

Society of Cost Estimating and Analysis CCEA Examination Preparation Handbook



CCEA
EXAMINATION
PREPARATION
HANDBOOK



The Society of Cost Estimating and Analysis

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Introduction

The Certified Cost Estimator/Analyst (CCEA) Examination Preparation Handbook is designed to familiarize the test taker with the Professional Cost Estimator/Analyst (PCEA) or CCEA Examinations. In addition, this handbook will provide instruction on how to prepare and focus for each test. The CCEA Examination section gives an overview of Part I (PCEA) and Part II, while the Examination Administration section specifically walks you through the timeline and expectations of the exam day. The CCEA Examination Preparation Guidance section then delves into the design and construction of the exam to enable testers to understand what is expected and how to use the testable topics list to prepare for the examination. The Training Resources section emphasizes the benefit of using CEBoK in preparation for the exam. Finally, the Contact Information section outlines the variety of ways that testers can contact the SCEA National Office.

The CCEA Examination

Certified Cost Estimator/Analyst (CCEA) Examination

The CCEA (Certified Cost Estimator/Analyst) examination has two parts. Part I tests Foundation Knowledge and Practical Application. Applicants who successfully pass Part I and meet the eligibility requirements, receive the Professional Cost Estimator/Analyst (PCEA) designation. Part II tests Advanced Analysis and provides a Case Study. Applicants who successfully pass Part I and Part II receive the Certified Cost Estimator/Analyst (CCEA) designation upon completion of all eligibility requirements.

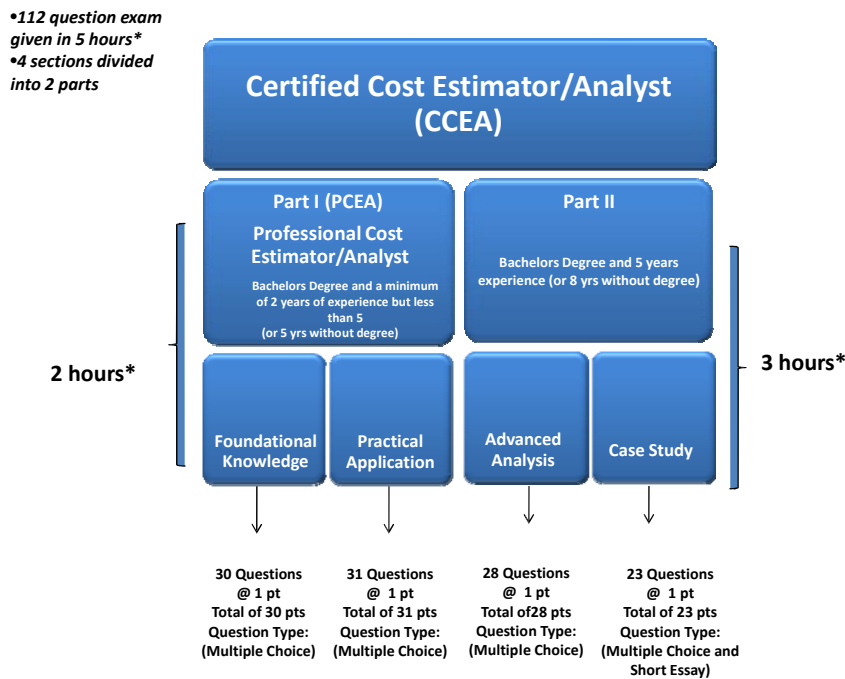


Figure 1 CCEA Certification Examination

Part I or Professional Cost Estimator/Analyst (PCEA)

Part I, or the PCEA examination, is comprised of two sections, A and B. Section A tests Foundational Knowledge while Section B tests Practical Application. Section A consists of 30 multiple choice questions worth 1 point each. Section B consists of 31 multiple choice questions worth 1 point each. The applicant must pass Part I of the examination with an overall score of 70% or greater (i.e., attain a total of 43 or more out of a possible 61 points) to receive credit for the examination and/or attain the PCEA designation.

