ASBOG® Task Analysis Survey (TAS) 2015

Purpose: to maximize the relevance of the FG and PG Examinations to the practice of the geological profession.

History: Task Analysis Surveys were completed in 1995, 2000, 2005, 2010, & 2015.

TAS 2015 Procedures:

- The TAS Subcommittee updated and refined the TAS 2010 task statements (n = 43).
- ASBOG® mailed the TAS to a random sample of 200 licensed/registered geologists/geoscientists in each participating jurisdiction (USA = 5,800; Canada = 1,890; Academia = 2,000).
- Geologists/geoscientists rated the importance of the 43 task statements to the practice of geology as it is applied to the protection of the public.
- The TAS Subcommittee reviewed and evaluated the TAS 2015 results which define the content scope of the FG and PG Examinations (i.e., Test Blueprints).

ASBOG® Task Statements (n = 43)

A. General and Field Geology

- 1. Plan and conduct geological investigations considering human health, safety, and welfare, the environment, regulations, professionalism and ethics, 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. Mineralogy, Petrology, and Geochemistry

- 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.

ASBOG® Task Statements (cont.) (n = 43)

C. Sedimentology, Stratigraphy, and Paleontology

- 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, and sediment provenance.
- 14. Identify and interpret sediment and/or rock sequences, positions, and ages.
- 15. Identify fossils and interpret fossil assemblages for age, paleoenvironmental interpretations, and/or stratigraphic correlations.

D. Geomorphology, Surficial Processes, and Quaternary Geology

- 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 absolute or relative age relationships of landforms, sediments, and soils.
- 19. Evaluate geomorphic processes and development of landforms, sediments, and soils, including watershed functions.
- 20. Apply remote sensing and GIS techniques to interpret geomorphic conditions and processes.

ASBOG® Task Statements (cont.) (n = 43)

E. Structure, Tectonics, and Seismology

- 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 relations, including constructing and interpreting structural projections and 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.

F. Hydrogeology

- 26. Plan and conduct hydrogeological, geochemical, and environmental investigations, including the use of field, laboratory, and analytical techniques.
- 27. Define and characterize hydraulic properties of saturated and vadose zones.
- 28. Design groundwater monitoring, observation, extraction, production, or injection wells.
- 29. Evaluate water resources, assess aquifer yield, and determine sustainability.
- 30. Characterize water quality and assess chemical fate and transport.
- 31. Manage, develop, protect, or remediate surface water or groundwater resources.

ASBOG® Task Statements (cont.) (n = 43)

G. Engineering Geology

- 32. Plan and conduct environmental and engineering geological investigations, including the use of field, laboratory, and analytical techniques.
- 33. Identify and evaluate engineering and physical properties of earth materials.
- 34. Provide recommendations for engineering design, land use decisions, environmental restoration, and watershed management.
- 35. Identify, map, and evaluate geologic, geomorphic, and seismic hazards.
- 36. Interpret land use, landforms, and geological site characteristics using imagery, maps, records, and GIS.
- 37. Develop plans and recommendations for hazard mitigation, and land and watershed restoration.

H. Economic and Resources Geology

- 38. Plan and conduct mineral or energy resource exploration, evaluation, and environmental programs, including the use of field, laboratory, and analytical techniques.
- 39. Compile and interpret the data necessary to explore for mineral and energy resources.
- 40. Estimate the distribution of resources based on surface and subsurface data.
- 41. Undertake economic evaluation and reserve assessment.
- 42. Determine quantity and quality of resources.
- 43. Perform geological studies for design, abandonment, closure, waste management, and reclamation and restoration of energy development or mineral extraction operations.

Task Analysis Survey Rating Scale

JUDGMENT OF IMPORTANCE

Based on your knowledge and experience as a professional geologist/geoscientist, how important is this task to the practice of geology as it is applied to the protection of public health, safety, and well-being?

0 - Not important 1 – Somewhat important 2 – Very important 3 – Extremely important

