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ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS  
Connecting Professionals, Practice and the Public

# **How to Prepare and Strategize for the ASBOG<sup>®</sup> Fundamentals of Geology Exam**

**AEG Student & Young  
Professional Support Committee  
February 5, 2024**



## Introduction

- The Fundamentals of Geology (FG) exam is the first step in becoming a Professional Geologist.
- After passing this exam, the next step is to acquire the training and experience to be able to take and pass the Practice of Geology (PG) exam and become a registered geologist.
- Thirty-one states and Puerto Rico have registration programs for registration. Each program requires a candidate pass both exams to be registered.



## Random Notes

- You should have received the slide deck as a pdf. We won't be reading every slide in this presentation.
- Webinar presentations will take about an hour. We will have a question-and-answer session afterwards.
- As you think of them, send questions via the Chat feature. We will answer them at the end of the slide show.
- Reply with *yes* or *no* answers to the five questions we ask periodically; we will tabulate and summarize the answers before the next slide.
  1. First question: Are you a member of AEG?



## Webinar Outline

- Presenters
- What is AEG?
- ASBOG<sup>®</sup> and FG Exam Background
- Hints and Suggestions to Prepare for the FG Exam
- Study Guides and Courses
- Strategies for Taking the FG Exam
- Cheating
- Summary
- Contributors
- Questions?



## Presenters in order of presentation:

- Rick Kolb, L.G., North Carolina Department of Environmental Quality, Brownfields Section (part-time); Raleigh, NC
- Martin Helmke, Ph.D., P.G., Professor of Geology; West Chester University of Pennsylvania; West Chester, PA; ASBOG® Member
- Jacob Frishberg, G.I.T., Junior Geologist at Core Environmental, New York, NY
- Julian Cohen, G.I.T., Staff Geologist at CWM- H2O in Portland, OR
- Catherine Schmidt, G.I.T., ANS Geo, Inc.; Austin, TX



## **Rick Kolb, L.G.**

- Co-chair, AEG's Student & Young Professional Support Committee and AEG's Membership Committee
- Program Manager at North Carolina Department of Environmental Quality in Raleigh, North Carolina





# What is AEG?

- Premier professional society in the field of applied geology
- Supports application of the practice of geology to engineering, environmental concerns, public health, and safety
- A network of students, professionals, practitioners, and sponsors/friends





## Why Join AEG?

- To support our profession and the practice of geology
- To be eligible for eleven scholarship programs for students to attend field camp and professional meetings, and to support student research and professional development
- To provide access to seven funds for practitioners to support workshops, conferences, speaker programs, and publications
- To be updated with technologies and tools in your area of practice/interest



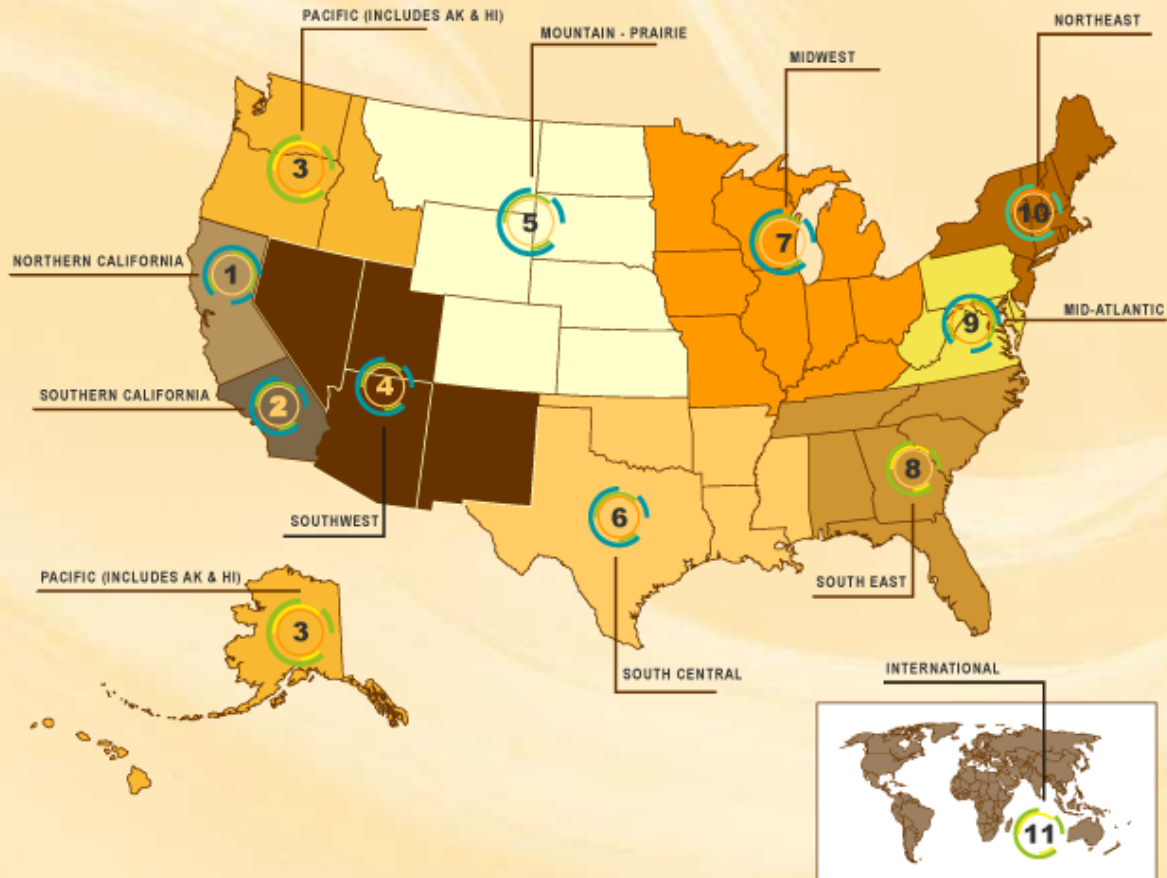
## More Reasons to Join AEG

- Field trips (e.g., for continuing education requirements)
- Technical workshops, forums, and webinars
- Reduced prices for chapter and annual meetings
- Networking opportunities at chapter meetings and AEG's annual meeting – Portland, Oregon in 2023
- Free access to the Environmental & Engineering Geoscience journal, AEG News, and chapter newsletters



