Subject Area Committee Name: Geography

Outcome Being Assessed: Professional Competence

Contact Person

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This form is for the initial assessment of a core outcome.

- Refer to the help document for guidance in filling-out this report. If this document does not address your question/concern, contact Wayne Hooke to arrange for coaching assistance.
- Please attach all rubrics/assignments/etc. to your report submissions.
- **Subject Line of Email:** Assessment Report Form (or ARF) for <your SAC name> (Example: ARF for MTH)
- **File name:** SACInitials_ARF_2016 (Example: MTH_ARF_2016)
- SACs are encouraged to share this report with their LAC coach for feedback before submitting.
- Make all submissions to **learningassessment@pcc.edu**.

Due Dates:
- **Planning Sections of LAC Assessment or Reassessment Reports: November 28th, 2016**
- **Completed LAC Assessment or Reassessment Reports: June 16th, 2017**

Please Verify This Before Beginning this Report:

☒ *This project is not the second stage of the assess/reassess process (if this is a follow-up, re-assessment project, use the LAC Re-assessment Report Form LDC. Available here.)*

1. Outcome

1A. PCC Core Outcome: Professional Competence
1B. How does your discipline interpret the outcome you are assessing?
An ability to provide correct responses on a multiple-choice knowledge survey of technical and spatial questions related to Geographic Information Systems (GIS), as specifically compared with length of GIS experience prior to and near completion of a PCC GIS Certificate.
1C. Briefly describe how this outcome is/might be important/useful to your students.
Professional competence in GIS, as specifically related to technical software profiency and spatial reasoning, is particularly useful in the future academic or professional careers of students enrolled in the PCC GIS Certificate program. An ability to conceptually solve spatial or geographic problems, as well as an ability to utilize the requisite technical or software-oriented tools, is an expectation of the students and faculty of the GIS certificate program.

2. Project Description

2A. Assessment Context
Check and complete all the applicable items:
☐ **Course-based assessment.** Course names and number(s): Type of assessment (e.g., essay, exam, speech, project, etc.): Are there course outcomes that align with this aspect of the core outcome being investigated? ☐ Yes   ☐ No   If yes, include the course outcome(s) from the relevant CCOG(s):
☐ **Common/embedded assignment in all relevant course sections.** An embedded assignment is one that is already included as an element in the course as usually taught. Please attach the activity in an appendix. If the activity cannot be shared, indicate the

type of assignment (e.g., essay, exam, speech, project, etc.):

☒ **Common – but not embedded - assignment used in all relevant course sections.** Please attach the activity in an appendix. If the activity cannot be shared, indicate the type of assignment (e.g., essay, exam, speech, project, etc.): **see end of document for potential knowledge survey**

☐ **Practicum/Clinical work.** Please attach the activity/checklist/etc. in an appendix. If this cannot be shared, indicate the type of assessment (e.g., supervisor checklist, interview, essay, exam, speech, project, etc.):

☐ **External certification exam.** Please attach sample questions for the relevant portions of the exam in an appendix (provided that publically revealing this information will not compromise test security). Also, briefly describe how the results of this exam are broken down in a way that leads to nuanced information about the aspect of the core outcome that is being investigated.

☐ **SAC-created, non-course assessment.** Please attach the assessment in an appendix. If the assessment cannot be shared, indicate the type of assignment (e.g., essay, exam, speech, project, etc.):

☐ **Portfolio.** Please attach sample instructions/activities/etc. for the relevant portions of the portfolio submission in an appendix. Briefly describe how the results of this assessment are broken down in a way that leads to nuanced information about the aspect of the core outcome that is being investigated:

☐ **Survey**

☐ **Interview**

☐ **Other.** Please attach the activity/assessment in an appendix. If the activity cannot be shared, please briefly describe:

In the event publicly sharing your assessment documents will compromise future assessments or uses of the assignment, do not attach the actual assignment/document. Instead, please give as much detail about the activity as possible in an appendix.

2B. How will you score/measure/quantify student performance?

