Graduate Record Examination (GRE)

Record Examination: General Test	
Acronym	GRE
Type	Computer-based or paper-based standardized test
Developer / administrator	Educational Testing Service
Knowledge / skills tested	Analytical writing, quantitative reasoning and verbal reasoning.
Purpose	Admissions to master's and doctoral degree programs in various universities
Year started	1936; 83 years ago
Duration	About 3 hours and 45 minutes (includes 1-minute breaks after each section and a 10-minute break after third section)
Score / grade range	Analytical writing: 0.0 to 6.0 (in 0.5-point increments), Verbal reasoning: 130 to 170 (in 1-point increments),

	Quantitative reasoning: 130 to 170 (in 1-point increments).
Score / grade validity	5 years
Offered	Computer-based test: Multiple times a year (depends on availability of the test center) Paper-based test: Up to 3 times a year in October, November and February
Restrictions on attempts	Computer-based test: Can be taken only once after 21 days from the day of exam in every year. Maximum of 5 times a year. (Applies even if candidate cancels scores on a test taken previously Paper-based test: Can be taken as often as it is offered.
Countries / regions	About 1,000 test centers in more than 160 countries (Paper-based test offered only in areas where computer-based testing is not available.)
Languages	English
Annual number of test takers	584,677 (2016)
Prerequisites /	No official prerequisite. Intended for

eligibility criteria	bachelor's degree graduates and undergraduate students who are about to graduate. Fluency in English assumed.
Fee	US$ 205 (Limited offers of "Fee Reduction Program" for U.S. citizens or resident aliens who demonstrate financial need, and for national programs in United States that work with underrepresented groups)
Scores / grades used by	Most graduate schools in USA, and few in other countries

The **Graduate Record Examinations** (**GRE**) is a standardized test that is an admissions requirement for most graduate schools in the United States. The GRE is owned and administered by Educational Testing Service (ETS). The test was established in 1936 by the Carnegie Foundation for the Advancement of Teaching.

According to ETS, the GRE aims to measure verbal reasoning, quantitative reasoning, analytical writing, and critical thinking skills that have been acquired over a long period of learning. The content of the GRE consists of certain specific algebra, geometry, arithmetic, and vocabulary sections. The GRE General Test is offered as a computer-based exam administered at Prometric testing centers. In the graduate school admissions process, the level of emphasis that is placed upon GRE scores varies widely between schools and departments within schools. The importance of a GRE score can range from being a mere admission formality to an important selection factor.

The GRE was significantly overhauled in August 2011, resulting in an exam that is not adaptive on a question-by-question basis, but rather by section, so that the performance on the first verbal and math sections determines the difficulty of the second sections presented. Overall, the test retained the sections and many of the question types from its predecessor, but the scoring scale was changed to a 130 to 170 scale (from a 200 to 800 scale).

The cost to take the test is US$205, although ETS will reduce the fee under certain circumstances. They also promote financial aid to those GRE applicants who prove economic hardship. ETS does not release scores that are older than five years, although graduate program policies on the acceptance of scores older than five years will vary.

History

The Graduate Record Examinations was "initiated in 1936 as a joint experiment in higher education by the graduate school deans of four eastern universities and the Carnegie Foundation for the Advancement of Teaching."

The first universities to experiment the test on their students were Harvard University, Yale University, Princeton University and Columbia University. The University of Wisconsin was the first public university to ask their students to take the test in 1938. It was first given to students at the University of Iowa in 1940, where it was analyzed by psychologist Dewey Suit. It was first taken by students at Texas Tech University in 1942. In 1943, it was taken by students at Michigan State University, where it was analyzed by Paul Dressel. It was taken by over 45,000 students applying to 500 colleges in 1948.

"Until the Educational Testing Service was established in January, 1948, the Graduate Record Examination remained a project of the Carnegie Foundation."

