Chapter 1
Maps, the Web, and You

Lesson 1-1: Spatial distribution

U.S. Population Change 2000 to 2010

Scenario

1. Answers:

   a. Counties.

   b. Census tracts.

   c. "Census tract," a concept established by the US Census Bureau to facilitate analyzing populations, refers to an area roughly equivalent to a neighborhood. In general, a census tract encompasses a population of anywhere between 2,500 to 8,000 people. Census tracts are described as "relatively permanent," but they change over time.

   d. The US government takes a census count of the population every decade. Here, percent change is a measure (in percentages) of the difference in values between the population sizes of counties in 2010 compared to 2000. In this case, the difference between the numbers of people by county shows both increase (+) and decrease (-).

   e. Percent change = (2010-2000)/2000 x 100 percent.

2. Answers:

   a. The midwestern states show a decrease in population, while Florida, Arizona, Southern California, and Southern Nevada show an increase in population.
d. State and county agencies can and do use this information to predict where schools, fire departments, hospitals, and other public facilities should be built. Infrastructure is another area in which this data is useful for advanced planning.

**Lesson 1-2: Spatial distribution**

**Terrain of Swiss Alps**

**Scenario**

1. **Answer:**
   
a. A terrain map defines topographic features by using a collection of points with x, y, and associated z values.

2. **Answers:**
   
a. The Alps stretch across the western and southern parts of Europe in a broad arc. The mountain range starts near the Mediterranean Sea on the border between France and Italy. It curves to the north and eastward going through Italy, Switzerland, Liechtenstein, Germany, Austria, and Slovenia.

   b. Anyone curious about traveling in France, Italy, most of Switzerland, and parts of Southern Germany would be interested.

**Lesson 1-3: Symbolization and classification**

**Nepal Earthquake Epicenters**

**Scenario**
14. **Answer:**

a. The legend shows the population in a color gradation, with the darker shades indicating more people and the lighter indicating fewer. The most populated districts are on the southern edge of Nepal.

24. **Answers:**

a. Most of the earthquakes are to the north of Nepal, and the population is heavier in the south.

b. The terrain is rough.

**Lesson 1-5: Build and publish a web app**

**U.S. Population Change 2000 to 2010**

Symbolize and adjust legend: states

13. **Answer:**

a. The Northeast and Louisiana show a decline in population over the 2000 to 2010 time period. The western states, particularly Nevada, show a gain in population.

**The ArcGIS Book, chapter 1**

**Questions for reading comprehension, reflection, and discussion**

1. Geography applied

   **Thought Leader: Jack Dangermond: Web GIS is an incredible new pattern for applying geography**

   a. **Answer:** The evolution of GIS technology; software programs and tools that include desktop, networks and iCloud; and public engagement, has led to what we call “web GIS.”
2. Web GIS is collaborative
All GIS data fits onto the earth’s surface:

a. **Answer:** Geography is the organizing key; information in web GIS is sorted by location. Because all these layers share this common key, any theme of data can be overlaid and analyzed in relation to all other layers that share the same geographic space.

b. **Answer:** Georeferencing data means associating it with a specific, physical place.

c. **Answer:** Suddenly, you have much more than just your and your colleagues' data layers available to you—web GIS puts nearly everything that anybody has ever published and shared about any particular geographic area within your reach. Web GIS exponentially expands the potential of your data visualization and analysis capabilities.

3. The expansive reach of web GIS
GIS is evolving: The new ArcGIS is a web GIS

a. **Answer:** What software platform should be learned first?

b. **Answer:** A basemap is a foundational layer that provides information in great detail at many scales.