☐ **Rubric** (used when student performance is on a continuum - if available, attach as an appendix – if in development, attach to the completed report that is submitted in June)

☐ **Checklist** (used when presence/absence rather than quality is being evaluated - if available, attach as an appendix – if in development, attach to the completed report that is submitted in June)

☐ **Trend Analysis** (often used to understand the ways in which students are, and are not, meeting expectations; trend analysis can

complement rubrics and checklist)
☒ **Objective Scoring** (e.g., Scantron-scored examinations)
☐ **Other** – briefly describe:

2C. Type of assessment (select one per column)

☒ **Quantitative**　　　☐ **Direct Assessment**
☐ **Qualitative**　　　☐ **Indirect Assessment**

If you selected 'Indirect Assessment', please share your rationale:

Qualitative Measures: projects that analyze in-depth, non-numerical data via observer impression rather than via quantitative analysis. Generally, qualitative measures are used in exploratory, pilot projects rather than in true assessments of student attainment. Note that the **use of a numerical rubric is considered quantitative analysis**, even if the artifacts under consideration are not based on quantitative calculations (e.g. an essay scored by a rubric counts as quantitative in the context of assessment).

Indirect assessments (e.g., surveys, focus groups, etc.) do not use measures of direct student work output. These types of assessments are also not able to truly document student attainment.

2D. Check any of the following that were used by your SAC to create or select the assessment/scoring criteria/instruments used in this project:

☒ Committee or subcommittee of the SAC collaborated in its creation
☐ Standardized assessment
☐ Collaboration with external stakeholders (e.g., advisory board, transfer institution/program)
☐ Theoretical model (e.g., Bloom's Taxonomy)
☒ Aligned the assessment with standards from a professional body (for example, The American Psychological Association Undergraduate Guidelines, etc.)
☐ Aligned the benchmark with the Associate's Degree-level expectations of the Degree Qualifications Profile
☐ Aligned the benchmark to within-discipline post-requisite course(s)
☐ Aligned the benchmark to out-of-discipline post-requisite course(s)
☐ Other (briefly explain:　　　)

2E. In which quarter will student artifacts (samples of student work) be collected? If student artifacts will be collected in more than one term, check all that apply.
☐ **Fall**   ☒ **Winter**   ☒ **Spring**   ☐ **Other** (e.g., if work is collected between terms)

2F. What student group do you want to generalize the results of your assessment to? For example, if you are assessing performance in a course, the student group you want to generalize to is 'all students taking this course.'
The results will be generalized to students enrolled in GIS classes at PCC, which will include two comparisons: (1) GIS knowledge as compared with length of GIS experience near the beginning of the 2-year GIS Certificate program, and (2) GIS knowledge as compared with length of GIS experience near the end of the 2-year GIS Certificate program.

2G. There is no single, recommended assessment strategy. Each SAC is tasked with choosing appropriate methods for their purposes. Which best describes the purpose of this project?
☐ **To measure established outcomes and/or drive programmatic change**   ☐ **To participate in the Multi-State Collaborative for Learning Outcomes Assessment**   ☒ **Preliminary/Exploratory investigation**
If you selected 'Preliminary/Exploratory' (most often a 'pilot study'), briefly describe why you opted to do a pilot study, along with your rationale for selecting your sampling method:
The 2016-2017 Geography assessment is a preliminary attempt to introduce and standardize annual introductory and exit assessments in the 2-year GIS Certificate program, in order to measure the level of GIS knowledge of students entering the program as compared with the level of GIS knowledge achieved near the end of the 2-year program. This comparison, in turn, provides evidence of GIS proficiency and spatial reasoning ability, as well as general preparedness for continued academic or professional work.   The sampling method is to assess students during Winter and Spring terms in the 2016-2017 year (potentially adjusted to Fall and Spring terms in 2017-2018). Winter term classes without GIS prerequisites will be selected, the results of which will be compared with assessment results from Spring term classes that do have GIS prerequisites and are positioned to be taken near the end of the 2-year GIS Certificate program. The sampling method based on GIS prerequisites and position in the GIS Certificate curriculum will insure that a comparison is occurring between students that are near the beginning of their certification with students near completion.
2H. Which will you measure?