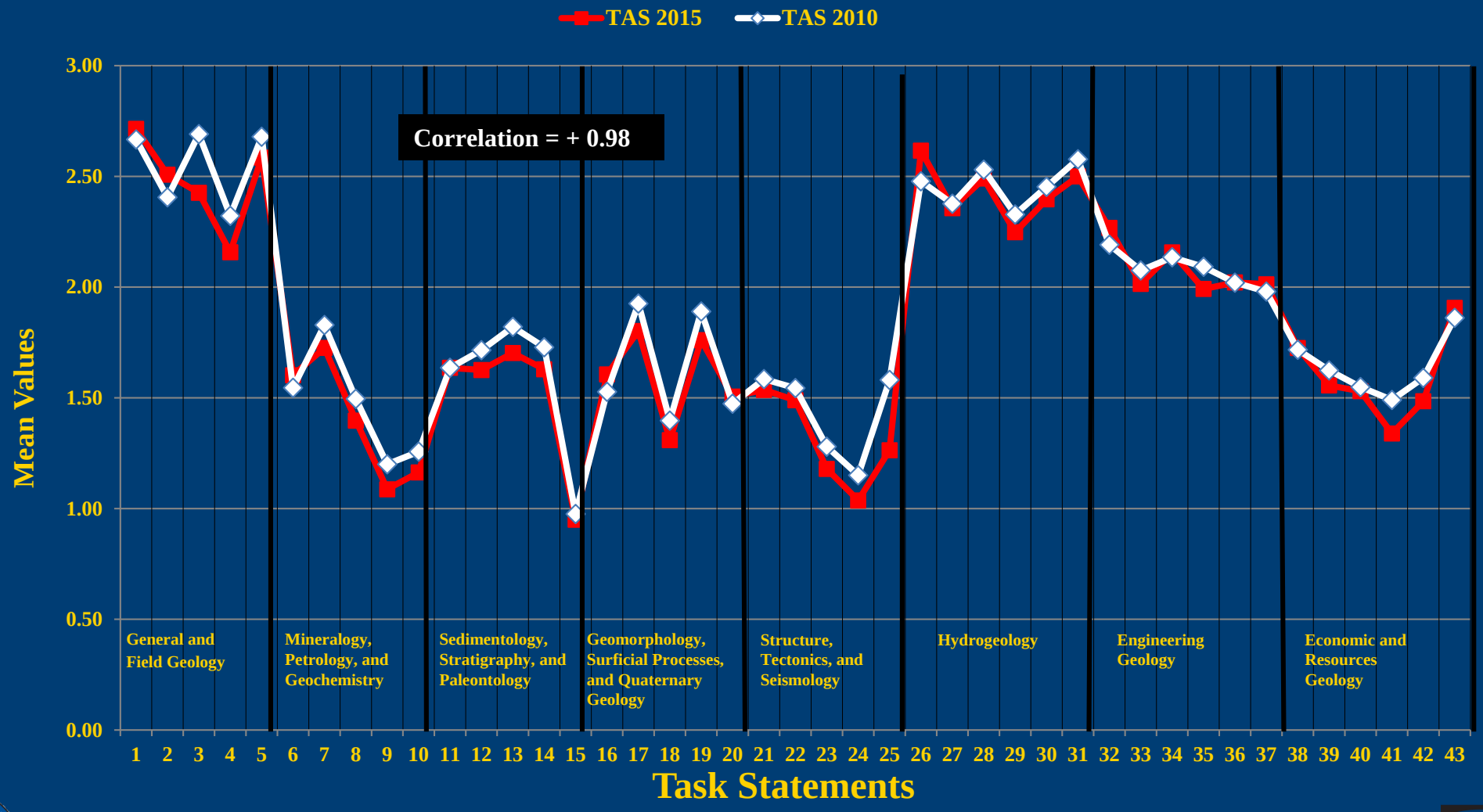
Task Analysis Survey Return Rates

- 2,332 out of 5,800 surveys returned from practicing geologists (USA)
  40% Return Rate

- 399 out of 1,890 surveys returned from practicing geoscientists (Canada)
  21% Return Rate

- 194 out of 2,000 surveys returned from academicians (USA)
  10% Return Rate

ASBOG® Task Analysis 2015