4. A condensed and specific chart

<table>
<thead>
<tr>
<th></th>
<th>Traditional (desktop) GIS</th>
<th>Web GIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data storage</strong></td>
<td>Stored locally on computer or local server.</td>
<td>Stored in the cloud–access from any location or device.</td>
</tr>
<tr>
<td><strong>Data creation</strong></td>
<td>Must create your own data.</td>
<td>Can combine data you create with existing data from other sources.</td>
</tr>
<tr>
<td>Interacting with maps and data</td>
<td>On computer through installed GIS software.</td>
<td>On any device–computer, tablet, or smartphone through the cloud.</td>
</tr>
<tr>
<td>Sharing and collaboration</td>
<td>Limited data access makes sharing cumbersome and limits collaboration.</td>
<td>Cloud-based data storage enables sharing of data and layers, which fosters collaboration. Easy to mash up your work with that of others. Easy to share with public.</td>
</tr>
</tbody>
</table>

5. ArcGIS information items

a. **Answer:** A web map consists of a basemap and a set of data layers presented as a two-dimensional map. A scene combines basemap layers with operational overlays but displays them in the third dimension or in the z-axis.

b. **Answer:** Answers will vary.

c. **Answer:** Answers will vary.

d. **Answer:** Layers displayed in *The ArcGIS Book* show data from the following different types of layers: The in-ground sensor, raster, or gridded layer; a layer shown with a z value; and a layer of social media tweets.
Chapter 2

Cartography Is For Everyone

Lesson 2-1: Investigate basemaps

Identifying the geographical context of your content

Scenario

8. Answers:

a. This map features satellite imagery for the world and high-resolution aerial imagery for many areas.

b. This map features satellite and high-resolution aerial imagery for the world with political boundaries and place-names for reference purposes.

c. This map features highway-level data for the world and street-level data for North America, Europe, and other parts of the world.

d. This map is designed to be used as a basemap and a reference map.

e. This map is designed to focus attention on your thematic content by providing a neutral background with minimal colors, labels, and features.

f. This map is designed to focus attention on your thematic content by providing a neutral background with minimal colors, labels, and features.

g. This map features the National Geographic World Map, which is a cartographically rich and distinctive reference map of the world.
h. This map is designed to be used as a basemap by marine GIS professionals and as a reference map by anyone interested in ocean data.

i. This map features shaded relief imagery, bathymetry, and coastal water features that provide neutral background with political boundaries and place-names for reference purposes.

j. OpenStreetMap (OSM) is a collaborative project to create a free editable map of the world.

k. This map features detailed USGS topographic maps for the United States at multiple scales.

l. The USGS Topo basemap service from The National Map is a combination of contours, shaded relief, woodland, and urban tint, along with vector layers to provide a composite topographic basemap.

9. Answer:

a. If the basemaps were not multiscale there would be only one zoom level. Because they are multiscale, the user can zoom from the world to individual houses.

Lesson 2-2: Scale and resolution

Mastering the difference between them

Scenario

4. Answers:
a. The map scale is shown in the lower-left corner of the map.

b. Yes. Some zoom to 4 ft. and others to 6 ft.

c. When zoomed to the full extent, visibility is not clear.

5. Answer:

a. The resolution of the imagery depends on the satellite or aerial imagery provider, and the resolution refers to the number of pixels in an image. The resolution is calculated by the width and the height of a pixel and the total number of pixels the image contains.

Lesson 2-3: Classification

2008 presidential election results by precinct

What you need

3. Answers: States, precincts, ethnicity, income.

5. Answers: Answers will vary.

6. Answers: Answers will vary.

The ArcGIS Book, chapter 2

Questions for reading comprehension, reflection, and discussion

1. The online mapping revolution
   a. Answers: Google Maps, MapQuest, and Yahoo Maps.

2. GIS maps engage an audience for a purpose
3. What maps can do
   a. **Answers**: Answers will vary.

4. The role of web maps: At their heart, web maps are simple basemaps and operational layers
   a. **Answer**: A basemap is a map that has provided a background or a geographical palette to display your map. Esri provides several basemaps, each with a different focus. An operational layer consists of the users own subject matter that will be overlaid on the basemap.

5. Web map properties: Continuous and multiscale
   a. **Answer**: Online maps can be continuously updated and simple popups can be added to contain a wealth of information.

