Questionnaire

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Introduction

This document contains the questions that participants answered during the experiment. The experiment is broken up into four sections:

1. Preliminary questions

2. Color vision test

3. Cartogram analysis questions

4. Attitude test

For each question in the cartogram analysis section, the following information is given:

1. A screenshot of the cartogram viewing interface shown to participants during the experiment, with all interactive features enabled.

2. Question task type from our task taxonomy. This was not shown to participants during the experiment.

3. The text of the question.

4. The multiple choice answer options. Most questions have only one correct answer. Questions with multiple correct answers will be indicated with instructions in the question text.

Preliminary Questions

1. How old are you?

_____

2. What is your gender?

    A. Male   B. Female

    C. Other   D. Prefer not to say

3. What is your highest level of education?

    A. High School graduate   B. Some college

    C. Associate's and/or Bachelor's degree   D. Bachelor's degree

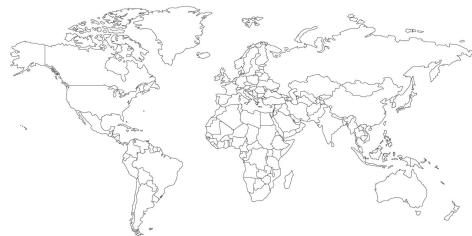   E. Master's degree   F. Doctorate or Professional degree

4. How familiar are you with interactive computer graphics?

    A. 1: Very unfamiliar   B. 2: Unfamiliar

    C. 3: Somewhat familiar   D. 4: Familiar

    E. 5: Very familiar

5. How familiar are you with cartograms?

    A. 1: Very unfamiliar   B. 2 :Unfamiliar

    C. 3: Somewhat familiar   D. 4: Familiar

    E. 5: Very familiar

6.

Consider the world map above. Would you be able to point at the location where you were born?

A. 1: Yes, with confidence.

B. 2: Yes, with a little effort.

C. 3: Yes, with much effort.

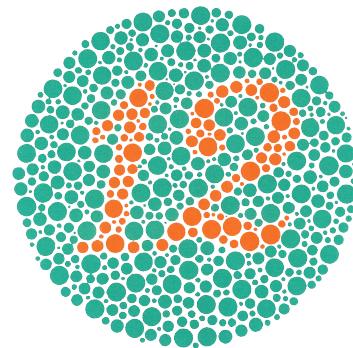D. 4: Possibly, but I'm uncertain.

E. 5: No.

7. When you encounter the names of unfamiliar locations (e.g. countries, islands, lakes), how frequently do you immediately look them up on a map to find out where they are?
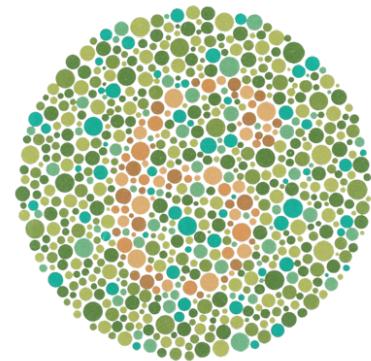
A. 1: Never

B. 2: Rarely

C. 3: Sometimes

D. 4: Generally
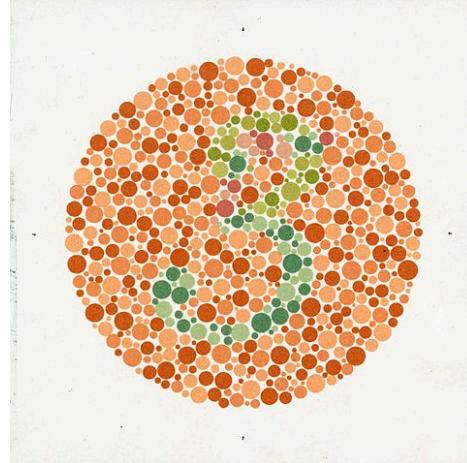
E. 5: Always

Vision Test Questions

1. Please enter the number displayed in the image below. If you do not see any number, please enter "NA."
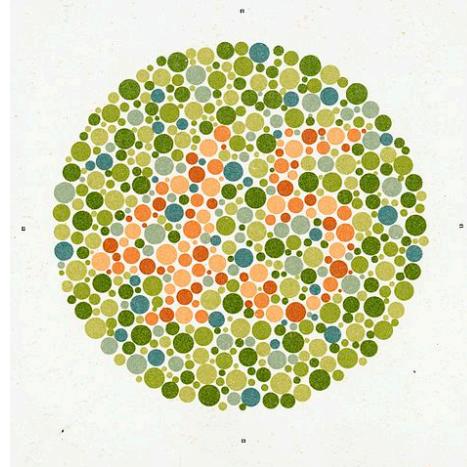

_____

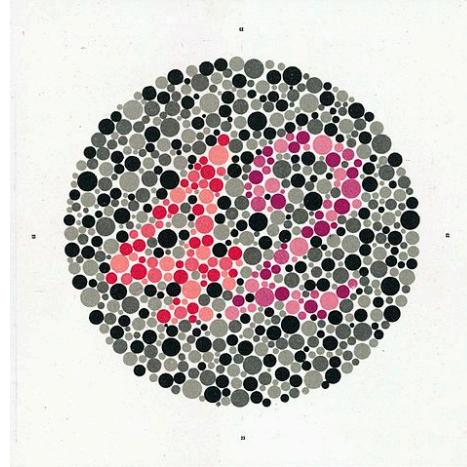2. Please enter the number displayed in the image below. If you do not see any number, please enter "NA."

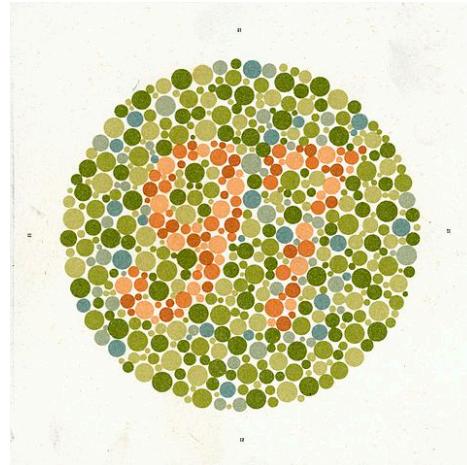3. Please enter the number displayed in the image below. If you do not see any number, please enter "NA."

4. Please enter the number displayed in the image below. If you do not see any number, please enter "NA."

5. Please enter the number displayed in the image below. If you do not see any number, please enter "NA."

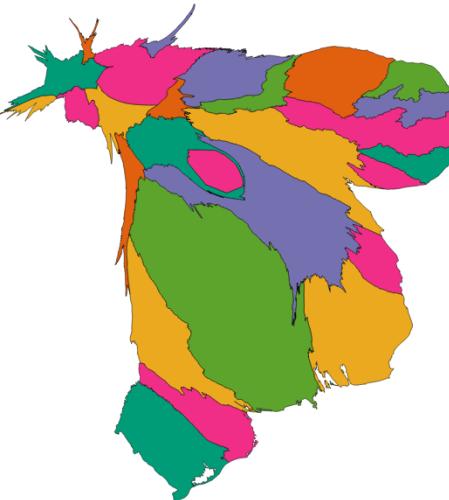6. Please enter the number displayed in the image below. If you do not see any, please enter "NA."

Multiple Choice Questions

Question 1

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

Next »

(Cluster) Question 1 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a cattle population cartogram (right). Out of the states listed below, which has a cattle population most similar to Mato Grosso do Sul (MS)?
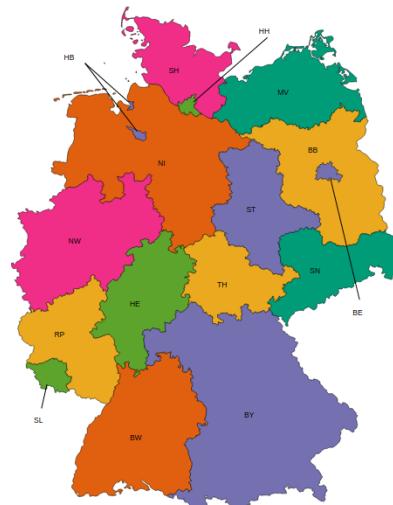
A. Rondonia (RO)

B. Para (PA)

C. Mato Grosso (MT)

D. Sao Paulo (SP)

Version 5, 20 Dec 2019

Question 2

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

« Previous

Next »

(Compare) Question 2 out of 43 On the other monitor, you can see a conventional map of Germany (left) and a GDP cartogram (right). Is the GDP of Mecklenburg-Vorpommern (MV)

- higher than,

- approximately equal to or

- lower than

the GDP of Rheinland-Pfalz (RP)?