Mean Values for All Task Statements for Practicing Geologists (TAS 2015 vs. TAS 2010)



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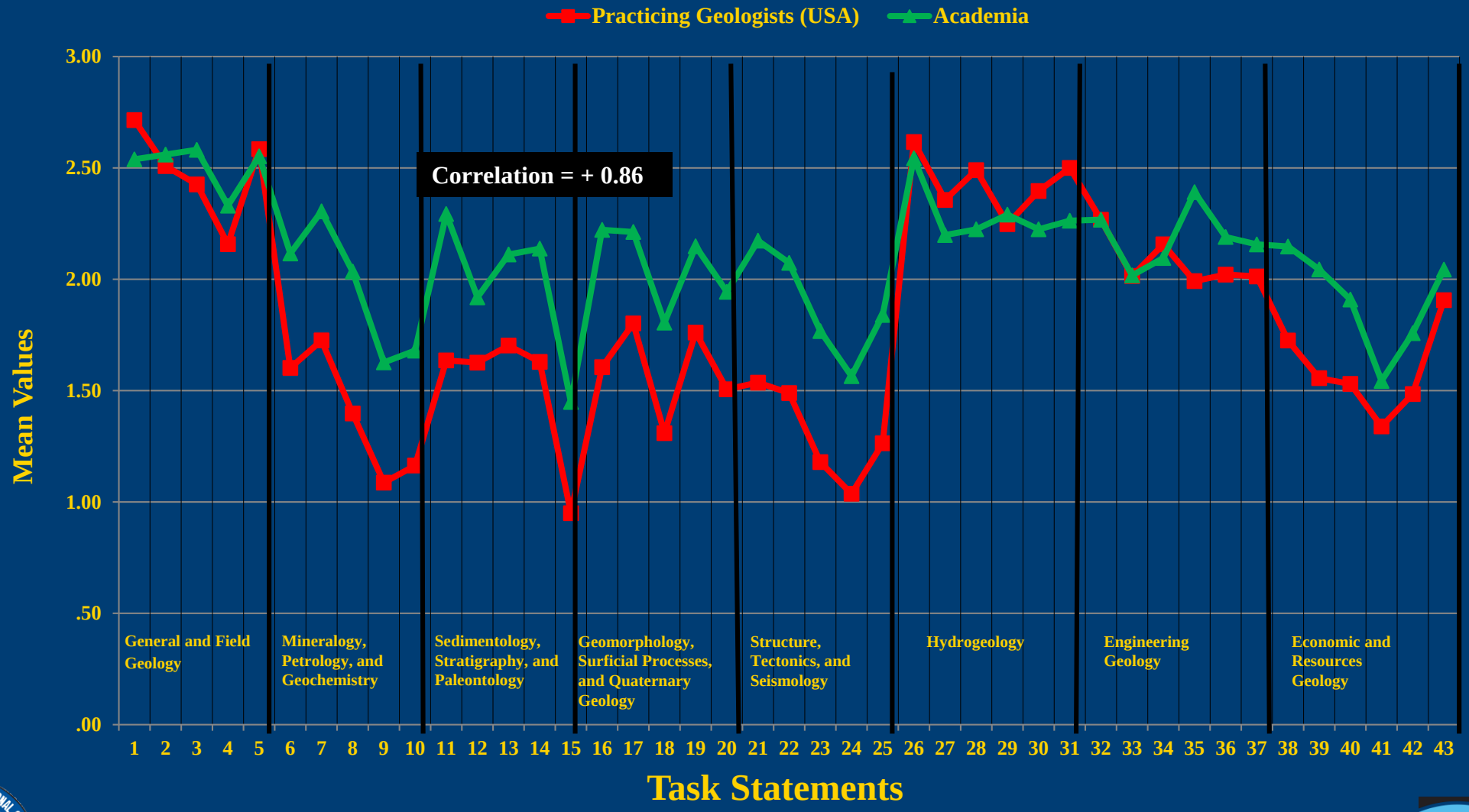
ASBOG® Task Analysis 2015
Consistency in the Practice of Geology (USA)

- Reliability analyses indicate a high degree of consistency in the ratings made by practicing geologists in each of the 29 states (Alpha Coefficient = +0.997).