## AEG Regions

ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS **REGION MAP**



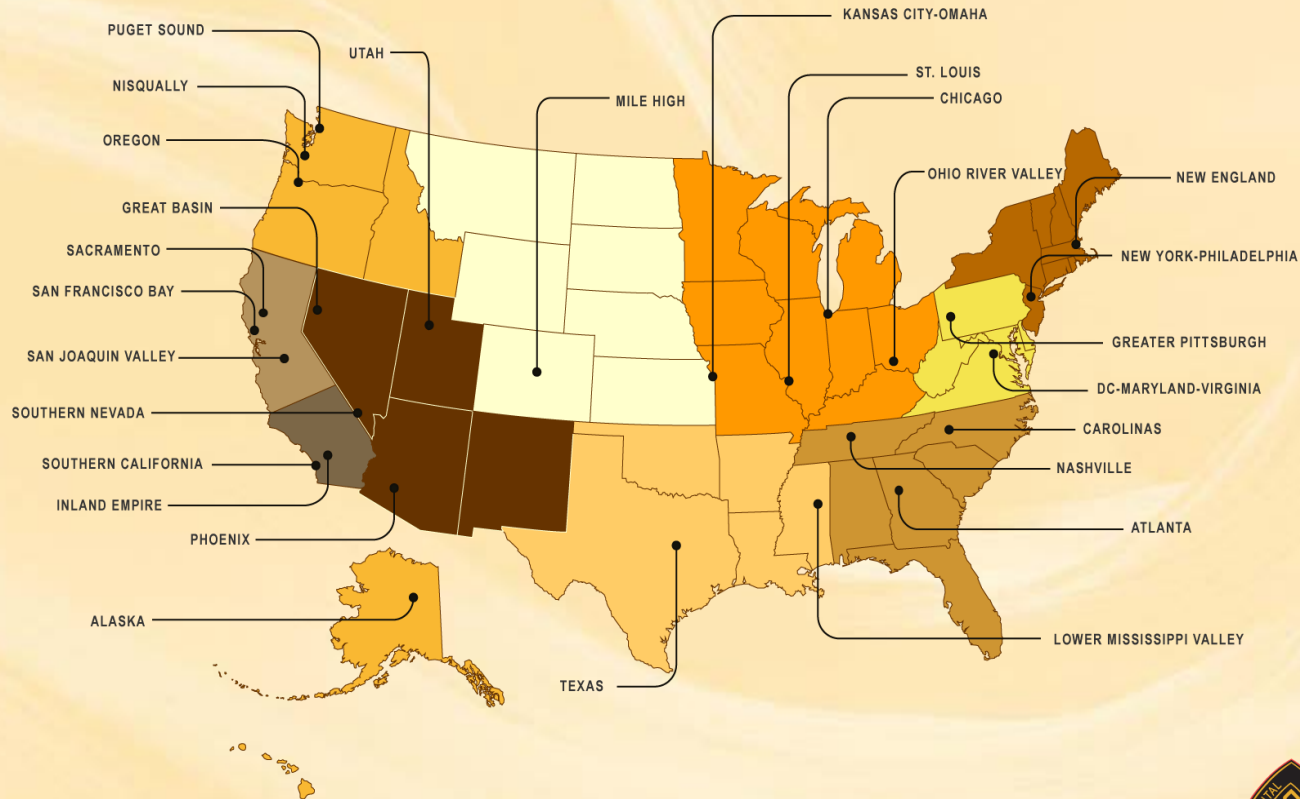


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## AEG Chapters

ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS **CHAPTER MAP**





## Second question

2. Did you know AEG membership is free for students, and AEG Early Career membership is only \$80/year for your first 3 years of practice?



## Dr. Martin F. Helmke, P.G.

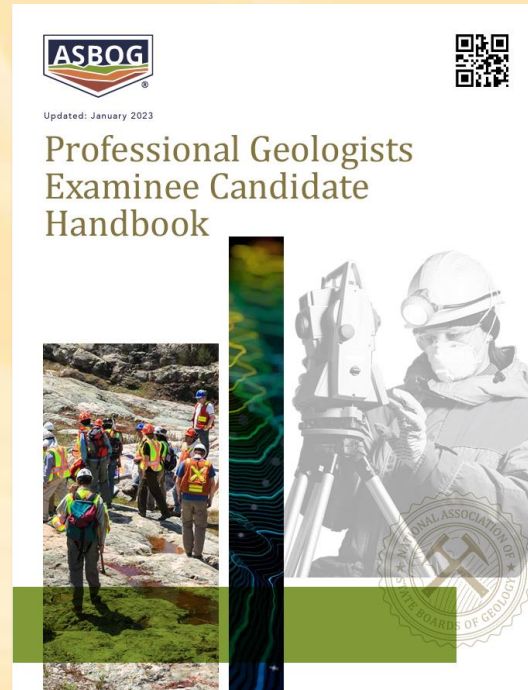
- Professor of Hydrogeology at West Chester University
- Member, ASBOG<sup>®</sup>
- Member, Pennsylvania Registration Board for Professional Engineers, Land Surveyors, and Geologists





# ASBOG<sup>®</sup> and the FG Exam Background

*Read the Professional  
Geologists Examinee  
Candidate Handbook*





## What is ASBOG<sup>®</sup>?

Founded in 1990, the National Association of State Boards of Geology was created to serve as a connecting link between individual state geological licensing boards. Through its committees, ASBOG<sup>®</sup>:

- evaluates and provides guidance on matters of common interest to member boards including criteria for registration (such as formal education, work experience, ethics, etc.), testing, examination waivers, “grandfathering”, and reciprocity
- creates and rigorously maintains national examinations to evaluate minimum competency to practice geology
- assists those states wishing to formulate licensing legislation and regulations
- promotes cooperative licensure throughout the U.S. through the equalization of registration and licensing requirements.







## What is ASBOG<sup>®</sup> (cont'd)?

- ASBOG<sup>®</sup> is the link between independent state geology boards.
- ASBOG<sup>®</sup> consists of 31 member states and Puerto Rico.
- Member boards have issued over 45,000 licenses (some geologists hold licenses in more than one state).
- ASBOG<sup>®</sup> coordinates and cooperates with international organizations interested in reciprocal relationships.
- All activities of the national association are coordinated by the ASBOG<sup>®</sup> Executive Committee at its headquarters in Douglasville, Georgia.