6. New smart mapping workflows
   a. **Answer**: Elevation or terrains give height to a map or a z-value.
Chapter 3
Tell Your Story Using a Map

The ArcGIS Book, chapter 3

Questions for reading comprehension, reflection, and discussion

1. Story maps: The fusion of maps and stories come to life
   a. Answer: Interactive maps, text, photos, video, and audio.
   b. Answer: Answers will vary.

2. The world of story maps: A gallery of exceptional examples from around the globe
   a. Answers:

   • Twister Dashboard: Hundreds and sometimes thousands of tornadoes occur each year throughout the United States. While some are very powerful and result in widespread injuries and property loss, others cause far less impact and cost.

   • Geography Bee: More than 40,000 bee species are found around the world; they have adapted to a wide range of environments, where they depend on native plants for their survival.

   • The Age of Megacities: Today’s global megacities reflect a range of serious issues facing Earth in the 21st century and are a major causal factor for many of these issues.

   • Exploring China’s Burgeoning Highways: China’s rapidly growing highway system brings potential costs as well as benefits.

3. Who creates story maps: For the people, by the people
   Answers: (See the chart on page 72 of the book)
<table>
<thead>
<tr>
<th>Organization</th>
<th>Who is the audience they want to reach? What is the purpose of the story map?</th>
<th>Suggest a story they might want to communicate with a story map.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A local historical or preservation group</td>
<td>Audience: Community members. Purpose: Foster awareness of and appreciation for town history.</td>
<td>Historic houses and other community structures.</td>
</tr>
<tr>
<td>The campaign staff for a Presidential candidate</td>
<td>Audience: Voters Purpose: Win voter support</td>
<td>The candidate’s position and record on important issues (immigration, oil pipeline, and so on).</td>
</tr>
<tr>
<td>A city or state law enforcement agency</td>
<td>Audience: City residents. Purpose: Raise awareness of dangerous intersections and streets.</td>
<td>Locations where pedestrian, bicycle, and automobile accidents have occurred in a given timeframe.</td>
</tr>
</tbody>
</table>

4. Thought Leader: Allen Carroll: Why maps are so interesting
   a. **Answer**: Maps arrange information according to its location—latitude/longitude coordinates, ZIP Code, street address, and so on. Arranging information this way enables us to see patterns and relationships and provides context for our explorations.

5. Maps tell stories: What kinds of stories can you tell?
   a. **Answers**:

       1. The author’s assent of Mt. Langley with a group of friends.

3. Correlations between officer-involved shootings and race, poverty, and crime in Los Angeles from 2009-2014.

4. The impact of class status on passenger survival on the Titanic.

5. The role of geography (particularly participant viewsheds) on the outcome of the Battle of Gettysburg.

6. Weird sports around the world.

7. Plotting tweets to crowdsource observations of the International Space Station around the world.

8. Comparing an 1859 map of San Francisco with a current satellite image.

9. Answers will vary.

6. Quickstart: Combine your maps and customize interactive apps to tell a story.
   a. **Answer:** Answers will vary.

   b. **Answer:** Answers will vary.

   c. **Answer:** Answers will vary.
Chapter 4

Great Maps Need Great Data

Lesson 4-2: Help restore a watershed

Chesapeake Bay States Land Use Enrichment

Display the Bay Area by State abbreviation

4. Answer:

   a. In this map you see that political boundaries represent the boundaries of the states and a natural boundary that represents a physical boundary, in this case the Chesapeake Bay Watershed. The bay’s watershed is irregularly shaped; the northern part of the watershed is narrower than the southern part. The bay’s watershed includes parts of seven states, with Virginia and Pennsylvania having the most land area and Maryland and Virginia having the most coastline.

The ArcGIS Book, chapter 4

Questions for reading comprehension, reflection, and discussion

1. The Living Atlas: The ArcGIS platform provides rich content
   
   a. Answer: By providing ready-made basemaps and authenticated data, GIS users can spend less time assembling the components for their projects and more time performing analysis, answering questions, and solving real-world problems.

