

Certification

H A N D B O O K

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Introduction to ASQ Certification Programs

Since 1968, when the first ASQ certification exam was given, more than 100,000 individuals have become certified through ASQ, including many who have attained more than one designation. In addition, an increasing number of companies, some 125 at last count, have formally recognized ASQ's certification as verification of an individual's knowledge of quality theory and techniques. A recent search on monster.com, an Internet job listings site, resulted in more than 300 job postings either requiring an ASQ certification or listing it as a preferred quality of a prospective employee. These statistics demonstrate the increasing value of ASQ certification as perceived in the marketplace.

It is important to understand that ASQ certification is not a license or registration. It is peer recognition that an individual has demonstrated a proficiency in and comprehension of a particular quality area at a specific point in time. ASQ certification is awarded to those who meet three criteria: Candidates must 1) have a specified level of education and/or experience, 2) provide proof of professionalism, and 3) pass a standardized examination in the certification area.

But for many, the process of becoming certified remains something of a mystery. Frequently asked questions come up about how the exams are put together, how they are scored, and how best to prepare for taking the test. We will attempt to address these issues in this handbook.

The Exams and the Questions

ASQ certification exams are not created in an ivory tower or by a computer program that randomly generates questions. Their development relies heavily on the efforts of ASQ members. During the course of any given year, approximately 300 volunteers are involved in some phase of exam development, and can participate in a number of ways, including developing a body of knowledge (BOK), writing questions, and ensuring the validity of an exam through a variety of review processes. Volunteers travel to ASQ headquarters in Milwaukee for up to three days at a time. During that period, they are expected to put in long, fast-paced days that may keep them occupied for up to 10 hours at a stretch. These are intense sessions with a lot of discussion and interaction. In return the volunteers get to sharpen their skills, network with peers, and come away with the knowledge that they have contributed to the development of the quality field.

The ASQ Certification Board has oversight responsibility for the exams, and its top priority is to ensure the integrity of the exam development process. Toward that end, the board has mandated that anyone involved in the development of an exam must refrain from helping others prepare for the test, either formally or informally, for a period of two years after their last involvement in the process.

The Many Phases of Exam Development

To ensure that ASQ certification retains its status as a hallmark of excellence, the Certification Board uses continuous improvement processes and formally re-examines each certification program on a five-year cycle to ensure continued relevance.

Job Analysis and Survey (the foundation for the examinations)

Whether a program is new or has been available for many years, the starting point for the exam development process is with a job analysis. This tool is developed as a survey and is used to identify the skills and knowledge areas currently being used in the field to be tested.

Advisory Committee (identifies job responsibilities and knowledge of the field)

In order to create an appropriate survey instrument, an advisory committee is appointed by the sponsoring ASQ division. This committee, like all of the subsequent exam development committees, is composed of ASQ members who work in the area to be tested and are already certified. (In the case of brand-new certification exams, ASQ volunteers who are subject-matter experts in the field to be tested serve on the committee.) The volunteers for the advisory committee meet for two days, and their primary goal is to identify typical job responsibilities (what people do on the job) and the knowledge required (what people need to know in order to perform their job). The result of this meeting is a questionnaire that asks respondents to rate each item in the survey in terms of criticality ("How important is this task or knowledge?") and frequency ("How often is this task performed or knowledge used?").

Member Input (who decides what will be in the BOK?)

Once the survey instrument has been approved by the advisory committee, it is sent to a sample of certified or otherwise qualified ASQ members who either work in the area to be tested (as identified by job title) or supervise employees who perform the tasks identified in the survey. Except for the deliberate job-title selection, the 2,000-plus certified ASQ members who receive the survey are randomly selected across geographic locations and industry types to ensure that no one industry or region skews the results of the survey. The data from the survey are analyzed and a set of recommended tasks and knowledge areas are presented to the sponsoring division, which approves the results. This same report is then submitted to the Certification Board for final approval.

So while the sponsoring division and Certification Board approve the results of the job analysis, it is really the ASQ members who answer the survey who truly determine what should be in the BOK and, ultimately, what material should be covered in the exam itself.

The Body of Knowledge Committee (how does the content get organized?)

After the approval process, a BOK committee is formed. This committee includes some members of the advisory committee and other qualified individuals who have subject-matter expertise and represent a wide demographic and industry spectrum. The BOK committee meets for two days, and its primary task is to translate the job analysis results into meaningful categories that can be tested. As part of this process, the committee determines how many questions will be asked in each area of the BOK, based on the importance of the topic (as indicated in the job analysis) and the depth of testable material for each subtopic.

**Question-Writing Committee
(how do they write questions?)**

The next step is the actual writing of the exam questions. This task is handled by a group of 16 certified volunteers who attend a two-day question-writing workshop. The volunteers are given extensive training in a variety of exam development issues, including how to avoid writing trick questions and how to develop thought-provoking questions and answers. The processes used in this and other exam development workshops are driven by internationally recognized standards for the development of assessments. In keeping with those standards, and as a means of ensuring the validity of the exam, each question must be linked to a reference book from the bibliography for that certification. (The bibliography for each exam can be viewed at <http://www.asq.org/certification/>.) This "linkage requirement" means that the question-writers must document support for the correct answer, down to the specific page number, in their reference for each question. Once a question-writer or a team has finished writing a complete test question, the other members of the team review it for completeness, accuracy, and appropriateness. Only after approval by one or more reviewers at the question-writing session can it be data-entered into the exam bank as a "raw" test question.

