INTERNATIONAL ENVIRONMENTAL SCIENCE OLYMPIAD

# 2024 Written Examination
# Elementary School Division

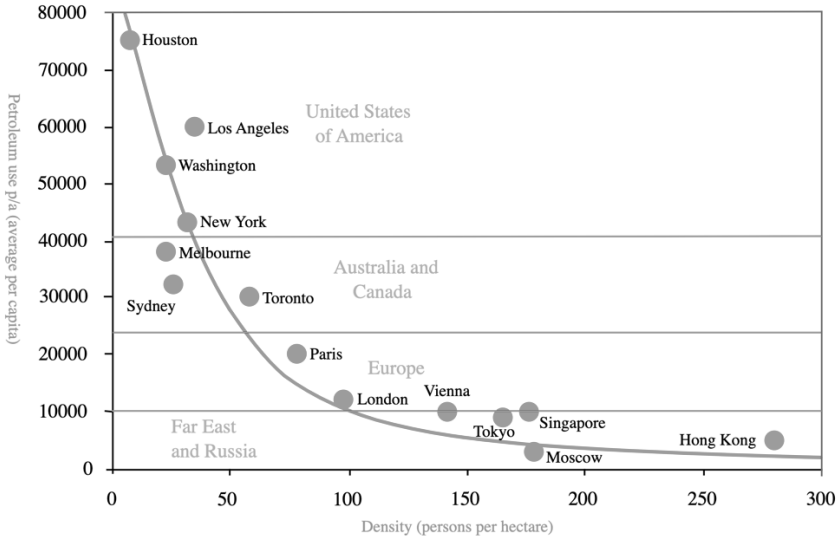
Name _____

Country OR State _____

**General instructions -** Respond to each of examination questions in the space provided on the answer document. Only answers written in the appropriate space on the answer document will be marked. Where appropriate, you should write sentences or phrases instead of single words. If a question or section asks for a specific number of reasons or answers, give only the number of answers specified. Show your work on all mathematical calculations. Please write clearly and legibly.

## Section 1 – Urban Sprawl and the Environment [26 points]

Section 1 refers to the image below.




A. Given the information on the graph, explain why cities with lower population density like Houston and Los Angeles use more petroleum products (like oil and gasoline) than cities like Tokyo and Hong Kong. Be as specific as possible in the space provided.

B. Describe TWO ways cities like Houston and Los Angeles could reduce petroleum use per person.

C. Define the term urban sprawl.

D. Identify and explain TWO environmental impacts of urban sprawl.

E. Respond to the following true / false statements.
1. Cities with a large amount of urban sprawl usually have extensive train or subway systems.
2. Moscow has a lower population density than London.
3. Highway systems in the United States are a major cause of urban sprawl in many cities.
4. The most densely populated cities in the world are in the United States.
5. Less densely populated cities always have worse air quality than more densely populated cities.

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## Section 2 – Arable Land and Population [28 points]

**Background information –**
The world's population is steadily increasing, and with it the demand for food is also on the rise. There is a finite amount of arable land on Earth, which the UN's FAO estimates is roughly 42.5 million $km^2$. Use the information in the chart below to help answer the following questions about agriculture – the chart shows the amount of land needed to feed the world's population from 1900 to the projected amount needed in 2060.

| **Year** | 1900 | 1920 | 1940 | 1980 | 2000 | 2020 | 2060 |
|---|---|---|---|---|---|---|---|
| **Land needed (million $km^2$)** | 4.0 | 5.0 | 6.0 | 12.5 | 16.0 | 25.0 | 47.5 |

A. On the graph provided on the answer document, plot the data from the table. Connect the points on the graph with lines.

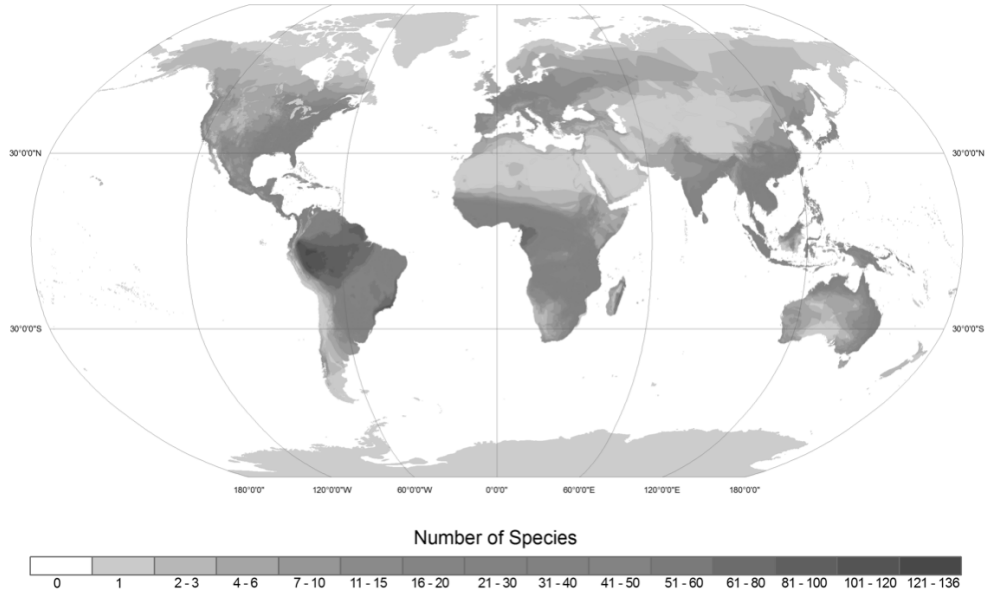
B. Based on your graph, in what year will the world run out of arable land to feed its population?