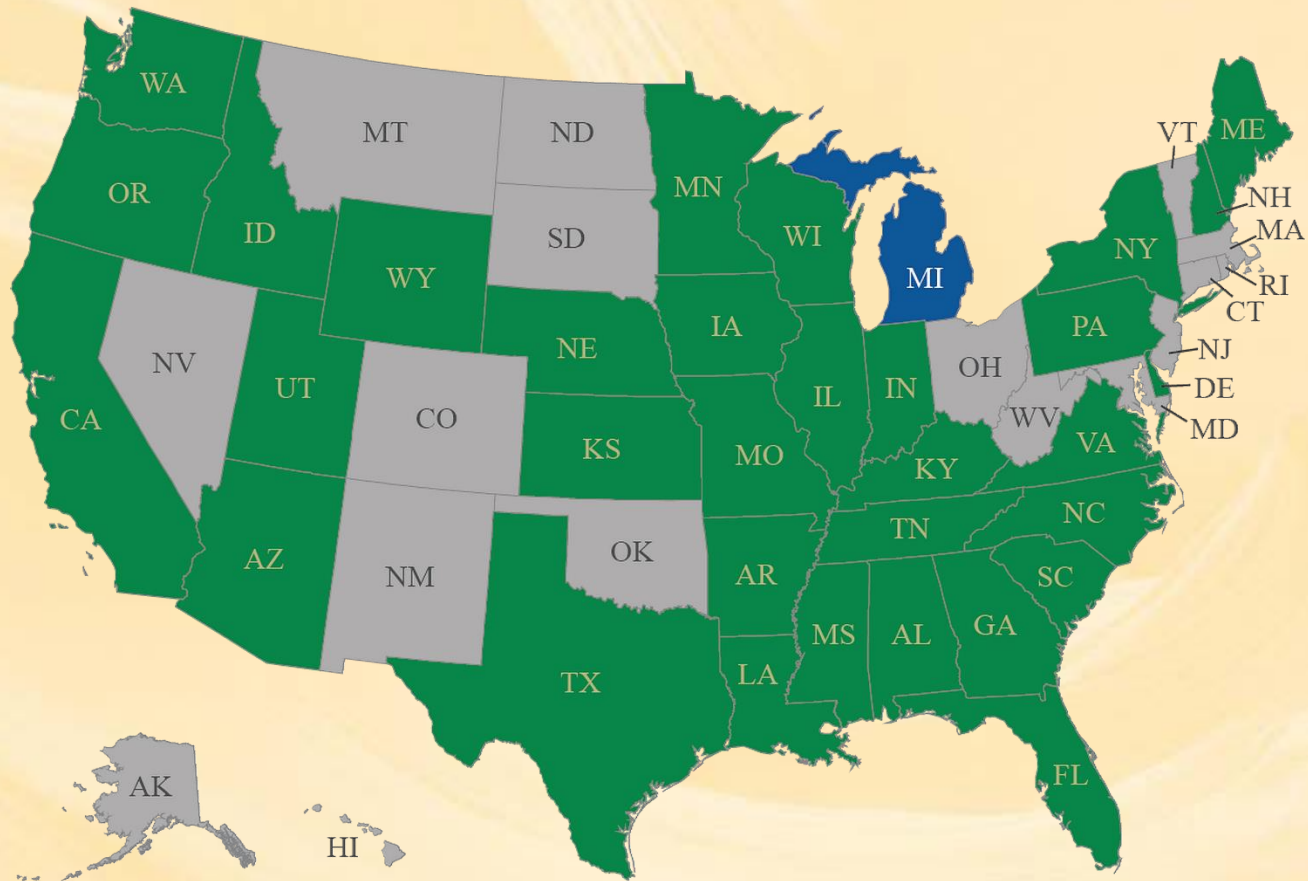




# ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS

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## United States & Puerto Rico



- ASBOG Member Board Regulatory State (MBR) (32)
- FG Testing Only State (FGTO) (2)
- Non-Regulatory State (NRS) (18)





## The ASBOG<sup>®</sup> Competency Examinations

- ASBOG<sup>®</sup>'s mission is to promote professional geological competence and ethical practice to ensure that the health, safety, and welfare of the public are protected.
- Licensure examinations provide the cornerstone quantitative metrics to accomplish that mission.
- Through its Council of Examiners (COE) and statisticians, ASBOG<sup>®</sup> has independently created two national geoscience examinations: the Fundamentals of Geology Exam (FG) and the Practice of Geology Exam (PG).
- ASBOG<sup>®</sup> maintains, administers, scores, and continually validates these examinations for the benefit of our member states.



## General Requirements for Licensure by ASBOG<sup>®</sup> Member States

- A minimum of 30 semester hours or 45 quarter hours in geological course work and, in some states, a degree in geology;
- Passing score (70% or greater) on the FG exam to become a *Geologist-in-Training* (GIT)
- Up to 5 years of professional experience under the direct supervision of a PG or PE
- Many states allow for graduate experience to substitute for work experience, e.g., North Carolina gives 2 years of credit for an undergraduate degree
- Passing the ASBOG<sup>®</sup> Practice of Geology (PG) examination



## Content Domains/Test Blueprints

<u>Content Domains</u>	<u>Percentage of Items by Domain</u>	
	<u>FG%</u>	<u>PG%</u>
<b>A. General Geology: Field Geology, Geophysics, Imagery, Modeling, Graphical Methods</b>	<b>17</b>	<b>17</b>
<b>B. Mineralogy, Petrology, and Petrography</b>	<b>12</b>	<b>5</b>
<b>C. Sedimentology, Stratigraphy, and Paleontology</b>	<b>11</b>	<b>5</b>
<b>D. Quaternary Geology, Geomorphology, and Surficial Processes</b>	<b>14</b>	<b>8</b>
<b>E. Structure, Tectonics, and Seismology</b>	<b>12</b>	<b>9</b>
<b>F. Hydrogeology and Environmental Geochemistry</b>	<b>13</b>	<b>22</b>
<b>G. Engineering Geology</b>	<b>12</b>	<b>18</b>
<b>H. Economic Geology and Energy Resources</b>	<b><u>9</u></b>	<b><u>16</u></b>
<b><i>Totals</i></b>	<b>100</b>	<b>100</b>



# ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS

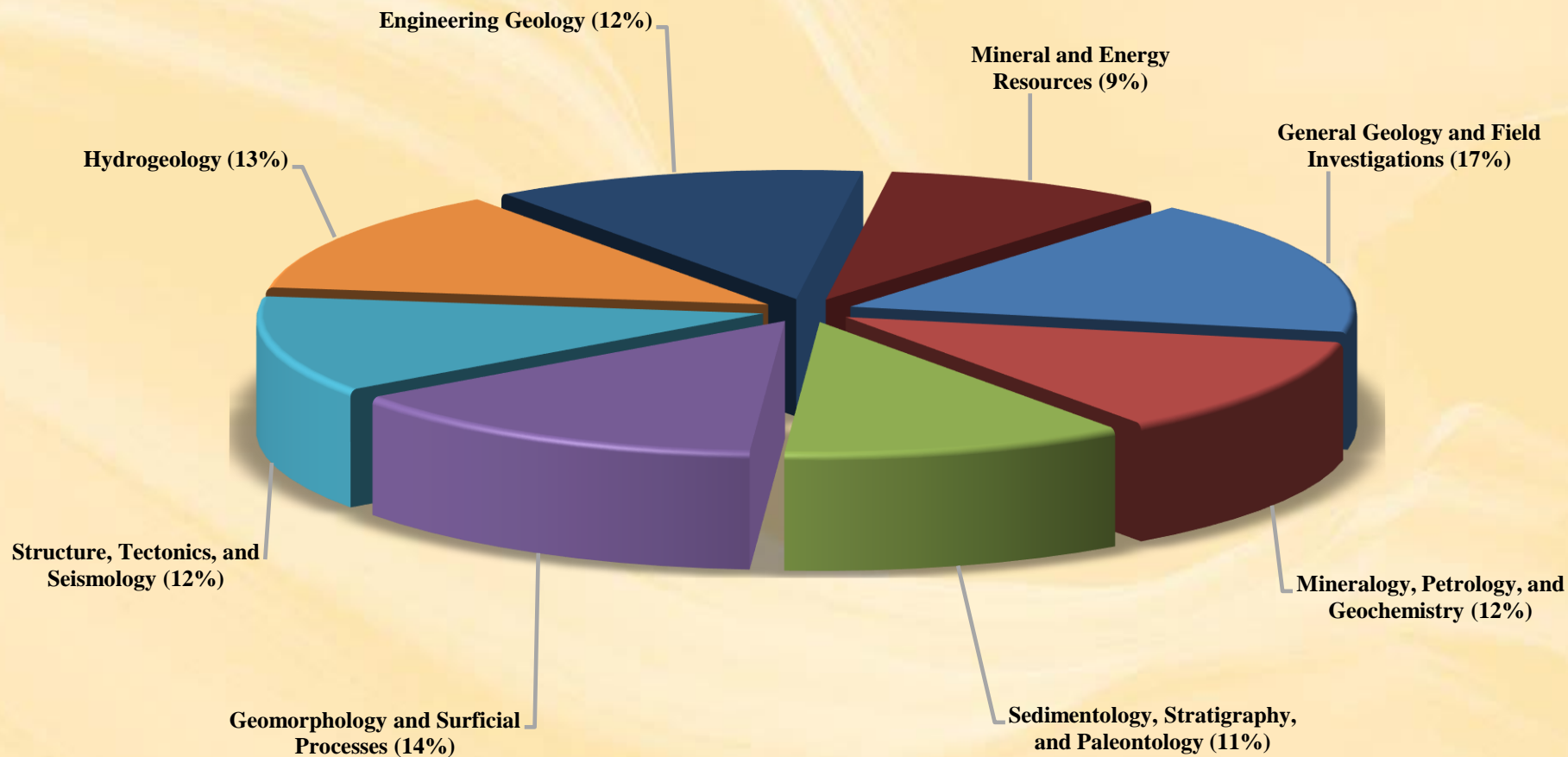
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## Task Analysis 2023 FG Test Blueprint

No.	A. General Geology and Geological Investigations
1	Plan and conduct geological investigations considering public health, safety, and welfare, the environment, regulations, and Quality Assurance/Quality Control (QA/QC).
2	Compile and organize available information to plan geological investigations.
3	Collect, describe, and record new geological and geophysical data.
4	Determine positions, scales, distances, and elevations from remote sensing, imagery, surveys, sections, maps, and GIS.
5	Prepare, analyze, and interpret logs, sections, maps, and other graphics derived from field and laboratory investigations.
	<b>B. Mineralogy, Petrology, and Geochemistry</b>
6	Plan and conduct mineralogic, petrologic, and geochemical investigations, including the use of field, laboratory, and analytical techniques.
7	Identify minerals and rocks and their characteristics.
8	Identify and interpret rock and mineral sequences and associations, and their genesis.
9	Evaluate geochemical and isotopic data and construct geochemical models related to rocks and minerals.
10	Determine type, degree, and effects of rock and mineral alteration.
	<b>C. Sedimentology, Stratigraphy, and Paleontology</b>
11	Plan and conduct sedimentologic, stratigraphic, or paleontologic investigations, including the use of field, laboratory, and analytical techniques.
12	Select and apply appropriate stratigraphic nomenclature and establish correlations.
13	Identify and interpret sedimentary processes and structures, depositional environments, sediment provenance, and geochemical and climatic cycles.
14	Identify sediment and/or rock sequences, positions, and ages, and interpret sequence stratigraphy.
15	Identify fossils and interpret fossil assemblages for age, paleoenvironmental interpretations, and/or stratigraphic correlations.
	<b>D. Geomorphology and Surficial Processes</b>
16	Plan and conduct geomorphic investigations, including the use of field, laboratory, and analytical techniques.
17	Identify, classify, and interpret landforms, surficial materials, and processes.
18	Determine relative or absolute age relationships of landforms, sediments, and soils.
19	Evaluate geomorphic processes and development of landforms, sediments, and soils, including watershed processes.
20	Apply remote sensing and GIS techniques to interpret geomorphic conditions and processes.
	<b>E. Structure, Tectonics, and Seismology</b>
21	Plan and conduct structural, tectonic, or seismic investigations, including the use of field, laboratory, and analytical techniques.
22	Identify and define structural features and relationships to construct and interpret cross sections and structural projections, and perform statistical analyses.
23	Interpret deformational history through structural and tectonic analyses.
24	Develop and apply tectonic models to identify geologic processes and history.
25	Evaluate earthquake mechanisms and paleoseismic history.
	<b>F. Hydrogeology</b>
26	Plan and conduct hydrogeological, geochemical, and contaminant investigations, including the use of field, laboratory, and analytical techniques.
27	Define and characterize hydraulic properties of vadose and saturated zones.
28	Design groundwater monitoring, observation, extraction, production, or injection wells.
29	Evaluate water resources, assess aquifer yield, and determine sustainability.
30	Characterize soil and water quality, and assess chemical fate and transport.
31	Manage, develop, protect, or remediate surface water or groundwater resources.
	<b>G. Engineering Geology</b>
32	Plan and conduct engineering geological investigations, including the use of field and laboratory methods.
33	Identify and characterize physical and index properties of earth materials.
34	Provide analysis and recommendations for engineering design, land use decisions, restoration, and watershed management.
35	Identify, map, and evaluate geologic hazards and processes.
36	Interpret land use, landforms, and geological site characteristics using remote sensing data, maps, records, and GIS.
37	Develop plans, interpretations, and recommendations for ground behavior during infrastructure development or hazard mitigation.
	<b>H. Mineral and Energy Resources</b>
38	Plan and conduct resource exploration, evaluation, and reclamation programs, including the use of conceptual models, and field, laboratory, and analytical techniques.
39	Collect and interpret data necessary to locate mineral or energy resources.
40	Determine the presence and distribution of resources based on surface and subsurface data.
41	Perform economic evaluation and reserve assessment.
42	Calculate quantity and quality of resources.
43	Conduct geological studies for design, abandonment, closure, waste management, and reclamation and restoration of energy development or mineral extraction operations.



