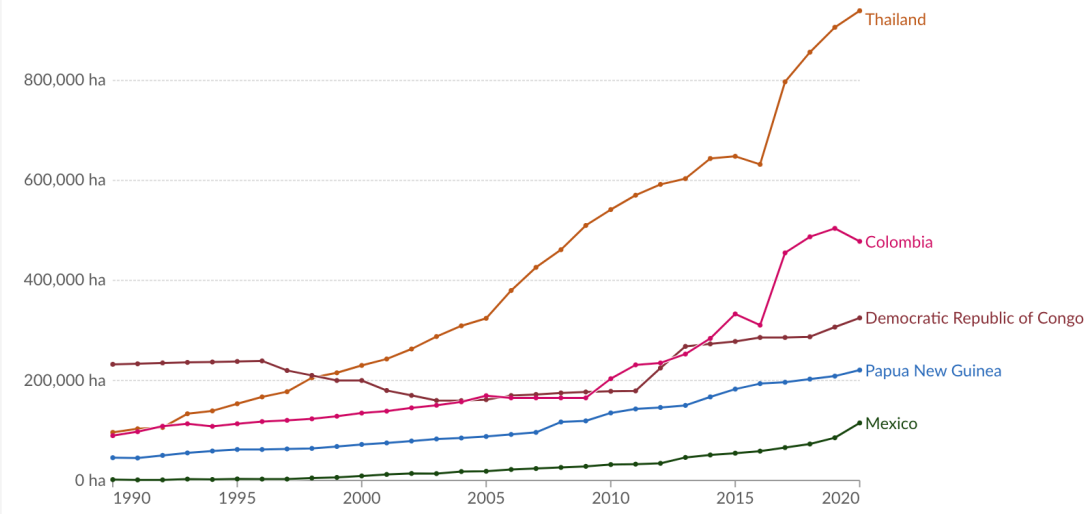
2024 USGC Nationals - Written Examination - Key and Marking Scheme

Section 1 – Palm Oil Production [20 points]

Expected answers:

1. [3 points – award ½ point per correct answer and a bonus ½ point for all 5 correct] 1 – Indonesia; 2 – Thailand; 3 – Brazil; 4 – China; 5 – Madagascar

2. [10 points] Graph produced should follow the trend lines below (there are more data points below than students are expected to account for). The graph should be CLEARLY labeled with hectares of production on one axis and years on the other. Countries should be indicated clearly in some way. Full marks should be awarded for any graph that captures the essence of the image below and has no major errors. Other accurate representations of the data can also score full credit, provided the requirements above are met. Generous partial credit should be awarded.



3. [2 points] Oil palms grow best in tropical and semi-tropical environments with steady rainfall, high temperatures, and sufficient sunshine. They prefer hot temperatures between 25–28°C (75–82°F) with an average maximum temperature of 29–30°C (84–86°F) and an average minimum temperature of 22–24°C (71–75°F). Oil palms also need at least 200 rainy days per year, with a prolonged drought period of less than 60 days per year, and relative humidity between 75–80%. The optimal climatic conditions for oil palm cultivation are found in Southeast Asia, especially in Indonesia and Malaysia, where there are consistently high temperatures and precipitation throughout the year. The tropical climates in Indonesia and Malaysia are well-suited for oil palm cultivation. [other reasonable answers accepted]

4. [2 points] The production of palm oil requires intensive deforestation and this has led to a gradual loss of flora and fauna in the areas where land is cleared for the cultivation of palm oil. This can result in widespread habitat loss and soil degradation in areas where production is the highest. This is however a complicated question because the answer also depends on whether palm plantations immediately and directly replaced existing forest, or if plantations which very quickly replaced forests which had been logged for wood, paper and pulp. Full credit should ONLY be awarded for a response that includes nuance – only half credit should be awarded otherwise. [other reasonable answers accepted]

5. [3 points] Acceptable answers should address both land use and other factors, such as cost, environmental impact, and the utility of the products produced. Full credit should only be awarded for either a thorough exploration of the issue OR for reasonable thoughts about additional information to address the question more accurately.