ASBOG® Task Analysis 2015
Mean Values for All Task Statements
Practicing Geologists (USA) vs. Academia



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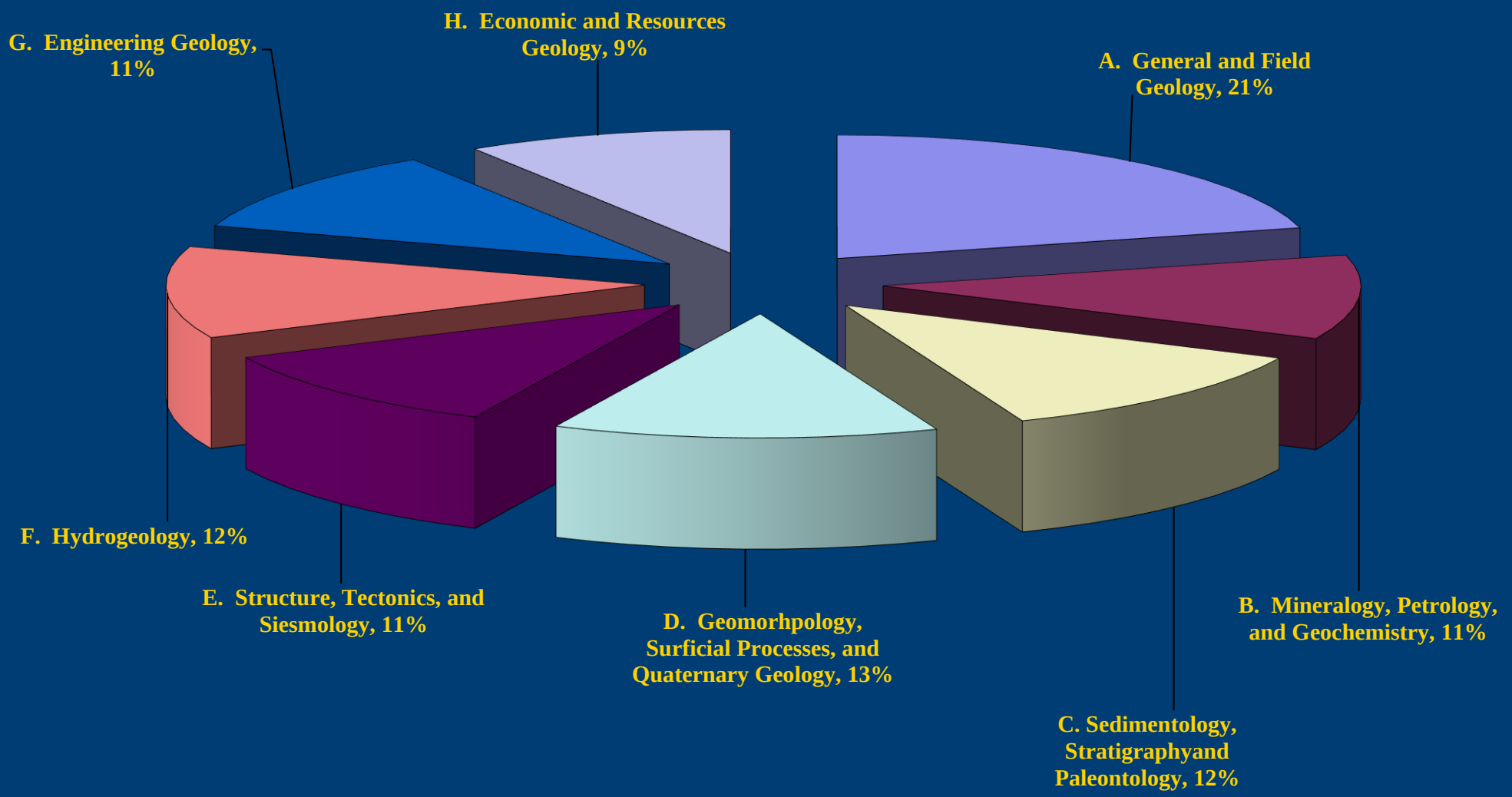
ASBOG® Task Analysis 2015
Fundamentals of Geology (FG)
Practice of Geology (PG)
Test Blueprints

- FG Test Blueprint - Developed using the ratings from Practicing Geologists (50%) and Academicians (50%)

- PG Test Blueprint – Developed using the ratings from Practicing Geologists (100%)

ASBOG® Task Analysis 2015
FG Test Blueprint - Domain Percentages



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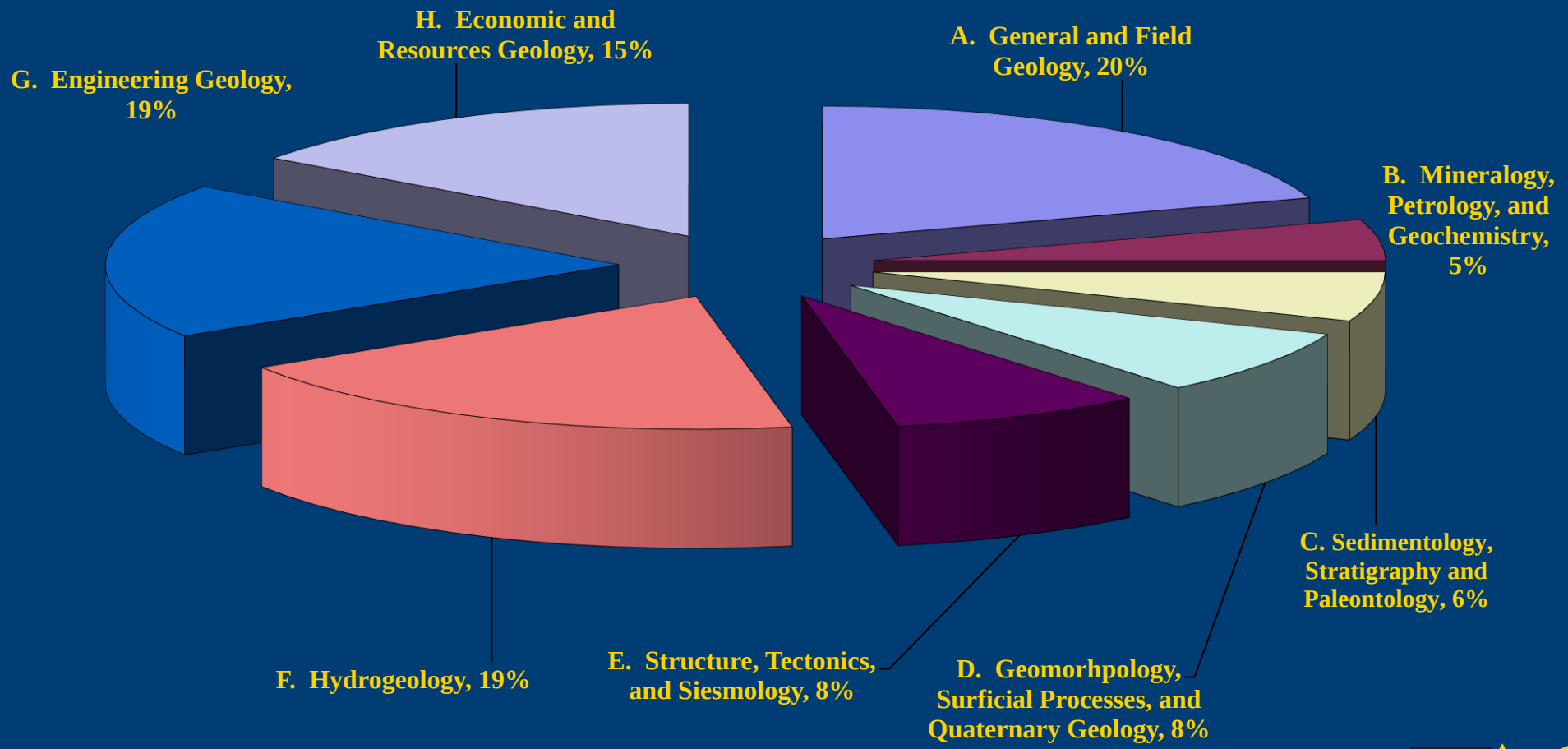
ASBOG® Task Analysis 2015
PG Test Blueprint - Domain Percentages