**Question Review Committee
(verification and review)**

The next stage in the exam development process is to convene another panel of 12 subject-matter experts who meet for two days to review those raw questions, verify the references and the BOK classification, and, most important, agree that there is only one correct answer.

This additional, intensive process of review, revision, and rework is designed to ensure that all language ambiguities have been eliminated and that the questions have been phrased and presented as clearly as possible. The questions are also reviewed to ensure that they are not biased in favor of any particular industry. A question can be selected for use in a test only if it has survived these two initial phases of development.

**Exam Review Committee
(Testing the Test: the last question check
before the exam)**

The next phase in the process is the exam review meeting where another 12 subject-matter experts are asked to participate, first by actually taking the exam and submitting their comments and answers, and then by coming to the meeting to discuss the test. At the meeting, the group reviews each question for clarity and correctness. By the time an exam makes it through this process, each question on the test has been reviewed and approved by dozens of qualified professionals.

**Exam Statistics
(post-exam question verification)**

Despite the best efforts of all of these individuals, there are questions on the test that do not perform well. These problem items are identified through a statistical analysis that is conducted after each administration of a test. Also, comments from examinees who took the test and from the proctors are used to identify any problematic questions (i.e., confusing terms used, trick questions, questions with more than one correct answer, etc.) These problem items are reviewed by the exam program’s Certification Board chair and other subject-matter experts in conjunction with Certification Offerings staff members. If a question is determined to be unfair or inaccurate, all examinees are given credit for that question on the examination.

**Grading Process
(how ASQ examinations are graded)**

Just as great care is taken in developing an exam, ASQ goes to great lengths to ensure that the grading process provides an accurate assessment of a candidate’s proficiency. ASQ uses procedures that meet the *Standards for Educational and Psychological Testing*, which were developed jointly by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME).

See page 9 for extensive information on the ASQ grading process.

**Common Questions From
Exam Candidates**

How do I decide which certification is right for me?

Each ASQ certification has specific education and experience requirements. The more work related experience you have for a specific BOK, the better qualified you are to take that exam. To determine which exam is right for you, visit www.asq.org/certification/right-for-you.html.

How do I apply for an examination?

Once you have decided which certification is right for you, you can apply online, or mail or fax your application to ASQ headquarters.

To apply online, visit www.asq.org/certification/apply.html.

To obtain an application, visit www.asq.org/certification/downloadable-apps.html or call ASQ headquarters:

- From Canada and United States
1-800-248-1946
- From Mexico 001-800-514-1564
- From other International sites
+1-414-272-8575

Mail your completed application to:

American Society for Quality
P.O. Box 3005
Milwaukee, WI 53201-3005
USA

OR

American Society for Quality
600 North Plankinton Ave.
Milwaukee, WI 53203
USA

Fax your completed application to:

414-272-1734

How should I prepare for an examination?

We should say at the outset that preparing to take an exam is a personal matter and highly dependent on an individual's personal learning methods. For some, a careful reading of the texts in the reference bibliography will be most helpful, while others may find value in purchasing study guides, taking a local ASQ section refresher course, or forming a study group with other quality professionals. All certification candidates are responsible for their own study and preparation for the examination. No specific set of courses or curriculum of study is required as part of the certification process. Likewise, ASQ makes no representation that completion of any specific course or program of study will significantly enhance a person's chance of passing a certification examination.

Successful candidates have shown that they study a wide variety of materials from the reference list, in addition to relying on their experiences in the workplace. It is important to understand that each BOK is comprehensive and that no single source of information should be relied upon in order to prepare for an examination.

As a starting point, read the BOK for the examination and pay special attention to the subtext for the area, as well as the cognitive levels that are assigned to those areas. Both of these are intended to help you determine exactly what will be tested for that topic area, as well as the depth of knowledge that is required for that topic area. (For an in-depth explanation of the cognitive levels, see Appendix B of this handbook.) After becoming familiar with the BOK, review it to identify areas you may need to study further to feel confident in the topic.

References

Once you have identified study topics, it is important to refer to the reference list that is published on www.asq.org for that exam (<http://www.asq.org/certification/>) to determine which resources may be helpful for you to study from. The reference list for each exam program contains the resources that support the exam program; the test question pool for the program has been developed using these references. While it may seem daunting to see that some exam programs have quite extensive reference lists, it is important to remember that each BOK is also very encompassing. For this reason, it is recommended that you first determine the topic areas to study, then determine which references to use for study material.

The reference lists are listed alphabetically by author, and no one reference can be recommended for you to study from. It should be your own, individual decision as to which references will be most helpful for your study needs. Since it would be difficult to decide which books to study from based on the title alone, the following tips may help you determine which books to study from:

- Ask co-workers and other candidates who have passed the examination which books they found most helpful for specific areas of the BOK.
- Books that appear in the online reference lists with a link will direct users to the online ASQ bookstore. For some of these books, the bookstore has sample chapters to view online. Reading these samples may help you decide if the book will meet your study needs.
- Other online book sellers offer features that list the table of contents and indexes for books. Some even provide a tool to search inside the books. These features will allow you to decide whether the book will be adequate for your study needs.

- If it isn't possible to purchase the references, you should consult your local library to borrow the books. Even if the local library does not carry the more technical books, the library should be able to request them from other libraries through the inter-library loan system.
- Consider checking with your local section about a library. Some sections keep a library for the use of its members to study for the examinations.