☒ **the population** (all relevant students – e.g., all students enrolled in all currently-offered sections of the course)
☐ **a sample** (a subset of students)

If you are using a sample, select all of the following that describe your sample/sampling strategy (refer to the Help Guide for assistance):

☐ **Random Sample** (student work selected completely randomly from all relevant students)
☐ **Systematic Sample** (student work selected through an arbitrary pattern, e.g., 'start at student 7 on the roster and then select every 5th student following'; repeating this in all relevant course sections)
☐ **Stratified Sample** (more complex, consult with an LAC coach if you need assistance)
☐ **Cluster Sample** (students are selected randomly from meaningful, naturally-occurring groupings (e.g., SES, placement exam scores, etc.)
☐ **Voluntary Response Sample** (students submit their work/responses through voluntary submission – e.g., via a survey)
☐ **Opportunity/Convenience Sample** (only a few instructors are participating in a project taught via multiple sections, so, only those instructors' students are included)

The last three options in bolded red have a high risk of introducing bias. If your SAC is using one or more of these sample/sampling strategies, please share your rationale:

2I. Briefly describe the procedure you will use to select your sample (including a description of the procedures used to ensure student and instructor anonymity).

All students in GEO 246 and 265 will be assessed in Winter term (i.e., both classes without GIS prerequisites), and two classes with GIS prerequisites will be selected in Spring term. The assessment will be administered on D2L via a mandatory, anonymous, muliple-choice survey. Instructor anonymity will be insured by collecting only data relevant to term and year (rather than course number), as well as by deriving results only after all surveys have been aggregated and randomized at the end of spring term.

2J. Follow this link to determine how many artifacts (samples of student work) you should include in your assessment: http://www.raosoft.com/samplesize.html (see screen shot below).

Start with the number of students you estimate will be enrolled in the course(s) from which you will draw the sample – that is your "population." Enter the other numbers as indicated in the screenshot. The sample size

> *calculator will tell you how many artifacts you need to collect. Enter that number below:*
>
> Approximately 110 students will be sampled Winter and Spring term (i.e., two classes each term), which will require completed assessments from approximately 85 students.

3. Project Mechanics

3A. Does your project utilize a rubric for scoring? ☐ **Yes** ☒ **No**

If 'No', proceed to section B. If 'Yes', complete the following:

Which method of ensuring consistent scoring (inter-rater reliability) will your SAC use for this project?

☐ **Agreement** – the percentage of raters giving each artifact the same/similar score in a norming session; ideally, that will be 75%

agreement or greater.

If you are using agreement, describe your plan for plan for conducting the "norming" or "calibrating" session:

☐ **Consensus** - all raters score **all** artifacts and reach agreement on each score

☐ **Consistency** – raters' scores are correlated: this captures relative standing of the performance ratings - but not precise agreement. Briefly describe your plan:

Notes: the agreement method is the most frequently used for assessment, but the **calculation of inter-rater reliability is also among the more challenging issues** within assessment as a whole. If your SAC is unfamiliar with norming procedures, contact your assessment coach, or if you don't know who your coach is, contact LAC Vice Chair [Chris Brooks](#) to arrange for coaching help for your SAC's norming session.

The consistency method is not generally recommended; see the help guide for details.

3B. Have performance benchmarks been specified?

The fundamental measure in educational assessment is the number of students who complete the work at the expected/required level. We are calling this SAC-determined performance expectation the 'benchmark.'

☐ **Yes**
☒ **No**

If yes, briefly describe your performance benchmarks, being as specific as possible (if needed, attach as an appendix):

If no, what is the purpose of this assessment? (For example, this assessment will provide information that will lead to developing benchmarks in the future; or, this assessment will lead to areas for more detailed study; etc.)

The purpose of the entry assessment (Winter term 2016-2017, Fall term 2017-2018, in GIS courses without GIS prerequisites) is to establish a baseline for technical GIS knowledge of students when entering the GIS Certificate program and taking GIS courses that do not have GIS prerequisites. The exit assessment (Spring term 2016-2017 and 2017-2018, in GIS courses with specific GIS

prerequisites) is designed to measure the level of technical GIS knowledge achieved over the course of the program.

Since the 2016-2017 standardized pre/post assessment for the GIS Certificate program is designed to be a pilot study for the potential annual use of pre/post assessments in following years, specific benchmarks have not yet been specified. A tentative minimum benchmark for the exit assessment is to have less than 5% of sampled students achieve less than 80% correct responses.

3C. The purpose of this assessment is to have SAC-wide evaluation of student work, not to evaluate a particular instructor or student. Before evaluation, remove student-identifying information (and, when possible remove instructor-identifying information). **Please share your process for ensuring that all identifying information has been removed.**

Using D2L's anonymous survey functionality will insure that student information is not attached. The only background information that will be collected is (1) an ordinal self-assessment of length of GIS experience in months, (2) an ordinal self-assessment of number of GIS classes taken at PCC, and (3) term and year of assessment.

