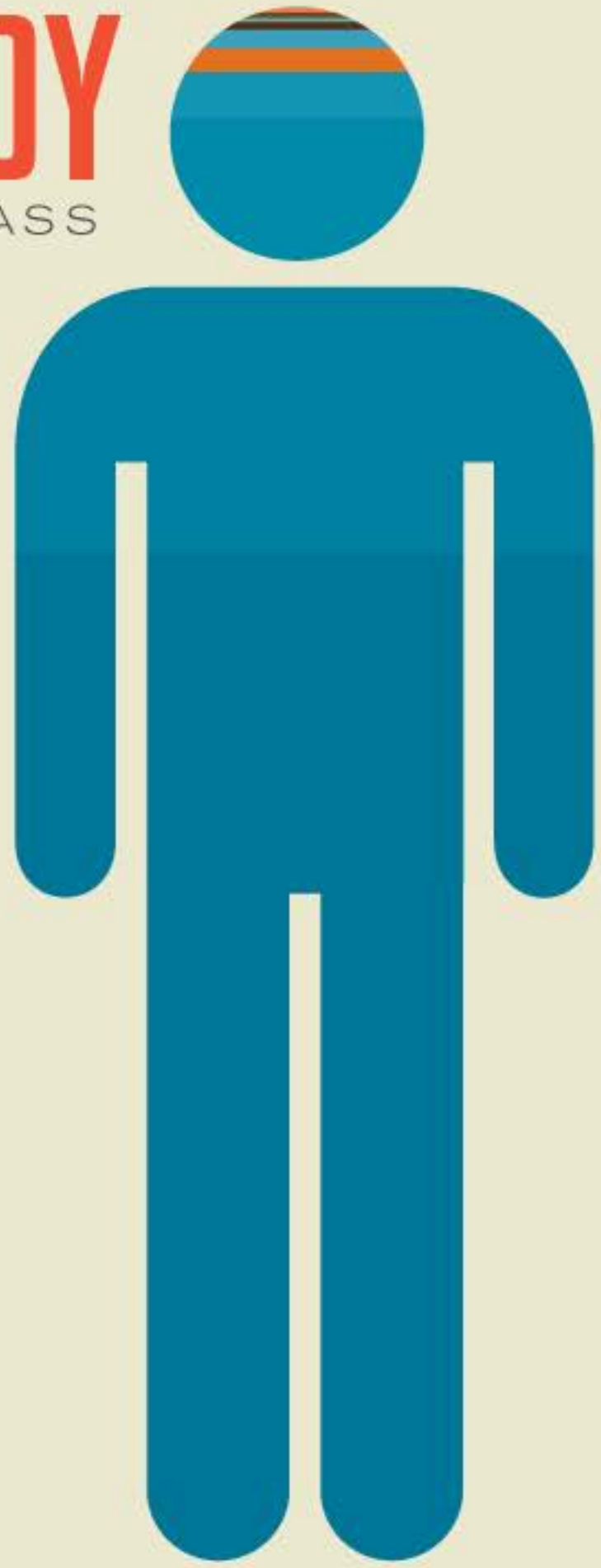
THE HUMAN BODY

ELEMENTAL COMPOSITION BY MASS



HYDROGEN

PERCENT: 10
SYMBOL: H
ATOMIC Nº: 1

CARBON

PERCENT: 18
SYMBOL: C
ATOMIC Nº: 6

NITROGEN

PERCENT: 3
SYMBOL: N
ATOMIC Nº: 7

OXYGEN

PERCENT: 65
SYMBOL: O
ATOMIC Nº: 8

FLUORINE

PERCENT: <.01
SYMBOL: F
ATOMIC Nº: 9

SODIUM

PERCENT: 0.1
SYMBOL: Na
ATOMIC Nº: 11

MAGNESIUM

PERCENT: .05
SYMBOL: Mg
ATOMIC Nº: 12

PHOSPHORUS

PERCENT: 1.2
SYMBOL: P
ATOMIC Nº: 6

SULFUR

PERCENT: 0.2
SYMBOL: S
ATOMIC Nº: 16

CHLORINE

PERCENT: 0.2
SYMBOL: Cl
ATOMIC Nº: 17

POTASSIUM

PERCENT: 0.2
SYMBOL: K
ATOMIC Nº: 19

CALCIUM

PERCENT: 1.5
SYMBOL: Ca
ATOMIC Nº: 20

IRON

PERCENT: <.05
SYMBOL: Fe
ATOMIC Nº: 26

COBALT

PERCENT: <.05
SYMBOL: Co
ATOMIC Nº: 27

COPPER

PERCENT: <.05
SYMBOL: Cu
ATOMIC Nº: 29

ZINC

PERCENT: <.05
SYMBOL: Zn
ATOMIC Nº: 30

SELENIUM

PERCENT: <.01
SYMBOL: Se
ATOMIC Nº: 34

IODINE

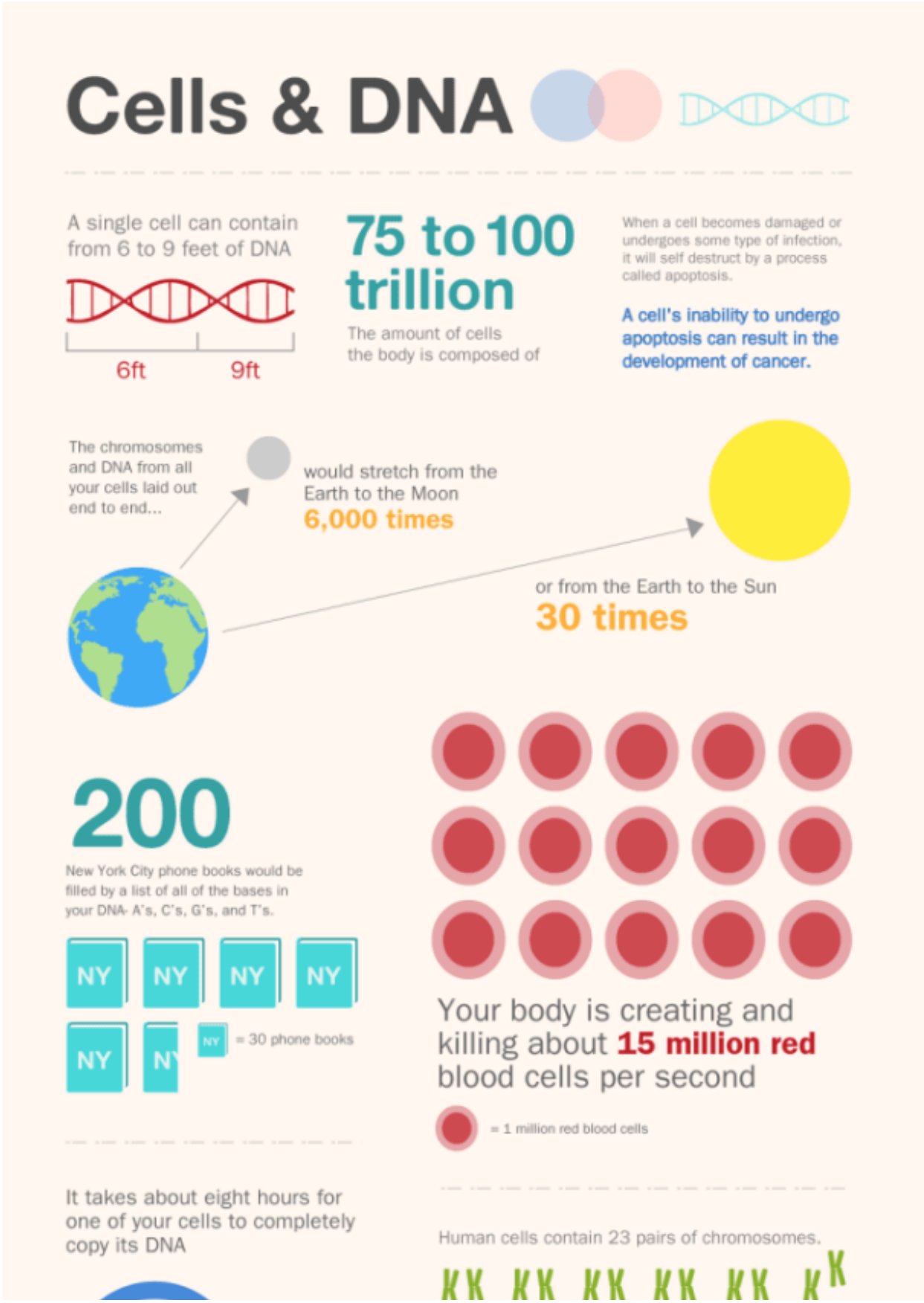
PERCENT: <.05
SYMBOL: I
ATOMIC Nº: 53

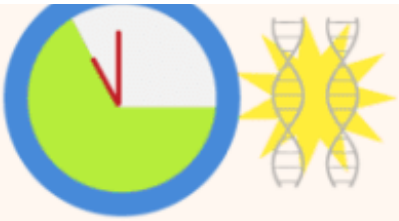
Cells & DNA infographic

collectedny.org/frameworkposts/cells-dna-infographic/

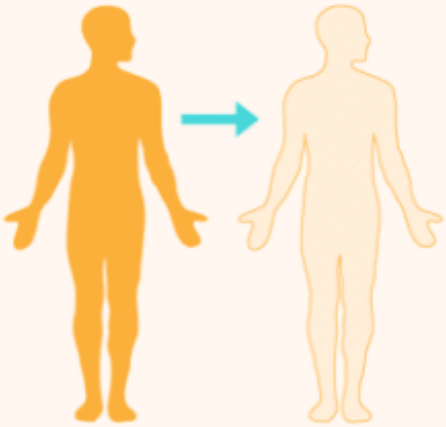
Eric Appleton

November 29, 2016

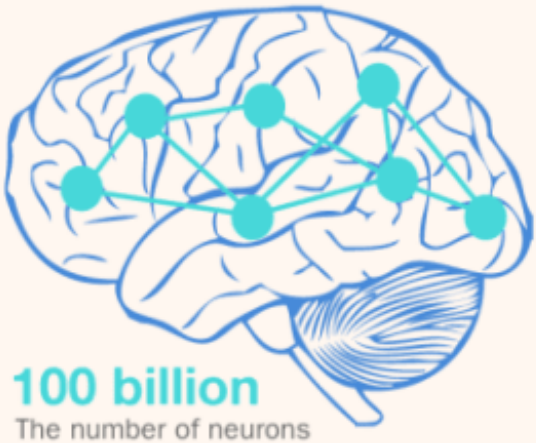




Humans shed and regrow outer skin cells about every 27 days



You could fit one thousand cell nuclei across the period at the end of this sentence.



About **95%** of the cells in your body are bacteria

100 billion
The number of neurons in the human brain

Carbon Hydrogen Oxygen Nitrogen (CHON) infographic

Eric Appleton

November 28, 2016

This is simple infographic gives information about the four most common elements. This could be used as a reading in conjunction with instruction on matter and basic chemistry, with a focus on photosynthesis since plants use all four of these elements.

Introducing CHON

CARBON HYDROGEN OXYGEN NITROGEN

Four elements make up most living things — including you! The elements are carbon, hydrogen, oxygen, and nitrogen.

KIDS DISCOVER

Carbon

C

12 6

A carbon atom has 6 protons and 6 neutrons and an atomic mass of 12. Just like all other kinds of atoms, how carbon atoms are organized, held together, and combined with other atoms determines what they form.

Carbon is mixed with atoms of other elements to form the lead in your pencil. Carbon combines with oxygen to form carbon dioxide (CO_2). Carbon dioxide is what you exhale when you breathe. It is also the fizz in the sodas you drink.

Hydrogen

H

1 1

Hydrogen is the most common element in the universe. It is also the lightest, with an atomic mass of 1. In its most common form, hydrogen has 1 proton and no neutrons. Hydrogen combines with carbon atoms to form gasoline, candle wax, kerosene, and petroleum. Hydrocarbons, as these compounds of hydrogen and carbon are called, are very common.

Oxygen is an element that occurs naturally. About 20 percent of the air you breathe is made up of oxygen. About 60 percent of your body mass is oxygen. An oxygen atom has 8 protons and 8 neutrons and an atomic mass of 16. Oxygen combines with hydrogen to form water, H_2O.

Oxygen

O

16 8

When oxygen atoms are grouped in threes, they form a molecule known as ozone (O_3). Ozone is a gas in the upper atmosphere which shields us from the sun's dangerous ultraviolet rays.

Plants use nitrogen and other elements to manufacture amino acids, the building blocks of protein.

Nitrogen has 7 protons, 7 neutrons, and an atomic mass of 14. It makes up almost 80 percent of our atmosphere. Nitrogen is an important part of protein, the major ingredient of cell tissue.

Nitrogen

N

14 7

www.KIDSDISCOVER.com

Save

Save

States of Matter infographic

collectedny.org/frameworkposts/states-of-matter-infographic/

Eric Appleton

November 28, 2016

This infographic is a nice summary of the three phases (states) of matter, with visualizations of the atoms and arrows showing transformations between the states of matter.

States of Matter

Water freezes. Ice melts. Steam condenses. These are ways that water—and all matter—can change. Scientists refer to these changes as "changes of state." However, the molecules that make up the matter do not change.

KIDS DISCOVER

Gases

If it fills the entire space of the container it's in, it's a gas. Unlike liquids and solids, the molecules in a gas are spread far apart and full of energy. They bounce around, spreading out to fill the volume and shape of the container they're in—a balloon, for example.

Gas molecules move around freely.

Liquids

If it flows, it's a liquid. Think of water coming out of a hose. Like all liquids, the water changes shape. If it flows into a container, such as a bucket or a pool, it takes the shape of the container. The molecules that make up liquids are close together but are free to move around. This is what makes the shape of a liquid changeable.

Water molecules are close together but can move around.

Sublimation

Deposition

Condensation

Evaporation

H_2O

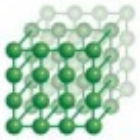
Melting

Solidification

Solids

If matter is a solid object, it maintains its own shape. Take rocks, for example. A rock is a solid object. It keeps its shape unless it is crushed or something else happens to it. This is because the molecules in solids are so tightly packed that they are not free to move around.