2. The ArcGIS data community: A global network for creating and sharing authoritative geographic information resources
   
   a. Answer: During the early days of GIS, the compilation of relevant data layers was one of the primary tasks of each organization. Today, this data is increasingly available to everyone
via the web, providing these organizations with access to a continuous coverage of geographic information worldwide.

3. What kind of data is available? Definitive, authoritative basemaps
   a. Answers:
      - Amount of detail changes as you zoom in or out.
      - Maps cover the entire surface of the earth.
      - Seamlessly wrap around the earth.

4. Demographics
   a. Answer: Data enrichment is the ability to add to your map relevant demographic data to the problem or issue under investigation.

5. Opening data to the world of possibilities
   a. Answer: Citizens can directly access thousands of open government datasets, which they can search, download, filter, and visualize through their web browsers or mobile devices. These Open Data sites enhance government transparency and foster collaboration among community groups.

6. Imagery
   a. Answer:
      - Photographic: Aerial photography and videos taken from airplanes and, increasingly, drones.
      - Satellite: Imagery created from data collected by Landsat satellites.
      - Multispectral: Imagery created by combining visible and invisible light collected remotely by satellites or planes.
7. Landscapes: Landscape analysis layers
   a. **Answer**: Ecological land units (ELUs) are areas of distinct bioclimates, landforms, lithology, and land cover that form the basic components of terrestrial ecosystem structure.

8. Thought Leader: Richard Saul Wurman: A map is a pattern made understandable
   a. **Answer**: Answers will vary.

   b. **Answer**: Exploring and analyzing relevant data is essential before you attempt to address a problem or issue.
Chapter 5

The Importance of Where

Introductory activities

Activity

Water Quality

1. **Answer:** How do we use land cover data as a water quality indicator?

2. **Answer:** Calculate area of forest cover, impervious area, developed grass, and riparian buffers.

3. **Answer:** After mapping the data layers, use spatial analysis tools to see how the layers are interrelated.

4. **Answer:** After your analysis, make a decision as to which location is the most vulnerable.

5. **Answer:** The story map is the means of communication.

Conservation

1. **Answer:** Where in Brazil do natural disasters occur?

2. **Answer:** The data is mapped in two layers—one layer for drought and one layer for flood/extreme rain.

3. **Answer:** After mapping the data, areas of vulnerability can be seen.

4. **Answer:** Decisions are made about what geographic locations resources are most needed.
5. **Answer:** These decisions are shown on a map and are the driving forces behind allocation of funds and resources.

**The ArcGIS Book, chapter 5**

**Questions for reading comprehension, reflection, and discussion**

**Spatial problem solving**

1. **Write a paragraph explaining this statement: GIS is more than a map.**

   **Answer:** The first step of any spatial problem is to put the data on a map; however, maps are more than locational information. They are the production and storage of analytical spatial information. This spatial information allows the user to solve problems using a particular suite of geospatial tools.

2. **Explain one tool from each of the following spatial analysis tools:**

   **Understand places**
   - **a. Answer:** A request for records of features based on their attribute values.
   - **b. Answer:** A selection of geographic features based on location or spatial relationships.
   - **c. Answer:** A selection of geographic features based on their distance from other features or cells.

   **Detect patterns**
   - **d. Answer:** A concentration of features per area.
   - **e. Answer:** The task of grouping a set of objects in groups similar to each other.

   **Determine relationships**
   - **f. Answer:** Joins tables to a spatial layer based on a value field.
   - **g. Answer:** Joins the attributes of two layers based on location.
h. **Answer:** Joins and views separate datasets based on analytical functions.

**Make predictions**

i. **Answer:** Predicts values for cells in a raster from a limited number of points.

j. **Answer:** Analyzes several variables, with a focus on the relationship between the dependent and independent variables.

k. **Answer:** Depicts surface conditions such as contour, slope, aspect, and hillshade.