3D. Will you be coding your data/artifacts in order to compare student sub-groups? ☒ **Yes** ☐ **No**

If yes, select one of the boxes below:

☐ **student's total earned hours** ☐ **previous coursework completed** ☐ **ethnicity** ☒ **other**

Briefly describe your coding plan and rationale (and if you selected 'other', identify the sub-groups you will be coding for):

(1) Ordinal self-assessment of length of GIS experience: (a) less than 3 months, (b) 3 - 6 months, (c) 6 - 12 months, (d) greater than 12 months; and (2) ordinal self-assessment of number of GIS classes taken at PCC: (a) 1, (b) 2, (c) 3, (d) 4 or more.

3E. Ideally, student work is **evaluated** by both full-time and adjunct faculty, even if students being assessed are taught by only full-time and/or adjunct faculty. Further, more than one rater is needed to ensure inter-rater reliability. If you feel only one rater is feasible for your SAC, please consult with an LAC coach prior to submitting your plan/conducting your assessment.

Who will be assessing student work for this project? Check all that apply.

☒ PCC Adjunct Faculty within the program/discipline
☒ PCC FT Faculty within the program/discipline
☐ PCC Faculty outside the program/discipline

☐ Program Advisory Board Members
☐ Non-PCC Faculty
☐ External Supervisors
☐ Other:

End of Planning Section – Complete the remainder of this report after your assessment project is complete.

Beginning of End-of-Year Reporting Section – complete the following sections after your assessment project is complete.

4. Changes to the Assessment Plan

Were there changes to your project since you submitted the planning section of this report?   ☐ **Yes**   ☐ **No**

If so, note the changes below:

5. Narrative

Broadly, what did your SAC learn from the assessment of the core outcome under consideration this year?

6. Results of the Analysis of Assessment Project Data

6A. Quantitative Summary of Sample/Population
How many students were enrolled in all sections of the course(s) you assessed this year?
(If you did not assess in a course, report the number of students that are in the group you intend to generalize your results to.)

How many students did you actually assess in this project?
Did you use a recommended sample size (see the Sample Size Calculator linked to in section 2J)? ☐ **Yes** ☐ **No**

If you did not use a recommended sample size in your assessment, briefly explain why:

6B. Did your project utilize a rubric for scoring? ☐ **Yes** ☐ **No**
If 'No', proceed to section C. If 'Yes', complete the following:

How was inter-rater reliability assured? (If help is needed calculating inter-rater reliability, please contact your SAC's LAC coach.)

☐ **Agreement** – the percentage of raters giving each artifact the same/similar score in a norming session
☐ **Consensus** - all raters score all artifacts and reach agreement on each score
☐ **Consistency** – raters' scores are correlated: this captures relative standing of the performance ratings - but not precise agreement
☐ **Inter-rater reliability was not assured.**

If you utilized agreement or consistency measures of inter-rater reliability, report the level here:

6C. Brief Summary of Benchmark Achievement (frequencies and/or averages)

1. *If you used frequencies of benchmark achievement, report those here. For example, "46 students attained or exceeded the benchmark level in written communication and 15 did not." If necessary, provide detailed results in an appendix.*

2. *If you used percentages of the total to identify the degree of benchmark attainment in this project, report those here. For example, "75% of 61 students attained or exceeded the benchmark level over-all in written communication."*

6D. If possible, attach a more detailed description or analysis of your results (e.g., rubric scores, trend analyses, etc.) as an appendix to this document. Appendix attached? ☐ *Yes*   ☐ *No*

6E. Do the results of this project suggest that academic changes might be beneficial to your students (changes in curriculum, content, materials, instruction, pedagogy etc.)? ☐ *Yes* ☐ *No*

If you answered 'Yes,' briefly describe the changes to improve student learning below. If you answered 'No', detail why no changes are called for.

If you are planning changes, when will these changes be fully implemented?

6F. Has all identifying information been removed from your documents? (Information includes student/instructor/supervisor names/identification numbers, names of external placement sites, etc.) ☐ *Yes* ☐ *No*

7. SAC Response to the Assessment Project Results

7A. Assessment Tools & Processes: Indicate how well each of the following worked for your assessment:

Tools (rubrics, test items, questionnaires, etc.):

☐ *very well*　　☐ *some small problems/limitations to fix*　　☐ *notable problems/limitations to fix*　　☐ *completely inadequate/failure*

Please comment briefly on any changes to assessment tools that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome).