2011 revision

In 2006, ETS announced plans to enact significant changes in the format of the GRE. Planned changes for the revised GRE included a longer testing time, a departure from computer-adaptive testing, a new grading scale, and an enhanced focus on reasoning skills and critical thinking for both the quantitative and qualitative sections.

On April 2, 2007, ETS announced the decision to cancel plans for revising the GRE. The announcement cited concerns over the ability to provide clear and equal access to the new test after the planned changes as an explanation for the cancellation. The ETS stated, however, that they do plan "to implement many of the planned test content improvements in the future", although specific details regarding those changes were not initially announced.

Changes to the GRE took effect on November 1, 2007, as ETS started to include new types of questions in the exam. The changes mostly centered on "fill in the blank" type answers for the mathematics section that requires the test-taker to fill in the blank directly, without being able to choose from a multiple choice list of answers. ETS announced plans to introduce two of these new types of questions in each quantitative section, while the majority of questions would be presented in the regular format.

Since January 2008, the Reading Comprehension within the verbal sections has been reformatted, passages' "line numbers will be replaced with highlighting when necessary in order to focus the test taker on specific information in the passage" to "help students more easily find the pertinent information in reading passages."

In December 2009, ETS announced plans to move forward with significant revisions to the GRE in 2011. Changes include a new 130–170 scoring scale, the elimination of certain question types such as antonyms and analogies, the addition of an online calculator, and the elimination of the CAT format of question-by-question adjustment, in favor of a section by section adjustment.

On August 1, 2011. the Revised GRE General test replaced General GRE test. The revised GRE is said to be better by design and gives better test taking experience. The new types of questions in the revised pattern are supposed to test the skills needed in graduate and business schools programs. From July 2012 onwards GRE announced an option for users to customize their scores called ScoreSelect.

Before October 2002

The earliest versions of the GRE tested only for verbal and quantitative ability. For a number of years before October 2002, the GRE had a separate Analytical Ability section which tested candidates on logical and analytical reasoning abilities. This section was replaced by the Analytical Writing Assessment

Structure

The computer-based GRE General Test consists of six sections. The first section is always the analytical writing section involving separately timed issue and argument tasks. The next five sections consist of two verbal reasoning sections, two quantitative reasoning sections, and either an experimental or research section. These five sections may occur in any order. The experimental section does not count towards the final score but is not distinguished from the scored sections. Unlike the computer adaptive test before August 2011, the GRE General Test is a multistage test, where the examinee's performance on earlier sections determines the difficulty of subsequent sections. This format allows the examined person to freely move back and forth between questions within each section, and the testing software allows the user to "mark" questions within each section for later review if time remains. The entire testing procedure lasts about 3 hours 45 minutes. One-minute breaks are offered after each section and a 10-minute break after the third section.

The paper-based GRE General Test also consists of six sections. The analytical writing is split up into two sections, one section for each issue and argument task. The next four sections consist of two verbal and two quantitative sections in varying order. There is no experimental section on the paper-based test. This version is only available in areas where the computer-based version is unavailable.

Verbal section

The computer-based verbal sections assess reading comprehension, critical reasoning, and vocabulary usage. The verbal test is scored on a scale of 130–170, in 1-point increments. (Before August 2011, the scale was 200–800, in 10-point increments.) In a typical examination, each verbal section consists of 20 questions to be completed in 30 minutes. Each verbal section consists of about 6 text completion, 4 sentence equivalence, and 10 critical reading questions. The changes in 2011 include a reduced emphasis on rote vocabulary knowledge and the elimination of antonyms and analogies. Text completion items have replaced sentence completions and new reading question types allowing for the selection of multiple answers were added.