Study Groups

Another option for preparing for an exam is to join or create a study group. In a study group, each individual has an area of expertise and can assist others in the group in those areas. In return, each individual receives information for areas they are not experts in from the other members of the group.

One technique used by some study groups is to assign each individual in the group a specific area of the BOK to research and report back to the group. By reporting back to the group, that individual teaches the other members the content for that topic area. Using this technique not only reduces the amount of research and study time required for each topic area by each individual, but the individuals learn more about each topic and have more opportunities to apply what they have learned simply by having to teach others. Combining the act of studying with teaching is a very effective learning technique.

Study Plans

To determine the time period you may need to study for an examination, it may be wise to create a study plan. Doing so will allow you to determine the amount of personal time that can be appropriated for studying, as well as the amount of time that is appropriate based on the topics that need to be improved in.

The following tips may help you begin your study plan:

- Determine the topic areas you wish to study and approximate the amount of study time you will need to master that topic area. To do this, determine the amount of knowledge you currently have compared with the amount that is expected based on the examination. Both the BOK and any past score report(s) will enable you to determine this gap.
- Identify your best time to study: Do you have more energy in the morning or in the evening? Low energy times should be allotted to tasks such as laundry or dishes, while high energy times should be allotted to studying.
- Schedule time to study into your weekly schedule, ensuring there is also time for personal activities (family, friends, and socializing) and your general health (sleeping and eating). Be sure the schedule is flexible enough to adjust for last minute changes, without affecting your study periods.
- Study at the same time every day; when studying becomes a routine activity, the time spent studying will be used more efficiently and procrastination is less likely to occur.
- Space study periods (60-90 minutes at a time) or study in shorter time blocks with short breaks in between. During the break time, the brain is still processing information learned during the study period.
- Plan weekly reviews of the topics that you studied that week. This will reinforce what you learned and allow you to retain more information.

For more information on study plans and strategies, the Study Guides and Strategies (<http://www.studygs.net/>) and the How to Study (<http://www.howtostudy.org/>) Web sites are extremely helpful resources for creating study plans, overcoming typical study obstacles, and time management.

Other resources

If you would like to learn more about how others have studied for the certification exams, there have been several articles published by ASQ from members sharing their experiences of studying and taking ASQ examinations. The following are a few that are available online:

Free articles:

- Certification Exam Tips, Trips, and Traps, by James J. Rooney, <http://www.asq.org/pub/qualityprogress/past/1004/qp1004rooney.pdf>
- Developing a New Kind of Certification, by Melissa G. Hartman, <http://www.asq.org/pub/qualityprogress/past/0502/qp0502hartman.pdf>

Articles available to members only:

- ASQ's Black Belt Certification – A Personal Experience, by Don Cochrane and Praveen Gupta, <http://www.asq.org/data/subscriptions/qp/2002/0502/qp0502cochrane.pdf>
- ASQ Certification Program Gains Wider Recognition, by Jack W. Moran and Patricia C. LaLonde, http://www.asq.org/data/subscriptions/qp/2000/0400/29asq_cert_program_april2000.html

How is the cut-score (the passing score) determined for a test?

Since the whole point of taking an ASQ certification exam is to pass it, many questions arise about how the passing grade for any given exam is determined and what adjustments are made to ensure that one version of an exam is no harder, or easier, than any other.

The passing grade, or cut point, is established through a cut-score study. The methodology used on ASQ exams is called a Modified Angoff and is based on the work of the late William Angoff, a renowned measurement research statistician in Princeton, New Jersey.

The cut point for an ASQ exam is established each time a BOK is created or revised. For this process, a panel of 12 to 15 subject-matter experts, also called judges, is convened. The panel's first task is to set the performance standard for the exam. Through consensus they determine a set of characteristics that they expect of a minimally qualified or "borderline" candidate in relation to the BOK. The distinction regarding borderline candidates is key to understanding the cut-score process, as it ultimately draws a very fine line between candidates who are qualified to be certified and those who are not. The expectations for performance, therefore, need to be clearly stated and agreed to by all of the participants in the cut score study.

Once that list of characteristics is developed, the subject-matter experts use it as a guide to help them rate each question on the first test that is administered for a given BOK. They rate each question in terms of what proportion of 100 such borderline candidates will get the answer right. For example, the judges may agree that borderline candidates will know a particular topic in the BOK very well when asked a definition question, and therefore they may estimate that 85% to 90% will get it right. But the same candidates may be much more challenged in that topic when required to apply a specific formula to get the correct answer (resulting in the judges' estimates of 35% to 45% correct).

The results of this two-day cut-score study are then presented to the Certification Board. Along with the written expectation of performance that the panel developed, the summary of the judges' combined estimate of the difficulty of the exam is presented as the recommended cut point for the exam. Once that raw cut-score point is established by board approval, it is converted to a scaled score (550), which becomes the minimum score necessary to earn certification in that BOK.

Why are scaled scores used instead of raw scores?