Part II

Part II also consists of two sections, C and D. Section C tests Advanced Analysis knowledge while Section D tests knowledge applied in a Case Study. Section C consists of 28 multiple choice questions worth 1 point each. Section D consists of 23 multiple choice questions and 2 short-answer questions worth 1 point each. The applicant must pass Part II of the examination with an overall score of 70% or greater (i.e., attain

a total of 36 or more out of a possible 51 points) to receive credit for the examination. To attain the CCEA designation, the applicant must pass both Parts I and II with scores of 70% or greater on each part and meet the requisite eligibility requirements.

CCEA Exam					Exam Time
Part of the Exam	Number of Questions	Points Per Question	Total Number of Points	Number of Points Required to Pass	
Part I or PCEA					
Section A (Foundational Knowledge)	30	1	30		
Section B (Practical Application)	31	1	31		
Part I Total	61		61	43	2 hours
Part II					
Section C (Advanced Analysis)	28	1	28		
Section D (Case Study)	22	1	23		
Part II Total	50		51	36	3 hours

Figure 2. Question and Point Distribution

Examination Administration

Regardless of the examination you are taking (Part I/PCEA, Part II or both), the examinations will be administered following the same format. On the examination day, those taking Part I/PCEA should arrive at the test site 30 minutes prior to the scheduled exam, which we will refer to as T-hour, and follow the prescribed sequence below.

Both proctor and those taking the exam should following this guideline concerning calculator usage: Calculators with logarithm, universal power, memory, and parentheses keys invariably also have statistical function keys—e.g., mean, standard deviation, correlation, linear regression keys. Inasmuch as examinees may find logarithm, universal power, etc. capabilities useful, we allow them to bring these calculators to the exam. However, it is not acceptable to use preprogrammed statistical functions. Rather than disallowing these calculators in their entirety we disallow only their automated statistical capabilities. Additionally, cell phone calculators are prohibited.

ACTIVITY	SAMPLE TIMELINE
1. At T-hour, the proctor will hand out Instructions and a survey and have testers fill-in personal information. The proctor will allow for up to 30 minutes for testers to answer the questions and read the instructions.	9:00AM-9:30AM
2. At T+30 mins, Part I will be distributed and testers have 2 hours to finish this part of the exam. During the Part I portion of the exam, both Section A (Foundational Knowledge) and Section B (Practical Application) will be given. The tester may answer any question in either section at his or her own pace. They may use whatever testing strategies they prefer, but must complete all examination questions by T+2 hours and 30 minutes.	9:30AM-11:30AM
3. After T+2 hours and 30 mins, the proctor will collect all exam materials.	11:30AM
4. For those continuing on to take Part II, the proctor will allow for a 1 hour and 15 minute break. For those only taking Part I, they may be dismissed once all exam materials and questionnaires have been turned in to the proctor.	11:30AM-12:45PM
5. For those only taking Part II, you must arrive 45 minutes prior to your examination to check-in, read instructions and answer a questionnaire.	12:00PM
6. For those taking Part II, testing will resume or start (depending on test being taken) at T+3 hours and 45 minutes. At this time the proctor will pass out part II, Section C: Advanced Analysis and Section D: Case Study and start the clock. The tester may answer any question in either section at his or her own pace. They may use whatever testing strategies they prefer, but must complete all examination questions in the 3 hours allotted for Part II.	12:45PM-3:45PM
7. After T+6 hours and 45 minutes (where 3 full hours have been allocated for Part II), the proctor will collect all exam material. Once a tester turns in all of his or her test material, he or she will be dismissed.	3:45PM

CCEA Examination Preparation Guidance

To fully prepare for the CCEA examination, it is important for the test-taker to understand the exam development process, to include the role “cognitive knowledge” played in the development of the testable topics list, the testable topics list location, the general construct of questions on the exam and the relationship of the testable topics list to the examination questions. Understanding the aforementioned elements should help test takers focus their studies properly. In addition, it is recommended that test-takers study using CEBoK, which can be obtained by contacting the SCEA National Office.