Solid molecules are tightly packed and stay in a fixed position.



Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 1: Data Graphic Interpretation

1. Use David MacCandless's Peak Breakup Times blank infographic (Figure 1) to have a fun introduction to infographics. Share this using the "Activity 1 Presentation" power point slides (download the slides at www.calacademy.org/infographics-in-the-classroom-teacher-toolkit. PDF versions of the slides are also included in this packet). After students try to guess what the blank graphic is showing, reveal what it is and some of the "explanations" MacCandless offers. We modeled this after his TED talk: http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization?language=en.
2. Briefly discuss with students why they think scientists would visualize their data.
3. Hand out a few graphics to analyze (Figures 2-8) and *Worksheet 1*. Give them 10 minutes to answer the questions on their own.
4. Have students find people who did the same graphic (if you have a large class, you may want to break them into smaller groups) and share out within their group what they think the graphic is about. You can also have them complete the worksheet together.
5. Working as a group, make a poster to share what you noticed in the graphic: 1-2 sentences describing the central ideas; what numbers/data are represented and how are they represented; what do you like/dislike about the way the author presents his/her story?
6. Give the students a chance to share out their ideas as a group.
7. Make new groups of 3-5 people who did different graphics. Share what the main story was and how the author visualized the numbers. The goal of this discussion is to come up with a list of all the different ways you can visualize/represent numbers. Have them write each one on a post-it. When they are done have each group bring up the post-its and start sorting them by similar ideas
8. Wrap up this section by summarizing the different post-it ideas. Pass out the Academy's list of ways to visualize data. Have a quick read over them – what is similar/different between them.

Infographics used for this lesson:

- David MacCandless, 20th Century Deaths, from his book, Visual Miscellaneum. There is a more complicated version here: http://www.informationisbeautiful.net/visualizations/20th-century-death/
- New York Times, One race, every medalist ever, http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html?_r=0

- Big Oak Studios, Inc, Diving the Depths Infographic http://visual.ly/diving-depths-infographic
- David MacCandless, 20th Century Deaths, from his book, Visual Miscellaneum\
- Craig Robinson, The Rise and Fall of Scoring in Baseball, Smithsonian Magazine, http://www.smithsonianmag.com/history/infographic-the-rise-and-fall-of-scoring-in-baseball-170927844
- Ocean Conservancy, International Costal Cleanup 25 years of Debris Collected, http://media-cache-ec4.pinimg.com/550x/7d/35/82/7d358209a4be18d0db69af13ef75ce78.jpg

Activity 1
Data Graphic Interpretation

CALIFORNIA ACADEMY OF SCIENCES

Name _____

Date _____

Title of Graphic _____

1. What ideas or pieces of information does the author present? List as many as you can.

2. Identify main conclusion told in the graphic. This should not just be the title, but what conclusion you can make from the information provided.

3. Pick one point on the image that represents a number. What is that number (you can approximate, if necessary) and what are the units? If known, what is the source of the data?

4. Describe how the author represents data in the graphic? (Ex. Using color to differentiate two things.)

»

»

»

»

5. What other ways does the author tell the audience about the key message(s)?

6. What questions do you have about the graphic? What confuses you?

7. What do you like/dislike about the graphic?

20th Century Death

What's killed the most?

famine
111m

food
76m

obesity 11m
diabetes 30m
heart disease 35m

ideology
16m

8.5m 7.1m 0.1m

war
124m

revolution
9.5m

5m 2m 1.6m 1m

nature
9.7m

tobacco
71m

disease
1390m

smallpox
500m

measles
200m

meningitis
190m

tuberculosis
150m

whooping cough
30m

influenza
30m

HIV
25m

suicide
70m

murder
20m

technology
0.2m

animals
4m

0.5m 90,000 29,000 5000 4000 100 100

source: Internet and wikipedia. Data very coarse. Some guesswork and extrapolation

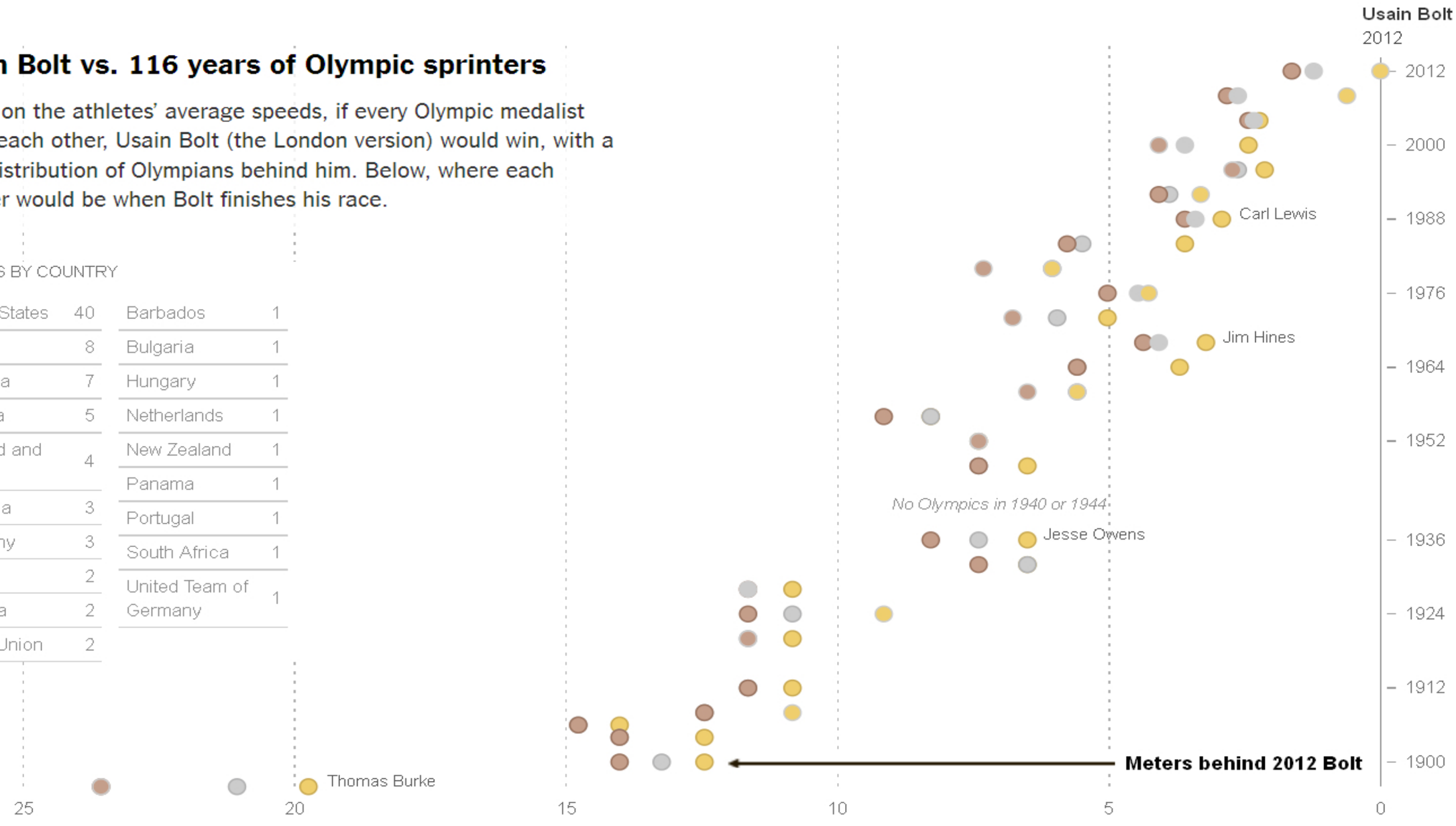
http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html

Usain Bolt vs. 116 years of Olympic sprinters

Based on the athletes' average speeds, if every Olympic medalist raced each other, Usain Bolt (the London version) would win, with a wide distribution of Olympians behind him. Below, where each sprinter would be when Bolt finishes his race.

MEDALS BY COUNTRY

United States	40	Barbados	1
Britain	8	Bulgaria	1
Jamaica	7	Hungary	1
Canada	5	Netherlands	1
Trinidad and Tobago	4	New Zealand	1
Australia	3	Panama	1
Germany	3	Portugal	1
Cuba	2	South Africa	1
Namibia	2	United Team of Germany	1
Soviet Union	2		



This chart includes medals for the United States and Australia in the "Intermediary" Games of 1906, which the I.O.C. does not formally recognize.

Diving the Depths

Pearl Divers to Squid Eaters

Pearl Diver (Free Dive)

Pearl divers of the central Tuamotu Archipelago in French Polynesia dive without external air supply. They can dive to depths of more than 39 meters where they collect oysters for up to two minutes.

39 meters

Emperor Penguin

Emperor penguins dive deeper than any other bird. They hold their breath when they dive and how long they hold their breath depends on how deep they dive and how fast they move.

200 meters

SCUBA Diver (Aided Dive)

In June 2005 Nuno Gomes set the World's Deepest Open Circuit SCUBA record; independently verified by Guinness World Records. It took Gomes about 20 minutes to reach 318.25m, and 12 hours to surface.

318.25 meters

Bottlenose Dolphin

Bottlenose dolphins usually do not need to dive deep to catch their food however they are capable of diving. Under experimental conditions, one bottlenose dolphin dove to 535 meters.

535 meters

647 meters

Beluga Whale

Beluga whales are able to swim both forward and backwards (something few other whales can do). Under experimental conditions a trained beluga whale dove to a depth of 647 meters.

Southern Elephant Seal

Southern elephant seals live in sub-Antarctic and Antarctic waters and are the largest of all seals. The deepest dive recorded by an Elephant Seal is 2388 meters.

2388 meters

Sperm Whale

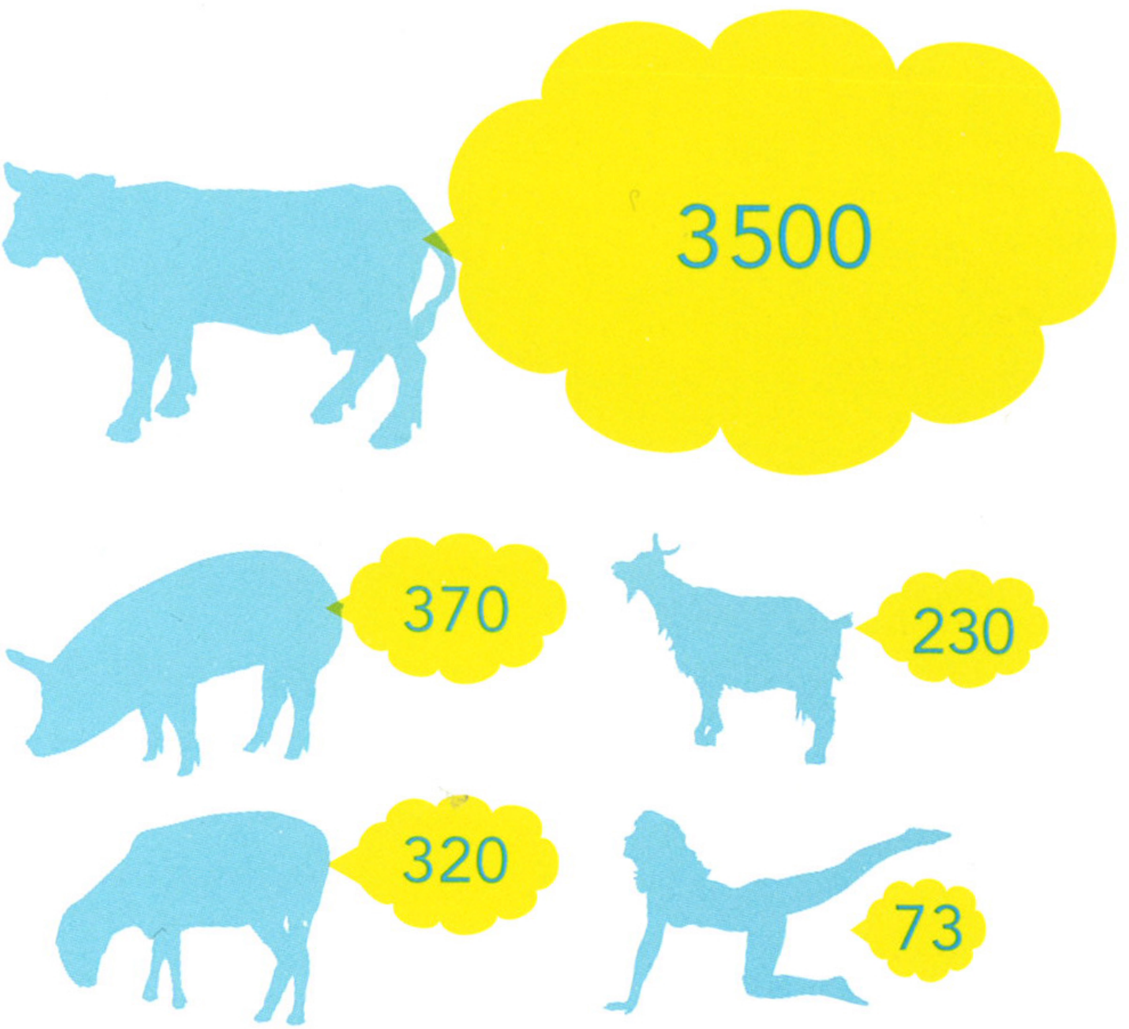
Sperm Whales are one of the deepest-diving mammals in the world. They dive in search of squid to eat and are believed to be able to dive up to 3000 meters in depth to the ocean floor.