A. Higher

B. Approximately equal

C. Lower

Question 3

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Cows | Population | Land Area

« Previous

Next »

(Detect change) Question 3 out of 43 On the other monitor, you can see a conventional map of Brazil (left), a cattle population cartogram and a human population cartogram (right). You may have to use the cartogram selector tab to view both cartograms.Is the area of Amazonas (AM) in the **cattle population cartogram**

- higher than,

- approximately equal to or

- lower than

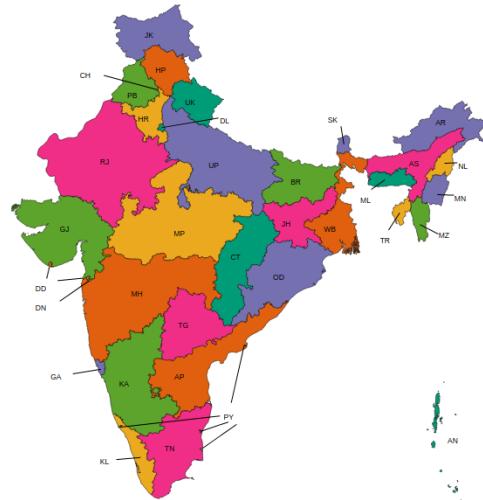its area in the **human population cartogram**?

A. Higher

B. Approximately equal

C. Lower

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

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Next »

(Recognize) Question 4 out of 43 On the other monitor, you can see a conventional map of India (left) and a population cartogram (right). What is the name of the state highlighted red in the population cartogram below?
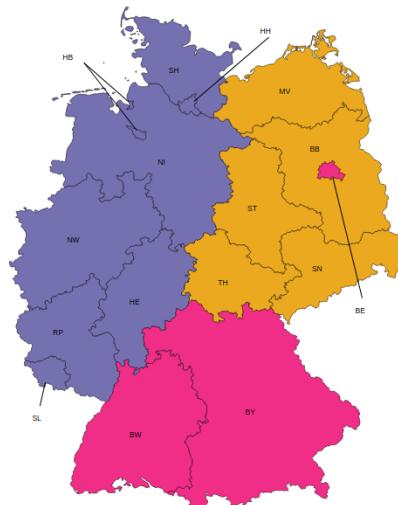
A. Haryana (HR)

B. Punjab (PB)

C. Rajasthan (RJ)

D. Himachal Pradesh (HP)

Question 5

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population (1985) | Population (2015) | Area

« Previous

Next »

(Summarize) Question 5 out of 43 On the other monitor, you can see a conventional map of Germany (left) and population cartograms for the years 1985 and 2015 (right). You may have to use the cartogram selector tab to view both cartograms. Three different regions are highlighted in yellow, purple and pink. What can you say about the change in population for each region from 1985 to 2015?

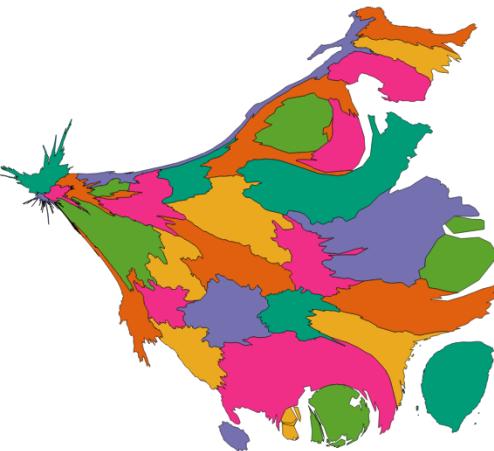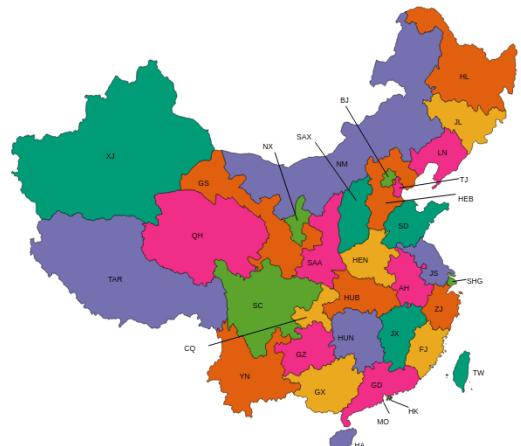|			
Yellow Region	A. Growth	B. Approximately No Change	C. Shrinking
Pink Region	A. Growth	B. Approximately No Change	C. Shrinking
Purple Region	A. Growth	B. Approximately No Change	C. Shrinking

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

« Previous

Next »

(Detect change) Question 6 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a GDP cartogram and a population cartogram (right). You may have to use the cartogram selector tab to view both cartograms.Is the area of Heilongjiang (HL) on the **GDP cartogram**

- higher than,

- approximately equal to or

- lower than

its area on the **population cartogram**?

A. Higher

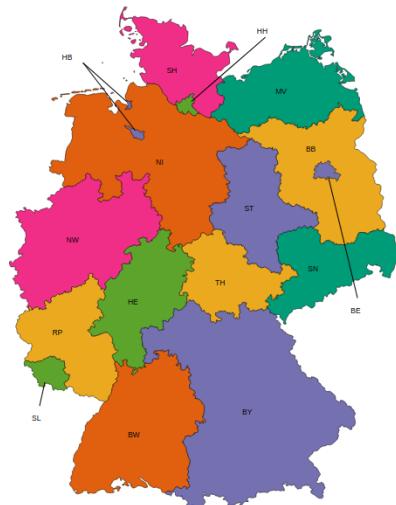B. Approximately equal

C. Lower

Question 7

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

« Previous

Next »

(Filter) Question 7 out of 43 On the other monitor, you can see a conventional map of Germany (left) and a population cartogram (right). Out of the states listed below, which one(s) have a population higher than Baden-Wuerttemberg (BW)? **There may be more than one correct answer.**
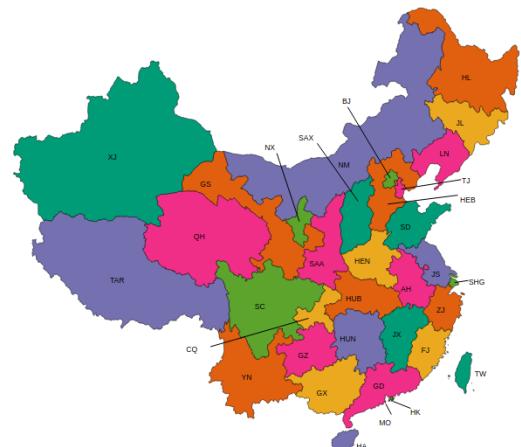
A. Nordrhein-Westfalen (NW)

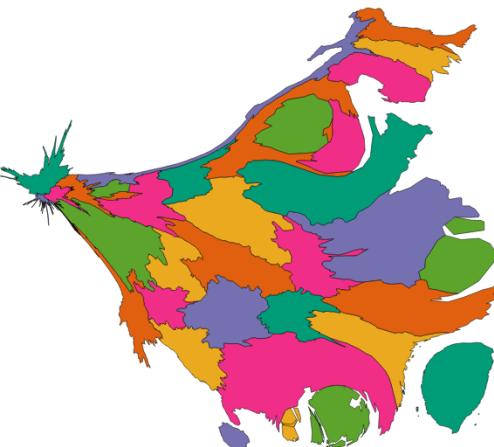B. Hessen (HE)

C. Niedersachsen (NI)

D. Bayern (BY)

Question 8

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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Next »

(**Compare**) **Question 8 out of 43** On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a GDP cartogram (right). You may have to use the cartogram selector tab to view both cartograms. Is the GDP of Taiwan (TW)

- higher than,

- approximately equal to or
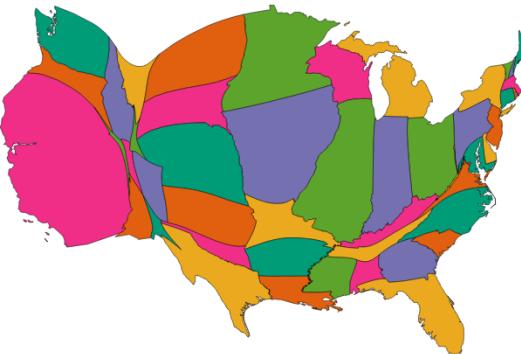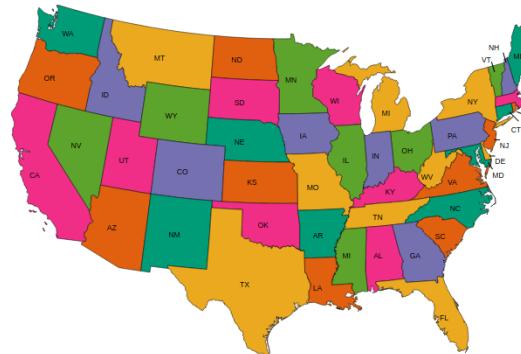
- lower than

the GDP of Zhejiang (ZJ)?