**Find Locations**

l. **Answer:** A type of analysis used in GIS to determine the best place or site for something.

m. **Answer:** Simultaneously locates facilities and allocates demand points to those facilities.

n. **Answer:** Determines the path of least cost between sources and destinations or a corridor of the paths of least costs, respectively.

**3. Ask, calculate, interpret, decide, and communicate**

a. **Answer:** See the introductory activity.

**4. Spatial data and spatial analysis**

a. **Answer:** Discrete data is stored by its exact geographic location (called **feature data**).

Continuous data is represented by regular grids (called **raster data**).

**5. Visualization: What can my map show me?**

a. **Answer:** It shows the area you’re showing and the data affected.

b. **Answer:** Style and attributes clarify information that the map conveys.
c. **Answer**: Classification schemes define which features fall into which groups.

6. **Explore: What can my data tell me?**
   a. **Answer**: Combined with location, descriptive statistics describe the main features.
   
   b. **Answer**: Both attribute and spatial queries are used to ask questions of the data.
   
   c. **Answer**: Proximity analysis is the most common type of spatial relations. It can be a symmetrical buffer or an asymmetrical drive-time.
   
   d. **Answer**: Spatial patterns deal with the distributions of values (attributes) and the spatial arrangement of the locations.

7. **Thought Leader: Linda Beale: The challenge is making complex data understandable**
   a. **Answer**: Health outcomes are spatial and characterized by human and physical geographies. GIS offers the technology to explore, manipulate, and analyze data from multiple sources. The ability of doctors, researchers, and the public to access multiscale interactive web maps during a time of crisis is what makes GIS so useful and valuable in these situations.

8. **Modeling: What can patterns tell you about the following?**
   a. **Answer**: Starting with one layer of spatial data, new information can be derived.
   
   b. **Answer**: Interpolation is a mathematical way of creating a continuous surface map from point data.
   
   c. **Answer**: Users can calculate spatial interaction because all layers in a GIS are linked together geographically.
Chapter 6
Mapping the Third Dimension

Introductory activities

Activity

1. Answer:

   a. In the assassination of President Kennedy scene, the local scene is Dealey Plaza in Dallas, which serves as the backdrop for the 3D re-creation. The airflow world map shows a global view.

2. Answer:

   a. A photorealistic view re-creates reality by using textures. In this case, the building polygons are extruded on the map. The map also shows how the sun angle can be changed.

3. Answer:

   a. Two variables are shown on one map. The political parties are represented by their respective colors of red and blue, and the population is represented by extrusion.

4. Answer:

   a. When you click the Settings gear, the sun slider is uncovered. Dragging the sun slider shows that the proposed development casts a disruptive shadow across Logan Square for several hours in the afternoon.

Lesson 6-3: Teach world time zones

Charting the hour for online students

Open Scene, search for and add layers, configure, and save

14. Answers:
a. A time zone is a region where the same standard time is used.

b. The land has irregular boundaries to avoid time changes at inconvenient locations.

c. The International Date Line identifies where the date changes for travelers.

d. The continental United States has four time zones: Eastern, Central, Mountain, and Pacific; if you include Alaska and Hawaii, there will be more.