3000 meters

http://visual.ly/diving-depths-infographic

Farty Animals

Annual methane emissions in equivalent CO2

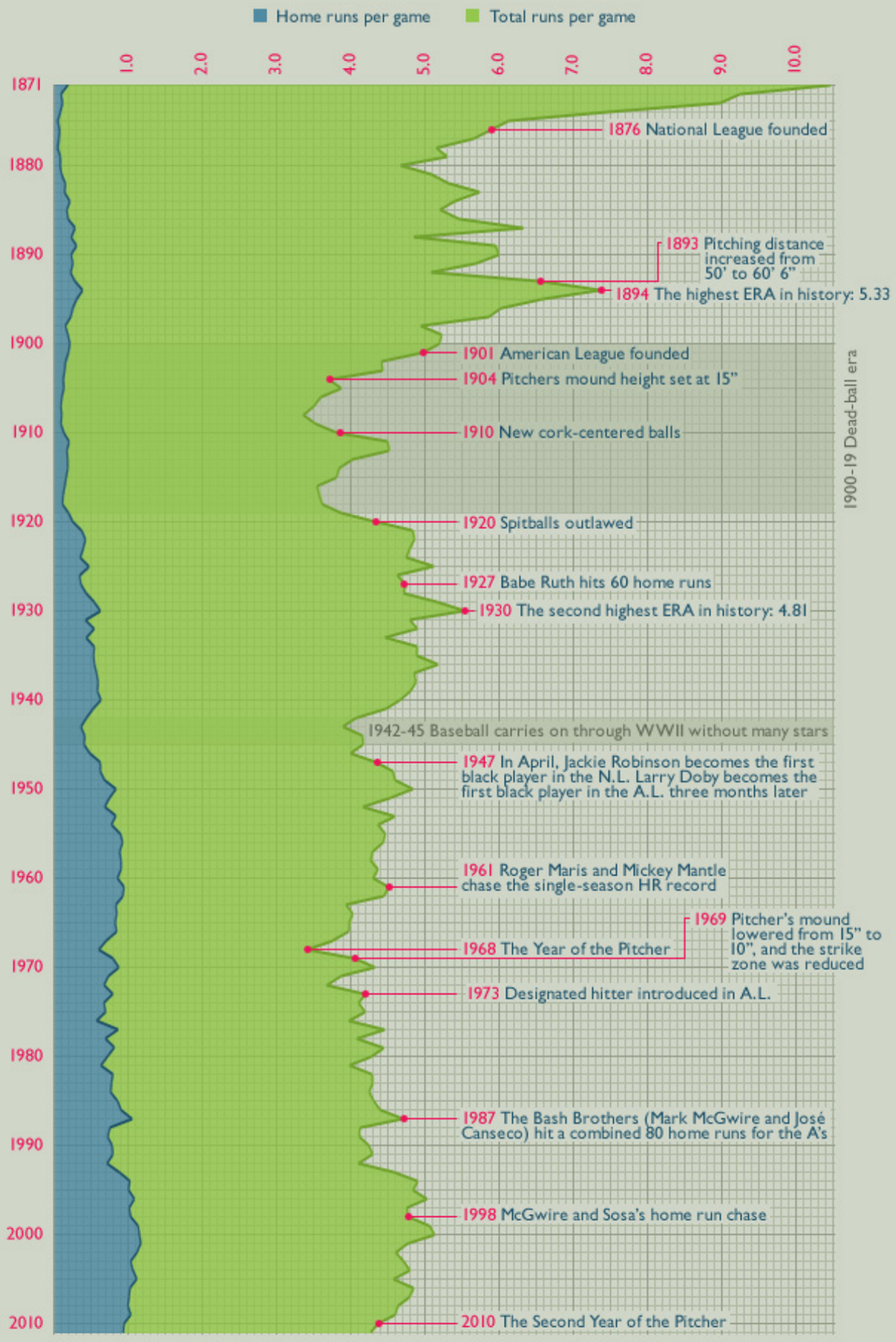


source: UN Environmental Programme, theregister.co.uk

TOTAL RUNS SCORED IN MAJOR LEAGUE BASEBALL
1871-2011

The total number of runs scored since 1871 is 1,814,039.
If you multiply those runs by the 360 ft covered when scoring a run, the total distance is 123,684.48 miles: 51.8% of the way to the moon.
It's also 4.97 times the circumference of the Earth's equator.

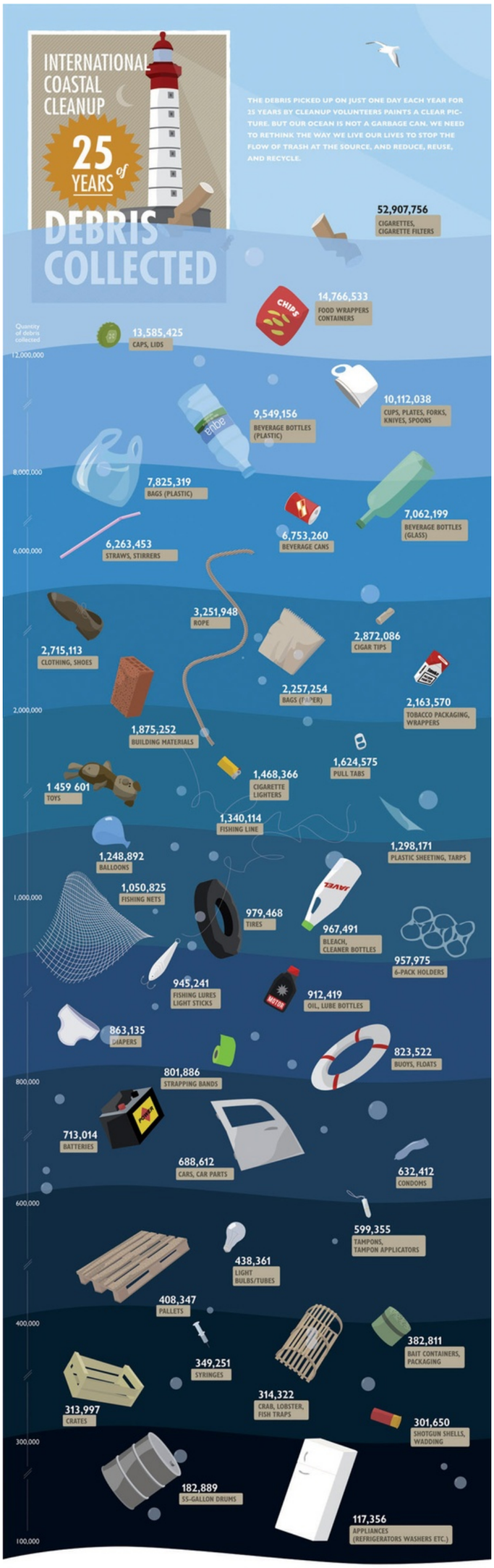
AVERAGE NUMBER OF RUNS SCORED PER TEAM



SOURCES
http://www.baseball-reference.com/leagues/MLB/bat.shtml
http://www.baseball-reference.com/leagues/MLB/pitch.shtml
http://solarsystem.nasa.gov/planets/profile.cfm?Display=Facts&Object=Moon
http://earth-info.nga.mil/GandG/publications/geolay/TR80003A.html
http://www.baseball-almanac.com/rulechng.shtml

DESIGN & RESEARCH
Craig Robinson www.craigrobinson.com

Smithsonian.com



ÉCLAIRAGE PUBLIC
L'ENSEIGNE LUMINEUSE
www.eclairagepublic.net

http://media-cache-ec4.pinimg.com/550x/7d/35/82/7d358209a4be18d0db69af13ef75ce78.jpg
http://www.oceanconservancy.org/our-work/marine-debris/check-out-our-latest-trash.html

How do Scientists Communicate?

Take 3 minutes to come up with a list of as many different ways that a scientist might use to share their findings with other scientists and with the the public

Scientists often use visual representations of their data to tell stories about their research

Let’s look at one example taken from social scientists, who study how groups of people behave…

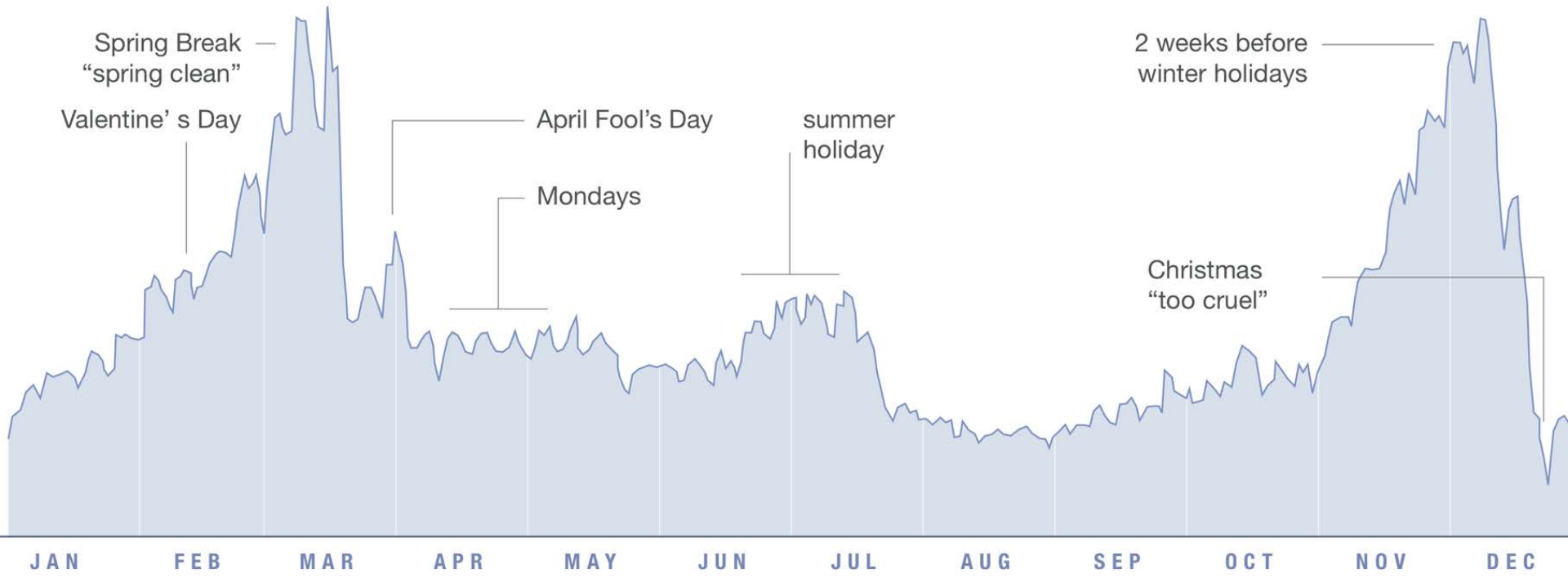

JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Peak Break-Up Times

According to Facebook status updates

Peak Break-Up Times

According to Facebook status updates



Source: searches for "we broke up because" from Facebook Lexicon

Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 2: Same Data, Different Graphics

This activity utilizes the "Pick a Side" method of oral debates. In this method, the instructor makes a statement and students move to one side of the room if they agree and the other side if they disagree. Students then justify why they moved to that side. We also used a similar method, but had four corners be 4 different answers to a question.

1. Pass out Contrasting Graphics and worksheet 2. Have them work through Part 1.A. on their own to interpret Body vs. Brain Mass.
2. Pause to ask for any questions about the graphic. What do the numbers mean? What type of graph is it? You may need to explain the logarithmic scale that it is graphed with.
3. In pairs, have them work through part 1.B. They should be prepared to share their ideas at the end. Gather student ideas for part 1.B.
4. In pairs, work through Part 1.C and 1.D, comparing the last 2 body vs. brain mass graphs.
5. Use "Pick a Side" for the following statements:
    - Agree-disagree? The different graphics convey the exact same story.
    - Graphic A, B, C, or D is the most accurate way to represent the numbers.
    - Graphic A,B, C, or D is the most effective at telling the story.
6. Working in pairs, have students work on Part 2 of the worksheet – comparing carbon emissions.
7. Use "Pick a Side" for the following statements:
    - A, B, or C is the most accurate way to represent the numbers
    - A, B, or C is the most visually interesting way to look at the numbers.
    - A,B, or C is the most effective at telling a story.

Infographics used:

- Edward Tufte, Brain vs Body Mass, from Beautiful Evidence
- David MacCandless, Tons of Carbon, from Visual Miscellenium

Activity 2
Same Data, Different Graphic

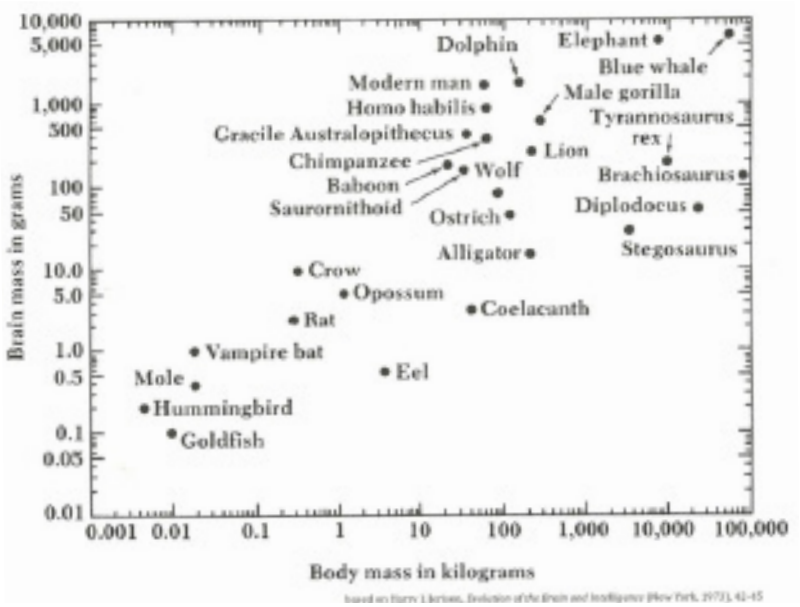
CALIFORNIA ACADEMY OF SCIENCES

Name _____

Date _____

Part I. Big Brains

Ⓐ



1. What ideas or pieces of information does the author present?

2. Identify the central idea(s) told in the graphic.

3. Pick one point on the image that represents a number. What is that number (you can approximate, if necessary) and what are the units?