ASBOG® Test Development Process
Council of Examiners (COE)

- A committee of licensed professional geologists serves as Subject Matter Experts (SMEs) on the Council of Examiners (COE). They supply the expertise that is essential in developing high-quality examinations.

- The SMEs (45 – 55) attend two COE examination development workshops each year shortly after the examinations are administered. The SMEs accomplish the following objectives following an orientation that addresses principles for evaluating test questions:

  1. review and evaluate the statistical results from the FG and PG Examinations,

  2. review and evaluate candidates' comments from the FG and PG Examinations,

  3. finalize the scoring keys on the FG and PG Examinations by multiple-keying or deleting items based on #1 and #2 above,

  4. write and review new questions for inclusion into the FG and PG Item Banks, and

  5. review and finalize the upcoming forms of the FG and PG Examinations.

ASBOG® Test Development Process
Criteria for Evaluating Examination Items

- Does the item relate to public protection?
- Is the item related to the practice of the profession?
- Is the item written at an "entry level" of difficulty?
- Does the item have only one correct or best answer?
- Is the item classified into the proper task statement in the Test Blueprint?
- Is the language clear and direct?
- Does the stem of the problem adequately describe a problem or situation?
- Does the stem of the item avoid negative phrasing?
- Do the options avoid "none of the above" or "all of the above"?
- Are the options (key and distractors) approximately the same length?
- Is the item free of "trickery"?
- Does the item avoid assessing "trivia"?

ASBOG® Test Development Process
Item Development and Review

- The FG and PG Examination questions are subjected to multiple reviews before they are scored.

  Each question is:

- written by a COE Member based on a particular task from the TAS and independently reviewed and edited, as necessary, by three other COE Members.

- reviewed by three COE Members and edited, as necessary, at a subsequent workshop to verify that typographical errors were not introduced when the question was entered into the Item Bank.

- reviewed by COE Members (15 - 20) and edited, as necessary, when the item is included in a draft examination prior to administration.

- reviewed by COE Members (15 - 20) after administration of the examination in conjunction with candidates' comments and a statistical evaluation of the item.

  Examination accuracy is enhanced because substandard items that are detected during the review process are not scored, and consequently, do not influence candidates' final scores.

ASBOG® Test Development Process
Statistical Analysis of Examination Items

- **Item Difficulty Levels** – The difficulty levels are based on the percent of candidates answering the items correctly (range from 0% correct to 100% correct).

- **Item-total Correlations** - The correlations show the relationship between candidate performance on individual items relative to the total examination scores (range from -1.00 to +1.00).

  Items with positive correlations are desirable because this demonstrates that candidates that answered the questions correctly received higher test scores compared to candidates that missed the questions.

  Items with negative correlations are considered suspect and are "flagged" for special review because negative correlations indicate that candidates with low test scores did better on the items than candidates with high test scores.

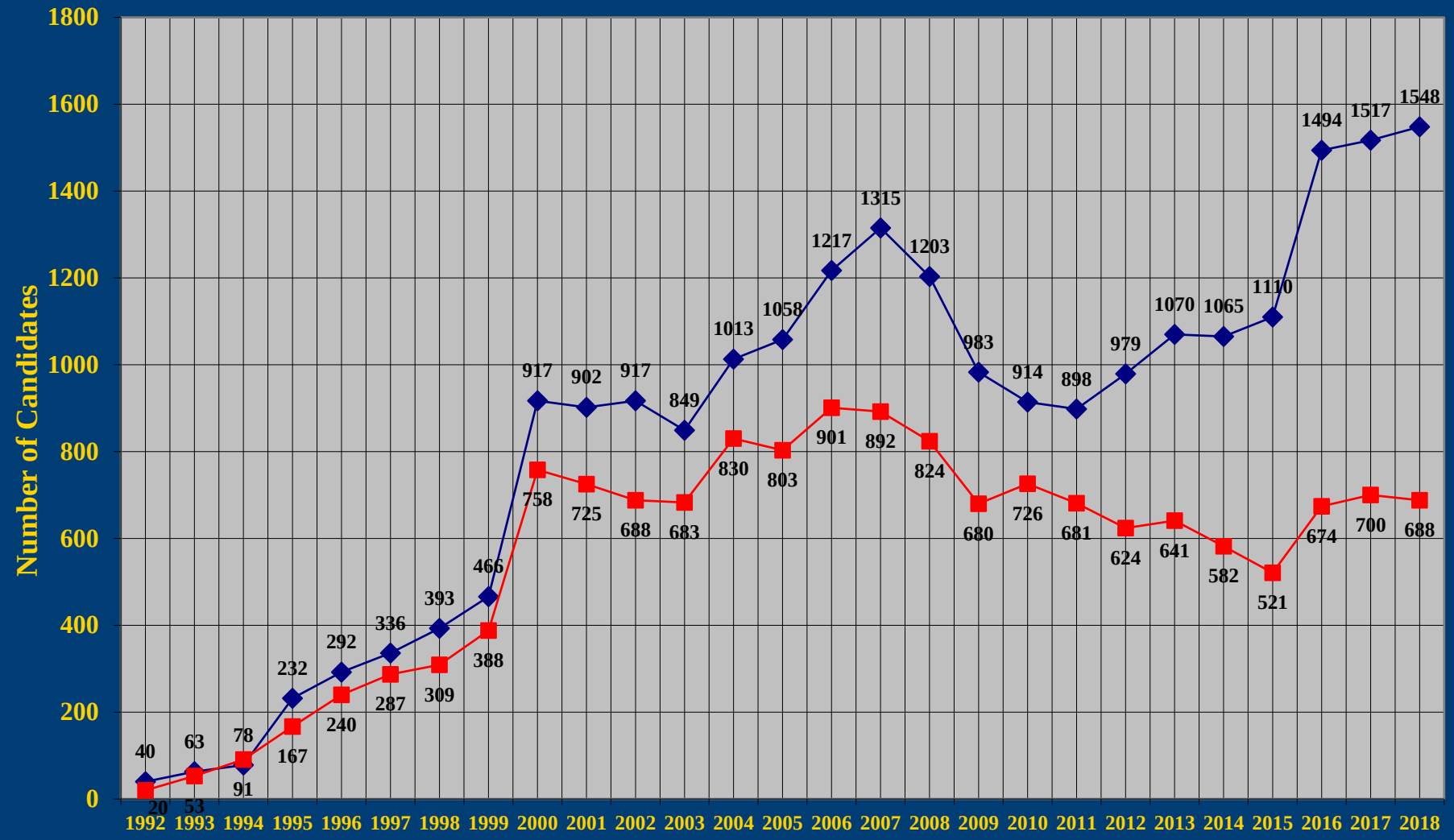
ASBOG® Test Development Process
Cut-off Scores