A. Higher

B. Approximately equal

C. Lower

Question 9

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Crop Total ($) | Population | Land Area

« Previous

Next »

(Cluster) Question 9 out of 43 On the other monitor, you can see a conventional map of the USA (left) and a crop production cartogram (right). Out of the states listed below, which has a crop production most similar to Minnesota (MN)?
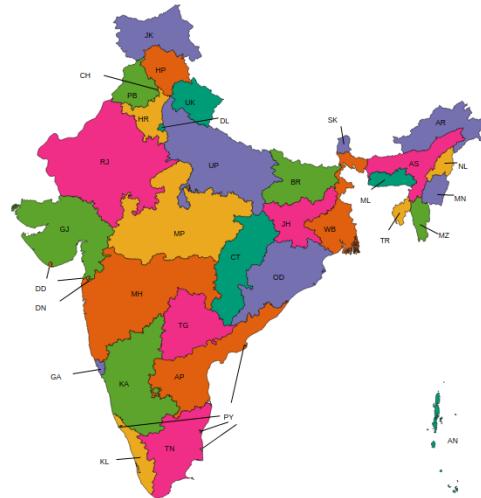
A. Iowa (IA)

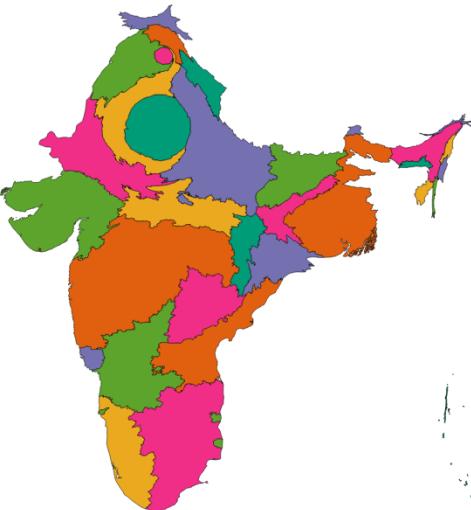B. Illinois (IL)

C. California (CA)

D. Washington (WA)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

« Previous

Next »

(Filter) Question 10 out of 43 On the other monitor, you can see a conventional map of India (left) and a GDP cartogram (right). Out of the states listed below, which one(s) have a GDP higher than Delhi (DL)? **There may be more than one correct answer.**

A. Arunachal Pradesh (AR)

B. Uttar Pradesh (UP)
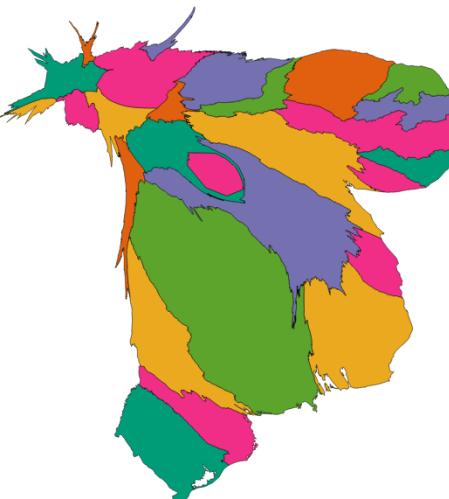
C. Puducherry (PY)

D. Punjab (PB)

Question 11

You have access to the infotips, parallel highlighting, and map switching features.

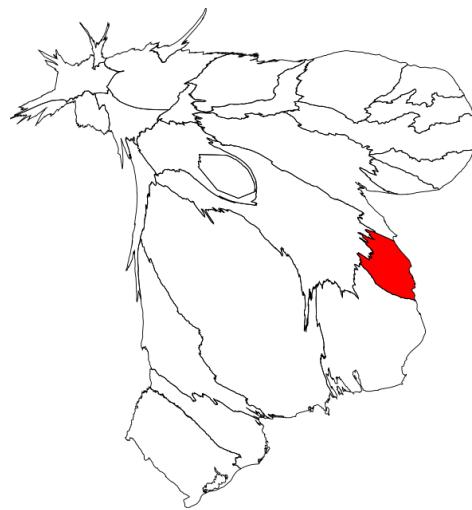**Hover over map regions to see more information.**

Population | Land Area

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Next »

(Find adjacency) Question 11 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a population cartogram (right). Which state(s) are **neighbours** of the state highlighted in red in the population cartogram below? **There may be more than one correct answer.**

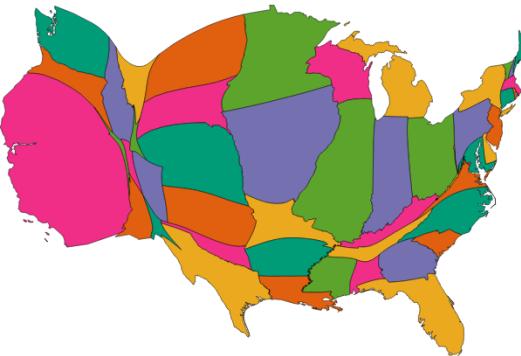A. Bahia (BA)

B. Minas Gerais (MG)

C. Maranhao (MA)

D. Sergipe (SE)

Question 12

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Crop Total ($) | Population | Land Area

« Previous

Next »

(Find top-k) Question 12 out of 43 On the other monitor, you can see a conventional map of the USA (left) and a crop production cartogram (right). Which state of the USA has the highest crop production?
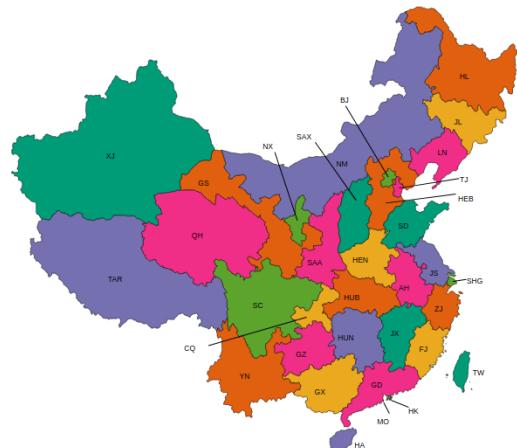
A. California (CA)

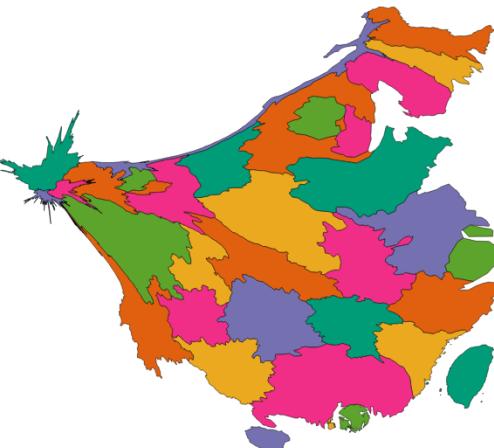B. Montana (MT)

C. Maine (ME)

D. Iowa (IA)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population Land Area

« Previous

Next »

(Cluster) Question 13 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a population cartogram (right). Out of the regions listed below, which has a population most similar to Hong Kong (HK)?
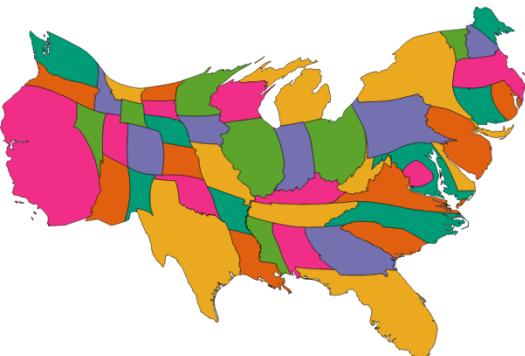
A. Xinjiang (XJ)

B. Heilongjiang (HL)

C. Yunnan (YN)

D. Ningxia (NX)

Hover over map regions to see more information.