23. Answers:

<table>
<thead>
<tr>
<th>Start City</th>
<th>Day/Time</th>
<th>Travel Direction</th>
<th>End City</th>
<th>Day/Time</th>
<th># Time Zones Crossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>Mon 11 AM</td>
<td>West</td>
<td>Denver</td>
<td>Mon 4 AM</td>
<td>7</td>
</tr>
<tr>
<td>London</td>
<td>Mon 11 AM</td>
<td>East</td>
<td>Denver</td>
<td>Mon 4 PM</td>
<td>17</td>
</tr>
<tr>
<td>Paris</td>
<td>Wed 1 AM</td>
<td>West</td>
<td>Minneapolis</td>
<td>Tues 6 PM</td>
<td>6</td>
</tr>
<tr>
<td>Paris</td>
<td>Wed 1 AM</td>
<td>East</td>
<td>Minneapolis</td>
<td>Tues 6 PM</td>
<td>18</td>
</tr>
<tr>
<td>Rio de Janeiro</td>
<td>Friday 10 PM</td>
<td>West</td>
<td>Tokyo</td>
<td>Sat 10 AM</td>
<td>12</td>
</tr>
<tr>
<td>Rio de Janeiro</td>
<td>Friday 10 PM</td>
<td>East</td>
<td>Tokyo</td>
<td>Sat 10 AM</td>
<td>12</td>
</tr>
</tbody>
</table>

The ArcGIS Book, chapter 6

Questions for reading comprehension, reflection, and discussion

1. The evolution of 3D mapping

   Advantages of 3D

   a. Answer: Maps that contain vertical information can show hillshading, contours, and volumetric information.
b. **Answer:** When data is presented in 3D, the viewer intuitively understands the size and relative positions of objects.

2. **Important 3D terminology: Getting the z-terminology straight**
   Explain these terms (including the difference between them where appropriate):

   a. **Answer:** Exemplifies 2D or 3D views.

   b. **Answer:** This represents two different scene environments: Global extends across large distances, and local scenes have a fixed study area.

   c. **Answer:** All surface data includes an x, y, and z value for any point on it.

   d. **Answer:** There is value in having some symbols remain the same, both in the scene and on-screen.

   **Representing the world in 3D**

   e. **Answer:** A photorealistic view re-creates reality by using textures.

   f. **Answer:** 3D cartography takes 2D thematic mapping techniques and moves them into 3D.

   g. **Answer:** A 3D view feels like virtual reality when photorealistic and thematic techniques are used in combination.

   **What makes a great scene?**

   h. **Answer:** 3D views allow people to see space in 3D. 3D views are immersive because they invite people to imagine themselves within the scene.
i. **Answer**: There are three types of 3D styling: fully photorealistic, fully thematic, and a combination of photorealistic and thematic.

j. **Answer**: Thematic 3D views use common 2D cartographic techniques such as classifications. 3D scene authors also create schematic, simplified representations to more effectively convey information.
Chapter 7
The Power of Apps

Introductory activities

Activity
Investigate ArcGIS Marketplace
marketplace.arcgis.com/

1. Answer: ArcGIS Marketplace is a website that "allows ArcGIS Online organizations to search, discover, and get apps and data from qualified providers for use within their organization. The apps and data services listed in the marketplace can be made available to any ArcGIS Online organization, worldwide."

2. Answer: Members of an ArcGIS Online organization.

3. Answer: Answers will vary.

Lesson 7-3: Get Answers with an app

Solving problems with Explorer for ArcGIS

Questions for Scenario 1

1. Answer: Land cover is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground, water, and so on.

2. Answer: See the image of the legend.

2. Answer: Land cover is one of the factors that defines an ecoregion.
Lesson 7-4: Investigate relationships

Alerts and news from the QuakeFeed Earthquake app

3. Answers:
   a. Convergent plate lines are located where earthquakes are high.
   b. Answers will vary but usually the two will be the areas around Japan and western coast of the United States.

The ArcGIS Book, chapter 7

Questions for reading comprehension, reflection, and discussion

1. The rise of spatially intelligent apps
   a. Answer: Apps are lightweight computer programs designed to run on the web and on smartphones, tablets, and other mobile devices.
   b. Answer: GIS apps are a special breed: they’re mapcentric and spatially aware.

2. Thought Leader: Abhi Nemani: Shaking things up in the City of L.A.
   a. Answer: The notion of government as a platform fundamentally means that innovation can come from anywhere—inside government or out.