Quantitative section

The computer-based quantitative sections assess basic high school level mathematical knowledge and reasoning skills. The quantitative test is scored on a scale of 130–170, in 1-point

increments (Before August 2011 the scale was 200–800, in 10-point increments). In a typical examination, each quantitative section consists of 20 questions to be completed in 35 minutes. Each quantitative section consists of about 8 quantitative comparisons, 9 problem solving items, and 3 data interpretation questions. The changes in 2011 include the addition of numeric entry items requiring the examinee to fill in the blank and multiple-choice items requiring the examinee to select multiple correct responses.

Analytical writing section

The analytical writing section consists of two different essays, an "issue task" and an "argument task". The writing section is graded on a scale of 0–6, in half-point increments. The essays are written on a computer using a word processing program specifically designed by ETS. The program allows only basic computer functions and does not contain a spell-checker or other advanced features. Each essay is scored by at least two readers on a six-point holist scale. If the two scores are within one point, the average of the scores is taken. If the two scores differ by more than a point, a third reader examines the response.

Issue Task

The test taker is given 30 minutes to write an essay about a selected topic. Issue topics are selected from a pool of questions, which the GRE Program has published in its entirety. Individuals preparing for the GRE may access the pool of tasks on the ETS website.

Argument Task

The test taker will be given an argument (i.e. a series of facts and considerations leading to a conclusion) and asked to write an essay that critiques the argument. Test takers are asked to consider the argument's logic and to make suggestions about how to improve the logic of the argument. Test takers are expected to address the logical flaws of the argument and not provide a personal opinion on the subject. The time allotted for this essay is 30 minutes. The Arguments are selected from a pool of topics, which the GRE Program has published in its entirety. Individuals preparing for the GRE may access the pool of tasks on the ETS website.

Experimental section

The experimental section, which can be either verbal or quantitative, contains new questions ETS is considering for future use. Although the experimental section does not count towards the test-taker's score, it is unidentified and appears identical to the scored sections. Because test takers have no definite way of knowing which section is experimental, it is typically advised that test takers try their best and be focused on every section. Sometimes an identified research section at the end of the test is given instead of the experimental section. There is no experimental section on the paper-based GRE.

Scoring

An examinee can miss one or more questions on a multiple-choice section and still receive a perfect score of 170. Likewise, even if no question is answered correctly, 130 is the lowest possible score.

Scaled score percentiles

The percentiles for the current General test and the concordance with the prior format are as follows. Means and standard deviations for the measures on the new score scale are not yet available:

"Field-wise distribution" of test takers is "limited to those who earned their college degrees up to two years before the test date." ETS provides no score data for "non-traditional" students who have been out of school more than two years, although its own report "RR-99-16" indicated that 22% of all test takers in 1996 were over the age of 30. [36]

GRE Subject Tests

You can take GRE Subject Test to highlight your strengths in specific subject area

In addition to the General Test, there are also six GRE Subject Tests testing knowledge in the specific areas of Biology; Chemistry; Literature in English; Mathematics; Physics; and Psychology. The length of each exam is 170 minutes.

In the past, subject tests were also offered in the areas of Computer Science, Economics, Revised Education, Engineering, Geology, History, Music, Political Science, Sociology, and Biochemistry, Cell and Molecular Biology. In April 1998, the Revised Education and Political Science exams were discontinued. In April 2000, the History and Sociology exams were discontinued; with Economics, Engineering, Music, and Geology being discontinued in April 2001. The Computer Science exam was discontinued after April 2013. Biochemistry, Cell and Molecular Biology was discontinued in December 2016.

Use in admissions

Many graduate schools in the United States require GRE results as part of the admissions process. The GRE is a standardized test intended to measure all graduates' abilities in tasks of general academic nature (regardless of their fields of specialization) and the extent to which undergraduate education has developed their verbal skills, quantitative skills, and abstract thinking.