- The passing scores on the FG and PG Examinations reflect *minimum competency* and are determined using a criterion-referenced procedure.

- The COE evaluates the difficulty levels of the examination items in relation to minimum competency in establishing cut-off scores that reflect minimum competency.

- Passing scores are adjusted (scaled) based on the difficulty level of each examination so that candidates have approximately the same probability of passing any version of the examinations.

ASBOG® FG and PG Examinations
Candidate Volume by Year
(1992 - 2018)



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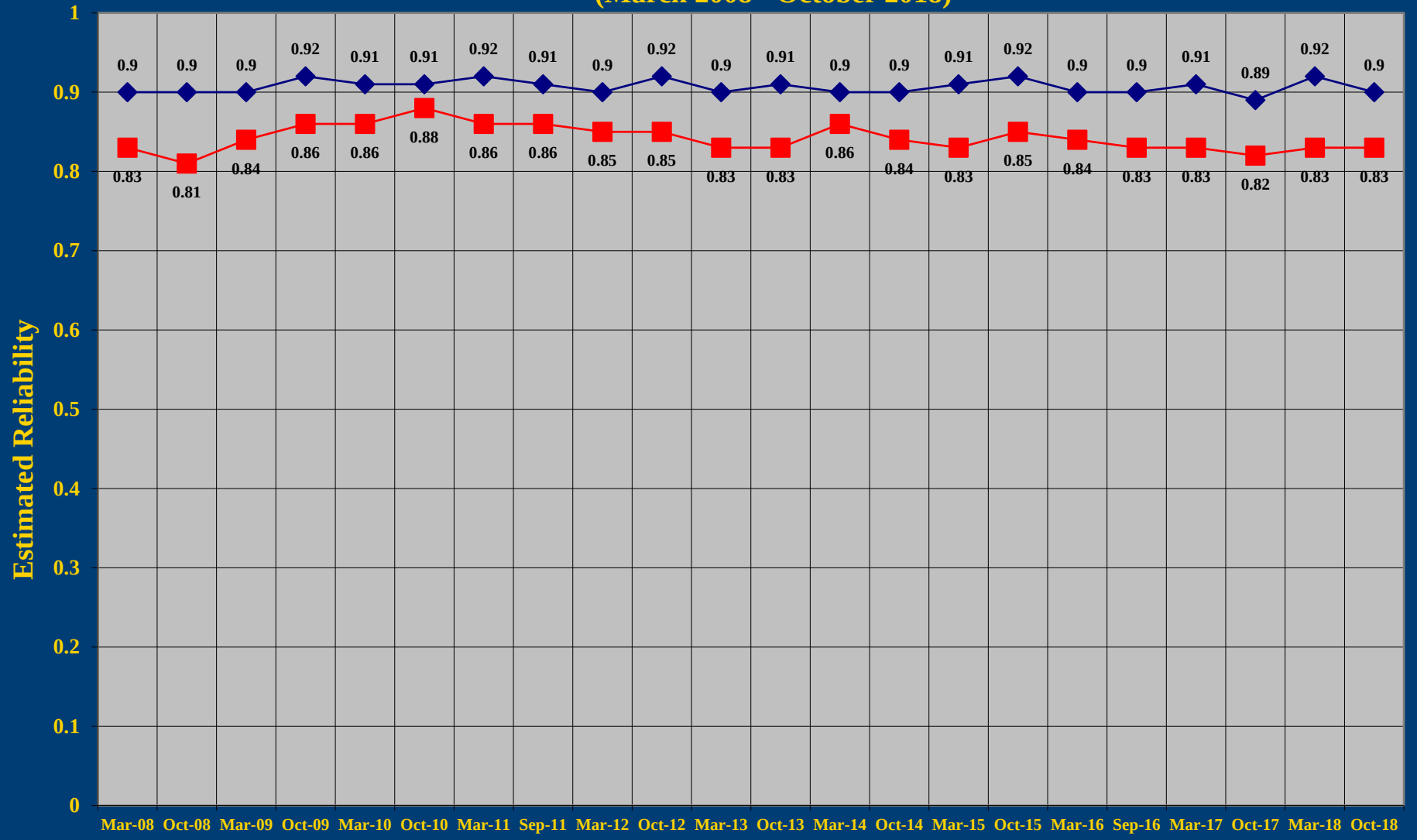
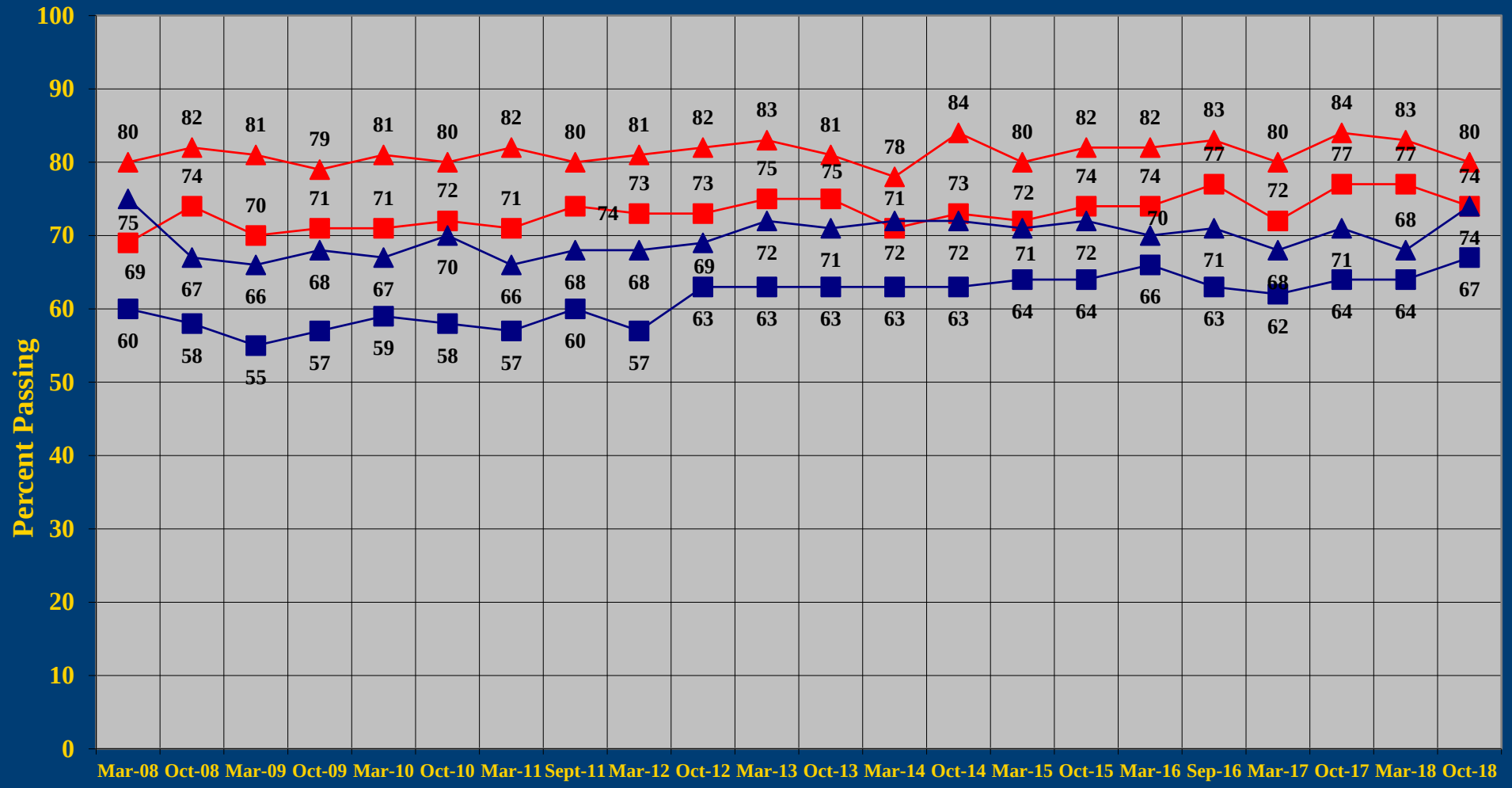
ASBOG® FG and PG Examinations
Exam Performance by Administration
(March 2008 - October 2018)