4. Where do apps come from?
Solve a problem with an app
   a. Answer:
      • Ready-to-use ArcGIS apps.
      • ArcGIS Marketplace apps.
      • ArcGIS Solutions apps.
      • Web AppBuilder for ArcGIS.
      • Code your own.
b. **Answer:**

- Tell a story.
- Engage with users.
- Collect data.
- Answer questions through analysis.
- Open your data.
- Provide geo-alerts.
- Track and Monitor.
- Get around.
- Manage operations.
- Add demographic context to your maps.

5. **Quickstart:** Use out-of-the-box apps, build apps without having to write any code, or code your own apps from scratch

   a. **Answer:** GIS has become mobile and awareness of the value of mobile mapping tools is expanding constantly. The public is increasingly aware of the value of mobile mapping tools for everything from navigation to locating the nearest gas station.

   Every consumer can find and use focused, single-purpose apps that enrich their daily lives. It’s a small step to go from appreciating a navigation app in your car to appreciating the value of a damage assessment app in disaster recovery.
Chapter 8
Your Mobile GIS

Introductory activities

Activity

Spatial versus nonspatial data

Spatial:

*Answer*: Weather, rivers, elevation, cities

Nonspatial:

*Answer*: Person’s height, recipes, phone numbers, book titles, television shows

Lesson 8-1: Assess collected information

The tree inventory map

5. *Answer*: The attributes include the following:

- Type
  - Needle
  - Broadleaf
  - Palm
- Estimation of the height of a tree in feet
- Estimation of the tree diameter in feet

6. *Answer*: The trees could be classified by type, buffers would be calculated from canopy diameter, and trees could be filtered by height.

7. *Answer*: Yes, there was an outlier at the Citrus Plaza. The collector was Zspc.
8. **Answer**: Yes, there were photographs of some of the trees attached.

**Lesson 8-5: Enable citizen collaboration**

Creating an editable web layer to map graffiti: Survey123

Prepare your survey for publishing: thumbnail, summary, and description

4. **Answer**: This is a survey to collect data about types of graffiti and the state of repair.

5. **Answer**: This survey collects data about the collector’s name, the date, the type of graffiti (ideological, territorial, or artistic), and whether or not the graffiti needs repair.

**The ArcGIS Book, chapter 8**

Questions for reading comprehension, reflection, and discussion

1. GIS goes where you go and Thought Leader: Jeff Shaner
   a. **Answer**: With the introduction of GIS apps you can collect data anywhere and coordinate the collection with other team members. For example, mobile data collection was used to collect data and share information in the 2010 Deepwater Horizon oil spill in the Gulf of Mexico.

2. What are Collector for ArcGIS and Survey 123?
   a. **Answer**: Collector for ArcGIS allows you to use your smartphone or tablet to collect data.

   b. **Answer**: Survey123, another tool for intelligent field polling for ArcGIS, also enables you to use your smartphone or tablet to collect data.
c. **Answer**: Collector for ArcGIS is mapcentric, while Survey 123 is formcentric. Collector for ArcGIS allows for updating and changing points, lines, and polygons. Survey 123 does not.

3. **Case Study: Gathering data in remote areas**
   a. **Answer**: No, data can be collected while disconnected and synchronized when connected. The mobile GIS data flow means that everyone is a potential data collector.
Chapter 9

Real-Time Dashboards

Introductory activities

Activity

Aspects of a real-time GIS

1. Answer: An organization can visually represent the live status of its network with information captured by sensors in the field, about such factors as storm effects, wind speed and direction, temperature, and current positions of police cars or ambulances.

2. Answer: After displaying data in real-time, next you want to perform analysis, such as filtering or detecting patterns.

3. Answer: Sharing where the storm is hitting or the location of a child who has been left on a school bus are examples of communicating results.

