ArcGIS Online SkillBuilder Activities for Education

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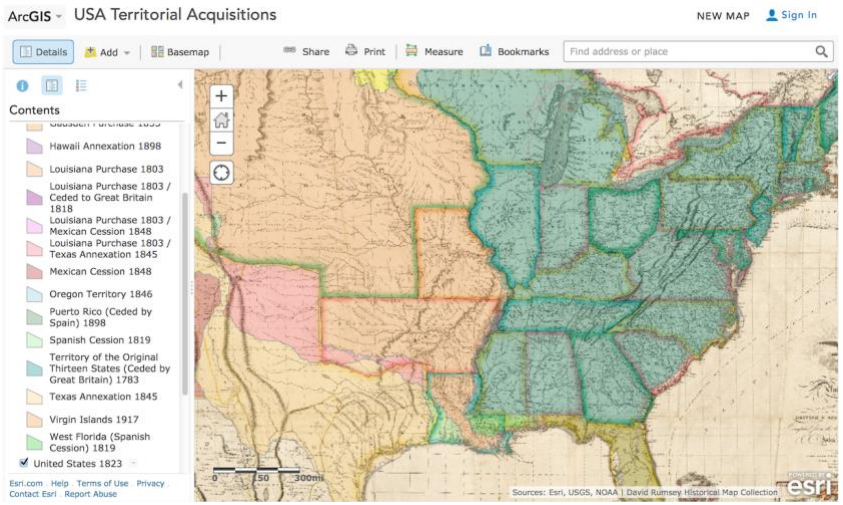
Make maps, analyze data, learn content, build capacity for community, college, and career



Level One: Explorer, Using ArcGIS Online without Sign-In

- Set One: Definitions
- Set Two: Principal Skills

Level Two: Cartographer, Using an ArcGIS Online Public Account

- Set Three: Expand the Universe
- Set Four: Add Map Content
- Set Five: Begin Analysis
- Set Six: Access Map Data from Other Software
- Set Seven: Finding Help

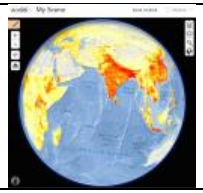
Level Three: Geoanalyst, Using an ArcGIS Online Organization Account

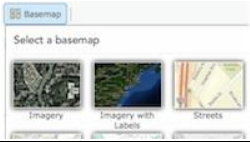
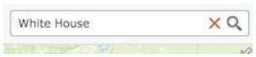
- Set Eight: Expand the Basics
- Set Nine: Expand the Analysis
- Set Ten: Go Pro

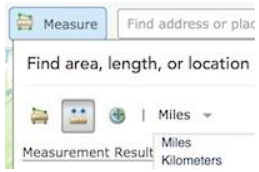
Skills, activities, resources, and challenges to help teachers and students build capacity in GIS to explore the world, understand the community, and solve problems by using ArcGIS Online

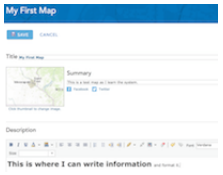
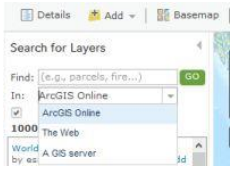
20220703

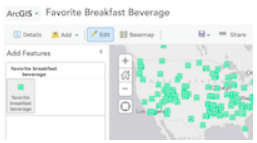
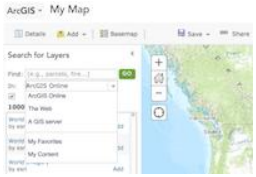
((**NOTE**: In April 2021, Esri launched a "**new Map Viewer**," and also retained "**Map Viewer Classic**." In the **top right corner of the map**, you can switch back and forth between New and Classic as desired, but elements from one may not look or work as expected in the other. **The instructions in this document use Classic.** After getting a solid feel for Classic, try the same steps in New, and note differences.))