Processes (faculty involvement, sampling, norming, inter-rater reliability, etc.):

☐ *very well*　　☐ *some small problems/limitations to fix*　　☐ *notable problems/limitations to fix*　　☐ *tools completely inadequate/failure*

Please comment briefly on any changes to assessment process that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome).

8. Follow-Up Plan

8A. How will the changes detailed in this report be shared with all FT/PT faculty in your SAC? (select all that apply)

☐ *email*　　　　　　☐ *phone call*　　　　　　☐ *workshop*
☐ *campus mail*　　　☐ *face-to-face meeting*　　☐ *other*
☐ *no changes to share*

If 'other,' please describe briefly below.

8B. Is further collaboration/training required to properly implement the identified changes? ☐ Yes   ☐ No

If 'Yes,' briefly detail your plan/schedule below.

8C. Re-assessment is a critical part of the overall assessment process. This is especially important if academic changes have been implemented. How will you assess the effectiveness of the changes you plan to make?

☐ follow-up project in next year's annual report   ☐ on-going informal assessment

☐ in a future assessment project   ☐ other

If 'other,' please describe briefly below.

8D. SACs are learning how to create and manage meaningful assessments in their courses. This development may require SAC discussion to support the assessment process (e.g., awareness, buy-in, communication, etc.). Please briefly describe any successful developments within your SAC that support the quality assessment of student learning. If challenges remain, these can also be shared.

The following summative assessment is designed to measure, very generally, the GIS knowledge and geospatial reasoning of incoming and outgoing students in the GIS Certificate program at PCC.

The questions are sourced from the Esri Technical Certification for ArcGIS Desktop Entry (i.e., software related knowledge) and the Association of American Geographers AP GIS&T Course Assessment.

Primarily, the assessment is designed to measure preparedness for professional employment in a GIS-related field, specifically using the most common software platform, ArcGIS. Secondarily, the assessment is designed to measure geospatial thinking.

PCC Geography
Draft Summative Assessment, 2016-2017

1. Which of the following most closely describes your level of experience with GIS?
   a. Less than 3 months
   b. 3 to 6 months
   c. 6 months to 1 year
   d. Greater than 1 year

2. How many PCC GIS classes have you completed?
   a. 1
   b. 2
   c. 3
   d. 4 or more

Answer the following questions to the best of your ability. You are not being graded by the number of correct responses, but are simply receiving a participation grade for completing the assessment.

3. Which ArcMap functionality should be used to create a custom tool that strings together geoprocessing operations?
   a. ArcToolbox
   **b. ModelBuilder**
   c. Query Builder
   d. Spatial Analyst

4. A user mistakenly zooms to a large scale and can no longer see all of the active layers from the table of contents in the current map. A single click of which button in the Tools toolbar will zoom the map to show all layers in the active data frame?
   a. Full Extent
   b. Fixed Zoom Out
   c. Go To XY

d. Find

5. Which tool from the Tools toolbar should be used to view the user-specified buffer distance for a polygon feature class created using the Buffer geoprocessing tool?
    a. Select Features
    b. Select Elements
    c. Measure
    d. Identify

6. While working in ArcMap the user is adding a file geodatabase feature class to the map document. Other than the Add Data button, how can this be accomplished?
    a. Drag the feature class from the Catalog window.
    b. Drag the feature class from Windows Explorer.
    c. Drag the geodatabase from the Catalog window.
    d. Drag the geodatabase from Windows Explorer.

7. How should an ArcGIS user create a file geodatabase?
    a. In the Catalog window, right-click any folder > New > File Geodatabase
    b. In the Catalog window, right-click any toolbox > New > File Geodatabase
    c. In the table of contents, right-click the data frame > New > File Geodatabase
    d. In ArcMap, add the Geodatabase toolbar > New File Geodatabase

8. Which **two** interfaces can be used to change the display name of a layer in an ArcMap map document? (Choose two).
    a. Overview window
    b. Catalog window
    c. Windows File Explorer
    d. Table of contents

9. Which tool should be used to adjust the extent of a map by changing it from a large scale to a small scale?
    a. Zoom In
    b. Zoom Out
    c. Find
    d. Identify