Lesson 9-1: Identify layers

The Boston Marathon is not a cakewalk

Build skills in these areas

Answer: The layers displayed on the map are as follows:

- Density of the 30,000 participating runners
- Progress along the course
- Percentage complete
- Location of emergency vehicles supporting the race
- Medical-related incidents in 26 medical tents
- Emergency call and their status
- Live weather information
The ArcGIS Book, chapter 9

Questions for reading comprehension, reflection, and discussion

1. How real-time dashboards are used
   How real is real time?
   a. **Answer:** Real-time dashboards are used by local governments to monitor
      snowplows and trash trucks, by law enforcement to monitor crime, and by
      transportation to monitor the flow of traffic. Real-time data is as current as the data
      source that is updating, whether that data is being updated every second, minute,
      hour, or daily. Real-time data is accessible from any source of data captured by
      sensors.

2. Components of a real-time dashboard
   Real-time GIS platform capabilities: Working with real-time data
   a. **Answer:** Real-time dashboards are composed of a map with inserted widgets. Real-time dashboards can be shared with your organization.

3. Examples of real-time data sources
   Case study: The 119th Boston Marathon
   a. **Answer:** Hourly wind conditions, Twitter feeds, and stream gauges are all examples
      of real-time data sources. A real-time dashboard tracked and recorded the horrific
      2013 Boston Marathon.
Chapter 10
GIS Is Social

Lesson 10-1: Crowdsources your story
Finding Your Way
What do landmarks tell you?

1. **Answers**: Your answers will depend on an analysis of the data that has been added to the map at a given point in time.

The ArcGIS Book, chapter 10

Questions for reading comprehension, reflection, and discussion

1. **GIS is collaborative: Geography is key for integrating work across communities**
   a. **Answer**: The GIS community has always recognized the need for data sharing because no organization can compile and create all the data it needs. The advent of cloud computing and the mobile/app revolution fostered the open data phenomenon and facilitated data-sharing to an extent never before possible.

2. **GIS work is a valued profession: Community is vital in GIS**
   a. **Answer**: GIS is currently used in virtually every segment of society: government, industry, academia, conservation. It is one of the fastest growing segments in the tech field of our economy. GIS professionals perform a vital role in addressing critical issues, such as access to resources, environmental collapse, and climate change. GIS professionals have a strong bond with local, state, and national networks.

3. **ArcGIS for organizations**
   a. **Answer**: These are among the opportunities that an ArcGIS organizational account provides to its members and to the organization overall:
• To create, organize, and share geographic information with appropriate groups.

• To create maps for users and constituents outside the organization and share these online.

• To share maps and information layers throughout the organization and beyond.

• To organize content by creating and managing groups.

4. Geodesign: Using social engagement in community planning
   a. Answer: These are core elements of geodesign as a planning methodology:

   • Planning is based on a community of collaborators who identify the following:
     o Project objectives
     o Special resources
     o Opportunities for support
   • Constant feedback loop between local citizens and stakeholders (community engagement).

5. Thought Leader: Clint Brown: GIS is participatory
   a. Answer: GIS provides a kind of integration engine: As more and more layers of data are amassed and maintained, GIS provides the means for integrating them in countess and different ways. This global collection of information can be applied to the analysis of virtually any issue, including climate change, the spread of disease, and food production.

6. Social GIS and crowdsourcing
   a. Answer: All three apps shown under the banner Social GIS and crowdsourcing are interactive, allowing users to input information for an intended purpose. The first
two collect information from the user while the last provides information to the user.

7. The rise of community engagement
   a. Answer: Each of the initiatives presented here reflect the concept of community engagement:
      
      • Direct Relief workers were able to use a geospatial app (Survey123) to collect health data in remote areas.
      
      • California citizens are kept aware of current air pollution conditions in high-risk areas.
      
      • Citizen science and other crowdsourced projects can collect data from participants on a local to national scale.

8. What is the ConnectEd initiative and where does GIS fit in?
   a. Answer: ConnectED Goal: To prepare K-12 students for digital learning opportunities and future employment.

   b. Answer: GIS connection: Esri provides a grant to make the ArcGIS system available free of charge to the more than 100,000 elementary, middle, and high schools in the United States, including public, private, and home schools.