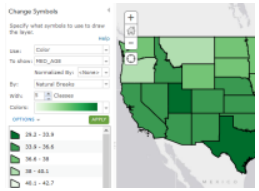
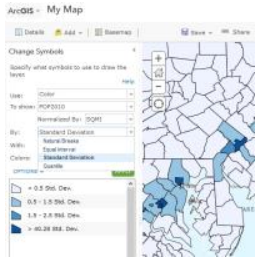
1	LEVEL AND SET = = = = = = = = = =	ITEM DESCRIPTION =	EXAMPLE OR TASK =	DONE = = = = =
2	**LEVEL ONE: EXPLORER**	**Begin exploring the world without even signing in anywhere.**		
3	**L-1, Set One: Definitions**	It helps to understand a few key terms to talk effectively about what one is doing.	**See the example and do this task.**	**Got it? Check it!**
4		**Maps** = Displays of an area of the world, which the viewer can use and alter (such as by adding new contents). Maps tend to have a generic interface. A user can often save a copy of someone else's map to the user's own account. After creation, maps can be turned into apps (expressions of data).	See the starting earthquake map that was used to make the app and the presentation in the row below.	
5		**Apps** = Displays based on a map, which the viewer can use but typically not enhance and save. Apps tend to have a custom interface and focused content. (If an app is a "finished project," a map is still in a "construction zone environment.") Apps include Story Maps and "Presentations."	See an earthquake app that was made from the map in the row above. See an earthquakes presentation that was made from the same map.	
6		**Layers** = Sets of data about places (features [points, lines, areas] and images) for use in one or more maps or apps. They can be stacked in a map in a sequence, like parts of a sandwich. Users typically can control which layers are visible in a map, and can sometimes control which layers are visible in an app.	The earthquake map and app above both have a basemap image and two layers of earthquake points. See various contents that can be layers in maps and apps. See also the ArcGIS geoinformation model topic in the ArcGIS Online Help.	
7		**Tools** = Widgets in a map/app that let a user change the display and/or accomplish a task (e.g., zoom, measure, add data). The map/app may have few or many tools, and they may be generic (consistent look and location across many maps) or custom (specific to a given app).	The earthquake map above has many tools, if you know where to find them. The earthquake app above offers few tools. Look carefully to find both similarities and differences. What are they?	
8		**Scenes =** Special displays of the world in 3D, allowing rotation on three axes. These require a recent web browser with enough power. This will be the only reference to scenes in this doc, but concepts and skills gained from 2D maps and apps transfer well to 3D scenes.	See this blog about 3D scenes and, if using a recent browser on computer, tablet, or smartphone, try clicking the images. If the browser can display the live 3D maps, explore them, then try this 3D app.	

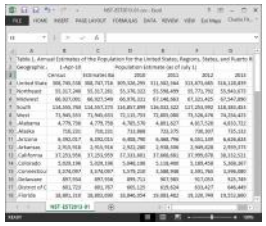
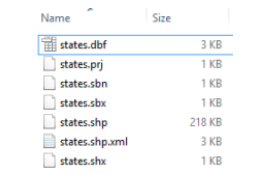
9	**L-1, Set Two: Principal Skills**	**Viewing** and **exploring** are fundamental tasks that mapmakers and users alike do constantly with a map. You can build these skills even without signing in to ArcGIS Online.	**See the example and do this task.**	**Got it? Check it!**
10		**Pan** = Move around the map, typically by just clicking and holding on the map and sliding to change the area shown. Double-clicking on the map zooms in and re-centers the map.	Try it on this map of USA territories, or see the Navigate topic in ArcGIS Online Help.	
11		**Zoom** = Change the display to show more area (often with less detail) or less area (often with more detail). Use buttons, the mouse's scroll wheel, or double-click on the map. To zoom into an area, hold down Shift key and drag to highlight a zone, then release to zoom in.	Try it on this Story Map Classic app about Washington DC, or see the Navigate topic in ArcGIS Online Help.	
12		**Choose basemap** = Decide which of several standard (or many custom) base displays works best for exploring in your map; custom apps may or may not allow changing the basemap.	Try it on any map/app above, or this map of current USA weather conditions. Look for the word "Basemap" (or 4-square icon) above the map/app, click it, and choose.	
13		**Change what is visible** = Set layers to display or not; in Contents, maps have standard checkboxes for layers. Apps may or may not allow the user to change visible layers, or may permit it through custom means, such as by clicking a tab, row, or button, or choosing from a drop-down menu. Zooming may change it, too.	Try it on any map above. Then try this Story Maps app on commuting. For another style, try this Story Maps app on tornadoes.	
14		**Click features to get info** = Characteristics of a given feature may be available by clicking or tapping it. The map maker may decide to disable this for a layer or may permit it and customize how items are displayed. Sometimes you will see at the top right "1/4 < >", and can scroll through features using "< >".	Try this app of USA Demographics. Hover over or click a feature to see info. What do you get when you zoom in, or change what layer is visible?	
15		**Find** = Use the Search box (usually top right of map; position and steps vary in apps) to type and choose a location based on place name, major landmark, street address, or set of x,y coordinates (longitude first, then latitude; use "-" for W or S).	Try some locations. Then see the Search locations and features topic in ArcGIS Online Help.	