10. How can an ArcGIS Online user switch from the Light Gray Canvas background to Imagery with Labels in a web map?
    a. Add Layer from Web
    b. Add Map Notes
   **c. Click Basemap**
    d. Click Edit

11. Which workflow should be used to place additional new fire hydrants in a map document containing a fire hydrants feature class?
    a. Start editing > Choose a map template > Add points > Stop editing
    b. **Start editing > Choose a feature template > Add points > Save edits > Stop editing**
    c. Select the layer in the table of contents > Add points > Save edits > Stop editing
    d. Select the layer in the table of contents > Choose a feature template > Add points > Stop editing

12. Which **two** options return a location from latitude and longitude coordinates? (Choose two.)
    a. **The Find tool > Locations tab**
    b. The Find tool > Linear Referencing tab
    c. The Search window
    d. **The Geocoding toolbar**

13. What is the primary 2D desktop program used to display, explore, create, and edit GIS datasets, as well as to create map layouts to print or publish?
    a. ArcCatalog
    b. **ArcMap**
    c. ArcGlobe
    d. ArcScene

14. Which ArcGIS extension provides tools for integrated raster-vector analysis?
    a. Tracking Analyst
    b. **Spatial Analyst**
    c. Business Analyst
    d. Network Analyst

15. Which five programs are available with ArcGIS for Desktop?
    a. ArcGIS Online, ArcPad, ArcGIS Engine, ArcGIS for Mobile, and License Manager
    b. Collector for ArcGIS, Explorer for ArcGIS, ArcReader, ArcGIS Online, and ArcGIS Publisher
    c. **ArcMap, ArcCatalog, ArcGlobe, ArcScene, and ArcGIS Pro**
    d. ArcInfo Workstation, ArcView, ArcEditor, ArcReader, ArcGIS Publisher

16. What should be used to create interactive web maps and apps?
    a. ArcGIS Publisher
    b. ArcGIS Explorer Desktop
    c. ArcReader
    d. **ArcGIS Online**

17. Which ArcGIS for Desktop app is mainly used to organize and manage GIS data content?
    a. ArcToolbox

b. ArcReader
c. ArcGlobe
d. **ArcCatalog**

18. Which method should you use to create a file geodatabase?
  a. **In the Catalog window, right-click a folder and choose New > File Geodatabase.**
  b. In the table of contents, right-click the data frame and choose New File Geodatabase.
  c. Click the Add Data button, and then click the New File Geodatabase button.
  d. In ArcToolbox, click Create New File Geodatabase.

19. Which file extension is a type of raster?
  a. SHP
  b. SHX
  c. **TIFF**
  d. DBF

20. In ArcGIS, what is a collection of geographic features with the same geometry type in a geodatabase called?
  a. Coverage
  b. Layer file
  c. **Feature class**
  d. Shapefile

21. An ArcMap user needs to create shortcuts to view saved extents. What should be used to perform this task?
  a. Stored view
  b. **Bookmarks**
  c. Markers
  d. Extent indicator

22. Which ArcMap view should be used to design and author a map to print or export?
  a. Data
  b. **Layout**
  c. Map
  d. Page

23. How should an ArcGIS user convert graphics drawn on the map into a shapefile or feature class?
  a. Click the Add Data button, browse to the feature class, and click Add.
  b. On the Draw toolbar, click the Polygon button and draw new features.
 c. **From the Drawing menu on the Draw toolbar, choose Convert Graphics To Features.**

    d. On the Annotations tab of the data frame properties, click New Annotation Group.

24. Which units can be used with the Buffer tool?
    a. Minutes
    b. Meters
    c. Hectometers
    d. Degrees

25. Which ArcGIS query expression should be used to select points that are higher than 1,000 kilometers in elevation with a population that is at or below 5,000 people?
    a. ELEVATION > 1000 AND POPULATION <= 5000
    b. ELEVATION < 1000 OR POPULATION < 4999
    c. ELEVATION > 1000 AND POPULATION >= 4999
    d. ELEVATION > 1000 OR POPULATION > 5000

26. How can an ArcGIS user find a single point location in a map document, given a latitude and longitude?
    a. Type the coordinates into the Map Scale text box.
    b. On the Tools toolbar, click the Go To XY button.
    c. On the Standard toolbar, click the Find button, and then click the Features tab.
    d. From the File menu, choose Add Data > Geocoding > Geocode Addresses.