Electoral Votes | Population | Land Area

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Next »

(Compare) Question 14 out of 43 On the other monitor, you can see a conventional map of the USA (left) and an electoral vote cartogram (right). Does Maine (ME) have more, fewer or an approximately equal amount of electoral votes than New Hampshire (NH)?
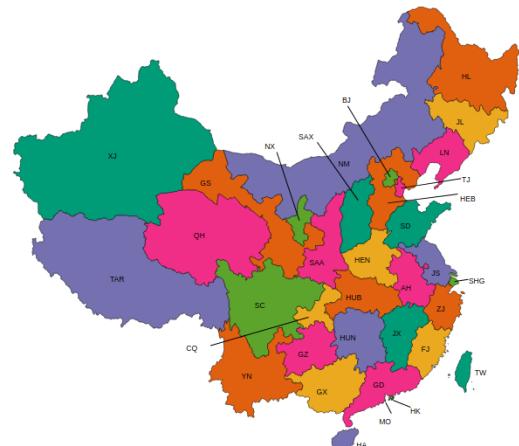
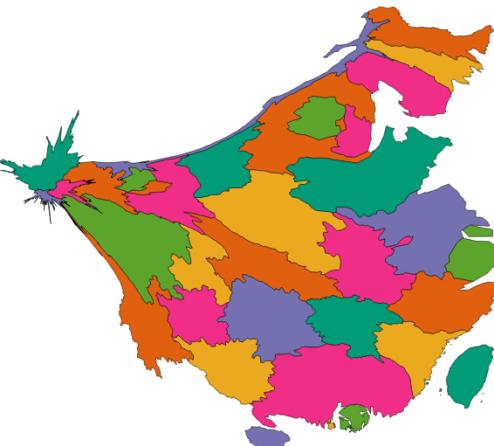A. More

B. Fewer

C. Approximately equal amount

Question 15

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.
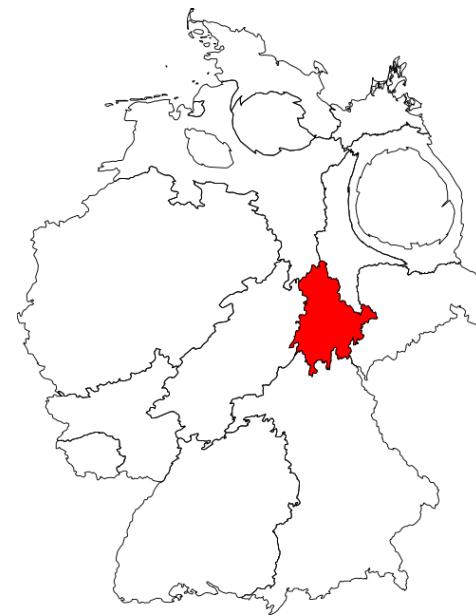
Population | Land Area

« Previous

Next »

(Find top-k) Question 15 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a population cartogram (right). Which region of China has the highest population?

A. Guangdong (GD)

B. Fujian (FJ)

C. Hong Kong (HK)
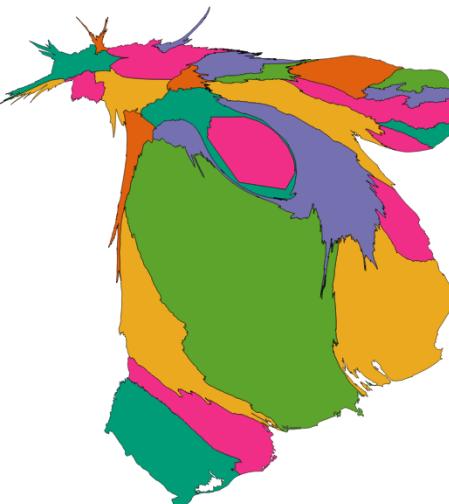
D. Beijing (BJ)

A. Berlin (BE)

B. Bayern (BY)

C. Saarland (SL)

D. Hessen (HE)

Question 17

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

« Previous

Next »

(Compare) Question 17 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a GDP cartogram (right). Is the GDP of Rio de Janeiro (RJ)

- higher than,

- approximately equal to or

- lower than

the GDP of Rio Grande do Sul (RS)?

A. Higher
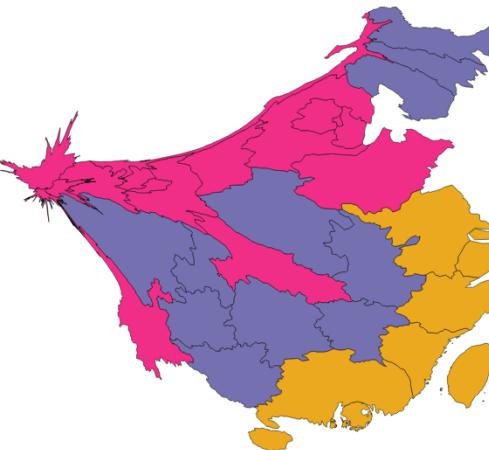
B. Approximately equal

C. Lower

Question 18

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population (2000) | Population (2030) | Area

« Previous

Next »

(Summarize) Question 18 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and population cartograms for the years 2000 and 2030 (projected population, right). You may have to use the cartogram selector tab to view both cartograms. Three different regions are highlighted in yellow, purple and pink. What can you say about the projected change in population for each region from 2000 to 2030?

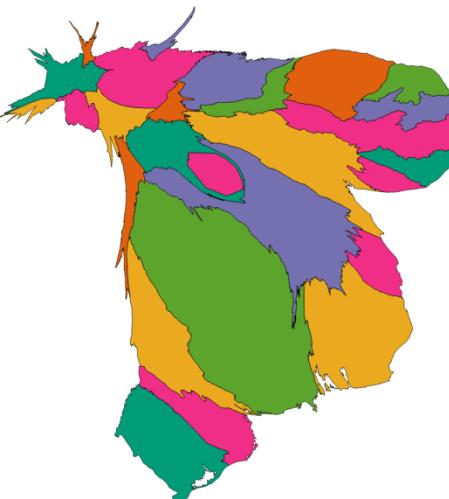|			
Yellow Region	A. Growth	B. Approximately No Change	C. Shrinking
Pink Region	A. Growth	B. Approximately No Change	C. Shrinking
Purple Region	A. Growth	B. Approximately No Change	C. Shrinking

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.
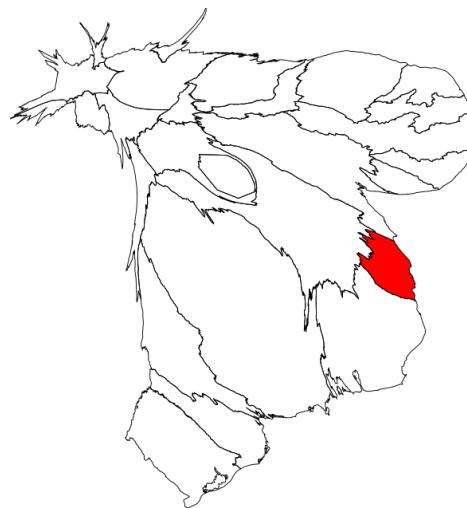
Population | Land Area

« Previous

Next »

(Recognize) Question 19 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a population cartogram (right). What is the name of the state highlighted in red in the population cartogram below?
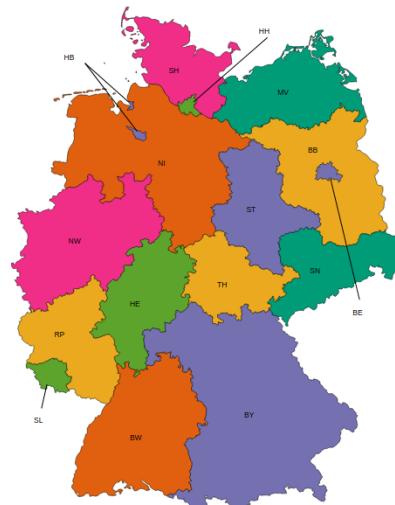
A. Espirito Santo (ES)