16		**Measure** = Determine the area of a polygon, length of a line, or location of a point, using various units. Some custom apps use the Measure tool to launch a new capacity, such as an elevation profile for a line.	See the Measure topic in ArcGIS Online Help. Then, see how the Elevation Profile Maker app uses the Draw a Line tool to display distance and elevation.	
17	**WANT MORE?**	With just these skills, you can work with many maps and apps, and there are many examples that can help students and educators. Here are some great places to see more maps and apps: • Living Atlas: interactive layers/map/apps, about imagery, communities, people, earth, and life. • **ArcGIS StoryMaps gallery** = Set of latest format StoryMaps, with search tools at top. • Esri Story Maps Classic Gallery = Set of early format Story Maps focused on a particular topic. • Maps & Apps Collections are ready-to-use items. See the Esri K12 GIS Organization, button #07.		
18	**LEVEL AND SET** = = = = = = = = = =	**ITEM DESCRIPTION** =	**EXAMPLE OR TASK** =	**DONE** = = = = =
19	**LEVEL TWO: CARTOGRAPHER**	**Develop powerful skills and learn to create and share content using an ArcGIS Online Public Account**		
20	**L-2, Set Three: Expand the Universe**	Just looking around at a map is a good start, but modifying an existing map, or building a layer from scratch and then saving your creations and sharing these layers/maps/apps with others, lets you add knowledge to the world.	**See the example and do this task.**	**Got it? Check it!**
21		**Open a map or app** = Find a link to a map or app, and perhaps a description and thumbnail, and click it to open and explore.	Try any item from the Maps We Love collection (also found via button #07 of https://k12.maps.arcgis.com/).	
22		**Share a link to a map/app via email or social media** = Use a button to launch options for a link, permitting you to share the resource with others.	Look for share or link options in both maps and apps. Then see the Share topic in ArcGIS Online Help.	
23		**Get an ArcGIS Online Public Account and sign in** = Set up a free public account where you can save maps, apps, layers, and other contents. (Educators should see ArcGIS Online Use Strategies for Instruction.)	FOR AGE 18+ only (minors need a parent to do this): See instruction on creating a "public account". Sign up, then sign in at https://www.arcgis.com/home/signin.html	
24		**Save a copy of an existing map in your account** = Sign in to your account first, then open an existing map (not an app), and save a duplicate version in your own account. Using Save As to save someone else's map in your account just saves a copy of that map, including whatever changes you have made.	Sign in to your account first, then open a map (not an app) like the recent earthquakes map. Use Save As to save a copy in your account.	