In addition to GRE scores, admission to graduate schools depends on several other factors, such as GPA, letters of recommendation, and statements of purpose. Furthermore, unlike other standardized admissions tests (such as the SAT, LSAT, and MCAT), the use and weight of GRE scores vary considerably not only from school to school, but also from department to department and program to program. For instance, most business schools and economics programs require very high GRE or GMAT scores for entry, while engineering programs are known to allow more score variation. Liberal arts programs may only consider the applicant's verbal score, while mathematics and science programs may only consider quantitative ability. Some schools use the GRE in admissions decisions, but not in funding decisions; others use it for selection of scholarship and fellowship candidates, but not for admissions. In some cases, the GRE may be a general requirement for graduate admissions imposed by the university, while particular departments may not consider the scores at all. Graduate schools will typically provide the average scores of previously admitted students and information about how the GRE

is considered in admissions and funding decisions. In some cases programs have hard cut off requirements for the GRE; for example, the Yale Economics PhD program requires a minimum quantitative score of 160 to apply. The best way to ascertain how a particular school or program evaluates a GRE score in the admissions process is to contact the person in charge of graduate admissions for the specific program in question.

In February 2016, the University of Arizona James E. Rogers College of Law became the first law school to accept either the GRE or the Law School Admissions Test (LSAT) from all applicants. The college made the decision after conducting a study showing that the GRE is a valid and reliable predictor of students' first-term law school grades.

In the spring of 2017, Harvard Law School announced it was joining University of Arizona Law in accepting the GRE in addition to the LSAT from applicants to its three-year J.D. program.

MBA

GRE score can be used for MBA programs in some schools.

The GMAT (Graduate Management Admission Test) is a computer-adaptive standardized test in mathematics and the English language for measuring aptitude to succeed academically in graduate business studies. Business schools commonly use the test as one of many selection criteria for admission into an MBAprogram. Starting in 2009, many business schools began accepting the GRE in lieu of a GMAT score. Policies varied widely for several years. However, as of the 2014–2015 admissions season, most business schools accept both tests equally. Either a GMAT score, or a GRE score, can be submitted for an application to an MBA program. Business schools also accept either score for their other (non-MBA) Master's and PhD programs.

The primary issue on which business school test acceptance policies vary is in how old a GRE or GMAT score can be before it is no longer accepted. The standard is that scores cannot be more than 5 years old (e.g., Wharton, MIT Sloan, Columbia Business School)

Preparation

A variety of resources are available for those wishing to prepare for the GRE. ETS provides preparation software called PowerPrep, which contains two practice tests of retired questions, as well as further practice questions and review material. Since the software replicates both the test format and the questions used, it can be useful to predict the actual GRE scores. ETS does not license their past questions to any other company, making them the only source for official retired material. ETS used to publish the "BIG BOOK" which contained a number of actual GRE questions; however, this publishing was abandoned. Several companies provide courses, books, and other unofficial preparation materials.

Some students taking the GRE use a test preparation company. Students who do not use these courses often rely on material from university text books, GRE preparation books, sample tests, and free web resources.

Testing locations

While the general and subject tests are held at many undergraduate institutions, the computer-based general test is only held at test centers with appropriate technological accommodations. In the United States, students in major cities or from large universities will usually find a nearby test center, while those in more isolated areas may have to travel a few hours to an urban or university location. Many industrialized countries also have test centers, but at times test-takers must cross country borders.

Criticism

Bias

Algorithmic bias

Critics have claimed that the computer-adaptive methodology may discourage some test takers since the question difficulty changes with performance. For example, if the test-taker is presented with remarkably easy questions halfway into the exam, they may infer that they are not performing well, which will influence their abilities as the exam continues, even though question difficulty is subjective. By contrast, standard testing methods may discourage students by giving them more difficult items earlier on.

Critics have also stated that the computer-adaptive method of placing more weight on the first several questions is biased against test takers who typically perform poorly at the beginning of a test due to stress or confusion before becoming more comfortable as the exam continues. On the other hand, standard fixed-form tests could equally be said to be "biased" against students with less testing stamina since they would need to be approximately twice the length of an equivalent computer adaptive test to obtain a similar level of precision.