Understanding the Derivation and Construction of the Exam

Cognitive Domain

There are three domains for knowledge: affective, psychomotor, and cognitive. Testable knowledge resides in the cognitive domain. Using Bloom’s taxonomy (see Figure 3 Cognitive Domain), SCEA reviewed both the CEBoK and the bodies of knowledge of other relevant professions to generate the CCEA examination Testable Topics List. To help the test taker, “The Verbs for Each Level” (see Figure 3 Cognitive Domain) outlines commonly used verbs for each cognitive domain, which progressively increase in depth and complexity of knowledge as you move from left to right.

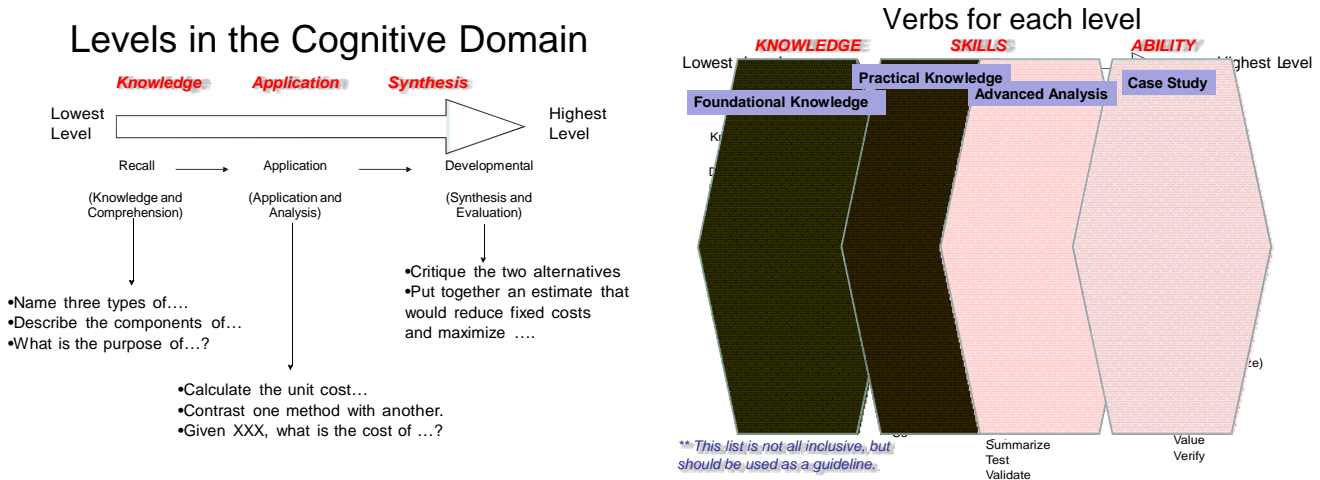


Figure 3 Cognitive Domain

The Examination Development Process

Testable Topics List

Once SCEA identified both the cognitive knowledge topics and levels that cost estimators should know by the time they have attained 5 years of cost estimating experience, SCEA determined a structure for organizing these topics. SCEA decided to use the category topics (module headings) found in the original CostPROF and the new CEBoK training tools. These knowledge topics organized by the CostPROF/CEBoK module heading make up the Testable Topics List (see step #1 in Figure