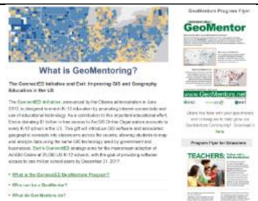
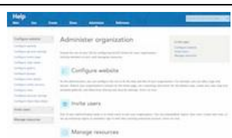
25		**Create a map from scratch** = Sign into your account first, make sure you have an empty map, then set your basemap, zoom in, and add a Map Notes layer to your map to show important features. Even these basic maps can be analytical.	See the Create maps and Add map notes topics in ArcGIS Online Help. Then watch the Route to School video and do the Route to School map.	
26		**Save a map you created or modified** = Having first signed into your account and created a map from scratch (or opened and modified a map), choose Save to save the current layers and map extent.	After signing in and then making your map (or modifying someone else's map), click Save, add some information, and save the map to your account.	
27		**Use metadata** = Metadata is "info about the info," whether app, map, layer, etc. Refer to these details for notes from the creator, such as the item's purpose, or where the data came from. When viewing a map, click the About this Map button, then access More Details.	Open any map (not app) above, then click the Details button, click About this Map, then More Details. Examine the information (such as here).	
28		**Create metadata for your map** = View the "item details" for your map, click Edit in different segments, add and format key information that may give the viewer essential facts about your map, and click Save. Good metadata lets users know if they can trust the map and its contents.	For the map you saved above, create metadata about the map's purpose, data, date of creation, and so on.	
29	**SELF-CHECK**	It's time to see what you can do. Can you create a map, change the basemap, add map notes, save it, and add metadata? Watch the Month of Activities video and then do the Month of Activities map.		
30	**L-2, Set Four: Add Map Content**	A map may come with information, but adding data can make it better for your needs. There are several ways to add data.	**See the example and do this task.**	**Got it? Check it!**
31		**Add layers to a map** = Maps can be enhanced by adding layers of additional data. Many, many data sets are available, and various formats are possible, each with its special characteristics and procedures.	Search Esri Videos for "Add features from a file" and watch it. See also the Add Layers topic in ArcGIS Online Help.	
32		**Add/Enhance map notes in a map** = Map notes can provide basic info on a map, but they can also be quite extensive and informative, even carrying the viewer on a journey or providing links to additional information. (Also see "ArcGIS Online Use Strategies for Instruction" and "Making a Group Map".)	Open this map about Alexander the Great, and explore the different notes that the mapmaker has assembled. Notice how providing rich information can tell a story, even with very basic techniques.	

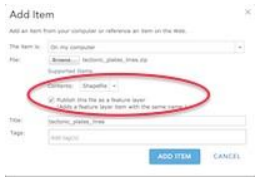
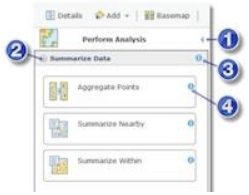
33		**Add additional data to a layer designed for user input** = Some mapmakers want viewers to add data into an existing layer in their map, so they create a map with an editable feature service, in which users can add features, according to what the mapmaker permits.	Open this map about breakfast beverages. Zoom to your location, click Edit, click the mug in Contents, and click on the map to add a point. Use drop-down arrows or type to add data. Click Close. Click Details/ About to check the map's metadata.	
34		**Add new layers (services)** = Many useful ready-to-map layers are available in ArcGIS Online. These can be added into any number of maps. In searching for layers, pay special attention to the area being searched. (Note the Within map area checkbox.) Be sure the region of interest is showing in your map when you search, but be careful about zooming in too close (focusing too narrowly) or zooming out too far (including too much).	Create a new map and zoom to the world. Choose Add>Search for Layers. With the "In:" drop-down showing "ArcGIS Online", type "world population density" (use quotes). Find one by Bonnie521 and click Add. Click Details atop the left pane to return to Map Contents. Click Legend.	
35		**Add new layers (tables)** = Properly formatted text tables (.csv or even .txt) with good latitude-longitude data can be mapped easily, just by dragging and dropping the file onto the map. (For help building tables, see also Row#46 below.)	Get a text table of significant earthquakes from the previous month. Save the table as "quakes.csv" on your desktop. Create a new map, then drag and drop the file onto the map. Click the features to examine their contents.	
36		**Add new layers (shapefiles)** = Zipped shapefiles (point, line, or polygon features, plus their attributes, created in ArcGIS Desktop) can be added into a map, using "Add> Add layer from a file." Many such geographic data sets, built by professional GIS users, are available online. Try an internet search using the terms "<my state name> GIS data."	Download a simple zipped shapefile of the 50 US states. Then, try creating a new map and adding this file to your map, using Add> Add layer from a file.	
37	**SELF-CHECK**	It's time to see what you can do. Can you create a map of a region with three specific and different data types, save it, and add metadata? Sign in to your account and create a new single map using **(a)** the world population density service used above, plus **(b)** the earthquake table used above, plus **(c)** the zipped shapefile used above. Save it and add metadata. For extra credit, see how far you can go quickly in the ArcGIS Online help file's "Get Started" sections: Basics, Quick lessons, and View maps and scenes.		
38	**L-2, Set Five: Begin Analysis**	A map can show a lot of data, but that power is multiplied by using the map to analyze the data, which helps to show patterns and relationships. Basic analysis involves changing the appearance of the data according to some characteristic.	**See the example and do this task.**	**Got it? Check it!**