A new form or version of an examination, following the BOK, is used for each exam administration. We recognize that each of these test versions can prove to be more difficult or easier than the test on which the cut score was set. In order to be fair to the candidates and consistent in maintaining the standard of performance from one test to the next, we analyze the results after every administration and adjust the cut-point on the raw score (the actual number of questions answered correctly) of the test. (For more information about how this adjustment is determined, see the next section of this handbook, *How is the difficulty level of a test determined in order to create the scaled scores?*)

If raw cut scores were reported, different passing scores could be shown for each version of the test, resulting in confusion for everyone. Instead, we use scaled scores to allow comparisons to be made between various versions of the test. Therefore, your scaled score is not the number of questions you answered correctly, nor is it a percentage of the questions. It is a conversion. The scaled scores range from 200 to 750 and reflect your performance level, taking into account the difficulty level of the test.

Here is an example of a scaled score conversion for two versions of a test (this example is for a hypothetical 100-question test):

Test A		Test B	
Raw Score	Scale Score	Raw Score	Scale Score
65	530	67	540
66	540	68	540
67	540	69	540
68	550	70	550
69	550	71	550
70	560	72	550
71	560	73	560
72	560	74	560

In this example, test A was slightly more difficult than test B, so individuals who took test A were not required to answer as many questions correctly as the individuals who took test B. In this example, the scores of 68 on test A and 70 on test B reflect the same minimum level of performance required to become certified. The scaled score of 550 is used to represent this minimum level as it is reported to the examinees.

The use of scaled scores for reporting purposes also helps you to determine your score in relation to the minimum standard of performance for a test. Since the standard of performance is represented by a scaled score of 550, you can determine your performance compared to that standard. Likewise, if you took a test at two different administrations, your two scaled scores can be used to determine how much you have improved your performance between the two administrations. It is important to note that those who pass the tests will not receive a scaled score because those candidates have met or exceeded the standard of performance.

How is the difficulty level of a test determined in order to create the scaled scores?

Although the raw cut score is established for a specific number of questions correct for the first exam under a BOK, the scaled score is what is reported to the candidates. This scaled score allows adjustments to be made for exam difficulty on subsequent forms of the test, while maintaining a scaled score of 550. The scaled score of 550 is the minimum standard of performance for all ASQ certification exams.

The goal of ensuring that two versions of the same exam have the equivalent degree of difficulty is achieved through a process known as common item equating. Here ASQ selects a set of questions from the previous exam and embeds them in the next exam. This set of questions, called equaters, is a kind of mini-exam in that the questions are representative of the previous exam's difficulty level (some easy, some hard, some in the middle) and cover areas of the BOK proportionately. ASQ then develops the rest of the test with different questions, some new and some previously used. This way ASQ can administer almost entirely new tests each time and still maintain the established standard of performance.

The common items (or equaters) between the two tests are analyzed after the new test is administered to determine whether the new test is more or less difficult than the previous version of the test. If the analysis of the equaters determines that the new test is more or less difficult than the previous test, the cut score is adjusted so that the standard of performance is maintained over time.

For example, if one version of a test is administered in March and the mean score of the candidates is 80, and another version of that test is administered in October and the mean score of the candidates is 75, does that mean that the test administered in March was easier than the October test? Or, were the candidates who took the test in March better prepared than those who took the test in October?

Before determining whether there was a difference in the tests, and making any adjustments to the cut point based on those differences, more information is needed about the two candidate groups. To gather that information, comparisons are made between the performances of the two groups on the common items (equaters) in the two tests.

Here is an illustration of how an analysis of the common items can determine whether the October test was more difficult:

March Exam	October Exam
Total Exam Mean Score = 80	Total Exam Mean Score = 75
Is there a difference in the tests or a difference in the groups?	
Common Items Mean Score = 20	Common Items Mean Score = 20

Since the two groups performed equally well on the common items (the mean score for both administrations on the common items is 20), it can be concluded that the two candidate groups were equally prepared to take the test. Therefore, the expectation is that these two candidate groups would perform the same on the tests overall (i.e., the same total test mean score) if the two tests were equivalent in terms of difficulty. Since the overall mean score for October was lower than the mean score for March, it is safe to conclude that the test administered in October was in fact more difficult than the test administered in March.

As a result of this analysis, the cut point for the October test is adjusted to offset the effects of being a more difficult exam. Through this method, both tests will fairly assess the candidates' abilities while maintaining a consistent scaled score of 550 to pass.

Therefore, you should not worry about whether you will get a hard test or an easy test. If you get a hard test, you will not have to get as many questions right to meet the standard.

How are the constructed response papers for the Certified Manager of Quality/Organizational Excellence (CMQ/OE) examination scored?

The CMQ/OE test contains 150 multiple-choice questions as well as 3 constructed response (essay) questions. Candidates are instructed to choose 2 of the 3 constructed responses to respond to.

The constructive responses are scored by those Certified Managers of Quality/Organizational Excellence who have been trained in the evaluation techniques used for the scoring process. In addition, all the judges score the papers against a standard of performance that is specific to each essay question. That standard is neither arbitrary nor subjective, but is developed on the basis of sound quality practices, as described and prescribed in major textbooks in the field of quality. The essay questions are pre-tested on a group of Certified Managers of Quality/Organizational Excellence, so the development of the question includes a reality check to make sure that the committee's expectation of performance for each essay question matches actual responses.

Two judges provide a score for each response. If the scores from the two judges are more than 1 point apart, the judges must discuss the scores they gave based on the standard of performance for that essay question. This process is designed to provide the most appropriate score for each response.

The final scores for the essays are added to the total of correct multiple-choice answers, and the sum is converted to a scaled score as reported on the score report. The diagnostic details (alpha codes) on your score report are designed to indicate how you performed on the constructed response portion of the test.