Section 2 - Historical Geography [15 points]

Expected answers:
1. [5 points] Students should discuss the impact of roads, established migration trails, canals, steamboats, and especially railroads on westward migration in the period specified. Answers that earn full marks will provide specific examples (Erie Canal, transcontinental railroad, etc.) and specific areas to which settlers moved because of those transportation developments.

2. [5 points] This question is open to a wide variety of interpretations, and could include discussions of physical barriers (major rivers, mountain ranges, etc.) or climatological features of the west like the aridity or harsh winters of certain regions. Answers that earn full marks will provide specific examples of technology or innovation, and how these were used to respond to geographical challenges.

3. [5 points] This portion should reflect on the clash between land use patterns of both Native Americans and settlers, and how the increase in population, transportation, and industry disrupted the lives of Native Americans in the trans-Mississippi West. Answers that earn full marks will provide specific examples that are geographical in nature.

Section 3 – Hurricanes [15 points]

Expected answers:
1. [1 point per answer] 19 named storms; 1 hurricane landfall

2. [1 point per answer] Franklin; Idalia; Lee

3. [4 points] Idalia originated in the far eastern Pacific Ocean, A broad area of low pressure developed over the northwestern Caribbean Sea early on 25 August, with a band of disorganized showers and thunderstorms developing north of the low. The system turned northward later that day, and the center made landfall in Cozumel, Mexico, around 0600 UTC 27 August. The depression strengthened into Tropical Storm Idalia by 1200 UTC that day when it was located about 45 n mi southeast of Cozumel. Idalia then turned eastward and continued to strengthen. Idalia became a hurricane as it entered the far southeastern Gulf of Mexico around 0600 UTC 29 August. Idalia began to rapidly intensify while accelerating toward the north and north-northeast. Idalia became a major hurricane by 0600 UTC on 30 August. Idalia made landfall near Keaton Beach, Florida, around 1145 UTC that day. After the core of Idalia moved inland, rapid weakening began, and the cyclone fell below hurricane strength while centered over southern Georgia, only about 6 hours after it made landfall in Florida. Idalia turned northeastward late on 30 August and the center moved off the coast of South Carolina near Myrtle Beach around 0600 UTC. The center of Idalia passed just to the south of Bermuda between 0000 and 0600 UTC 2 September. [reasonable equivalents accepted and times need not be exact; partial credit awarded for incomplete answers]

4. [3 points] Since Margot did not make landfall and Lee made landfall as a rain-producing extra-tropical storm in populated areas of Canada, Lee was clearly the more destructive storm. Answers that earn full credit will make clear this distinction and will reference the hurricane tracks as indicated on the map. Answers that simply name Hurricane Lee without an explanation will receive a single point.

Section 3 (continued)

5. [3 points] In general, the consensus of scientists is that climate change has increased the intensity of storms and the speed at which they intensify. This means a higher percentage of storms are reaching Category 4 or 5 than in decades past, and they are doing so much more quickly than they have historically. There is not consensus on whether or not climate change is increasing the actual frequency of storms developing in the Atlantic. [accept reasonable equivalents, award partial credit where appropriate]

Section 4 – Great Salt Lake [15 points]

1. 17.5km (accept 16.5 to 18.5km); 35km (accept 34 to 36km); 17.5km (accept 16.5km to 18.5km); .473 km per year (accept .4 to .54 km per year) [1 point per correct answer – 4 points total]

Partial credit will be awarded for setting up equations to answer the third and fourth parts of the question, and for having correct value for time (37 years) [3 points total]

2. [4 points] Rapidly increasing population in the Wasatch Valley has increased diversions from the lake's inflows for decades. Needs like drinking water, construction, and agriculture have been consistently on the rise in the area since the 1985 photograph was taken. Per capita water usage in Utah is the second highest in the US, which also contributes greatly to the problem as the population of the area increases. [other reasonable answers accepted]