B. Sao Paulo (SP)

C. Amazonas (AM)

D. Rio Grande do Sul (RS)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

« Previous

Next »

(Find top-k) Question 20 out of 43 On the other monitor, you can see a conventional map of Germany (left) and a GDP cartogram (right). Which state of Germany has the highest GDP?
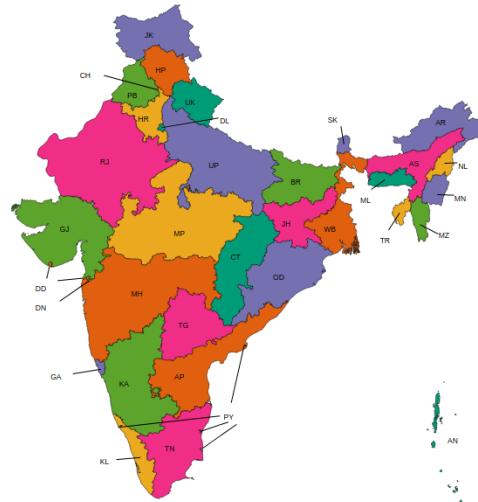
A. Berlin (BE)

B. Nordrhein-Westfalen (NW)

C. Bremen (HB)

D. Saarland (SL)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

| GDP | Population | Land Area |

« Previous

Next »

(Cluster) Question 21 out of 43 On the other monitor, you can see a conventional map of India (left) and a GDP cartogram (right). Out of the states listed below, which has a GDP most similar to Uttar Pradesh (UP)?

A. Delhi (DL)

B. Gujarat (GJ)
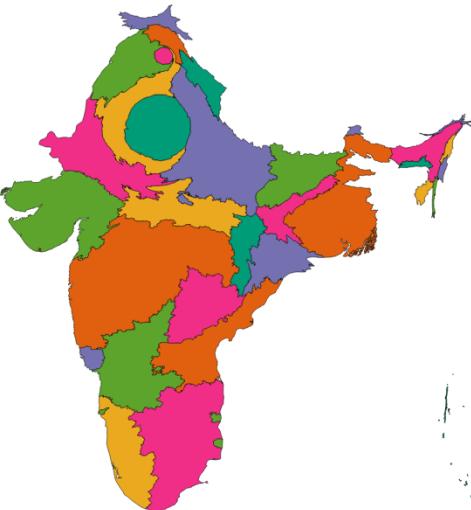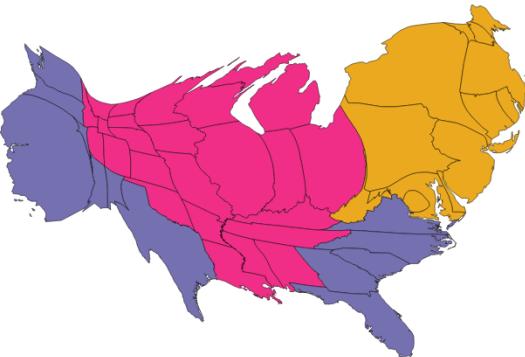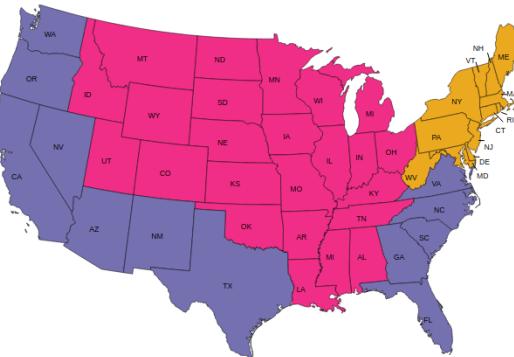
C. Rajasthan (RJ)

D. Tamil Nadu (TN)

Question 22

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population (1960) | Population (2010) | Area

« Previous

Next »

(Summarize) Question 22 out of 43 On the other monitor, you can see a conventional map of the USA (left) and population cartograms for the years 1960 and 2010 (right). You may have to use the cartogram selector tab to view both cartograms.Three different regions are highlighted in yellow, purple and pink. What can you say about the change in population for each region from 1960 to 2010?

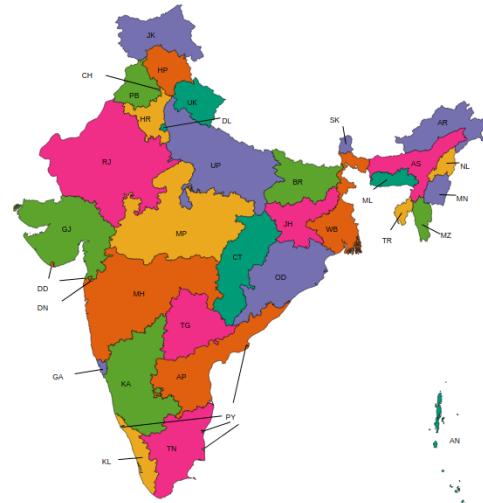|			
Yellow Region	A. Growth	B. Approximately No Change	C. Shrinking
Pink Region	A. Growth	B. Approximately No Change	C. Shrinking
Purple Region	A. Growth	B. Approximately No Change	C. Shrinking

Question 23

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

« Previous

Next »

(Find adjacency) Question 23 out of 43 On the other monitor, you can see a conventional map of India (left) and a population cartogram (right). What state(s) are **neighbours** of the state highlighted in red in the population cartogram below? **There may be more than one correct answer.**

A. Delhi (DL)

B. Tamil Nadu (TN)

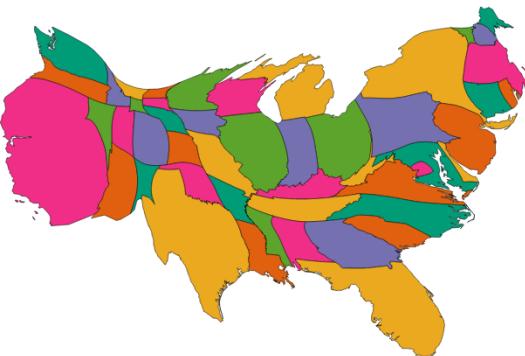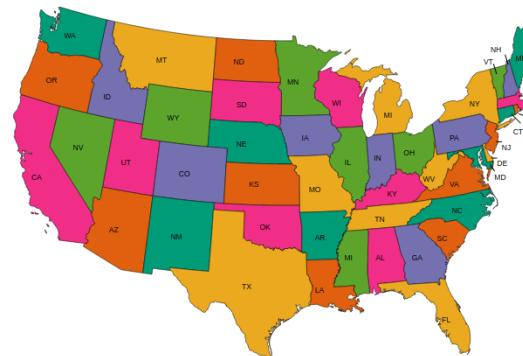C. Uttar Pradesh (UP)

D. West Bengal (WB)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.
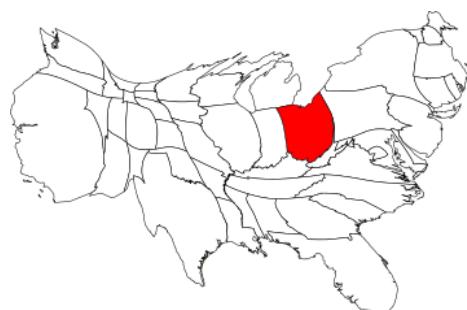
Population | Land Area

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Next »

(Recognize) Question 24 out of 43 On the other monitor, you can see a conventional map of the USA (left) and a population cartogram (right). What is the name of the state highlighted in red in the population cartogram below?
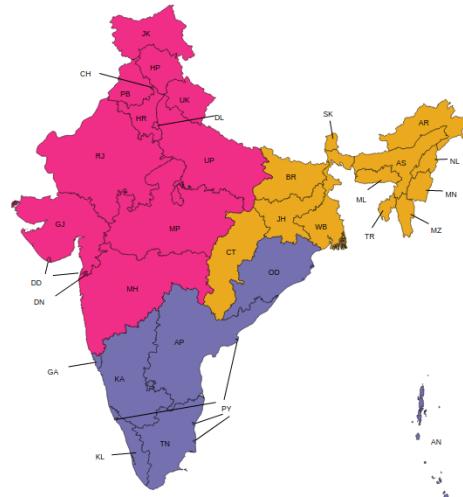
A. Florida (FL)

B. Maine (ME)

C. Ohio (OH)

D. California (CA)

Question 25

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

(Summarize) Question 25 out of 43 On the other monitor, you can see a conventional map of India (left) and population cartograms for the years 1961 and 2011 (right). You may have to use the cartogram selector tab to view both cartograms.Three different regions are highlighted in yellow, purple and pink. What can you say about the change in population for each region from 1961 to 2011?