When will I receive my exam results?

Examination results for pilot exams and exams with updated bodies of knowledge are mailed within four weeks after the exam is taken. Otherwise, exam results are mailed about two weeks (three and one-half weeks for CMQ/OE results) after the examination date. For international mail, allow up to six weeks to receive the mailed results.

In addition to the mailed results, you will receive an e-mail notification approximately 6-7 business days after the examination notifying you that your results are online. If you are an ASQ member, log into the ASQ Web site at www.asq.org to view your results online. (To do this, log into the site, then click "Training & Certification" in the left column, then click the "Certification" link to the right of the following site.) If you are a registered user of the Web site or a nonmember, you can view your online results by linking to the e-certification application through the actual e-mail notification letter.

We recognize that prompt notification of examination results is important, and we will make every effort to provide results as soon as possible. Results will not be given over the telephone. Information about certification is never divulged to third parties except at the written request of the person who took the examination. Your examination results are kept in strict confidence.

If you pass the examination you will receive a letter of congratulations from the Certification Board, and a wallet card and certificate showing your certificate number. Your name will be published on www.asq.org (<http://www.asq.org/certification/pass-lists/index.html>) and your local ASQ section will be notified. Your name may be published by your section and division as well. If you are certified as a CMQ/OE, CQE, CQA, CSQE, CSSBB, CRE, CHA, CBA, or CCT, you must participate in the Maintenance of Certification program to keep your certification current. The recertification journal provided with your certificate gives complete details.

ASQ certification is not a license. It is peer recognition of proficiency within the prescribed BOK. In order to avoid misunderstanding, the Certification Board requires that certified persons always refer to ASQ in citing their certification, e.g., "ASQ Certified Manager of Quality/Organizational Excellence."

ASQ may withdraw formal recognition and any current ASQ certification for falsification of credentials and/or unethical behavior. Such action may be taken by the Certification Board or, in the case of an ethics action, by the ASQ Board of Directors or its designee. In such cases, due process will be afforded to the individual against whom the action is directed. A copy of the ASQ Code of Ethics is supplied to all certified persons. By applying for certification, you pledge to uphold this code. You can view the Code of Ethics at <http://www.asq.org/about-asq/who-we-are/ethics.html>.

What if I do not pass an ASQ examination?

If you do not pass the examination you will receive a score report that provides an analysis of the exam to assist you in further studies. You can retake the examination within two years of your last attempt for a reduced fee. (See page 14 for more information on this process and the retake fees.)

What does my score report tell me?

The score report provides your scaled score, ranging from 200 to 540 in intervals of 10 scaled score points. A scaled score of 550 or above is required to become certified. (See appendices D and E for example score reports.)

Your score report also includes the number you had correct in each subject area. In addition, we have included the average number correct from only those candidates who passed the examination.

Constructed Response Portion of CMQ/OE: If you took the Certified Manager of Quality/Organizational Excellence (CMQ/OE) examination, specific diagnostic codes are provided for each of the two constructed response essays that you answered. (See appendix E for an example score report.)

NOTE: The scores you received for the two constructive response essays are added to the total number of questions you answered correctly on the multiple choice portion of the examination to make up your final score for the CMQ/OE examination.

How do I interpret my score report?

Your score report is designed to help you analyze your results and decide in which areas of the BOK you have strengths and weaknesses. By comparing the number you had correct in each subject area to the group of passing candidates, you will be able to assess your knowledge level for each area of the BOK.

The first piece of information in your score report is your scaled score. ASQ scaled scores range from 200 to 750 and the passing scaled score is 550. Your score alone will help you determine how close you may be to passing the examination.

The second piece of information in your score report is a table (shown below) that presents the total number of questions that are tested in each BOK area, the number of questions that you answered correctly, and the average number correct for the candidates who passed the examination (i.e., those candidates who obtained a score of 550 and above) for that exam administration. This information can be used to determine which areas of the BOK you performed the same in as those who passed, and in which areas you will need further study.

Example of a Score Report Table:

BOK AREAS	Total Questions	Number You Had Correct	Average*
I.	20	12	15
II.	21	8	15
III.	19	12	15
IV.	21	17	17
V.	9	9	8
VI.	10	6	8

*Average computed on total number of responses from only those who passed.

Scores Reported for the CMQ/OE Constructed Response Portion of the exam: If you took the CMQ/OE exam, you will receive diagnostic codes to represent the scores you received on the constructed response portion of the exam. (See Appendix F for the code descriptions.)

How do I sign up to retake an examination?

You must retake the examination within two years of your last attempt if you wish to pay a reduced fee and bypass submitting a new application. If you do not retake within this period, you will have to submit a new application with full fees.

You can sign up to retake an examination by completing the form on the bottom of your score report and returning it to ASQ headquarters or calling ASQ Customer Care at 800-248-1946 or 414-272-8575.

You may also sign up online to retake an exam:

Members:

Log into the ASQ Web site (www.asq.org), click "Training & Certification" in the left column, and then click the "Certification" link to the right on the following site.

Nonmembers or registered users:

Sign into the e-certification application directly at <https://secure.asq.org/e-commerce/certuser/execute/loginSetup>.

To determine the dates that are available for retaking an exam, along with the application deadlines, please see the following Web site: <http://www.asq.org/certification/dates.html>.