ASBOG® FG and PG Examinations
Passing Rates by Administration
1st Time Candidates vs. All Candidates
(March 2008 - October 2018)



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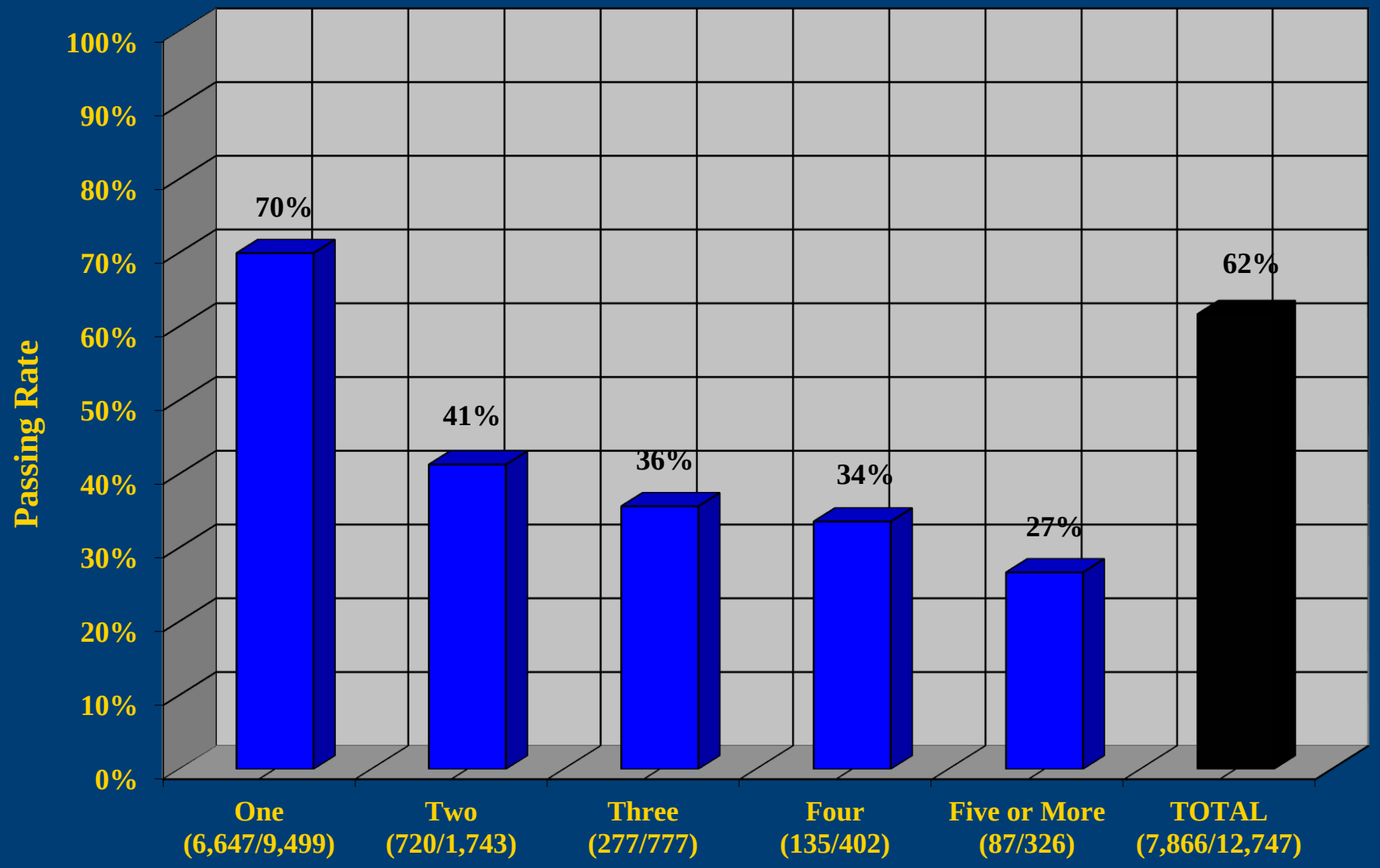
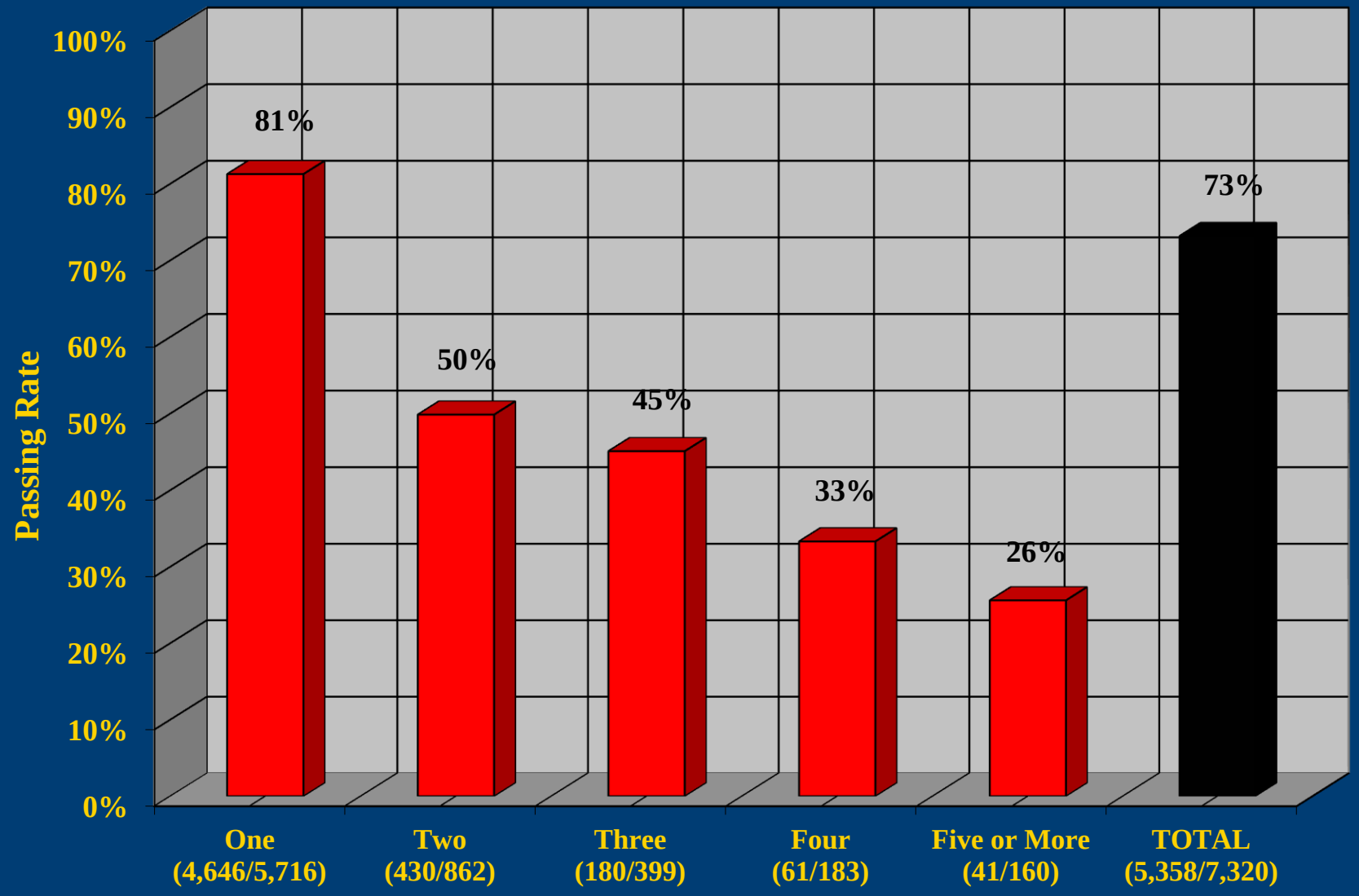
ASBOG® Fundamentals of Geology Examination
Passing Rate by Number of Attempts
(March 2008 through October 2018)
Total Number of Candidates = 12,747



ASBOG® Practice of Geology Examination
Passing Rate by Number of Attempts
(March 2008 through October 2018)
Total Number of Candidates = 7,320