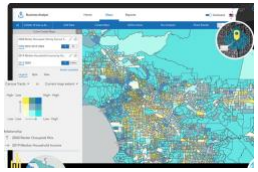
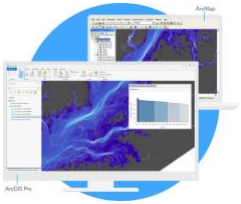
39		**Change layer visibility and transparency** = Modify the ability to see a layer and see through a layer to provide appropriate detail, help a viewer keep track of location, or see relationships with other layers. Maps typically allow this for all layers (transparency only for basemaps); apps vary in permitting this. Layer visibility and transparency are parts of styling, below.	See the Set visible range and Change transparency topics in ArcGIS Online Help. Open this map of ecological subregions in the US 48 states, and explore the impact of transparency at different scales.	
40		**Style data** = Beyond just layer visibility and transparency, using different symbol sets for features within a data set based on their characteristics is a powerful way to highlight or de-emphasize patterns. Symbolizing goes hand-in-hand with classification, and mapmakers constantly explore different ways to symbolize data. This is one of the most powerful capacities a mapmaker has, and many factors should be considered. It calls for experimentation, practice, and deep study of many maps.	See the Change Style topic in ArcGIS Online Help. See this rich collection of Smart mapping resources to learn how it helps users cope quickly with the many options that a mapmaker faces. When building your maps, smart mapping will attempt to help you design a better map.	
41		**Classify data** = Choose how to subset a group of features to explore and display the patterns and relationships. Classification and symbolization go hand in hand, and need to be explored together. How one classifies and symbolizes data may accentuate or diminish the visibility of differences. The same data can be classified in many ways, and users may decide (consciously or not) to use methods that are more appropriate or less appropriate. It is essential for mapmakers to explore and learn about classification and symbolization.	See the Classification methods topic in ArcGIS Online Help. Note an additional link to Classifying (in ArcGIS Pro Help), for more info. Watch a recent SmartMapping video for tips. See this brief Introduction to Map Design for basics of cartography, including the relationship between classification and symbolization.	
42		**Query or filter data** = Select members of a group that meet certain criteria, or modify the data to include *only* those members. When exploring, it can help to emphasize just a certain subset temporarily or even eliminate the others to reduce distraction and emphasize patterns and relationships. (No filters are possible on map notes or layers from added files.)	Watch this (YouTube) video about using filters. See the Apply filters topic in ArcGIS Online Help. Try this USA Demographics map and set one of the county layers to show counties of just a single state.	
43		**Show, sort, and modify a table** = Display and explore the table for a feature layer in a map. Features in each layer have consistent data elements, and looking at both the table and the map can show patterns and relationships. Tables can be sorted, records highlighted, and fields hidden or shown or have statistics calculated; editable tables can have fields added.	See the Show tables topic in ArcGIS Online Help. Explore the county table of USA Demographics. Open table, click column headers, use sort, hold down Shift and select some rows in the table, then show statistics. Show/hide columns via top R "+"	