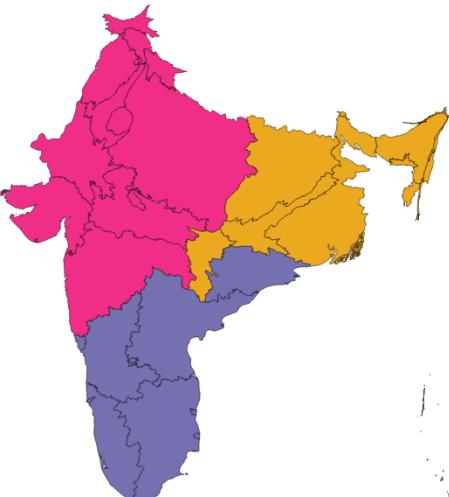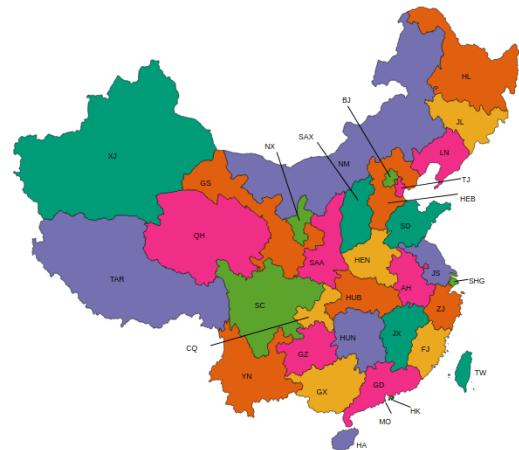|			
Yellow Region	A. Growth	B. Approximately No Change	C. Shrinking
Pink Region	A. Growth	B. Approximately No Change	C. Shrinking
Purple Region	A. Growth	B. Approximately No Change	C. Shrinking

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

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(Recognize) Question 26 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a population cartogram (right). What is the name of the region highlighted in red in the population cartogram below?

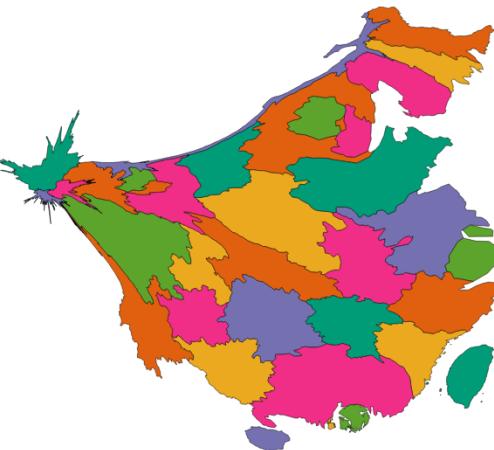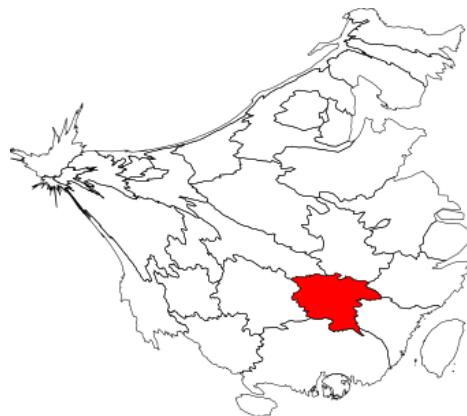A. Hong Kong (HK)

B. Taiwan (TW)

C. Jiangxi (JX)

D. Beijing (BJ)

Question 27

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

| Cows | Population | Land Area |

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(Find top-k) Question 27 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a cattle population cartogram (right). Which state of Brazil has the highest cattle population?
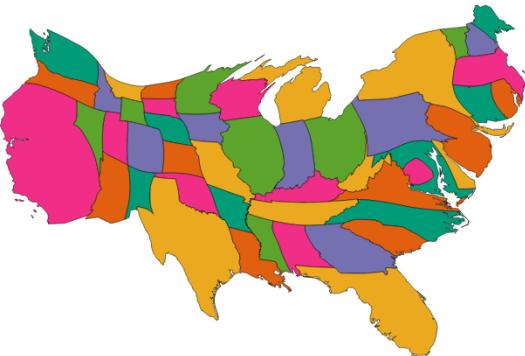
A. Mato Grosso (MG)

B. Amazonas (AM)

C. Acre (AC)

D. Para (PA)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Electoral Votes | Population | Land Area

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Next »

(Detect change) Question 28 out of 43 On the other monitor, you can see a conventional map of the USA (left), an electoral vote cartogram and a population cartogram (right). You may have to use the cartogram selector tab to view both cartograms. Is the area of California (CA) in the **electoral vote cartogram**

- higher than,

- approximately equal to or

- lower than

its area in the **population cartogram**?

A. Higher

B. Approximately equal

C. Lower

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

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Next »

(Cluster) Question 29 out of 43 On the other monitor, you can see a conventional map of Germany (left) and a population cartogram (right). Out of the states listed below, which has a population most similar to Sachsen (SN)?
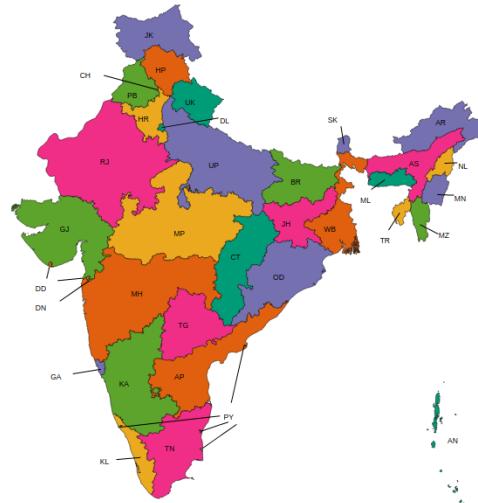
A. Berlin (BE)

B. Bremen (HB)

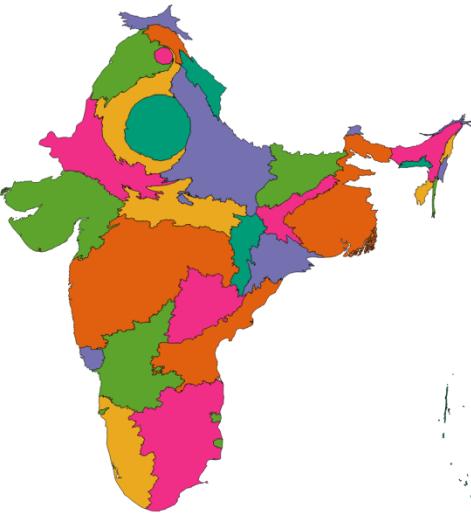C. Thueringen (TH)

D. Rheinland-Pfalz (RP)

Question 30

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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Next »

(Compare) Question 30 out of 43 On the other monitor, you can see a conventional map of India (left) and a GDP cartogram (right). Is the GDP of Jharkhand (JH)

- higher than,

- approximately equal to or
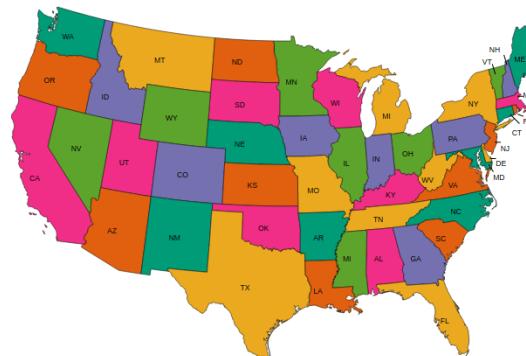
- lower than

the GDP of Odisha (OD)?