4. Describe how the author represents data in the graphic? (Ex. Using color to differentiate two things.)

»

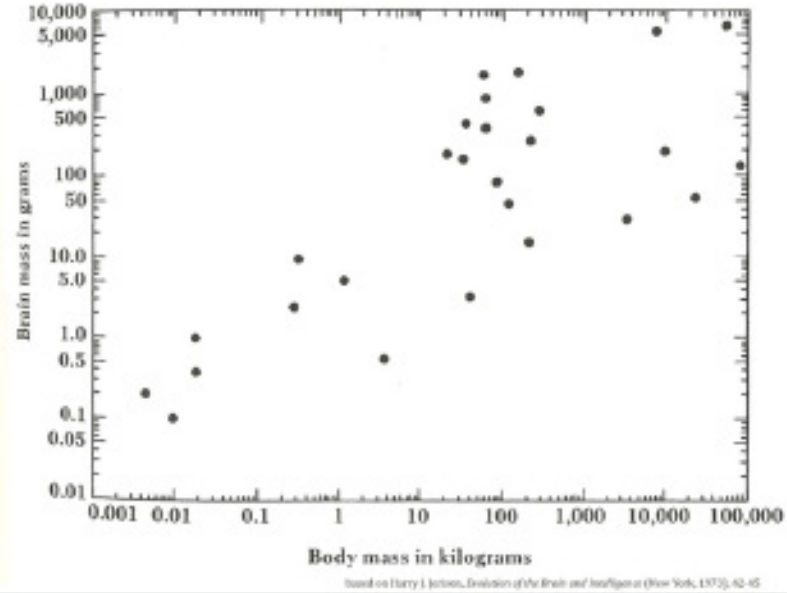
»

»

»

5. What questions do you have about the graphic? What confuses you?	6. What do you like/dislike about the graphic?

Ⓑ

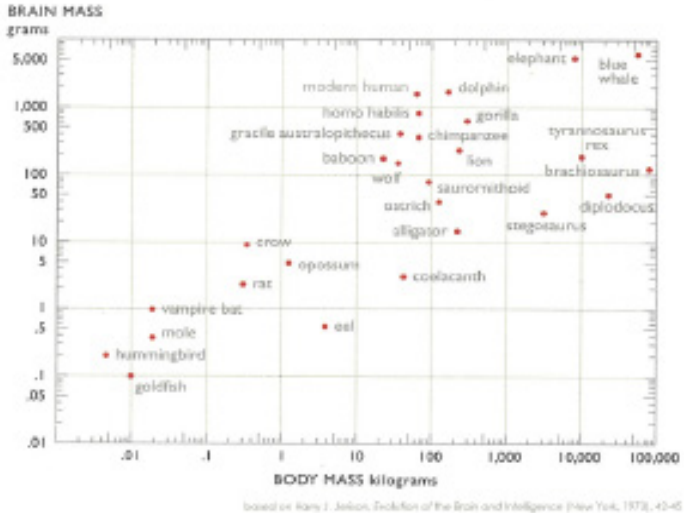


7. Does this graphic show a similar set of numbers?

8. Are there any differences in the main ideas?

9. Does the author use any different approaches to representing numbers in this graphic?

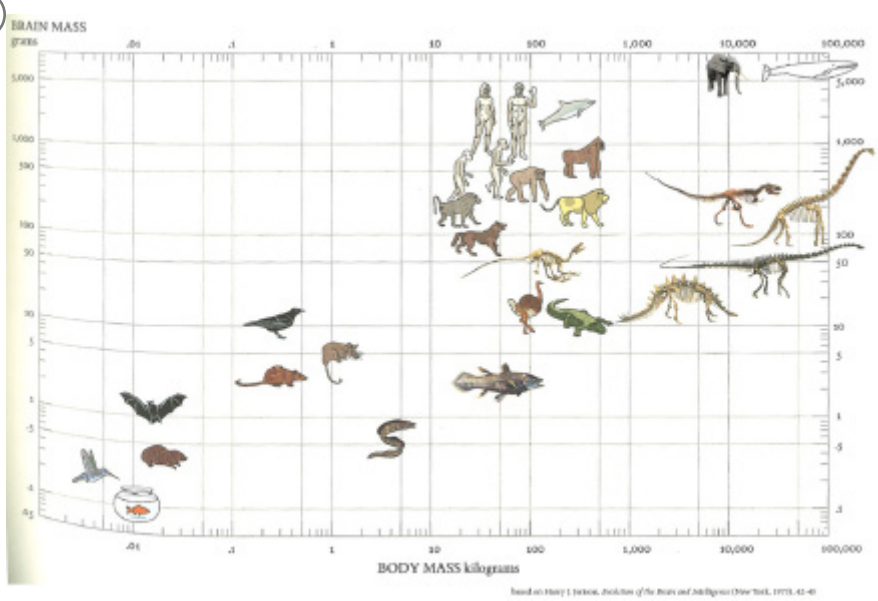
Ⓒ



10. How does this graphic visually compare to the previous two? What are the similarities and differences?

11. What do you like/dislike about this graphic? How does it compare with the other two in terms of understanding the main idea?

Ⓓ

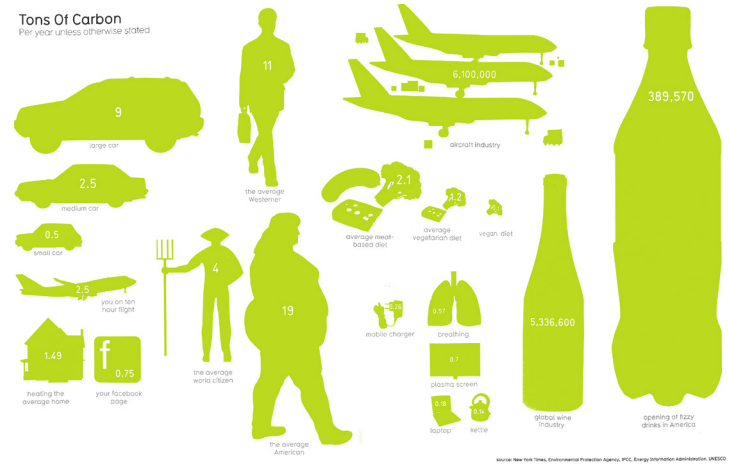


12. Describe how the author represents data in the graphic? How does it compare to the previous graphics?

13. Which of these four graphics would you consider the most accurate? Which is most effective at telling a story? Why?

Part II. Carbon Emissions

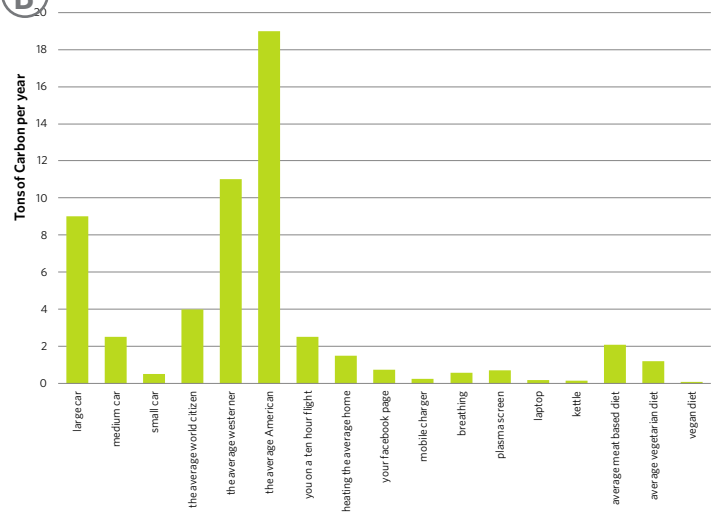
Ⓐ



1. Identify the central idea(s) told in the graphic. What story does it tell?

2. Does the graphic accurately represent numbers? Are all the images proportional?

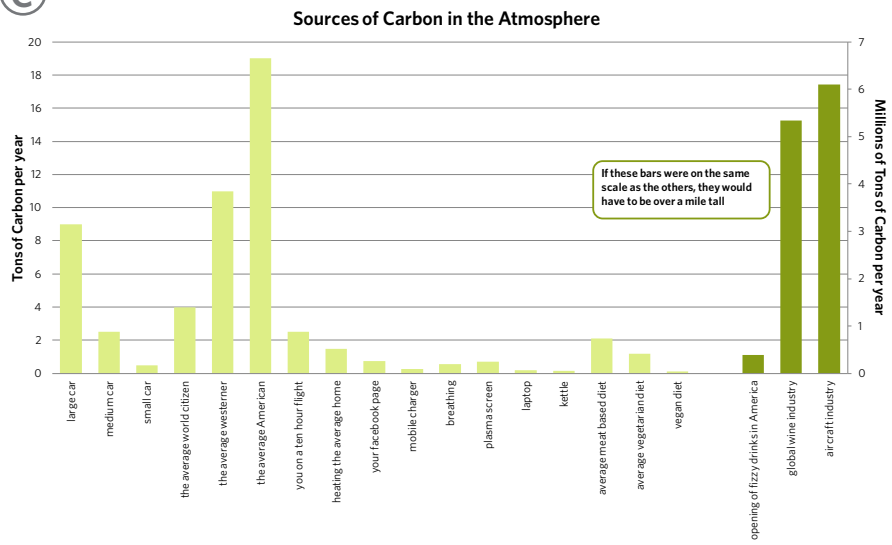
B



3. Is the information shown in this graphic similar to the previous one?

4. How does it compare visually to the previous graphic?

C

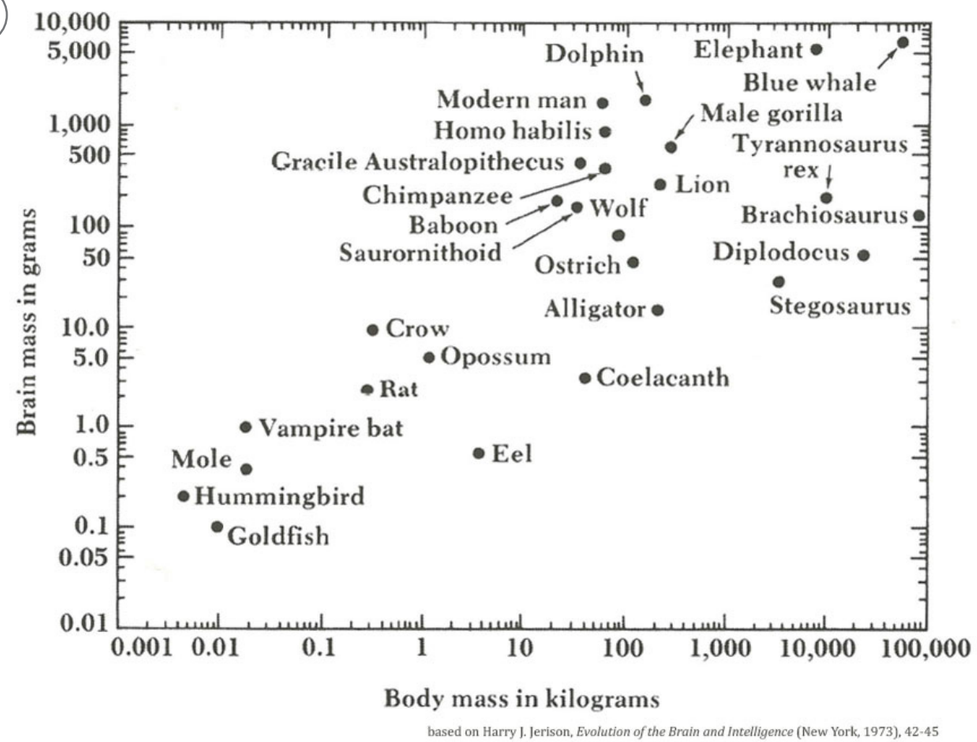


5. How does this graphic differ from the previous one? Does it show the same numbers?

6. Which of these three graphics would you consider the most effective at displaying the data accurately? Why?

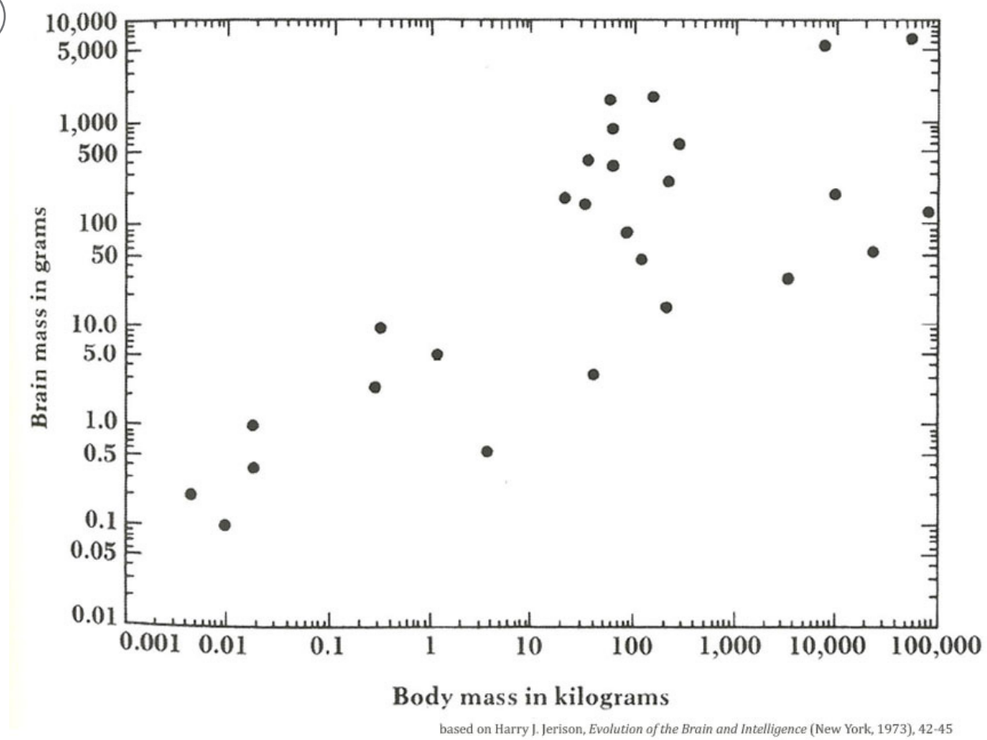
7. Which of the three graphics most convincingly conveys the author's main message? Why?