4. CCEA Examination Development Process)

CCEA Exam Development Process

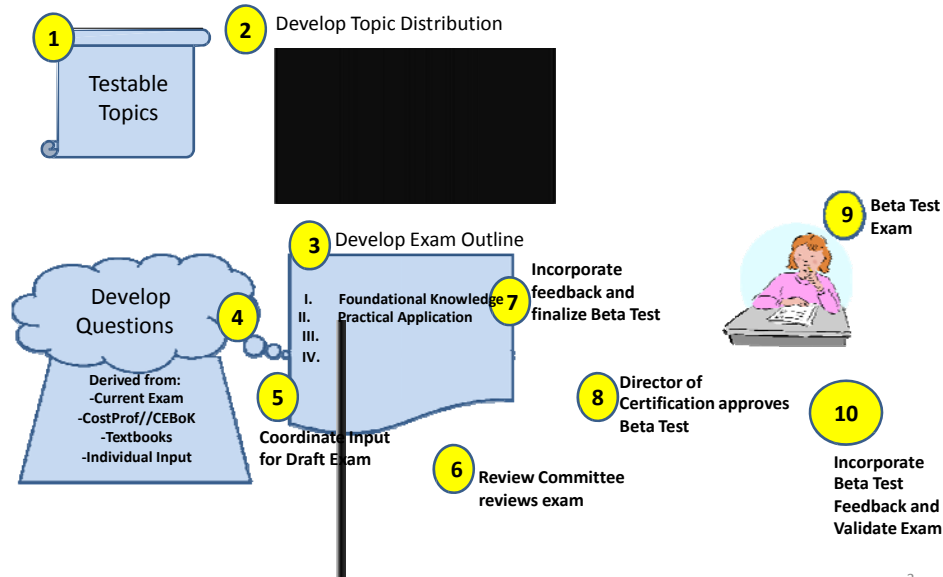


Figure 4. CCEA Examination Development Process

COST ESTIMATING BASICS TOPIC	CCEA			
	Part I or PCEA		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Applications of Cost Estimating	X			
<i>Budgeting, Investment, and Planning</i>	X			
<i>Analysis of Alternatives (AoA)</i>	X			
<i>Economic Analysis</i>	X			
<i>Cost Benefits Analysis</i>	X			
<i>Business Case Analysis</i>	X			

Figure 5. Example of Testable Topics matched to Cognitive Level

Foundational Knowledge

Topics designated as Foundational Knowledge topics focus on an individual’s awareness, understanding, and recognition of the topic itself and/or how the topic relates to the overall cost estimating process. An individual may be asked questions on the examination such as:

- Name the three types of...
- Describe the components of...
- What is the purpose of...?
- Match the term to the correct definition.

Practical Application

Topics designated as Practical Application topics focus on an individual's ability to apply concepts to numbers, situations, or events and to conduct simple analysis and calculations. An individual may be asked questions on the examination such as:

- Given the following event/numbers/situation, which method would you apply?
- Given the following numbers, how would they be displayed IAW...
- Given this event/situation, which technique would you recommend?
- Given the following numbers, what is the [mathematical term]?

Advanced Analysis

Topics designated as Advanced Analysis focus both an individual's rote knowledge as well as knowledge learned on the job to analyze information to answer specific questions. An individual may be asked questions on the examination such as:

- Given the following information, perform a [type of] analysis
- Differentiate between the two following methods/techniques
- Extrapolate...
- Quantify the amount of...
- Calculate the cost using...

Case Study

Topics designated as Case Study topics focus on the array of knowledge from each topic area as they relate to real-world scenarios and contextual information. An individual may be asked questions on the examination such as:

- In the case study, the analyst decided to use which method to analyze XXX?
- The analyst in the case study determined that the cost at T3 was \$40, is that correct? Which response below best describes your answer?
- Given the chart on page ##, did the analyst correctly use [insert technique]?
- Knowing that the inflation rate for year ### is XXX, did the analyst correctly determine the costs?

Topic Distribution

SCEA then designed the structure of the exam and determined the topic distribution of the Testable Topics List (see step #2 in Figure 4. CCEA Examination Development Process and Figure 6. CEBoK Modules). Please note that the Cost Estimating Body of Knowledge (CEBoK) provides not only the topics, but the cognitive level or degree of understanding that is expected for certification. The Testable Topics list (see the CCEA Program Handbook) is comprised of 605 topics organized by the 16 modules of CEBoK. On average, an individual can expect to see three or more questions from each of the modules listed below, in either part of the examination.

CEBoK Module # and Topic	
1	Cost Estimating Basics
2	Costing Techniques
3	Parametric Estimating
4	Data Collection and Normalization
5	Index/Inflation
6	Basic Data Analysis Principles
7	Learning Curve
8	Regression Analysis
9	Cost Risk Analysis
10	Probability and Statistics
11	Manufacturing Cost Estimating
12	Software Cost Estimating
13	Economic Analysis
14	Contract Pricing
15	Earned Value Systems
16	Cost Management

Figure 6. CEBoK Modules

Question Construction

Given the topic distribution, SCEA developed questions that assess the appropriate knowledge for the associated cognitive levels. Although on the examination you will only be given the question and five (5) responses, Figure 7 shows you the “behind the scenes” work completed for every question on the examination.