There is no limit to the number of times you may retake an examination; however, you will be charged a fee each time. The fees for retaking the examinations are as follows:

Biomedical Auditor (CBA)	\$160
Calibration Technician (CCT)	\$105
HACCP Auditor (CHA)	\$160
Manager of Quality/Organizational Excellence (CMQ/OE)	\$220
Quality Inspector (CQI)	\$105
Quality Auditor (CQA)	\$160
Quality Engineer (CQE)	\$160
Quality Improvement Associate (CQIA)	\$105
Quality Process Analyst (CQPA)	\$105
Quality Technician (CQT)	\$105
Reliability Engineer (CRE)	\$160
Six Sigma Black Belt (CSSBB)	\$190
Six Sigma Green Belt (CSSGB)	\$105
Software Quality Engineer (CSQE)	\$160

How can I prepare to retake an examination?

You should use the information provided in your score report to determine which areas of the BOK you would like to improve in. By comparing your performance to the passers (as provided in the table), as well as considering the actual BOK, you should be able to effectively use the score report to determine which strategy you would like to use to prepare for retaking the examination.

It is best to use your score report from any past exams to determine in which areas improvements can be made. As you review these areas, read the BOK for that exam and pay special attention to the subtext for the area, as well as the cognitive levels that are assigned to those areas. Both of these are intended to help you determine exactly what will be tested for in that topic area, as well as the depth of knowledge that is required for that topic area. For an in-depth explanation of the cognitive levels, see Appendix B of this handbook.

See page 7 of this handbook for more information about preparing to take an exam.

When should I retake an examination?

If you would like to retake an examination, it is important to choose a date that will allow you enough time to prepare for the retake. Some candidates are able to retake an examination within six months while others may need more time to study and may retake the examination one year later. The time period between testing depends on each candidate's individual needs for preparation. However, you must retake the exam within two years or you will be required to submit a new application with the full fees. To determine the time period you may need to study for a retake examination, it may be wise to create a study plan.

Are the exams available in languages other than English?

Yes, some of the examinations have been translated into other languages. These versions of the examinations are only provided outside of the United States. For more information about the translated exams, visit <http://www.asq.org/global/>.

Appendix A

Test-taking Tips

Test takers are also advised to keep in mind these general pointers about standardized exams:

- Read all of the questions on the first page of the test so you realize that you do know the material. In other words, relax.
- Read each question thoroughly. Do not assume you know what is being asked.
- Eliminate implausible answers and move quickly past the obviously wrong choices.
- Keep in mind that an answer may be a correct statement in itself but may not answer the question. Two answers may say exactly the opposite things or may be very similar. Read them again to decide what makes one correct and the other wrong.
- ASQ does not subtract points for incorrect answers. Answer every question. There is no penalty for guessing, and you have a 25% chance of getting it right.
- Go through and answer the questions you know. Then go through and read the ones you are unsure of. Mark those you are still uncomfortable with. You will narrow the field down to just a few questions you will need to spend more time on. These are the questions you might want to use your reference books for.
- Be aware of the time available for the exam and the remaining time as you work through the exam.
- Do not select more than one answer for a question. If you do, it will be scored as a “blank.” For example, you think that both A and C are correct answers. Select only one answer and use the comment sheet supplied with your test to explain why you think both A and C are correct. Your comments will be reviewed before results are reported.

Appendix B

Levels of Cognition:

Based on Bloom’s Taxonomy—Revised (2001)

Each body of knowledge (BOK) contains **content** specific within its subtext for each topic as well as a cognitive level to indicate the intended **complexity level** of the test questions for that topic. These levels are based on the “Levels of Cognition” (from Bloom’s Taxonomy—Revised, 2001) and are presented below in rank order, from least complex to most complex.

Remember

Recall or recognize terms, definitions, facts, ideas, materials, patterns, sequences, methods, principles, etc.

Understand

Read and understand descriptions, communications, reports, tables, diagrams, directions, regulations, etc.

Apply

Know when and how to use ideas, procedures, methods, formulas, principles, theories, etc.

Analyze

Break down information into its constituent parts and recognize their relationship to one another and how they are organized; identify sublevel factors or salient data from a complex scenario.

Evaluate

Make judgments about the value of proposed ideas, solutions, etc., by comparing the proposal to specific criteria or standards.

Create

Put parts or elements together in such a way as to reveal a pattern or structure not clearly there before; identify which data or information from a complex set is appropriate to examine further or from which supported conclusions can be drawn.

These levels are not intended to rank the topic areas by difficulty, but rather to help candidates determine how much knowledge they need for the topic in order to meet the standard of performance for the examination. For example, if a topic area has a cognitive level of "Apply," the candidates will be expected to be able to remember, understand, and apply the concepts and topics for that area. The questions for this area could be definition in nature (Remember), or they could be math calculations (Apply). If a topic area has a cognitive level of "Evaluate," the candidates will be expected to be able to remember, understand, apply, analyze, and evaluate the concepts (make a judgment) for that area. Likewise, if a topic area only has a cognitive level of "Remember," the candidates will only be expected to remember the topics (basic rote/definition knowledge).

The following are example test questions for each level of cognition:

Remember:

Who makes the final determination regarding the distribution of the audit report?

- (A) The lead auditor
- (B) The audit group manager
- (C) The auditee
- (D) The client

This is a "Remember" question because it requires candidates to be able to recall who is responsible for the report distribution.