27. Which of the following are 1-dimensional in spatial extent?
    a. Point phenomena
    b. Line phenomena
    c. Areal phenomena
    d. Volume phenomena

28. The map below shows annual precipitation of Texas. If you draw a graph showing change of Texas annual precipitation between A and B, the graph will be _____ (choose closest one).
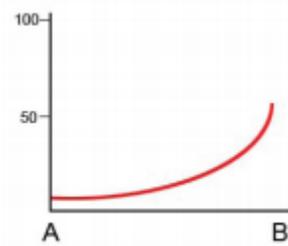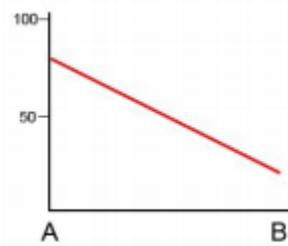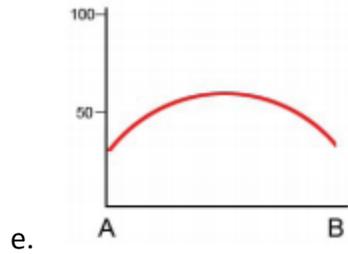
Precipitation (in.)
- 16–20
- 20–24
- 24–28
- 28–32
- 32–36
- 36–40
- 40–50
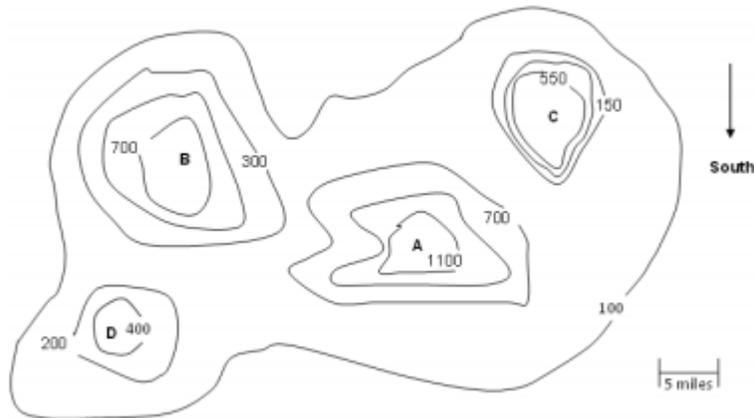- 50–60
- 60–70
- 70–80

a.

b.

c.

d.

e.
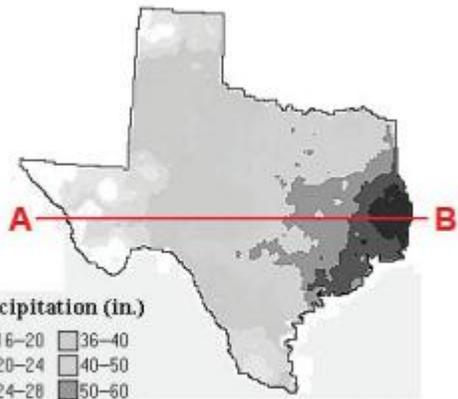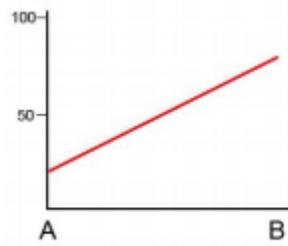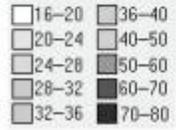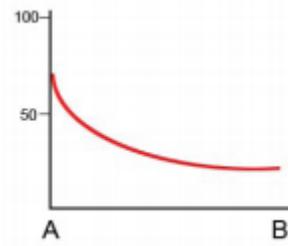
29. You are standing at the peak of mountain C looking south. Name in clockwise order the other mountain(s) you can see:

   a. A, D, B
   b. B, D, A
   c. D, A, B
   d. C, A, D
   e. A, B

30. Saraya is planting an orange grove in California's San Joaquin Valley. Below is a map of California and the San Joaquin Valley.
   Oranges cannot tolerate temperatures below 30 degrees Fahrenheit. What additional map or layer may help her determine the best part of the Valley to plant oranges?
   a. Minimum Temperature Map
   b. Average Temperature Map
   c. Maximum Temperature Map
   d. Today's Temperature Map