A



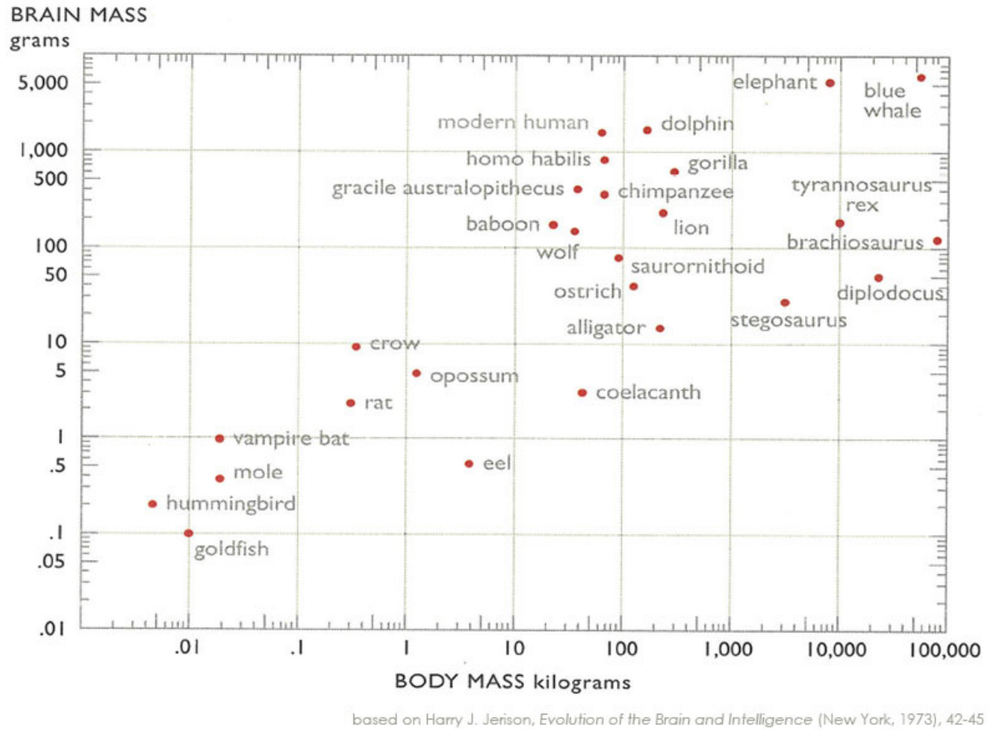
based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

B



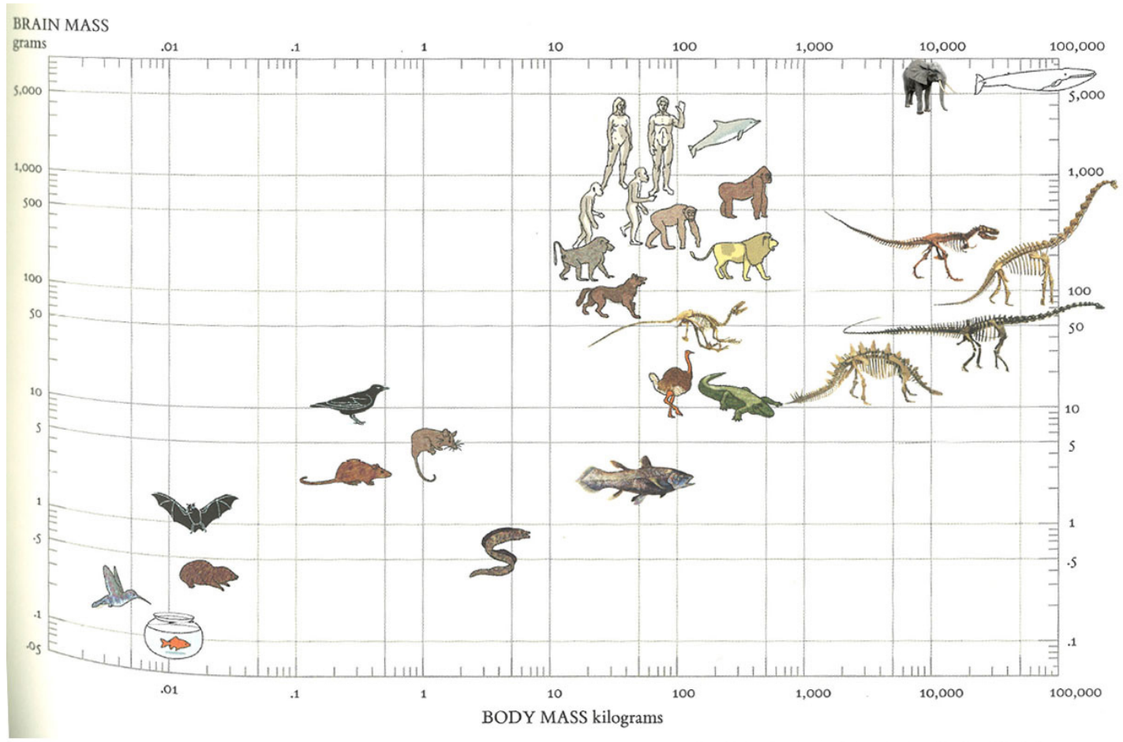
based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