## *ASBOG® Task Analysis Survey Fundamentals of Geology Blueprint- Domain Percentages*

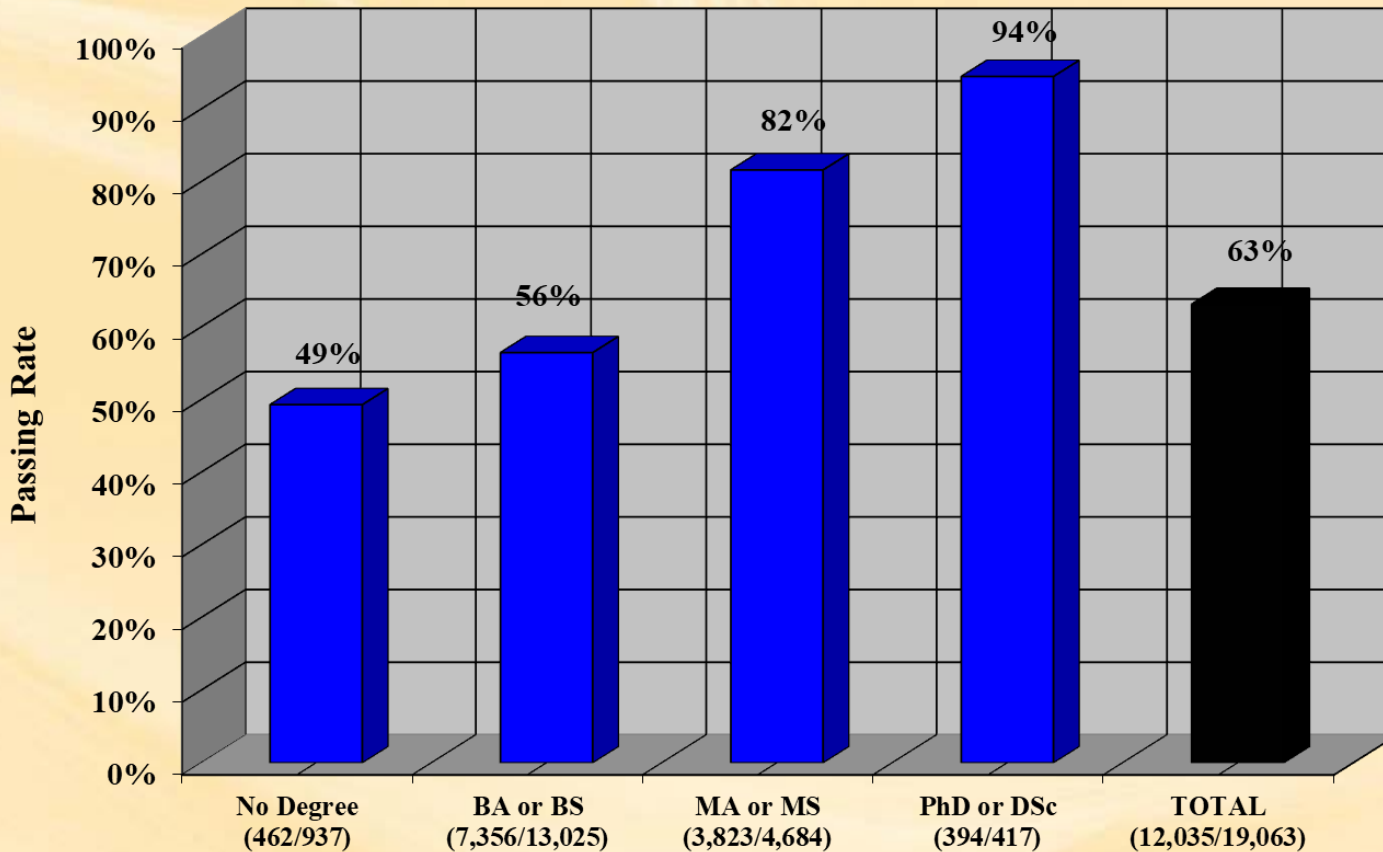




## ASBOG® Fundamentals of Geology Examination Passing Rate by Highest Degree in the Geological Sciences

(March 2008 through March 2023)

Total Number of Candidates = 19,063



Highest Degree in the Geological Sciences  
(Number Passing / Total Number)