3. [4 points] Due to climate change, more precipitation falls in the region in the form of rain than snow. Snow is better for the lake because it can be stored and released slowly over time. The lack of snow also results in worse aquifer recharge which also adversely effects lake levels. Climate change and demographic changes have also effected upstream water use in the region as well. [other reasonable answers accepted]

Section 5 – Deforestation [15 points]

1. [1 point per correct answer] Jamaica, Honduras, Haiti, Puerto Rico, Cuba

2. [4 points] Costa Rica and certain other Central and South American nations have adopted government policies to control deforestation. Some of these policies are limits or regulations on industry and agriculture to prevent forest loss through clear-cutting, logging, and other economic activities. Other policies focus on sustainable practices to encourage the reforestation of areas that have lost forest coverage in the past. In addition, many nations like Costa Rica have embraced the concept of ecotourism, and have put in place laws to protect forests and other natural areas as a result. [other reasonable answers accepted]

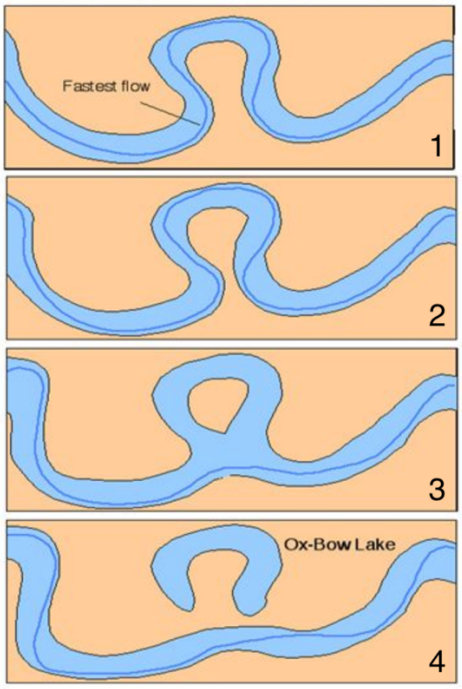
3. [4 points] Mexico has an increasing population and increasing agricultural production, both of which generally lead to deforestation. Mexico's economy has also been developing rapidly during this period, including extractive industries like oil and mining, which also leads to deforestation. In addition, Mexico has generally lax environmental regulation and has been moving away from import substitution industrialization and towards open free markets and more laissez faire policies in its economy. [other reasonable answers accepted]

4. [2 points] Reasons like soil erosion, wildlife extinction, biodiversity loss, food and fuel shortage, disruption of the water cycle, effect on human health are all acceptable answers. [other reasonable answers accepted]

Section 6 – Riparian landforms [10 points]

1. [1 point per correct answer] natural levee – D; backswamp – E; Yazoo stream – C

2. Diagram should illustrate the steps shown below, and should be labeled in some way with the appropriate steps of oxbow formation. Generous partial credit will be awarded for diagrams that show the general process of oxbow formation.



- This diagram shows the formation of an ox-bow lake.
- The neck of the meander narrows gradually due to erosion on the outer bends.
- Eventually, the neck is broken through, often during a time of flood.
- Deposition of silt/alluvium seals off the meander from the mainstream.
- Gradually, the ox-bow lake will dry up to leave a meander scar.

Section 7 – Karst topography [10 points]

1. [2 points] These formations may be identified as fengcong or fenglin formations (as they are known in Mandarin) or as cone or tower karst. Full credit will be given for any of these specific terms.

2. [5 points] This type of formation is typically formed in carbonate rocks that are pure and continuous over a stratigraphic thickness of more than 200-300 meters. The formation is mainly caused by precipitation dissolution and occurs in humid and rainy climates with deeply entrenched adjacent surface rivers and a vadose zone that is more than 100-300 meters deep. Tower karst forms as near-vertical joints and fractures are eroded downward by solution, leaving parts of a previously coherent rock mass isolated from each other. Tower karst is most common in tropical regions, although it may form in other climates as well. [other reasonable answers accepted]

3. [3 points] A. cenote is a natural pit, or sinkhole, resulting when a collapse of limestone bedrock exposes groundwater [other reasonable answers accepted]