A. Higher
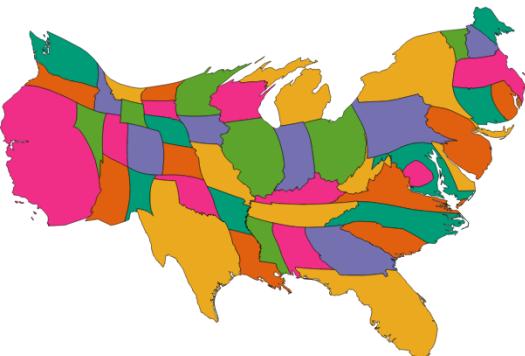
B. Approximately equal

C. Lower

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Electoral Votes | Population | Land Area

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(Filter) Question 31 out of 43 On the other monitor, you can see a conventional map of the USA (left) and an electoral vote cartogram (right). Out of the states listed below, which one(s) have a number of electoral votes higher than New York (NY)? **There may be more than one correct answer.**
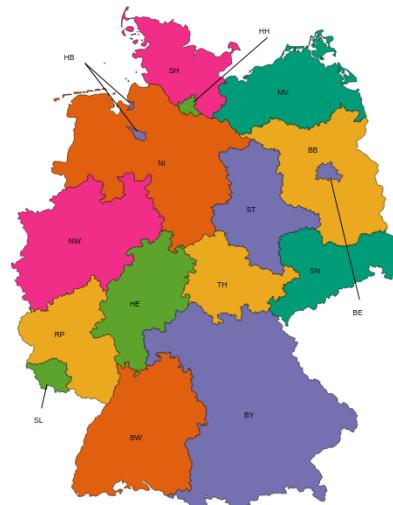
A. Maine (ME)

B. California (CA)

C. Ohio (OH)

D. Texas (TX)

Question 32

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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(Detect change) Question 32 out of 43 On the other monitor, you can see a conventional map of Germany (left), a GDP cartogram and a population cartogram (right). You may have to use the cartogram selector tab to view both cartograms.Is the area of Hamburg (HH) in the **GDP cartogram**

- higher than,

- approximately equal to or

- lower than
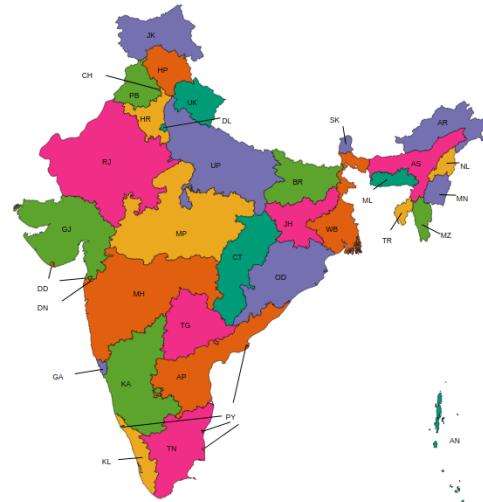
its area in the **population cartogram**?

A. Higher

B. Approximately equal

C. Lower

Question 33

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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Next »

(Find top-k) Question 33 out of 43 On the other monitor, you can see a conventional map of India (left) and a GDP cartogram (right). Which state of India has the highest GDP?

A. Maharashtra (MH)

B. Tamil Nadu (TN)
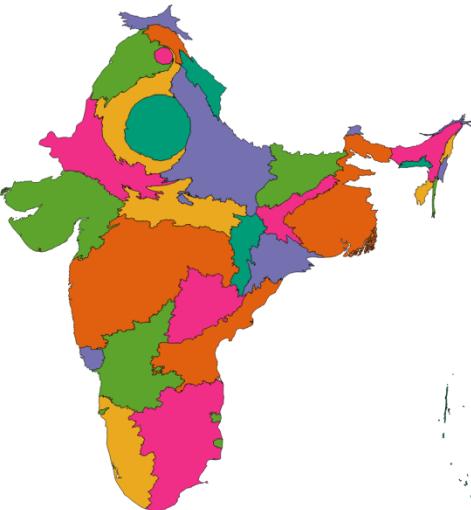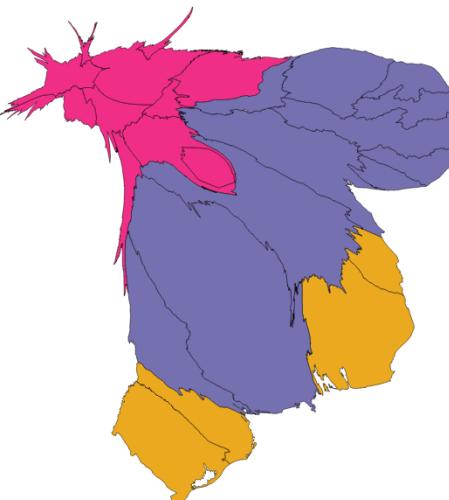
C. Uttar Pradesh (UP)

D. Rajasthan (RJ)

Question 34

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population (2000) | Population (2030) | Area

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Next »

(Summarize) Question 34 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and population cartograms for the years 2000 and 2030 (projected population, right). You may have to use the cartogram selector tab to view both cartograms.Three different regions are highlighted in yellow, purple and pink. What can you say about the projected change in population for each region from 2000 to 2030?

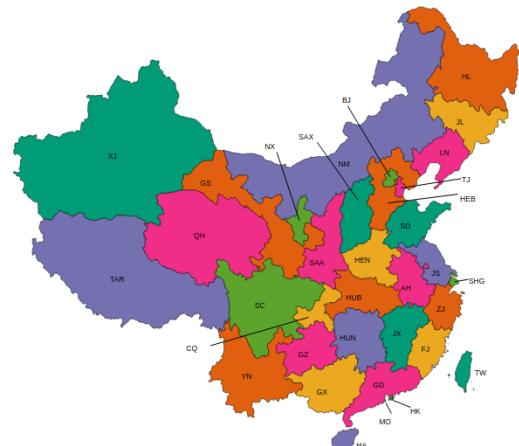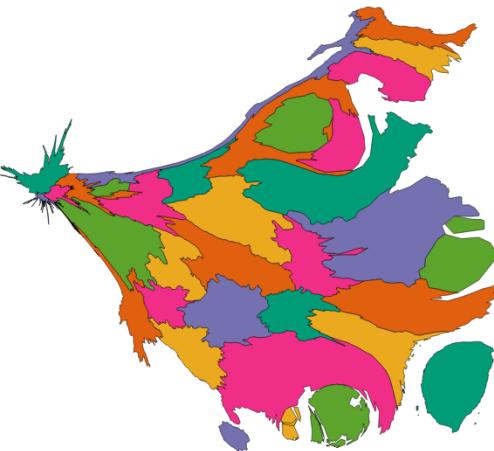|			
Yellow Region	A. Growth	B. Approximately No Change	C. Shrinking
Pink Region	A. Growth	B. Approximately No Change	C. Shrinking
Purple Region	A. Growth	B. Approximately No Change	C. Shrinking

Question 35

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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(Filter) Question 35 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a GDP cartogram (right). Out of the regions listed below, which one(s) have a GDP higher than Hong Kong (HK)? **There may be more than one correct answer.**

A. Xinjiang (XJ)
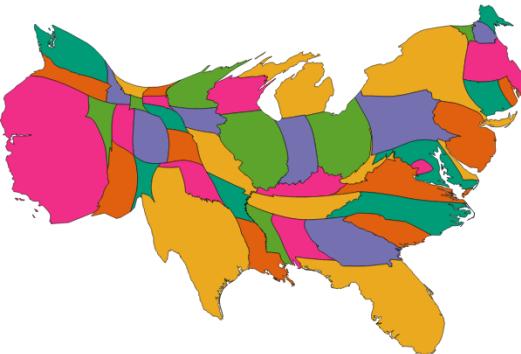
B. Jiangsu (JS)

C. Heilongjiang (HL)

D. Shandong (SD)

Hover over map regions to see more information.