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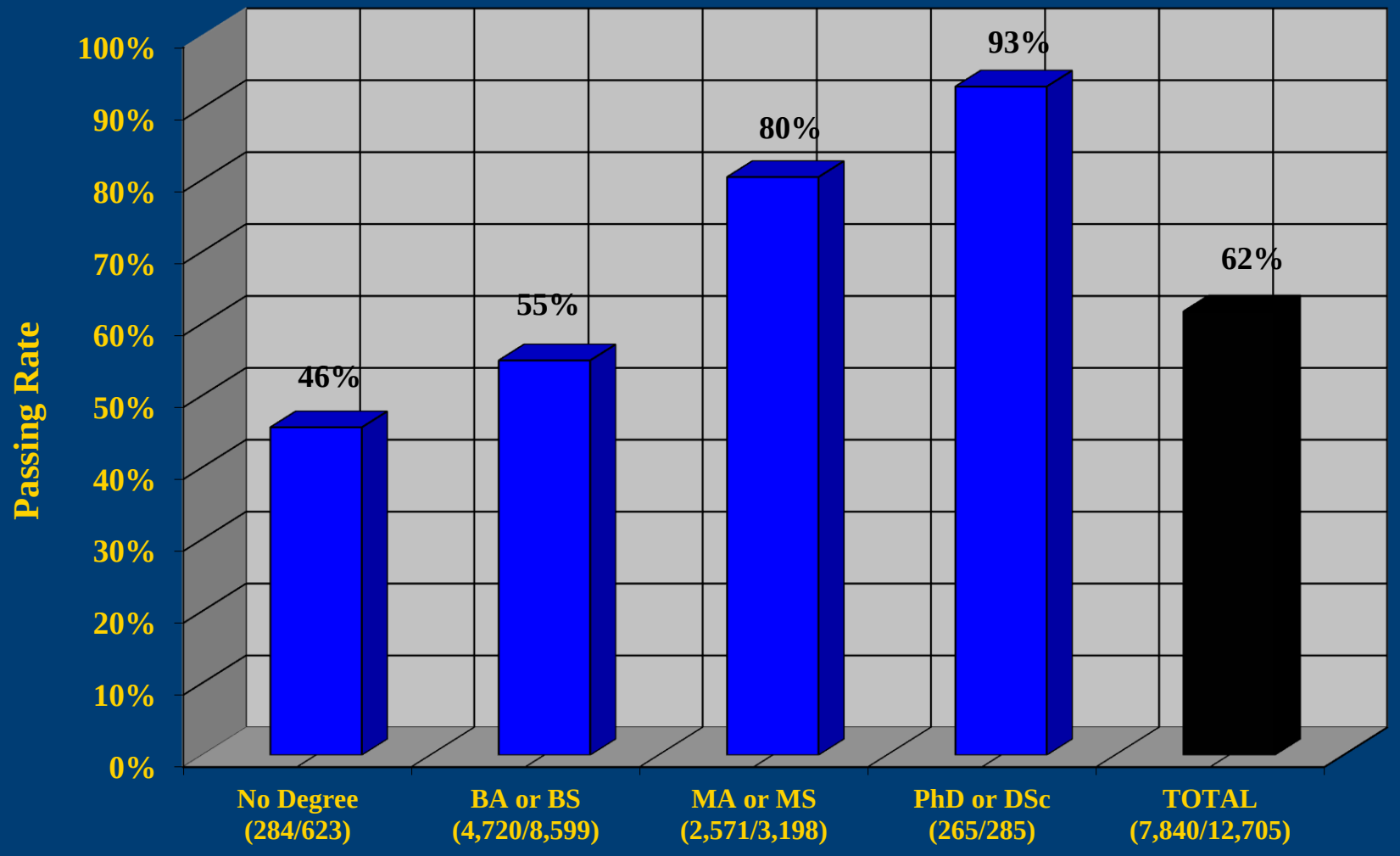
ASBOG® Fundamentals of Geology Examination
Passing Rate by Highest Degree in the Geological Sciences
(March 2008 through October 2018)
Total Number of Candidates = 12,705



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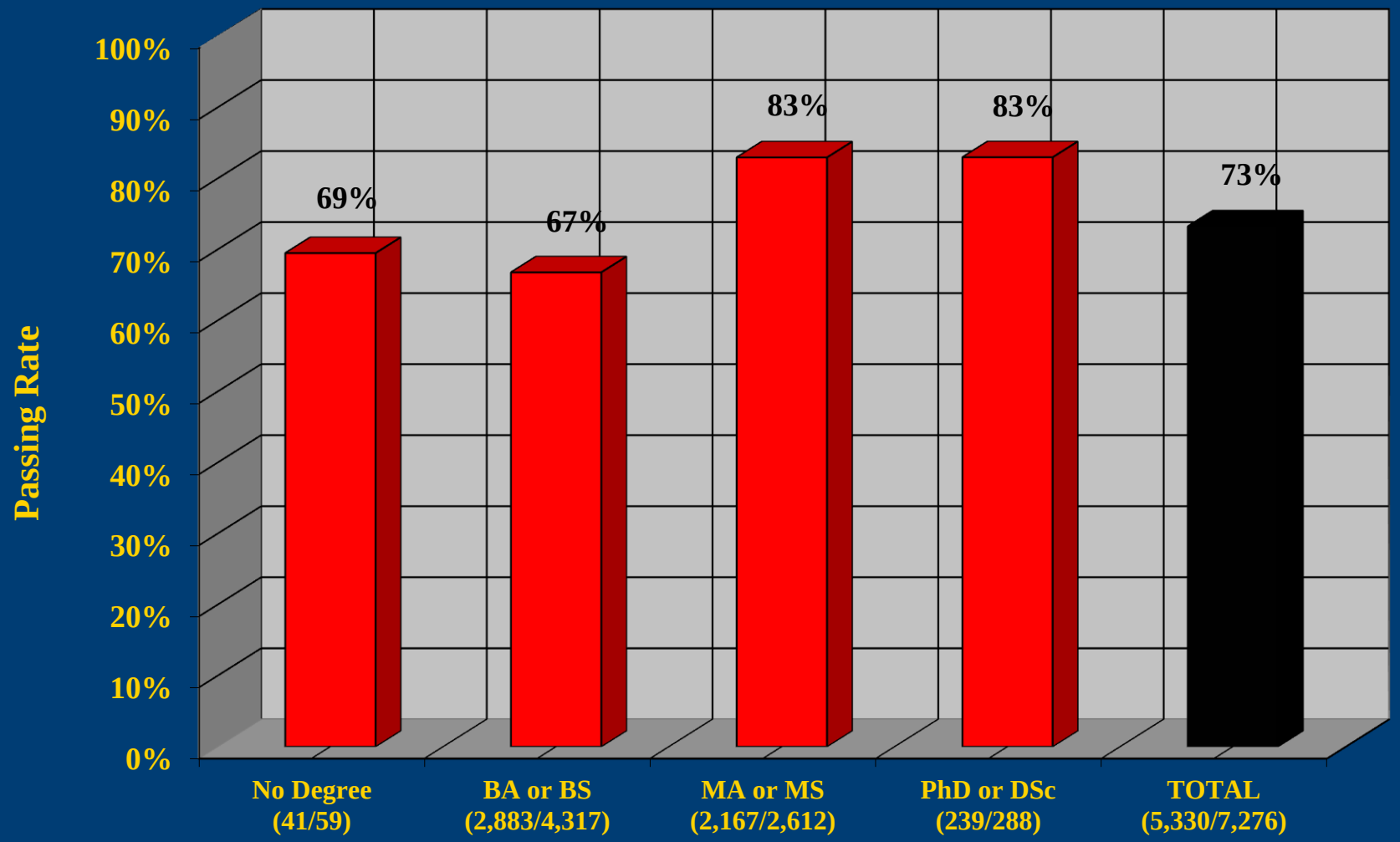
ASBOG® Practice of Geology Examination
Passing Rate by Highest Degree in the Geological Sciences
(March 2008 through October 2018)
Total Number of Candidates = 7,276



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