – a perennial vine from Asia; southern and eastern US; kills local plants and damages buildings due to its rapid growth; nutria – large, herbivorous, semi-aquatic rodent; southern Louisiana; destroys aquatic plants, marshes and irrigation systems, in addition to man-made structures; boll weevil – beetle from Central Mexico; southern and southeastern US; destroys cotton plants; sea lamprey – lamprey species from North Atlantic; Great Lakes region; kills native fish, particularly lake trout

Section 5 [13 marks]

1. Given the information in Map 1, briefly explain the high level of seismic risk in the area marked 1.

2. Briefly explain why shale deposits contain oil and gas.

3. Explain the mechanism by which the oil and gas is extracted from shale deposits.

4. What connection is there, if any, between shale gas and oil extraction and the increased seismic risk in the area on Map 1 marked 2?

5. Identify one potential positive economic impact and one potential negative economic impact of shale gas and oil extraction on the area of the Bakken formation in the US. Identify one demographic change in the region due to the boom in production, and one negative impact of that change.

Grading notes: This question is inspired by a question set on the 2013 iGeo WRT exam. Questions 1, 2, 4 and 5 are point marked. Question 3 is level marked, with points awarded for both specificity and accuracy.

Expected answers:
1. [2 marks] The area marked 1 on the map is the location of the New Madrid Seismic Zone. This area is particularly susceptible to intraplate earthquakes, and has both a history of powerful events in the past and a high potential for them in the future.

2. [2 marks] Because shale is a sedimentary rock, organic materials can become trapped in the pores during formation. Over time, these organic materials can be transformed by heat and pressure into oil and gas.

3. [3 marks] A hydraulic fracture is formed by pumping fracturing fluid into a wellbore at a rate sufficient to increase pressure at the target depth. The rock cracks, and the fracture fluid permeates the rock extending the crack further. The resulting fracture is permeable enough to allow the flow of gas, oil, salt water and hydraulic fracturing fluids to the well.

4. [2 marks] The increase in seismic risk in area 2 is most likely caused by excess wastewater from hydraulic fracturing and other sources being injected deep underground and causing tectonic stresses. These induced earthquakes are not the direct result of hydraulic fracturing.

5. [4 marks] Positive economic impacts include economic development and the influx of high-paying jobs; negative impacts mostly focus on the uncertainty of this economic development and the high break-even point of shale gas extraction relative to world oil prices (other reasonable answers accepted); demographic changes are mostly tied to the very rapid increase in population; negative impacts include strain on housing and infrastructure, higher crime rates, etc. (other reasonable answers accepted)

Section 6 [8 marks]

1. Which letter on the map indicates the location of a fjord? Briefly describe the process by which fjords are formed.

2. Briefly explain why fjords like Saltstraumen and many others have very strong saltwater rapids and tidal currents.

3. Define the term skerry. Which letter on the map indicates the location of skerries?

Grading notes: This is a typical physical geography question that might appear on the iGeo written exam. All questions were point marked.

Expected answers:
1. [1 mark] Location of fjord – C; [2 marks] Fjord formation - A true fjord is formed when a glacier cuts a U-shaped valley by ice segregation and abrasion of the surrounding bedrock. Glacial melting is accompanied by the rebounding of Earth's crust as the ice load and eroded sediment is removed (also called isostasy or glacial rebound).

2. [2 marks] Most fjords are deeper than the adjacent sea. Fjords generally have a sill or shoal (bedrock) at their mouth caused by the previous glacier's reduced erosion rate and terminal moraine. In many cases this sill causes extreme currents and large saltwater rapids. Saltstraumen in Norway is often described as the world's strongest tidal current due to this phenomenon.

3. [1 mark] Location of skerry – B; [2 marks] Skerry definition - In some places near the seaward margins of areas with fjords, the ice-scoured channels are so numerous and varied in direction that the rocky coast is divided into thousands of island blocks, some large and mountainous while others are merely rocky points or rock reefs, menacing navigation. These are called skerries.