Population | Land Area

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(Find adjacency) Question 36 out of 43 On the other map, you can see a conventional map of the USA (left) and a population cartogram (right). What state(s) are **neighbours** of the state highlighted in red in the population cartogram below? **There may be more than one correct answer.**

A. Maine (ME)

B. Louisiana (LA)

C. New Jersey (NJ)

D. New York (NY)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

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Next »

(Recognize) Question 37 out of 43 On the other monitor, you can see a conventional map of Germany (left) and a population cartogram (right). What is the name of the state highlighted in red in the population cartogram below?
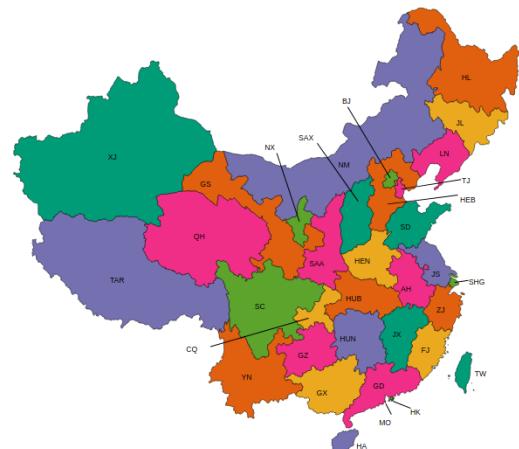
A. Saarland (SL)

B. Bayern (BE)

C. Thueringen (TH)

D. Bremen (HB)

Question 38

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

Population | Land Area

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(Find adjacency) Question 38 out of 43 On the other monitor, you can see a conventional map of Mainland China and Taiwan (left) and a population cartogram (right). What region(s) are neighbors of the region highlighted in red in the population cartogram below? **There may be more than one correct answer.**

A. Hong Kong (HK)

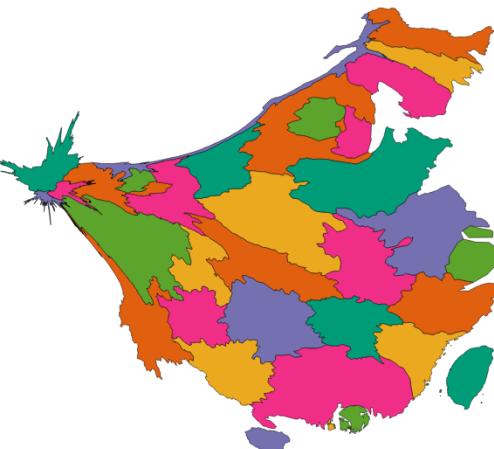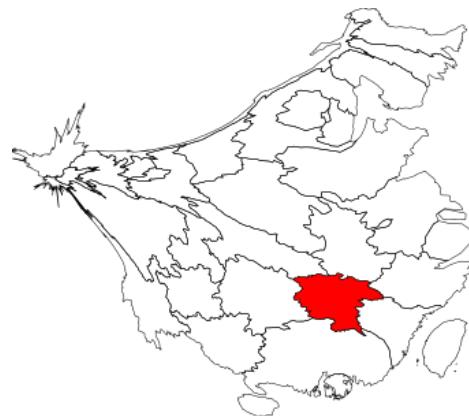B. Guangdong (GD)

C. Shandong (SD)

D. Beijing (BJ)

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

GDP | Population | Land Area

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(Detect change) Question 39 out of 43 On the other monitor, you can see a conventional map of India (left), a GDP cartogram and a population cartogram (right). Is the area of Odisha (OD) on the **GDP cartogram**

- higher than,

- approximately equal to or

- lower than

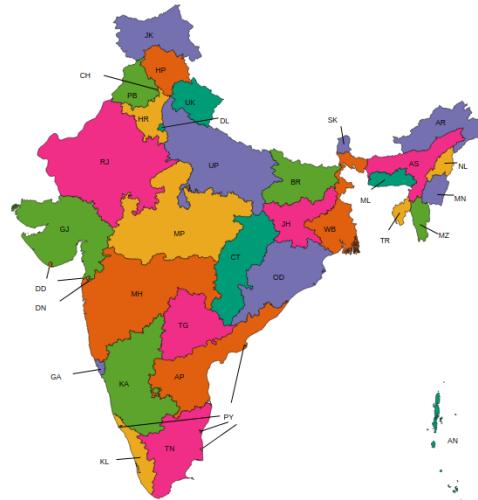its area on the **population cartogram**?
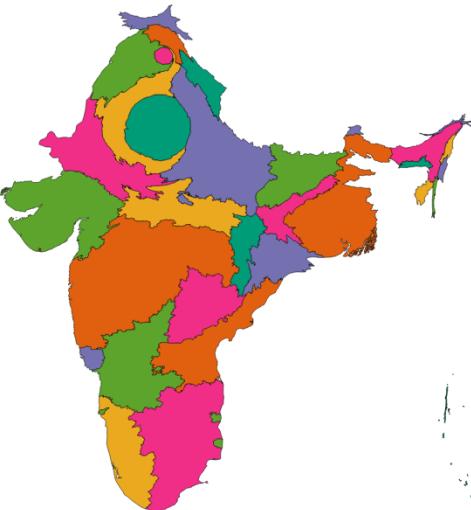
A. Higher

B. Approximately equal

C. Lower
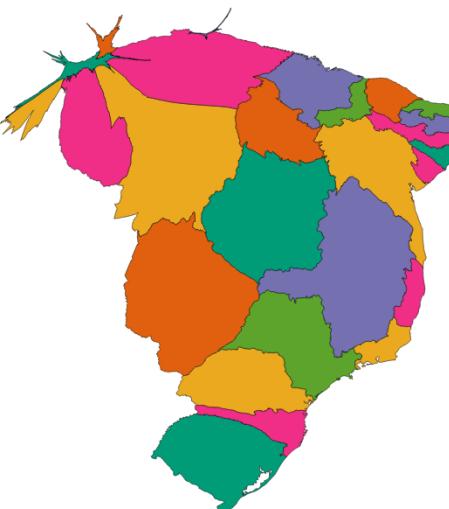
Question 40

You have access to the infotips, parallel highlighting, and map switching features.

Hover over map regions to see more information.

| Cows | Population | Land Area |

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(Filter) Question 40 out of 43 On the other monitor, you can see a conventional map of Brazil (left) and a cattle population cartogram (right). Out of the states listed below, which one(s) have a cattle population higher than Parana (PR)? **There may be more than one correct answer.**

A. Mato Grosso do Sul (MS)

B. Amazonas (AM)

C. Para (PA)

D. Sao Paulo (SP)

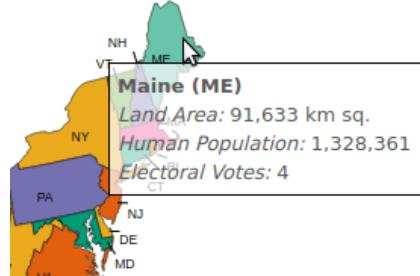For each pair of words below, select the score that corresponds most closely with your view of the **infotip interactive feature** (i.e. the textbox in the upper left that appears when you hover over a region).

Difficult to Use	1	2	3	4	5	Easy to Use
Does not form immediate impression	1	2	3	4	5	Forms immediate impression
Conventional	1	2	3	4	5	Innovative
Redundant	1	2	3	4	5	Informative
Hindering	1	2	3	4	5	Helpful
Boring	1	2	3	4	5	Entertaining
Ugly	1	2	3	4	5	Elegant

For each pair of words below, select the score that corresponds most closely with your view of the **parallel highlighting interactive feature.**

Difficult to Use	1	2	3	4	5	Easy to Use
Does not form immediate impression	1	2	3	4	5	Forms immediate impression
Conventional	1	2	3	4	5	Innovative
Redundant	1	2	3	4	5	Informative
Hindering	1	2	3	4	5	Helpful
Boring	1	2	3	4	5	Entertaining
Ugly	1	2	3	4	5	Elegant

Electoral Votes | Human Population | Land Area

For each pair of words below, select the score that corresponds most closely with your view of the **map switching interactive feature.**

Difficult to Use	1	2	3	4	5	Easy to Use
Does not form immediate impression	1	2	3	4	5	Forms immediate impression
Conventional	1	2	3	4	5	Innovative
Redundant	1	2	3	4	5	Informative
Hindering	1	2	3	4	5	Helpful
Boring	1	2	3	4	5	Entertaining
Ugly	1	2	3	4	5	Elegant