C



based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

D

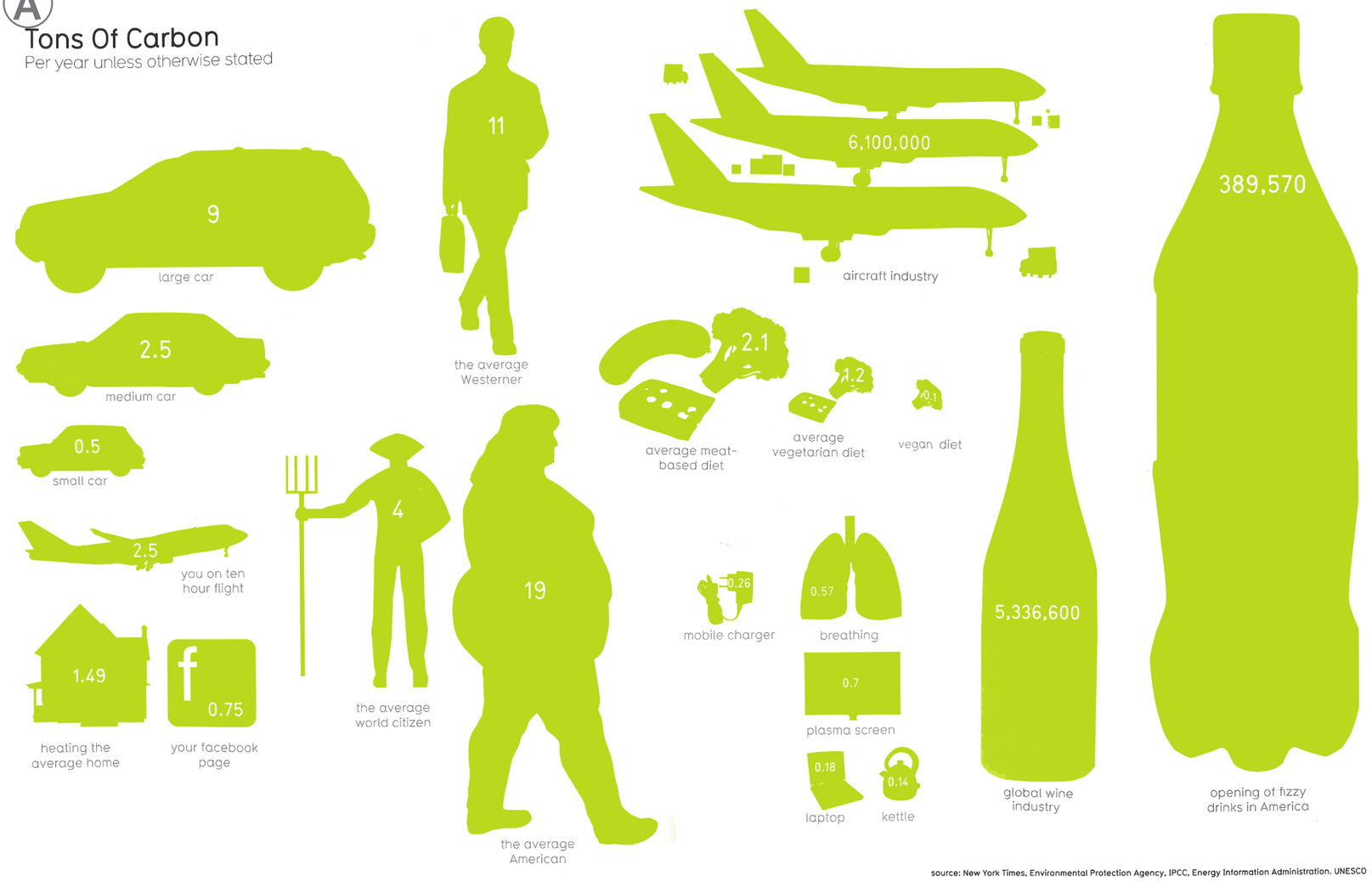


based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45

A

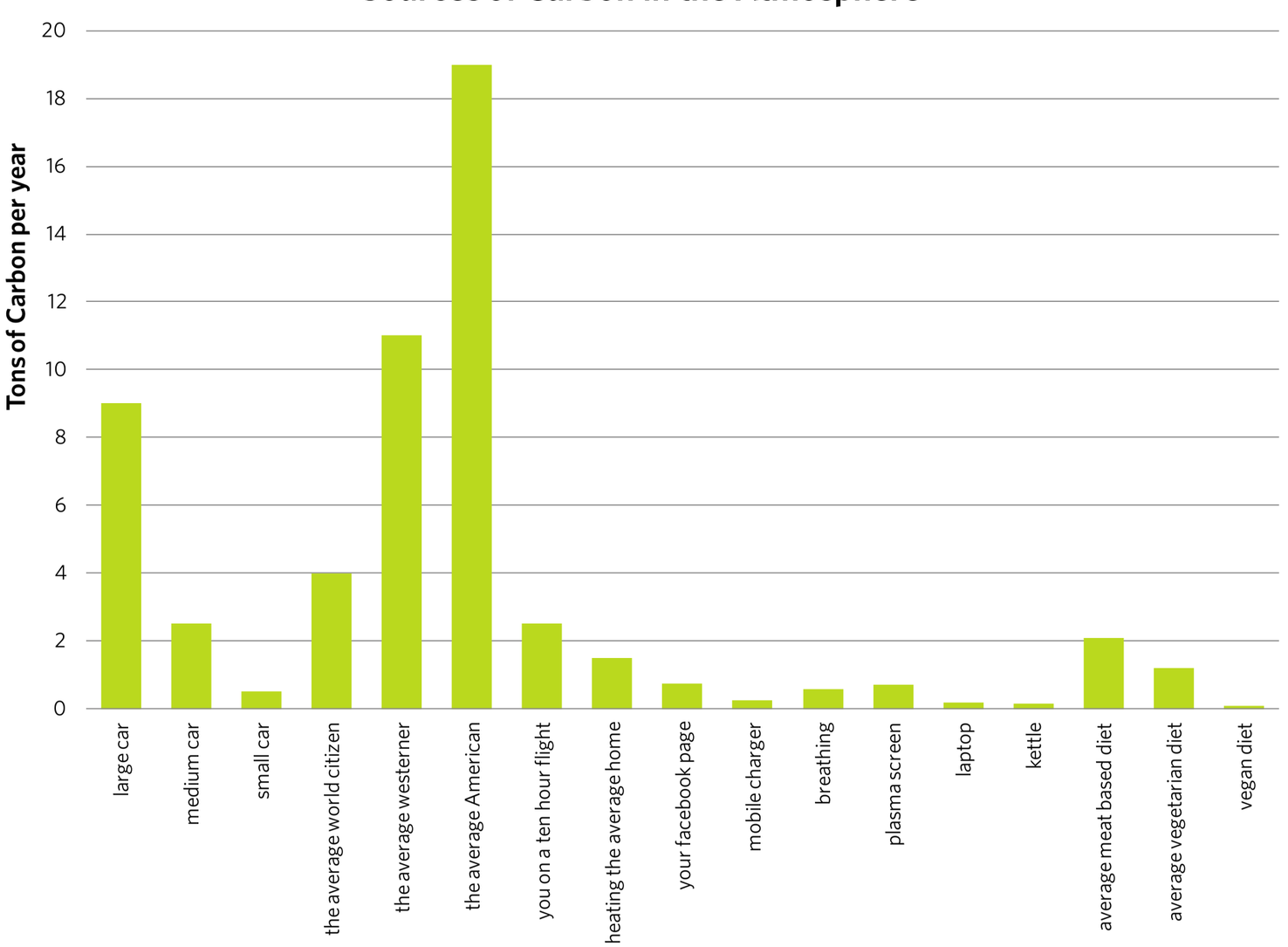
Tons Of Carbon

Per year unless otherwise stated

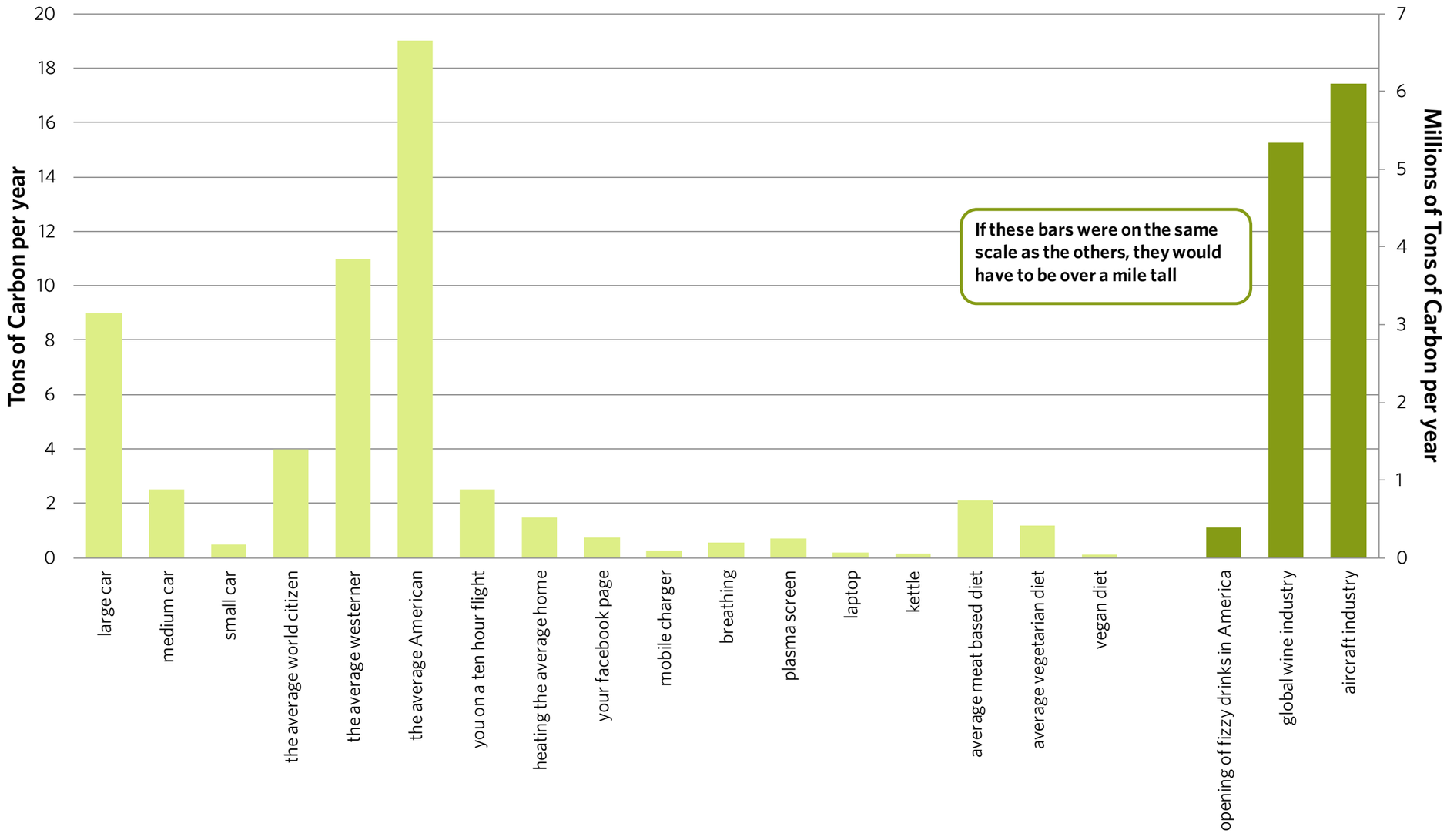


source: New York Times, Environmental Protection Agency, IPCC, Energy Information Administration, UNESCO

B



Sources of Carbon in the Atmosphere



Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 3: Data Graphic Critique

1. Reflecting on all the graphics seen in Activity 1 and 2, do a quick write about which graphic was their favorite and why? Encourage them to think beyond "I was interested in the subject"
2. In a group, have students share their opinions and create a list of what makes a good graphic.
3. Make master list of the classes ideas.
4. Introduce graphic principles created by Academy experts. How are they similar? How are they different from the class generated list?
5. Using the graphics from Activity 1 and 2, assign each pair of students one of the graphic principles from the Academy list or their own. Give each pair one red post-it and one blue post-it (have them write their principle on each) next have them decide on which graphic successfully uses the principle and which graphic might need some work.
6. Hand out the worksheet and a new graphic. Explain that they will be critiquing this graphic as homework.
7. The next day, have students find 1-2 others who critiqued the same graphic. Have them compare notes on how successfully the graphic met the different principles of what makes a good graphic.
8. Have student pairs/groups put together a small poster (like in Activity 1) to show what the main ideas are and how well they met the graphic principles

Infographics used:

- Nancy Gibbs, Where we Live, Time Magazine, http://www.truthistreason.net/wp-content/uploads/2010/04/infographic_us_population_large.jpg
- David MacCandless, Scale of Devestation, from Visual Miscellanuem http://www.informationisbeautiful.net/visualizations/scale-of-devastation/
- Philippe Rekacewicz, World Resources Institute, http://visual.ly/diversity-species
- National Geographic, Food for Thought, http://visual.ly/food-thought
- Meredith Darlington, Mother Nature Network, http://www.mnn.com/earth-matters/animals/stories/infographic-top-20-countries-with-most-endangered-species
- Stanford Kay, Global Carbon Emissions, http://www.stanfordkaystudio.com/information.html

Activity 3
Data Graphic Critique

CALIFORNIA ACADEMY OF SCIENCES

Name _____

Date _____

Title of Graphic _____

1. What ideas or pieces of information does the author present?

2. Identify the central idea(s) told in the graphic. What story does it tell?

3. Describe how the author represents data in the graphic? (Ex. Using color to differentiate two things.)	4. What questions do you have about the graphic? What confuses you?
» » » »	

5. Critique the graphic using the list of *Graphic Principles for Visualizing Scientific Data*.

» Does this graphic **impart only one to two key messages**? Explain your answer.

» Does **everything on the graphic have a reason for being there**? Explain your answer.

» Does the graphic **keep it accurate**? Explain your answer.

» Does the graphic **represent the numbers fairly**? Explain your answer.

» Does the graphic **blow them away**? Explain your answer.

Graphic Principles of Visualizing Scientific Data

CALIFORNIA ACADEMY OF SCIENCES

Name _____

Date _____

1. Keep it simple.

A. Aim to impart one or two key messages.

» Did you highlight key patterns that seem to have meaning in the real world?
» Can your viewers summarize your message(s) in a single sentence?
» Try to impart something your audience will be drawn to, remember, and share. Know your audience.

B. Everything on your graphic should have a reason for being there.

» Pretend ink is expensive, so use as little as possible to tell your story.
» Use color to reinforce your message, not solely for design.
» Use basic, intuitive representations.
» Don't include unnecessary dimensions of data (time, space, feature, etc.).

2. Tell the truth.

A. Keep it accurate.

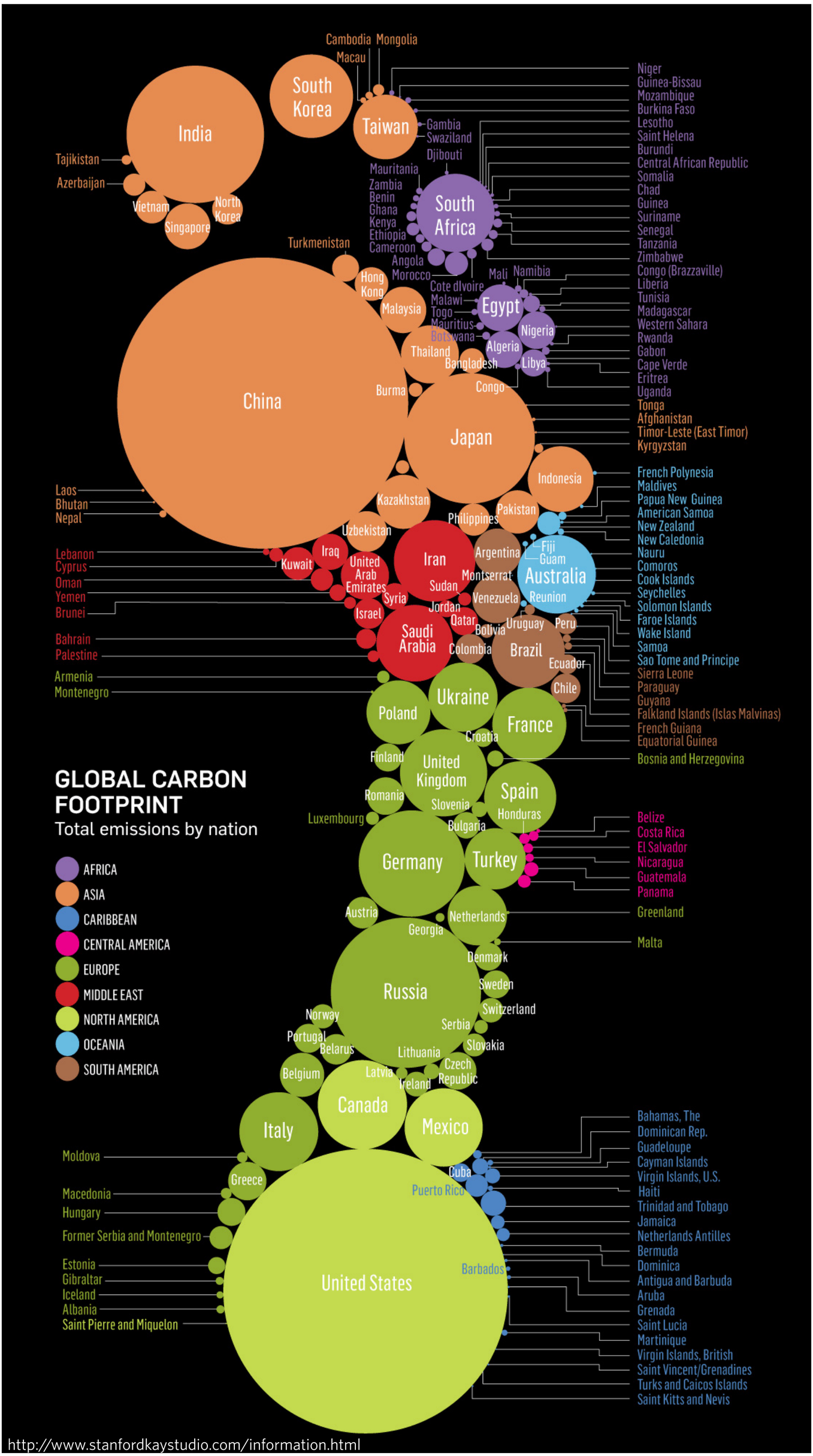
» Did you pull the numbers correctly?
» Keep in mind where your data came from. How was it collected? Context is essential.
» Did you cite your data sources?
» Use labels to eliminate ambiguity.

B. Be fair.

» Choose your statistics wisely. Mean/averages, medians, and percentages tell different stories.
» Did you represent the numbers and scale accurately? Make things proportional and appropriate to the numbers.
» Are you comparing like things (similar attribute, dimension, time scale, etc.)?
» Dots, lines, area, and volume convey different messages. Consider carefully which you will use.
» Be aware of ways your graphic could be misinterpreted. Do your graphs show what you think they show? (Challenge yourself to reinterpret your graphic.)

3. Blow them away.

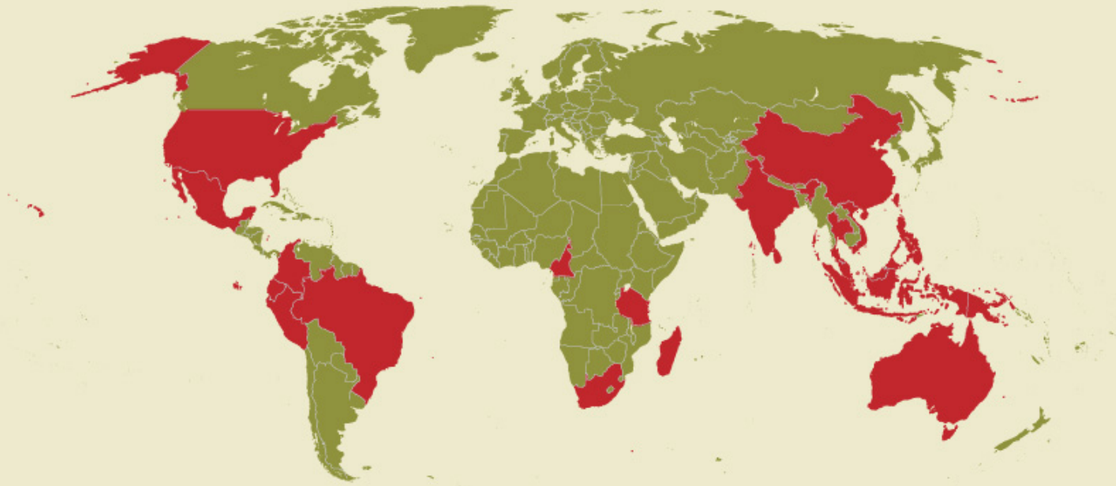
» Draw them in with interesting, innovative design.
» Shake up traditional charts, graphs, maps, etc.
» Draw viewers' attention to the substance of the graphic.
» Show data variation, not design variation.



http://www.stanfordkaystudio.com/information.html

ENDANGERED SPECIES

About 900 species of plants and animals have gone extinct in the last five centuries, and more than 10,000 others are now on the verge of joining them. Here's a look at some of the countries with the greatest potential for both disaster and improvement.