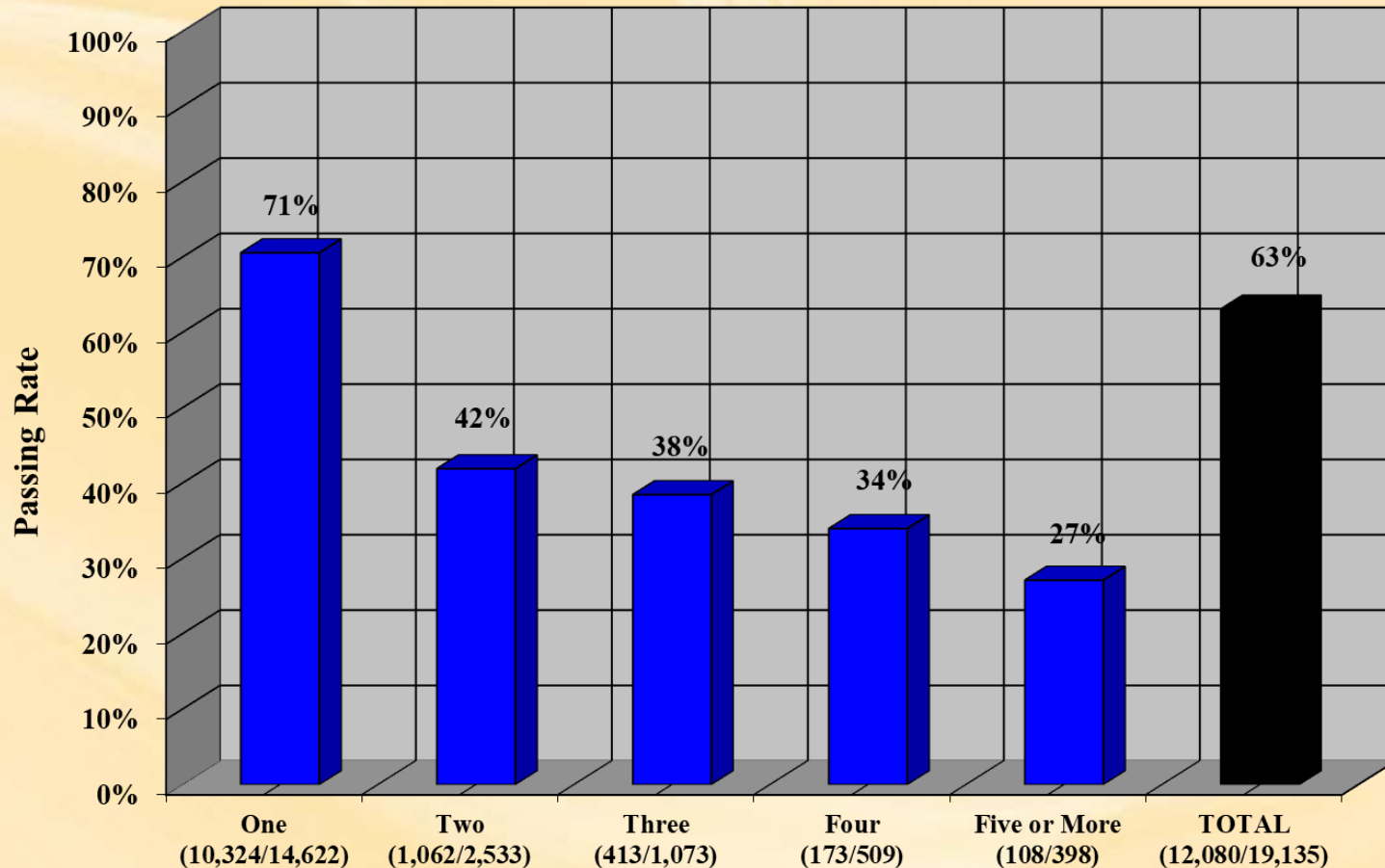


## ASBOG® Fundamentals of Geology Examination

### Passing Rate by Number of Attempts

(March 2008 through March 2023)

Total Number of Candidates = 19,135



Number of Attempts (Number Passing / Total Number)



## Third question

3. Have you taken the FG exam previously?



## Jacob Frishberg, G.I.T.

- Junior Geologist at Core Environmental Consultants, New York, NY





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# Hints and Suggestions to Prepare for the FG Exam



## Hints and Suggestions

1. Take the exam as soon as you are eligible. Some states (e.g., North Carolina) allow you to take it once you have 30 semester/45 quarter hours of geology credits (i.e., before receiving your degree). See the website of your state board for exact requirements.
2. The FG exam is everything you learned in school – the fundamentals of geology – and there will be some things you haven't learned, since you didn't take every course your geology department offered.



## Hints and Suggestions, cont'd.

3. Each exam is different, with different facets of geology stressed. “I noticed after taking it several times that the “theme” of questions tends to shift. One time I took it, there were a lot of hydrogeology-type questions, another time a lot of mining questions. Karst always tends to show up in a few questions”.
4. Form a study group of coworkers or college classmates. “I studied as an engineering geologist working as a consultant with a bunch of environmental geologists working for a government agency. We were able to share our expertise and background with each other”.



## Hints and Suggestions, cont'd.

5. Set a study schedule and stick to it. Study a little bit every day or both days on every weekend. Create a schedule in a notebook or calendar to keep track of study progress.
6. Review a good physical geology text from cover to cover, and then review old class notes, guided by the test blueprint on what to emphasize.



## Hints and Suggestions, cont'd.

7. Memorize important information and equations over time – you won't be able to take programmable calculators or any reference material into the exam with you.
8. Work the most common types of problems over and over. Three-point problems have many applications in different subject areas.





## Hints and Suggestions, cont'd.

### 9. Equations

- Put the main ones on flash cards and memorize them.
- You may receive information in a question that that can be used to solve another unrelated question later in the test.
- You may have to use more than one equation to calculate the answer to a problem. For example, Darcy's Law and the Velocity Equation.

$$Q = KiA \text{ and } Q = Av$$

You may only be given enough information such that you have to use both equations to solve the problem.