Understand

Producer's risk is defined as the probability of

- (A) rejecting a good lot
- (B) rejecting a bad lot
- (C) accepting a good lot
- (D) accepting a bad lot

This is an "Understand" question because it requires candidates to understand producer's risk enough to know its result.

Apply

Purchasing orders are to be checked for correctness during the audit of a purchasing department. Which of the following sampling strategies would be most appropriate?

- (A) Review 10% of all purchase orders.
- (B) Randomly sample an amount of orders processed on the day of the audit.
- (C) Review the first 10 orders processed on the day of the audit.
- (D) Use MIL-STD 105 to establish a sampling plan.

This is an "Apply" question because it requires candidates to use their knowledge of the difference between how samples can be selected and what a published sampling plan is.

Analyze

Cases containing 24 bottles of antibiotics are shipped to drug stores. A pharmacist has doubts about the potency of the drugs and decides to have five bottles from a case tested. What is the probability that none of the tested bottles will prove to be defective if in fact there are 10 defective bottles in the case?

- (A) 0.0010
- (B) 0.0059
- (C) 0.0471
- (D) 0.2355

This is an "Analyze" question because it requires candidates to understand the theories of probability in order to determine the correct answer. This question is more complex than a simple probability calculation because there are many factors that need to be considered in order to use the data provided to calculate the correct answer.

Evaluate

A lot comprised of 500 units is submitted by a supplier whose past history indicates that about 1% defectives should be expected. A random sample of 30 units is collected from the lot. Which of the following probability distributions could be best used to make predictions about the lot?

- (A) Normal
- (B) Weibull
- (C) Poisson
- (D) Exponential

This is an “Evaluate” question because it requires candidates to use the information provided about the lot, as well as their knowledge of the various distributions, to determine which distribution is most appropriate to use.

Create

A supplier evaluates all characteristics on a sample of 75 components that is taken twice a day. Each component is then recorded as either conforming or nonconforming. What type of control chart would be used for evaluating this data?

- (A) MR chart
- (B) c chart
- (C) u chart
- (D) p chart

This is a “Create” question because it requires candidates to understand the type of data that is required for each of these charts. The candidates must then determine which chart will enable the data to be categorized as pass/fail. The information provided in the test question provides a typical situation when evaluating components, and the candidates need to understand which data elements that are provided should be used and then “create” the correct chart to use.

Using cognitive levels for study purposes

When preparing to take an ASQ exam, it is important for candidates to read the subtext in the BOK in light of the cognitive level that is assigned for that area. By understanding the level of cognition for a particular topic area, candidates can determine if they need to develop a deeper understanding of a topic area than what they already have.

The following is an example of subtext from the Certified Quality Improvement Associate (CQIA) BOK:

- Define various improvement cycle phases (e.g., PDCA, PDSA) and use them appropriately. (Analyze)

On the basis of this subtext, candidates know that they should be able to define what the improvement cycles are and understand their phases enough to know when and how they should be used in various situations. The cognitive level is “Analyze” so test questions in this area could be definitions of terms, an understanding of the terms (“What is the ‘Plan’ phase of PDCA?”), and the application and analysis of the cycle (“Which method should a team use in order to improve a process?”).

Appendix C

Top 10 Myths

Myth: *If an answer is obvious it must be a trick question.*

Fact: Just because an answer is obvious to you does not mean it is obvious to everyone. Do not let the fact that this is a test question get in the way of your knowledge. Answer it and move on. Do not read more into the question in an effort to make it harder.

Myth: *Guessing wrong can hurt your score more than leaving an answer blank.*

Fact: There is no penalty for guessing, and you have a 25% chance of getting it right. Although some tests use "formula scoring" methods, ASQ certifications do not. You get one point for each question you answer correctly and zero points for those you get wrong or leave blank.

Myth: *The passing score for all ASQ exams is 70%.*

Fact: The passing score for each ASQ exam is established as a minimum performance standard during the cut-score process, which is detailed on page 9.

Myth: *Taking a section refresher course or buying ASQ exam prep material is a sure way to pass.*

Fact: Section refresher courses and the self-directed products are excellent ways to prepare for the examinations, but using them does not guarantee that you will pass. Refresher courses are meant to renew your knowledge, not to instruct you in areas that are not familiar to you. Questions from the self-directed products will assist you in becoming familiar with how to answer certain questions, but they are not the same questions you will see on the exams. Individual study is also a critical element for success.

Myth: *If you do poorly on one area of the BOK, you automatically fail the test.*

Fact: Your total score on the examination determines whether you pass or fail, not your score on any one portion of the test. Even in the CMQ/OE exam it is possible to pass if you do poorly on the constructed response portion, as long as your overall score is at or above the passing grade.

Myth: *ASQ limits the number of people who pass.*

Fact: Anyone who meets or exceeds the passing score (cut point) passes the examination. ASQ does not set a passing rate.

Myth: *The grading of the constructed response portion of the CMQ/OE exam is very subjective.*

Fact: The constructed response portion of the exam is designed to test the candidate's ability to respond to real-world situations. The responses are scored by Certified Managers of Quality/Organizational Excellence who have been trained in the evaluation techniques used for the scoring process. In addition, all the judges score the papers against a standard of performance that is specific to each essay question. That standard is neither arbitrary nor subjective, but is developed on the basis of sound quality practices, as described and prescribed in major textbooks in the field of quality. The essay questions are pretested on a group of CMQ/OEs, so the development of each question includes a reality check to ensure the committee's expectation of performance matches actual responses.