TOP 10 COUNTRIES

each icon = 10 species

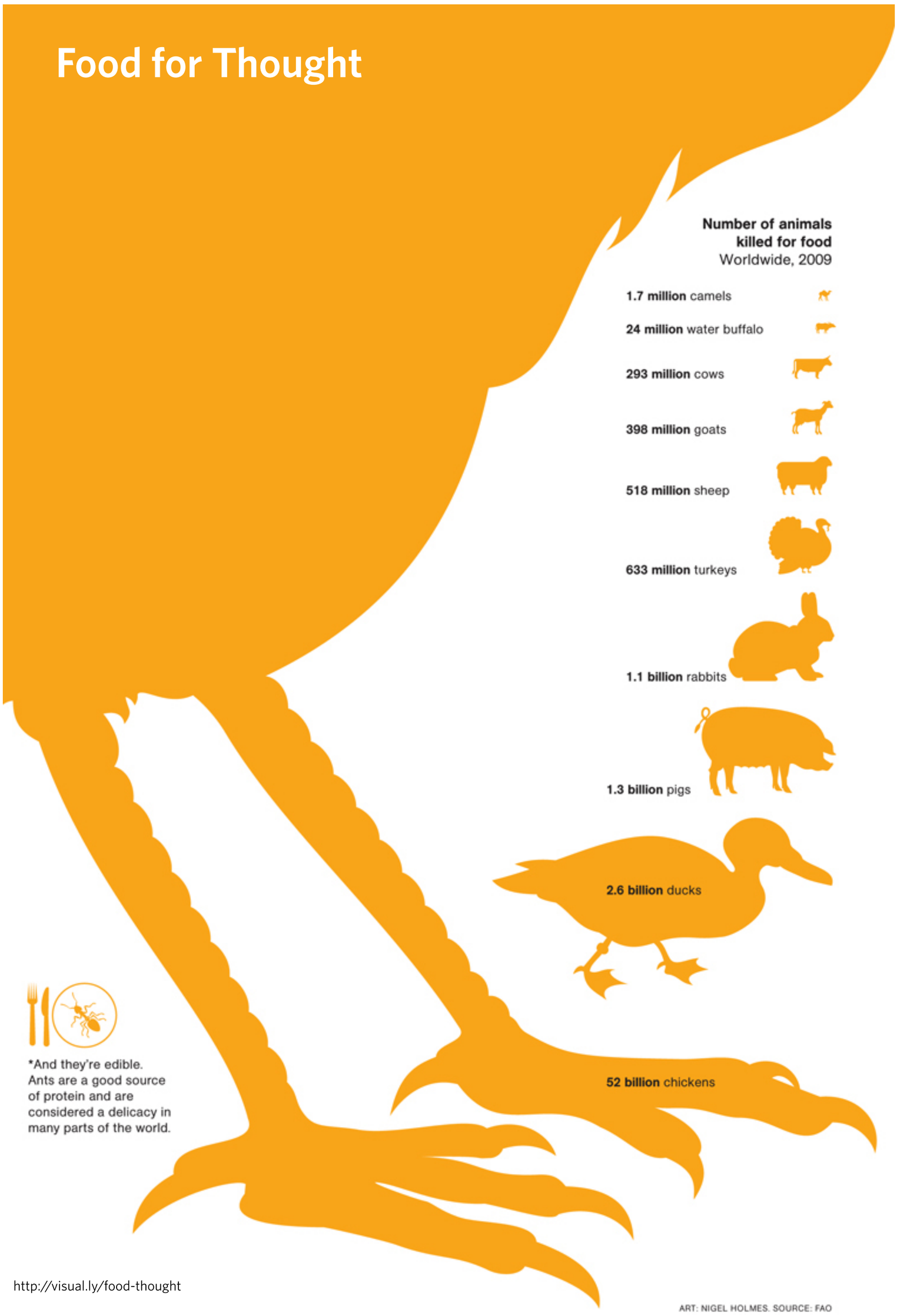
country	mammals	birds	reptiles	amphibians	fish	mollusks
Ecuador 2,211 total species	10	10	1	20	1	4
United States 1,203 total species	10	10	3	10	20	20
Malaysia 1,166 total species	10	5	2	10	4	3
Indonesia 1,126 total species	20	10	3	5	10	1
Mexico 900 total species	10	5	10	20	10	1
China 841 total species	10	10	3	10	5	1
Australia 804 total species	10	5	4	5	5	15
Brazil 769 total species	10	10	2	5	5	2
India 687 total species	10	5	2	10	3	1
Philippines 682 total species	4	5	4	10	4	1

Sources: IUCN Red List of Threatened Species 2009, 2009 State of Birds report, WWF, Bloomberg, PBS

Infographic: Meredith Darlington/MNN

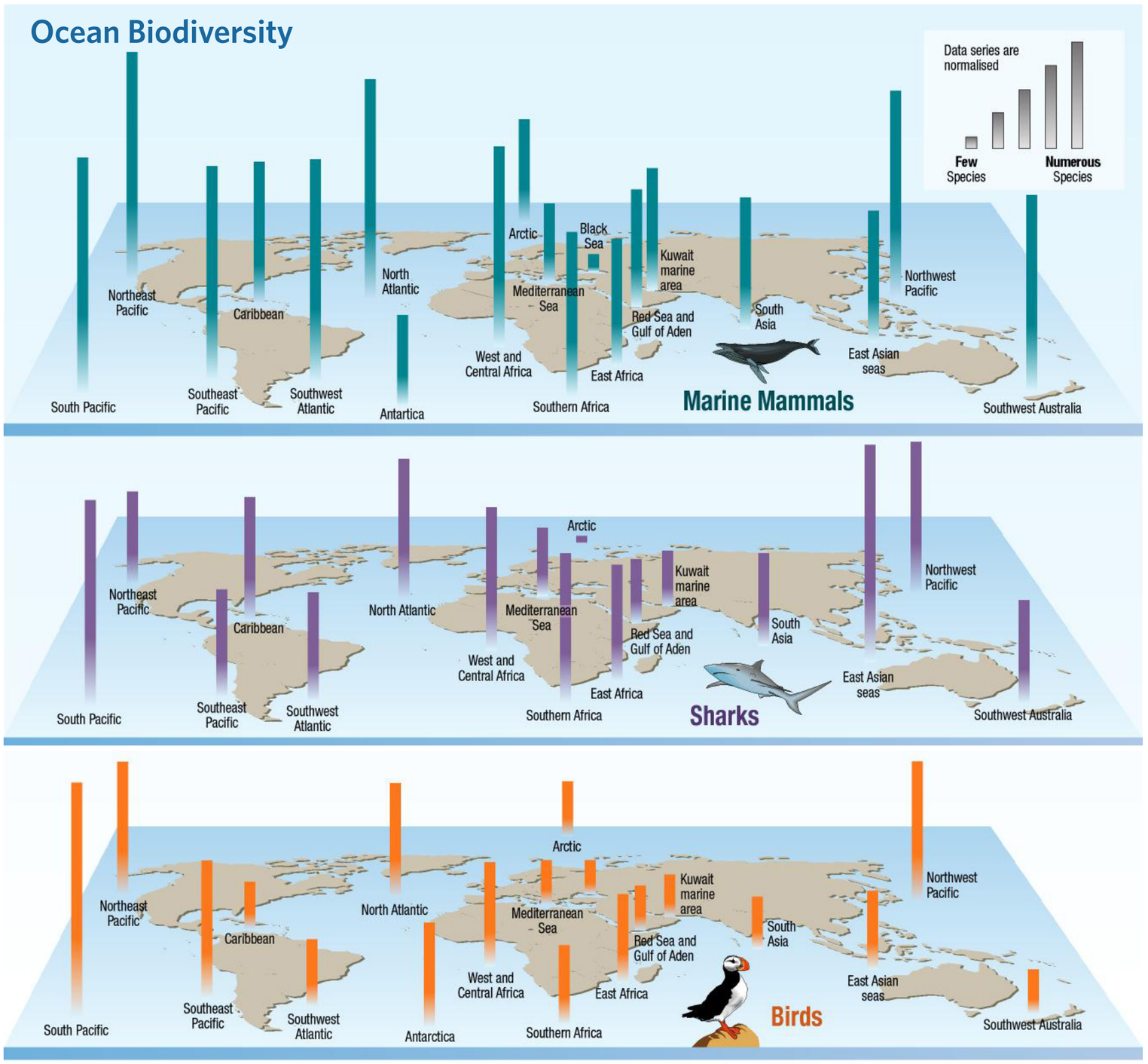
http://www.mnn.com/earth-matters/animals/stories/infographic-top-20-countries-with-most-endangered-species

Food for Thought



http://visual.ly/food-thought

ART: NIGEL HOLMES. SOURCE: FAO



Note: Data have been modified to show the species diversity of each region as a fraction of the most species rich region. The maximum number of marine mammals species in a region is 52, sharks 140, molluscs 1114, birds 115, and shrimps and lobsters: 210.
Source: World Resources Institute (WRI), Washington DC, 1998, based on data from UNEP-WCMC.

http://www.grida.no/graphic.aspx?f=series/vg-water2/0301-diversity-EN.jpg

Exxon Valdez oil spill
28,000 km²

Deep Water Horizon oil spill
5,750 km²

Amazon rainforest depletion yearly
6,400 km²

Forest loss Indonesia yearly
5,900 km²

Arable land destroyed by 2010 Russian heatwave
114,500 km²

Wildfires during 2010 Russian heatwave
8,800 km²

Chernobyl exclusion zone
1,300 km²

United Kingdom surface area
242,000 km²

Haiti earthquake 2010
13,000 km²

Chile earthquake 2010
300,000 km²

New Zealand earthquake 2011
5,800 km²

Japanese earthquake 2011
140,000 km²

earthquake areas experiencing at least 'strong' shaking

Thailand floods 2011
60,000 km²

Pakistan floods 2010
114,500 km²

Australian floods 2010
850,000 km²

Scale of Devastation

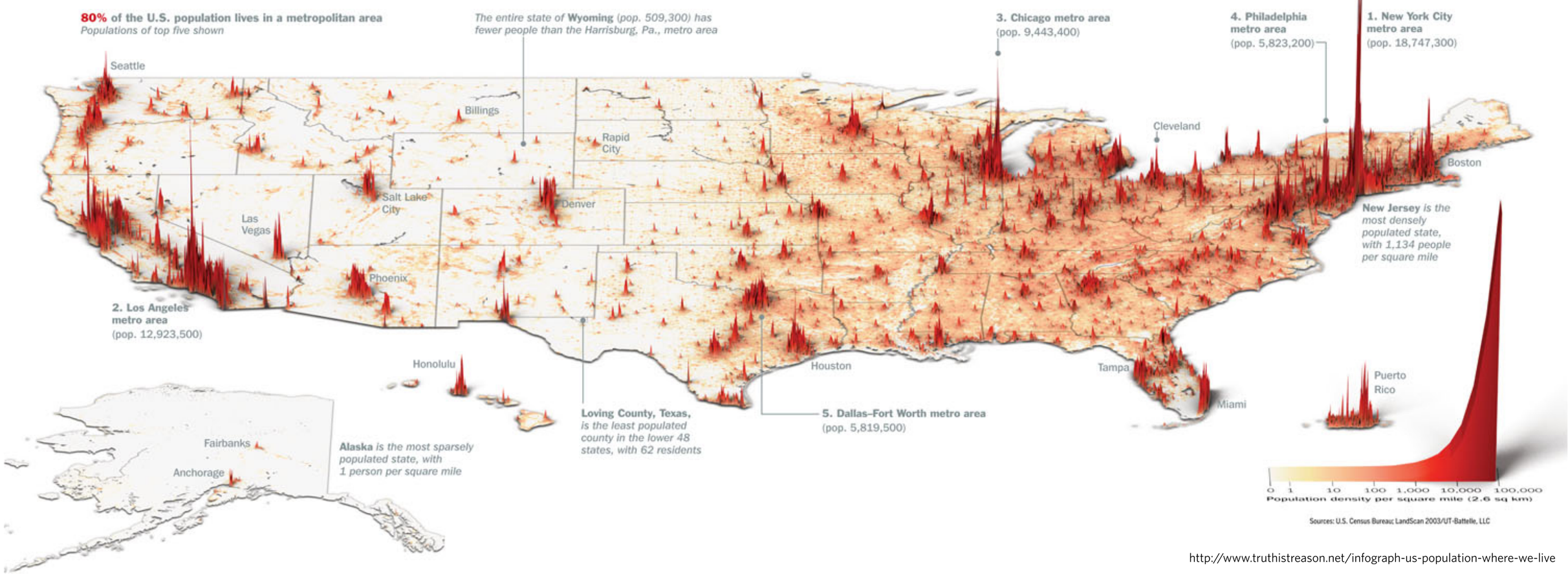
square kilometers

David McCandless & Miriam Quick // InformationIsBeautiful.net

sources: USGS, ScienceDirect, Wikipedia //data: bit.ly/scalesdev

Where We Live…

Unlike many developed countries, the U.S. keeps growing. We are also moving south and west. But compared with China or India, the nation is a vast prairie



http://www.truthistreason.net/infograph-us-population-where-we-live

Welcome to Infographics! A Toolkit to Get You Started

collectedny.org/2016/03/welcome-to-infographics-a-toolkit-to-get-you-started/

Patricia Helmuth

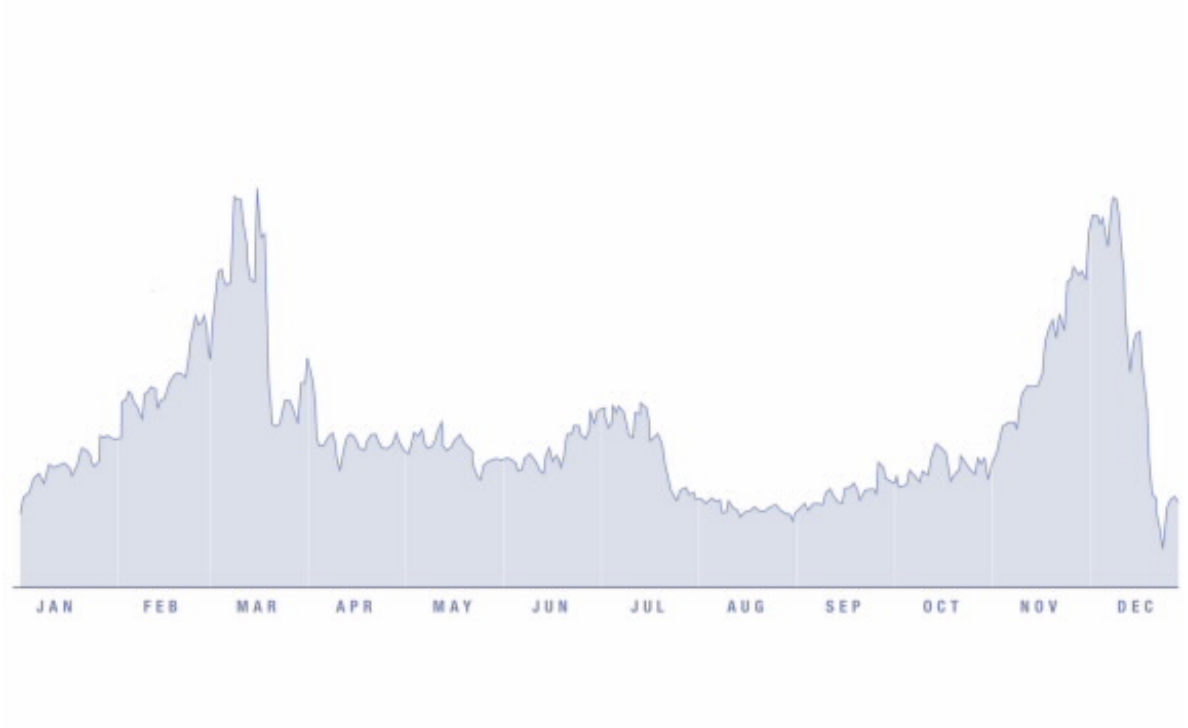
March 28, 2016

Infographics are everywhere and our students need to develop literacy skills to make sense of them. This resource is a very good way to kickstart an exploration of infographics in your classroom and one you will keep going back to throughout the year.