## Hints and Suggestions, cont'd.

### 10. Units

- Know the units for equations (e.g., transmissivity in  $\text{gpd}/\text{ft}$  or  $\text{ft}^2/\text{day}$ ). Hydraulic conductivity is  $\text{gpd}/\text{ft}^2$  and measures the volume of water flowing through a 1' x 1' cross section.
- Keep your units straight during conversions; write them out to make sure you can cancel out everything except the final answer. This is when knowing the units will help you. Some of the wrong answers in the exam are based on common conversion errors.



## Hints and Suggestions, cont'd.

11. If you haven't taken geophysics, familiarize yourself with geophysical methods (seismic reflection and refraction; gravity, magnetics, resistivity, borehole geophysics), and what's the use of each. Same goes for remote sensing.
12. Structural geology & plate tectonics – More big picture than minutiae. For instance, you won't have to construct a stereonet, but you need to know how basic structural features appear on a stereonet. What igneous and metamorphic rock types are associated with different plate types/boundaries?



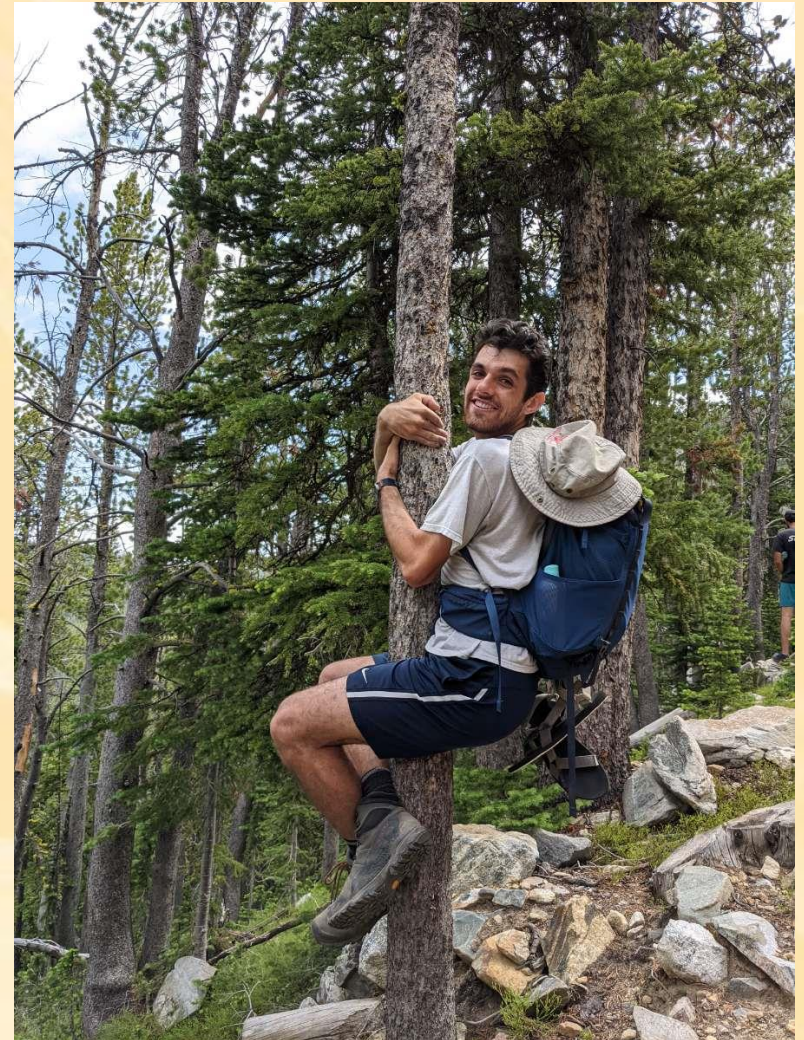
## Fourth question

4. Does your company pay for the exam?



## Julian Cohen, G.I.T.

- Staff Geologist at CWM-H2O in Portland, Oregon





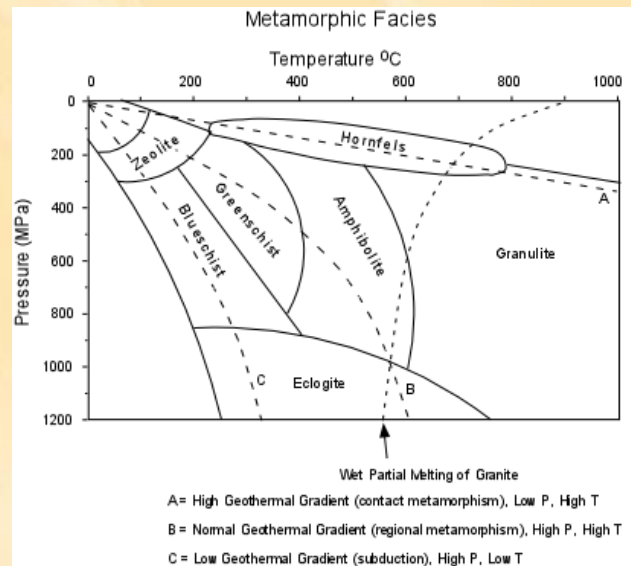
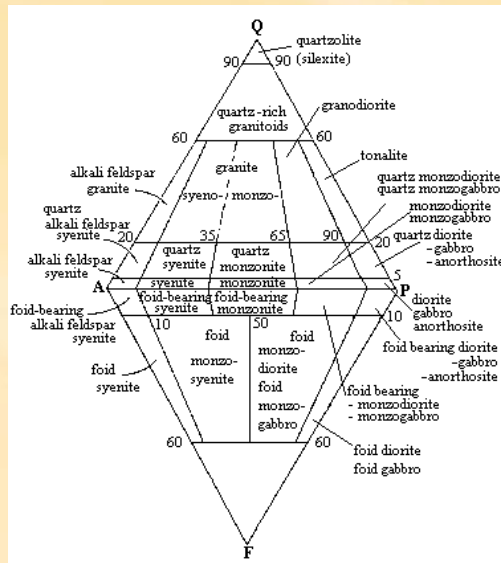
## Hints and Suggestions, cont'd.

13. Engineering geology – soil properties and classification systems (Unified and Wentworth), slope stability, Atterberg Limits, mass movement; equations for water content, void ratio, bulk density, dry density, etc.; types of logs – lithologic, core for subsurface characterization
14. Remember the charts you memorized in petrology?