44	**SELF-CHECK**	It's time to see what you can do. Can you re-create the earthquake map if you undo the classification and symbolization by changing the layers to a single symbol? Open the Recent Earthquakes map. Set the symbol for each layer to "Show location only." Then re-construct the original classification and symbolization. (Make a mistake? Just refresh the map and try again.) For extra credit, turn off one layer and try to show both depth and magnitude in a single layer at once, depth by color, magnitude by size. (Hint: see "bivariate mapping.")		
45	**L-2, Set Six: Access Map Data from Other Software**	ArcGIS Online has a lot of data, but users can also bring in and use data of different types that were created with other tools, multiplying capacity. Each type has advantages and limitations, and users must understand how to work with them all.	**See the example and do this task.**	**Got it? Check it!**
46		**Identify and use good data tables** = Examine a data table and determine if it can be mapped as is in ArcGIS Online or if it needs to be modified. Point data require accurate longitude-latitude or address info. Tables about polygons (e.g. about US states) require attachments to external data that can render in a map. Useful tables appear in all kinds of formats and open up vast amounts of data for mapping if the tables include or can be associated with proper geographic data.	See the CSV, TXT, and GPX files topic in ArcGIS Online Help. See also these blogs and associated resources for help: • Lesson on designing tables • Blog and lesson on troubleshooting tables • Blog and video on table to map to app	
47		**Identify and use zipped shapefiles** = Many shapefiles are available from professional GIS users; if they are reasonably sized and properly formatted and zipped, these shapefiles can be added to a map.	See the Shapefile topic in ArcGIS Online Help. See this blog and lesson on adding fields to polygons for a sample shapefile and ideas on how to enhance it. See also Join Features in Help to learn how it works using Analysis inside an Organization.	
48		**Understand and create GPX files** = Global positioning system (GPS) devices and apps on GPS-equipped smartphones can export generic files that can render directly in ArcGIS Online. Mastering the export process from any given device or app may require reading its documentation or conferring with a mentor.	See the CSV, TXT, and GPX files topic in ArcGIS Online Help. See this blog and also this rich guidance about using GPS for instruction.	
49		**Understand and use KML/KMZ** files = Keyhole Markup Language (KML) files (or zipped versions, KMZ) can be created in several external software packages, and are commonly found online. They can be added as reference files in ArcGIS Online.	See the KML files topic in ArcGIS Online Help. See also this blog post for valuable guidance on using KML and KMZ.	

50		**Understand and use metadata** = Metadata is information about the information. Users must read metadata, interpret it, and make decisions about the appropriateness of a resource for a specific task. A specific item may be sufficient for one user but inadequate for another. Good content creators will document their information in such a way that helps most users make an informed decision. Users should read metadata, then decide.	See the Item details topic in ArcGIS Online Help. See generally well-documented information about a set of groups, maps, items, and users. Follow links and look for details that provide enough info to help you decide if you could use it effectively.	
51		**Create appropriate metadata** = Practice good data/map/app creation by providing thorough information about posted layers and maps so others can decide what might or might not be appropriate for them. This also helps the data/map/app creator who, at some point after creation, needs to recall key details.	Sign in to your account and go to My Content, then compare details visible in the area above with the details about your items. Document items you want to keep, whether or not they have been shared.	
52	**SELF-CHECK**	It's time to see what you can do, adding several data sets into an existing map. Sign in to your account and make a map with these four layers: **(a)** Add a US 50 states shapefile.zip - Download the file and add it as a file to the map; **(b)** Add a one-day quake table (CSV) - Download the table and add it to the map, or add it from the web as a CSV file; **(c)** Add a 75-mile GPX file - Download the file and add it to the map; **(d)** Use the KML file blogpost (#49, above) to download a KML/KMZ file; save it to your computer, then add it as an item into My Contents and add it to the map. Symbolize any plain layers, save the map, and add metadata.		
53	**L-2, Set Seven: Finding Help**	ArcGIS is a platform. Sometimes it is challenging to know how to move forward when there are many options. There are many helpful materials available that you should use regularly. You can also find a GeoMentor - someone who uses geographic tools and can offer assistance.	**See the example and do this task.**	**Got it? Check it!**
54		**Search Help** = Many sources are available on Esri's website and beyond to help you in your search for ideas, options, procedures, or best practices. Documentation and guidance come in many forms, each with its own advantages. GIS users often need to consider multiple sources.	Visit and explore ArcGIS Online Help. See the tabs atop the page and the following links: intro, quick exercises, FAQs, tutorials, and blogposts.	
55		**Explore good pre-built lessons** = Use lesson collections that offer guidance for a particular subject, approach, or tool, and are geared toward your grade or experience level.	See the GeoInquiries for ready-made maps with guidance, plus a storymap intro to GeoInquiries, and hubsite.	