Myth: *It takes a long time to receive exam results.*

Fact: ASQ works very hard to provide exam results as quickly as possible and is very aware that candidates are anxious to learn whether they have passed or failed. In general, exam results are mailed within two weeks (three and one-half weeks for the CMQ/OE) of the examination date. Candidates can also sign into the ASQ Web site (www.asq.org) as soon as one week following the examination date to receive their score. Results are reported more slowly when the exam is a pilot for a new BOK or when the BOK has been rewritten; in those cases, results will be mailed within six weeks.

Many steps have to be completed, verified, and checked prior to sending out the results:

The answer sheets are sent back to ASQ headquarters and scanned, and statistics must be run and reviewed by the test development staff and appropriate volunteers. The results are then scored, verified, and uploaded to a computer before any result letters can be generated. ASQ is continuously working to reduce this cycle time.

Myth: *Test questions are deliberately tricky.*

Fact: ASQ goes through an extensive process to ensure examination questions are as accurate, clear, and concise as possible. (Please see page 4 of this handbook for more information.)

Myth: *I cannot learn from my mistakes if I do not get my scored test back.*

Fact: Because of its policy to reuse exam questions, ASQ cannot release copies of the examinations. Releasing tests would give the retake applicants an unfair advantage over candidates taking the examinations for the first time. The integrity of the examination process is of paramount importance to ASQ. Besides, it would not support the underlying premise of the certification program for candidates to just study the questions they got wrong, as it would not ensure that they would understand the material any better. It is more appropriate for the retake candidates to use the diagnostic information to identify the areas where they are weak and improve their knowledge in those topic areas.

Appendix D

Example Score Report

63389564
 Lou Doe
 166 Main St.
 Anytown, FL 33333

EXAM DATE	March 21, 2007	EXAM DEADLINE	March 21, 2007
	October 20, 2007		August 17, 2007
	March 1, 2008		January 11, 2008

Dear Mr. Doe:

An analysis of the ASQ Certified Quality Technician you recently wrote indicates that you did not achieve the required passing score of 550.

Your Score: 520

A diagnosis of your performance is listed below. PLEASE SEE THE ENCLOSED LETTER FOR CLARIFICATION.

BOK AREAS	Total Questions	Number You Had Correct	Average*
I.	20	12	15
II.	21	8	15
III.	19	12	15
IV.	21	17	17
V.	9	9	8
VI.	10	6	8

*Average computed on total number of responses from only those who passed.

To retake the exam, please complete the information below. To register via phone, please contact Customer Service at 800-248-1946 or 414-272-8575.

Sally M. Harthun
 Manager, Certification

Please schedule me to retake the CQT exam to be held _____ in Section# _____.

_____ Enclosed is the retake fee of \$105.00

_____ My MasterCard/VISA/American Express card number is:

_____ Expiration Date _____

Name _____ Member# _____

Appendix E

Example Score Report for the CMQ/OE Examination

	EXAM DATE	March 21, 2007	EXAM DEADLINE
	October 20, 2007	August 17, 2007	
	March 1, 2008	January 11, 2008	

63389564
 Lou Doe
 166 Main St.
 Anytown, FL 33333

Dear Mr. Doe:

An analysis of the ASQ Certified Manager of Quality/Organizational Excellence exam that you recently wrote indicates that you did not achieve the required passing score of 550.

Your Score: 500

A diagnosis of your performance is listed below. PLEASE SEE THE ENCLOSED LETTER FOR CLARIFICATION.

MULTIPLE CHOICE PORTION BOK AREAS	Total Questions	Number You Had Correct	Average*
I.	25	18	20
II.	15	10	12
III.	32	21	25
IV.	28	15	21
V.	20	14	16
VI.	15	9	10
VII.	15	11	13

*Average computed on total number of responses from only those who passed.

CONSTRUCTED RESPONSE PORTION

The constructed response questions are graded on content not format. Responses are assigned a score by each of two independent members of the Quality Management Division.

Problem A (Feedback Loop)	H
Problem B (Supplier Certification)	X
Problem C (Control Chart)	-

To retake the exam, please complete the information below. To register via phone, please contact Customer Service at 800-248-1946 or 414-272-8575.

Sally M. Harthun
 Manager, Certification

Please schedule me to retake the Manager's exam to be held _____ in Section# _____.

_____ Enclosed is the retake fee of \$220.00

_____ My MasterCard/VISA/American Express card number is:

_____ Expiration Date _____

Name _____ Member# _____

Appendix F

Constructed Response Diagnostic Codes—2006

Alpha Code	Diagnostic Statement
G	The problem statement asked for four (4) elements in the response and you provided only one or two of the elements.
H	The problem statement asked for three (3) elements in the response and you focused on one element.
I	Illegible handwriting; paper was graded but was very difficult to read.
J	Elements of response contained erroneous conclusions or inappropriate tools.
K	The recommended actions in your response were generic and did not relate to the specific problem presented.
L	The response you provided did not contain sufficient detail or lacked focus on key elements of the specific problem presented.
M	The response you provided did not include strategic impact.
N	No response was provided; blank answer sheet.
X	Provided a satisfactory response; scored at mid-level of points possible.
Y	Provided a more than satisfactory response; scored above the mid-level of points possible.
Z	Provided a response that was scored at the highest level of points possible.
-	Question was not two of the three chosen by examinee.