The California Academy of Sciences has put together an Infographics in the Classroom Teacher Toolkit that employs infographics as a way "for students to practice key science literacy skills". If you are new to infographics and would like to know what they are and how to use them in the classroom, this is a great place to start!

While the focus of these lessons is science, this toolkit can be used as a how-to guide on infographics in any content area. In fact, the worksheets from Activities 1 & 3 can be printed out and used, as is, to analyze just about any infographic. The website is simple and easy to navigate. It contains a Teacher Toolkit and five easy-to-follow, sequential lesson plans that include lots of opportunity for interaction among your students.

To start you on your infographic journey, I would recommend watching the fun and informative TED talk video that is cited in the Teacher Toolkit. In the video David McCandless, a data journalist, shows his audience the infographic below and asks for guesses on what they think the data might represent. What do you think it could be?



The infographic is included as part of Activity 1 and can be downloaded as a PDF or a powerpoint. When I showed it to my students, they noticed that there was a peak in March and mid-November and wondered what those months had in common. They guessed it might represent rainfall amounts, cold patterns, snowfall, patterns in spending money, retail sales, homicides, or suicides. Watch David McCandless' TEDtalk, The Beauty of Data Visualization, to find out what the data above represents and see Activity 1 below for ideas on how you can use it with your students.

The Teacher Toolkit provides background knowledge for teachers on what infographics are and why it makes sense to use them. You will find explicit connections to the Next Generation Science Standards and the Common Core State Standards in the toolkit.

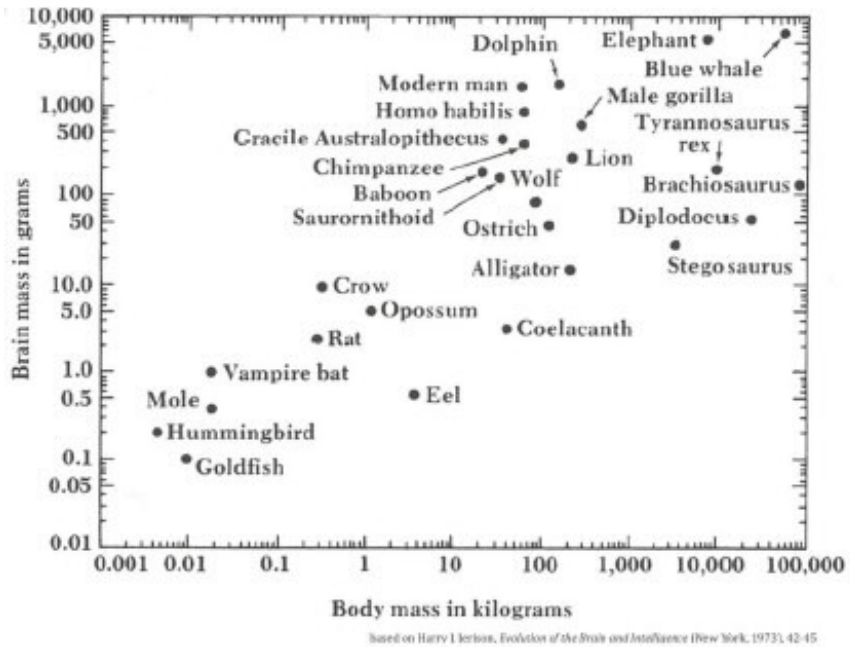
Interpreting Infographics

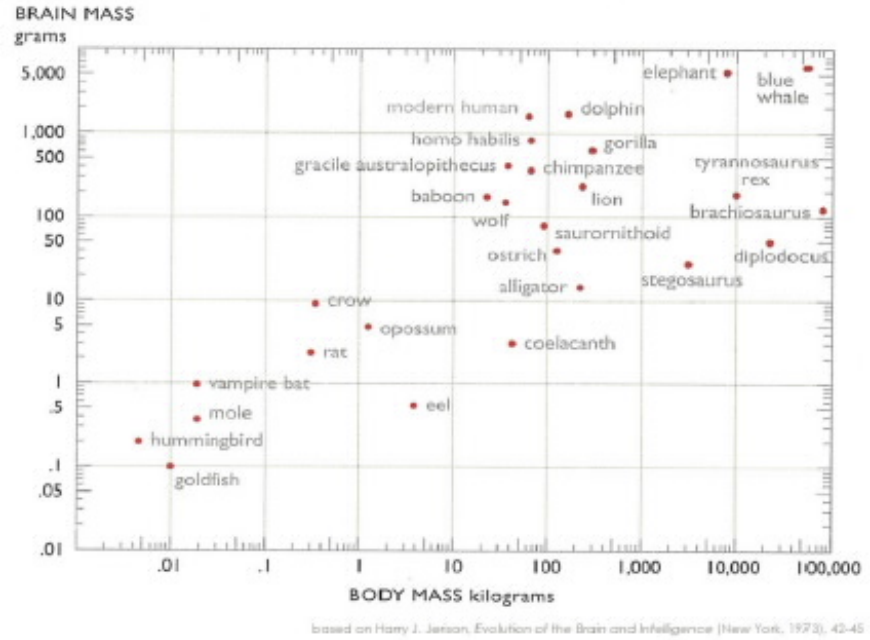
Activity 1 includes: a lesson plan, a worksheet, and a set of six infographics. The point of this lesson is to introduce students to infographics and have them analyze the message of the infographic. You may prefer, as I did, to use their data graphic interpretation handout with an infographic of your own choosing that correlates to content you are currently exploring with your students.

I chose to use an infographic that breaks down the elements that are in the human body, which fascinated my students. There's a lot of numbers in that infographic, so I also used it as a springboard for contextualizing a math lesson. I then followed up with an additional resource, from ASU School of Life Sciences, to verify the numeric information that was presented since the infographic did not cite a source.

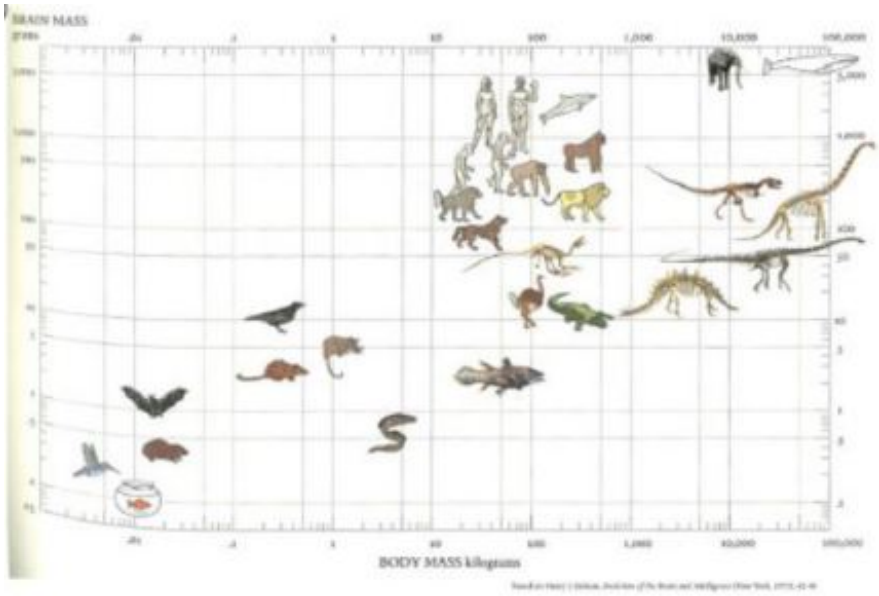
Visually Representing Data

Activity 2 asks students to compare identical information that is presented in different ways. An example is shown below:





based on Harry J. Jerison, *Evolution of the Brain and Intelligence* (New York, 1973), 42-45



How is the data represented in each graph? What do you like or dislike about each graph? Which one do you think is most accurate in depicting the data?

While the worksheets in this activity are specific to this set of graphs, the compare & contrast questions that are featured could be used with any set of graphs that contain similar data.

Critiquing Infographics

Activity 3 guides students through the process of how to critique graphics. My students were really engaged in this activity, which I believe was due to (1) allowing students to choose which infographic they wanted to evaluate (2) the varied and interesting set of infographics that are in this set and (3) because they knew they would be presenting their review to the class.

A rubric, *Graphic Principles for Visualizing Scientific Data*, is introduced in this lesson which serves as a guide for lessons to follow. This lesson gets students thinking critically about how the information is presented in the infographic with the objective of laying a foundation that prepares students for making their own graphs.

Making Infographics

Activity 4 includes a data set, graph paper, and instructions on several different ways to graph the data set. This activity gives students a really good sense of how important it is to think carefully about how the visual representation of data significantly impacts the message that is being communicated. The activity includes a link to a video, Science in Action: Sea Lion Pups, created by California Academy of Sciences that you can share with your students to give them some background information that makes the data meaningful.

Activity 5 extends the former activity and guides students through the process of thinking about how they can represent data visually by giving them the task of drawing a sketch of a data set, with the end goal of turning that sketch into an infographic. Suggestions on free online infographic tools that students can use to create an infographic are supplied in the Teacher's Toolkit.

A few final recommendations

> Longish infographics: A few of the infographics included in these activities were originally designed to be viewed on a computer screen or electronic device and don't lend themselves well to the printed page. Thus, if you have technology available it may be advisable to have your students pair and share a laptop, desktop, or tablet to view and analyze infographics that are longish. Links to the infographics that are featured in the activities are cited in the lesson plans.
>
> Color: In most infographics color is used to help convey the message, so if you have access to a color printer you should print out at least one copy of each infographic in color. You can them slip the infographics into page protectors for students to share.
>
> For some ideas on how to use infographics and math to contextualize your instruction, see my post at Tech Tips for Teachers (a World Education Resource), and my article in The Math Practitioner, a newsletter published by The Adult Numeracy Network (ANN).

Please use these activities with your students and let me know how it goes. And if you find any other great infographics that work really well with your class, please share them in the comments below.

Chemistry All Around

Chemical workshops resulted in unusual artistic effects

What is Art?

What is Science?

In international groups students from Cyprus, Greece, Italy, Slovakia and Poland tried to answer these questions and the results of their heated debates are presented here.

Good chemistry between people

Thanks for watching

Biology workshops

Science iT Engineering Art Maths

The Juliusz Sł owacki Highschool No. 7 in Warsaw

Colouring flowers with various dyes and investigating the inner structure of plants

Results

The naturally dyed flowers and leaves gathered in the forest were used in the land art activity

Warsaw, 16-20 october 2017
natural sciences and art

Norman Leto - an artist who builds bridges between art and science

Author: Karolina Ostrowska

School: VII LO im. Juliusza Słowackiego, Warsaw, Poland

Who he is

- born in 1980, in a small town in Southern Poland
- real name - Łukasz Banach
- famous for his latest movie "Photon"
- prestigious award winner - "Polityka's Passport", 2017

in 1999

- a student of IT High School in Bochnia
- studied computer graphics,
- decided to follow the greatest people in this world and... gave up school

Friendship with Beksiński

Leto's painting, that may be inspired by Beksiński

- Beksiński was a famous Polish painter, born in 1929 (50 years older!)
- helped Norman to start his art journey
- until 2005 (Beksiński's death).

Beksiński's paintings

(mostly dark, full of death motifs)

Characteristics of his art

1. Renaissance man

"I choose techniques depending on the content that I want to pass on. I can paint, write a novel or make a movie"

2. Expression

2. Maximum objectivism

"I portrait the world around, people appear in my works as a side effect"

"Poets call this phenomenon happiness"

"Sailor"

- movie, 2010
- addition to a book written by Norman Leto
- really low budget (US S 10k), Norman Leto and his friends were actors

Basic info

- Man called Norman Leto tells a story of his love,
- explains love as a biological phenomenon,

- shows simulations of society.

Basic info

Main character

- emotionless,
- considers himself a genius,
- critical about society, that only follows natural instincts

Main character

Life shapes

- way of presenting people's biographies
- size of a shape = impact on a society
- diversed shape = interesting biography

Joseph Stalin

common person

they are structured -form families, clans, dynasties

family tree built from lifeshapes

You can now order your own life shape!

artist started creating them for money :)

You can now order your own life shape!

Society simulations

Need for abstraction >>> religion groups

Society simulations

Natural leaders are crucial for society's development

Need for belonging to a group

"Photon"

- premiere: 6th October 2017
- "Polityka's Passport" award, in the visual arts category

Basic info

- popular science movie
- in cooperation with scientists,
- great educational value, since it shows biological processes
- a story of the world from a perspective of nature
- again, the human kind is a side effect of greater processes
- low budget

Basic info

History of the world

told by a scientist

- Andrzej Chyra, famous Polish actor)

History of the world

formation of matter, stars and planets

what is inside us and our brain

and what is inside us and our brains

What we know, and what we still need to study

visualisations of brain processes

Does free will exist, or is it our brain, that makes decisions?

visualisations of brain processes

- process of emotions forming
- what causes social pathology, violence

vision of the future

Presented as a tv programme:

- self-replicating machines
- internet will turn into artificial intelligence
- human bond with technology will become even stronger

vision of the future

Leto about his purpose

"This isn't difficult, it's only that scientists are using difficult words"

Leto about his purpose

- all science disciplines intertweave,
- our life is a series of processes mutually dependent on each other, all equally important and forming unity

Computer animations

Why he is using them:

-
- TECHNOLOGY LIMITS - not everything can be filmed, ex. microscope pictures
-
- REALISM - the world is dynamic, unlike photos/paintings

cell division and DNA unwinding