56		**Work with a GeoMentor** = Work on a repeated basis with a geo-savvy person who can help you use ArcGIS Online to accomplish your goals. GeoMentors can help you solve problems with technology, data, and GIS strategy, and usually know productive strategies for finding answers.	Learn about GeoMentors. Find a mentor who can help you engage GIS effectively in your setting and meet your needs.	
57		**Be a GeoMentor** = Help an educator or student use ArcGIS Online. Even when you don't know everything (no one ever does), you can be a good mentor by providing appropriate guidance, according to what a learner needs. Whether an answer is simple or extended, good communication is key.	Learn well the fundamental tools, capacities, and workflows of ArcGIS Online. When you're ready, and find an educator or student who can use your help in utilizing GIS effectively.	
58	**SELF-CHECK**	It's time to see what you can do. Complete the series of challenges in support of Houston before a hurricane. If you can do these and have projects in mind, you are ready to work with an ArcGIS Online Organization.		
59	**LEVEL AND SET ===========**	**ITEM DESCRIPTION =====================================**	**EXAMPLE OR TASK =========================**	**DONE =====**
60	**LEVEL THREE: GEOANALYST**	**Grow existing skills toward the professional level and add capacities by working with an ArcGIS Online Organization.**		
61	**L-3, Set Eight: Expand the Basics**	**Get started with an ArcGIS Online Organization**	**See the example and do this task.**	**Got it? Check it!**
62		Establish an ArcGIS Online Organization subscription. This should be done by an authorized representative of a school or club, typically a teacher working with a tech person or administrator. Advanced planning for use of the Organization is advised, including discussions of roles, security, personally identifiable information (PII), and credits.	Schools and clubs can request software, free for instruction. Several key mails will be sent to the applicant's email address. See ArcGIS Online Use Strategies and ArcGIS Online Orgs for Schools.	
63		Make sure the Organization is set up properly for use in school. Pay special attention to roles and privileges, the sign-in process, and sharing or not sharing outside the school. GeoMentors can help a lot in setting up the Organization properly.	See a set of Org videos (YouTube). See also these topics in ArcGIS Online Help: Activate subscription, Configure website, Invite users, and Manage resources.	
64		Organizational accounts operate similarly to a public account for building maps, but offer an additional rich set of premium data. Explore these extra layers, but know that viewers generally must be signed in to an Organization to see maps saved using one of these layers.	Sign in to your Organization, make a new map, choose Add>Browse Living Atlas, then click Show Esri Layers Only. See also the Browse Living Atlas Layers topic in ArcGIS Online Help.	

65		A key power of Organizations is publishing services. Published content can be shared with others for adding to many maps. Feature services can, if desired, be edited by users, allowing for selective or crowd-sourced data gathering. Feature services can be filtered to enhance analysis. Tile services offer fast rendering. Users can mix and match content in new and creative ways. This is an area where GeoMentors can help a lot, by optimizing, streamlining, and clarifying the publishing process.	See the About hosted features and tiles topic in ArcGIS Online Help. Practice first with small data sets, like the quakes.csv and states.zip (from Level 2 Set Four).	
66		Use the Survey123 for ArcGIS app to gather field data, online and offline. These can only be created by someone signed into an Org with the right privileges, but can be shared with a group, the Org, or the public, via a web browser or special app.	See Survey123 for ArcGIS and various Survey123 tutorial videos. Try a small test collection project, then a small test offline project, before diving into full usage. See also this blog.	
67	**L-3, Set Nine: Expand the Analysis**	**ArcGIS Online Organizations bring the power of true geographic analysis to the web browser!**	**See the example and do this task.**	**Got it? Check it!**
68		Many features would be much more useful with an additional field containing a calculation based on existing fields. Feature layers permit the layer owner to access the table, add fields, and fill the cells with calculated values.	See the overview in the Work with Fields topic in ArcGIS Online Help. See the blog on adding fields and calculations, then try it with the state shapefile. See also this blog with resources on Arcade.	
69		A number of powerful tools for geographic analysis are available for use in Organizations. The concepts and powers of each tool are carefully documented. Analysis requires publishing of features services to store results. Therefore analysis is available only to roles with publishing privileges.	See the overview in the Perform Analysis topic in ArcGIS Online Help. Pay special attention to the titles, graphics, and descriptions for the various tools. See Organization Roles in ArcGIS Online Help. Work with the Organization administrator to ensure that desired roles have publishing privileges.	
70		Each tool is part of a class of similar tools. If the tool names and associated icons are not sufficiently clear, help is available within each tool to clarify its purpose and operation. The help system also has more detailed guidance on each function.	See the Use Analysis Tools topic in ArcGIS Online Help. For additional guidance on a specific tool, see the class of tools within the Perform Analysis topic in ArcGIS Online Help. For additional background on the nature of analysis, see the Analytics documentation and case studies in the ArcGIS Desktop Help.	