C. Respond to the following true / false statements.
1. Making agriculture more efficient would increase the amount of land needed the world's population.
2. Farms produce much more food per acre now than they did in 1900.
3. The areas of the world with the fastest growing populations also produce the most food each year.
4. The United States does not currently grow enough food to feed its population.
5. More than half of Japan is considered arable land.

D. Define the term salinization. Why do modern agricultural practices often cause salinization? Identify and explain THREE detrimental effects of salinization on either agriculture or the environment.

## Section 3 – Species Richness [20 points]

Section 3 refers to the image below. This image shows species richness of amphibians throughout the globe.




A. Identify the biome in which amphibian species richness is the highest.

B. Explain TWO reasons that amphibian richness would be the highest in this biome.

C. Identify and explain TWO environmental threats to amphibian species in this biome.

D. Identify and explain TWO anthropogenic (human-caused) reasons for deforestation in this biome.

E. How does having a larger variety of plant and animal species help an ecosystem respond to climate change? Be as specific as possible in the space provided.

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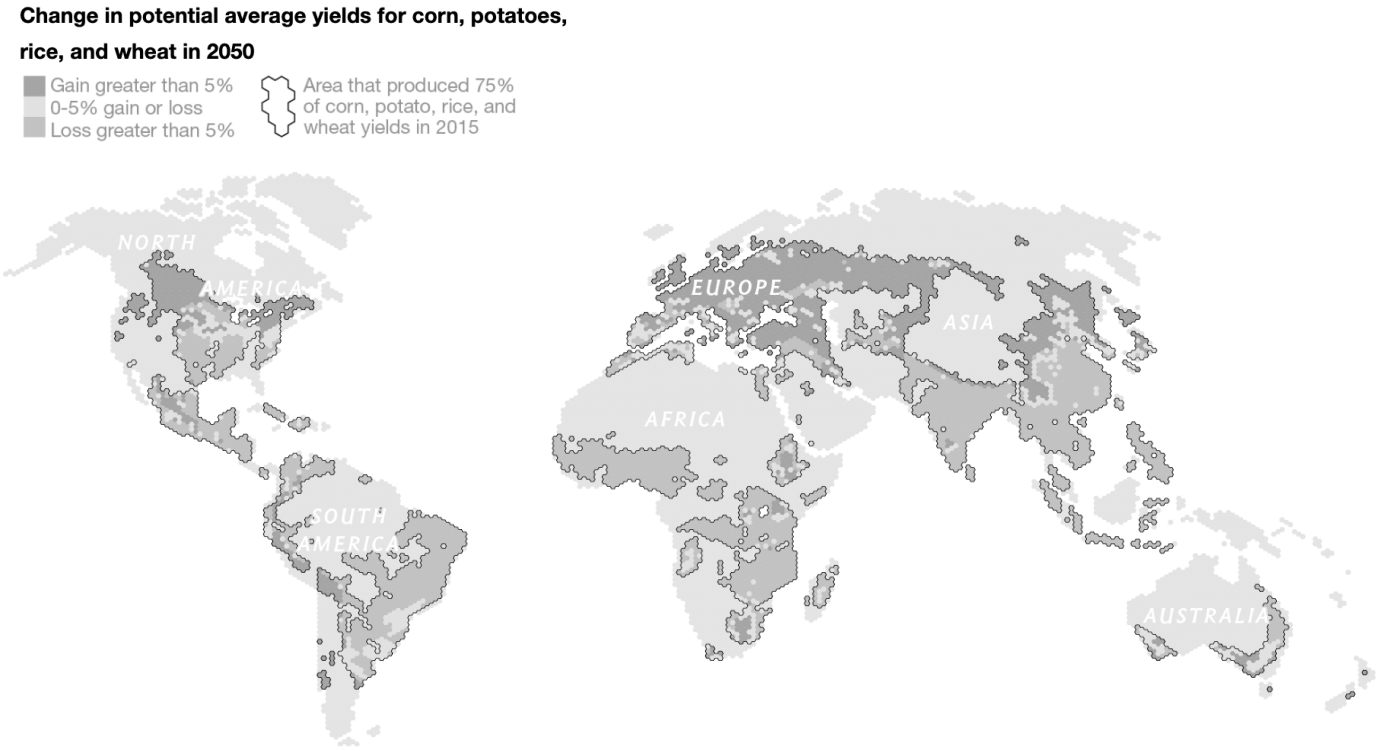
## Section 4 – Agriculture and Climate Change [26 points]

Use the image in section 4 to complete the following.




A. Given the information on the map, will agricultural production increase or decline by 2050 in each of these areas – the United States, Brazil, India, China, Canada

B. Explain how changes in the water cycle due to climate change will affect agricultural production in both Australia and the United States. Be as specific as possible in the space provided.

C. Respond to the following true / false statements

1. According to the map, South America will produce less food overall by 2050.
2. In many areas of Europe food production is likely to rise by 2050.
3. Coffee production throughout the world is likely to increase by 2050.
4. In many countries, climate change will make some land unsuitable for farming but other land more productive.
5. Climate change will make farmland in every country less productive.

**This is the end of the exam.**