Implicit bias

The GRE has also been subjected to the same racial bias criticisms that have been lodged against other admissions tests. In 1998, *The Journal of Blacks in Higher Education* noted that the mean score for black test-takers in 1996 was 389 on the verbal section, 409 on the quantitative section, and 423 on the analytic, while white test-takers averaged 496, 538, and 564, respectively. The National Association of Test Directors Symposia in 2004 stated a belief that simple mean score differences may not constitute evidence of bias unless the populations are known to be equal in ability. A more effective, accepted, and empirical approach is the analysis of differential test functioning, which examines the differences in item response theory curves for subgroups; the best approach for this is the DFIT framework.

Weak indicator of graduate school performance

The GREs are criticized for not being a true measure of whether a student will be successful in graduate school. Robert Sternberg (now of Cornell University;[56] working at Yale University at the time of the study), a long-time critic of modern intelligence testing in general, found the GRE general test was weakly predictive of success in graduate studies in psychology. The strongest relationship was found for the now-defunct analytical portion of the exam.

The ETS published a report ("What is the Value of the GRE?") that points out the predictive value of the GRE on a student's index of success at the graduate level. The problem with earlier studies is the statistical phenomena of restriction of range. A correlation coefficient is sensitive to the range sampled for the test. Specifically, if only students accepted to graduate programs

are studied (in Sternberg & Williams and other research), the relationship is occluded. Validity coefficients range from .30 to .45 between the GRE and both first year and overall graduate GPA in ETS' study.

Kaplan and Saccuzzo state that the criterion that the GRE best predicts is first-year grades in graduate school. However, this correlation is only in the high tens to low twenties. "If the test correlates with a criterion at the .4 level, then it accounts for 16% of the variability in that criterion, with the other 84% resulting from unknown factors and errors" (p. 303). Graduate schools may be placing too much importance on standardized tests rather than on factors that more fully account for graduate school success, such as prior research experience, GPAs, or work experience. While graduate schools do consider these areas, many times schools will not consider applicants that score below a current score of roughly 314 (1301 prior score). Kaplan and Saccuzzo also state that "the GRE predict[s] neither clinical skill nor even the ability to solve real-world problems" (p. 303).

In 2007, a study by a university found a correlation of .30 to .45 between the GRE and both first year and overall graduate GPA. The correlation between GRE score and graduate school completion rates ranged from .11 (for the now defunct analytical section) to .39 (for the GRE subject test). Correlations with faculty ratings ranged from .35 to .50.

Historical susceptibility to cheating

In May 1994, Kaplan, Inc warned ETS, in hearings before a New York legislative committee, that the small question pool available to the computer-adaptive test made it vulnerable to cheating. ETS assured investigators that it was using multiple sets of questions and that the test was secure. This was later discovered to be incorrect.

In December 1994, prompted by student reports of recycled questions, then Director of GRE Programs for Kaplan, Inc and current CEO of Knewton, Jose Ferreira led a team of 22 staff members deployed to 9 U.S. cities to take the exam. Kaplan, Inc then presented ETS with 150 questions, representing 70–80% of the GRE. According to early news releases, ETS appeared grateful to Stanley H. Kaplan, Inc for identifying the security problem. However, on December 31, ETS sued Kaplan, Inc for violation of a federal electronic communications privacy act, copyright laws, breach of contract, fraud, and a confidentiality agreement signed by test-takers on test day. On January 2, 1995, an agreement was reached out of court.

Additionally, in 1994, the scoring algorithm for the computer-adaptive form of the GRE was discovered to be insecure. ETS acknowledged that Kaplan, Inc employees, led by Jose Ferreira, reverse-engineered key features of the GRE scoring algorithms. The researchers found that a test taker's performance on the first few questions of the exam had a disproportionate effect on the test taker's final score. To preserve the integrity of scores, ETS revised its scoring and uses a more sophisticated scoring algorithm.