71		Each tool panel involves a careful flow, identifying layer(s), function(s), parameter(s), and storage plans. At the bottom of each tool panel (shown at left as item 5), there is a link to Show credits. Analysis is a computational process, which consumes some of the Organization's credits. Processes done on small data sets tend to consume relatively few credits. Click the link to see the projected credit consumption. Careful planning of data, processes, and geographic extents will help minimize credit consumption.	See the Work with a tool pane topic in ArcGIS Online Help. For additional guidance on a specific tool, see the class of tools within the Perform Analysis topic in ArcGIS Online Help.	
72		Sometimes, the data in the map is inadequate to answer a question. ArcGIS Online Organizations can enrich data layers with related content, using a growing storehouse of online data to add new attributes to features. This process also consumes credits, so plan carefully to minimize credit consumption.	See the Data Enrichment topic in ArcGIS Online Help. See also the Service Credits Overview page for guidance about the credits consumed in enriching features.	
73	**L-3, Set Ten: Go Pro**	**ArcGIS Online is more than just browser-based maps and apps. The ArcGIS School Bundle includes several tools that take significant time for investigation and mastery. Books, online classes, and GeoMentors are extremely valuable here.**	**See the example and do this task.**	**Got it? Check it!**
74		Users of Microsoft Office for Windows 2010 or later have an extremely powerful add-in available: ArcGIS Maps for Office, which provides mapping in Excel and access to dynamic maps in PowerPoint. (ArcGIS Online Organization sign-in required.)	See the ArcGIS Maps for Office Help, starting with the linked videos, and then the documentation tabs at the top of the page.	
75		ArcGIS Business Analyst is a powerful browser-based app, designed for researchers and marketers interested in local to national patterns. It includes access to vast amounts of curated demographic data and robust analytic tools and report templates, and allows exchanging data with ArcGIS Online users.	See the Business Analyst product pages. Check with your Organization Administrator to see if you have access to the application. Learn about the Esri Demographics data available.	
76		ArcGIS Desktop has two versions of full-featured, Windows-based software for analysis, cartography, and data generation: ArcGIS Pro is newer, 64-bit, more powerful, ribbon-based, and designed to integrate with ArcGIS Online. ArcMap is older, 32-bit, and able to publish data to ArcGIS Online. Both offer immense power but take time to master.	See the ArcGIS Pro product pages. See the ArcMap resource pages. See the Learn ArcGIS site for lessons that can help you learn to use the software in scenario-based guidance.	

Level Three (Sets 8, 9, 10) takes much more time and practice than the preceding sections, because there is much more capacity with an Organization account, especially when combined with the other tools of the ArcGIS School Bundle. But just making it through Levels One and Two into Level Three is a demonstration of significant capacity for learning and utilizing GIS. At this point, you need to take advantage of the many resources for learning about GIS that go far beyond what this tutorial can include. See the ArcGIS platform resources, the Learn ArcGIS site, and the Esri Academy.

For more information and guidance about using ArcGIS Online in education, see the **Esri K12 GIS Organization on ArcGIS Online**.

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