## Hints and Suggestions, cont'd.

# 15. Petrology – Igneous, metamorphic and sedimentary rock classifications and associated mineralogy.



Scheme for Sedimentary Rock Identification					
INORGANIC LAND-DERIVED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Clastic (fragmental)	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay	Mostly quartz, feldspar, and clay minerals; may contain fragments of other rocks and minerals	Rounded fragments	Conglomerate	
	Angular fragments		Breccia		
	Sand (0.2 to 0.006 cm)		Fine to coarse	Sandstone	
	Silt (0.006 to 0.0004 cm)		Very fine grain	Siltstone	
	Clay (less than 0.0004 cm)	Compact; may split easily		Shale	
CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Crystalline	Varied	Halite	Crystals from chemical precipitates and evaporites	Rock Salt	
	Varied	Gypsum		Rock Gypsum	
	Varied	Dolomite		Dolostone	
Bioclastic	Microscopic to coarse	Calcite	Cemented shell fragments or precipitates of biologic origin	Limestone	
	Varied	Carbon	From plant remains	Coal	



## Hints and Suggestions, cont'd.

16. “Read the question and answer the question. I noticed we tend to overanalyze things. The environmental geologists I studied with would get more engineering questions right than I, and I would get more environmental questions right than they until we realized that when it came to our discipline, we were overthinking and adding elements to the questions that were not included in the problem”.
17. “Content-wise, the exam focuses on applied geology, so be aware of the application of principles you have learned”.





## References and Outside Resources

1. *Professional Geologists Candidate Handbook* – published and downloadable on the ASBOG<sup>®</sup> website. Includes sample exam questions and answers. You **MUST** read this! Look at every link on this site.
2. The ASBOG website lists nine other resources (with links) useful in preparing for the exam. One former geology board member recommends highly the *AGI Handbook*, one of these nine resources. Digital copy is \$40, hard copy is \$59.95.



## References and Outside Resources, cont'd.

3. Do the practice problems 10 at a time, then check your answers. For those you got wrong or guessed, review that chapter, make flash cards, and discuss with your study group. Let that guide your study. If you try to review everything, you will be overwhelmed.
4. Everything listed in the ASBOG<sup>®</sup> handbook will be covered, so everything is important.



## References and Outside Courses, cont'd.

5. REG REVIEW – Most well-known outside course; has a study guide and practice problems. [www.regreview.com](http://www.regreview.com)
  - 2021 ASBOG® Study Manual is 530 pages with 13 chapters, \$140
  - 2020 Practice Quizzes, \$55; flash cards, \$32
  - Webinars - two, half-day webinars held beginning 3 to 4 months before each exam
  - Held every 2-3 weeks, 8:00 AM-1:00 PM Saturday and Sunday
  - Next live webinars are 1/21-22/23 and 2/8-10/23
  - Webinar (includes Study Manual): \$575 pregristration
  - One recommendation – take the course well before the exam



## References and Outside Courses, cont'd.

6. <https://www.georev.com/services.htm>
  - ASBOG® Study Guide - \$99.99, pdf \$89.99, PreTest \$49.99
  - Over 1400 questions and answers in all topics in geology: hydrogeology, mineralogy, and environmental, engineering, and economic Geology
  
7. Mometrix Media
  - ASBOG® Exam Secrets Study Guide
  - Offers money-back guarantee
  - ebook or hard copy \$54.99



## Fifth and final question

- Does your company give you the day off with pay to take the exam?



# Catherine Schmidt, G.I.T.

- Engineering Geologist at  
ANS Geo in Austin, Texas





# Strategies for Taking the FG Exam

- New online test format
- On test day, *depending on your state*, you may bring a protractor, a compass, a straight edge, an engineer's scale, a non-programmable calculator, and your photo ID. The test proctors will provide you with graph paper, scratch paper, and #2 mechanical pencils. *Some testing centers have lockers to keep your belongings.*
- Arrive early for check-in



## The Test

1. 140 Questions, 4 hours is ~ 1 minute and 40 seconds per question. Try to move at a consistent pace.
2. Online format
  - One question at a time
  - Ability to jump across questions
  - Ability to highlight or bookmark questions you want to revisit
  - Online portal will indicate if you have skipped a question and suggest revisiting them





## Online Format cont'd

1. All graphs, maps, diagram, or any other visual will be on a screen
2. You will need to get creative
  - Use your scratch paper to trace the scale bars, point locations, or other useful information. Transfer to your scratch paper. Treat this as your workbook.
  - Use your rulers/protractors on the screen
3. Your answers will be recorded through the online program. You can always change your answer before final submission



## Strategies

1. Earplugs are good to have if you are easily distracted.
2. Only one person is allowed to take restroom break at a time; you don't have time to waste, so forego coffee prior to the test.
3. Your scratch papers will be tossed after your exam. So, mark them up!
4. Write any memorized questions on the scratch paper right when you sit down.
5. Answer all questions.
6. Wear a watch and watch the time



## Post Exam

1. Exams are graded by a computer and evaluated by Subject Matter Experts
2. Questions are weighted according to difficulty
3. Exam is ranked according to overall difficulty
4. Results take a minimum of 2 months



# Cheating

## A Few Words About Cheating

- Licensing boards take cheating very seriously.
- In general, it is considered a violation of the law or regulations.
  - You can be prosecuted, in many cases criminally.
  - You can lose your license if you pass by cheating.
  - In some states, you can be forced to pay for the cost of replacing the questions (can be tens of thousands of dollars).
- Possessing examination questions before, during, or after the exam is cheating.
  - If your friends wrote down questions when they took the exam and gave them to you, this is cheating.
  - You writing down or photographing exam questions to give your friends is cheating.
  - Taking anything into the exam site that isn't allowed may get you kicked out with no refund (internet enabled devices, notes, unauthorized calculators etc.).



## Summary

- Take the FG exam as soon as you are eligible. The longer you wait, the more of the basic geology that you learned in college will be forgotten.
- Start a study group.
- Study regularly beginning 6 months before the exam, setting aside time to devote.
- Study the ASBOG<sup>®</sup> handbook closely and go through all the practice problems.



## Thanks to the Contributors

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- Sarah Kalika, P.G., Cornerstone Earth Group; San Ramon, California
- Melissa Magno, G.I.T., Colliers Engineering & Design; Charlotte, North Carolina
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Questions?