Question Construction

1 Topic Category 2 Topic

4. [Parametric Estimating]: (CER)

QUESTION: If a CER for Site Development was developed giving the relationship, y (in \$K) = $31.765x + 145.32$ (where x is the number of workstations) for a data set cost driver that had a range minimum of 2 workstations to 52 workstations, and the independent variable has tested positively for significance, the predicted cost for a site that had 33 workstations would be:

3 Question

4 5 multiple choice responses

a. \$1,193.57
b. \$1,193,565
c. \$1,797.10
d. \$1,797,100
e. \$208,850

ANSWER: B 5 The Answer
SOLUTION: $y = 31.765 * 33 + 145.32 = \$1,193.57$; Because in \$K, value is \$1,193.57 * 1000 = \$1,193,565. 6 The Solution
REFERENCE: CostProf Module 3 7 Reference

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Figure 7. Question Construction

Sample Questions

Below are two sample questions with associated answers and solutions for sections A through C.

FOUNDATIONAL KNOWLEDGE SAMPLE QUESTION #1

[Cost Estimating Basics] (Work Breakdown Structure)

QUESTION: Which of the following is ***NOT*** a purpose of the Work Breakdown Structure?

- To provide a lower level breakout of small tasks that are easy to identify, staff, schedule, and estimate
- To identify the organizational relationships and assign work responsibilities
- To reduce the possibility of overlap, duplication, or redundancy of tasks
- To provide a basis of comparison for the actual work completed versus the estimate.
- To furnish a convenient hierarchical structure for the accumulation of resources estimates

ANSWER: B

SOLUTION: All of the provided responses support the purpose of the WBS except response B.

REFERENCE: Stewart, Rodney. *Cost Estimating: Second Edition*. New York: John Wiley & Sons, Inc., 1991, p 35.

FOUNDATIONAL KNOWLEDGE SAMPLE QUESTION #2

[Learning Curve]: (Unit Learning Curve)

QUESTION: The following example uses which type of LC theory to determine cost?

Unit Number (X)	Unit Cost (Y)
1	\$100.00
2	80.00
4	64.00
8	51.20
16	40.96

- Wright (Cum Ave)
- Crawford (Unit)
- Heuristic Lot Midpoint
- Andelohr (Production Break)
- Straight-line deductions

ANSWER: B

SOLUTION: By definition
REFERENCE: By definition

PRACTICAL APPLICATION SAMPLE QUESTION #1

[Data Collection and Normalization]: (Reasonableness of Data-Data Quality)

QUESTION: While collecting historical data to perform an estimate for a future aircraft, you discover that the ABC aircraft is similar to the proposed aircraft. You find that the ABC aircraft cost \$2.2 billion (2007\$) to develop, has an average recurring production cost of \$90 million (2007\$), weighs 30,000 lbs, and has a range of 2000 miles and maximum speed of 550 miles per hour. What major category of data is missing from this collection effort?

- a. Cost
- b. Technical
- c. Programmatic
- d. None of the above
- e. All of the above

ANSWER: C

SOLUTION: Using the various terms addressed in Module 4 of CEBoK, programmatic is the best category for the missing data

REFERENCE: Module 4 of CEBoK

PRACTICAL APPLICATION SAMPLE QUESTION #2

[Basic Data Analysis Principles] : (Standard Deviation)

QUESTION: Given the following information and a sample mean of 1680, what is the sample standard deviation for monthly salary?

Employee	Monthly Salary
Abe	1500
Bob	1700
Cindy	2500
Doug	1450
Ellen	1250

- a. 434.2
- b. 485.5
- c. 971.1
- d. 1680
- e. 0

ANSWER: B
SOLUTION:

Sample Data	Sample Mean	Delta	Delta Squared
1500	1680	180	32400
1700	1680	-20	400
2500	1680	-820	672400
1450	1680	230	52900
1250	1680	430	184900

Sample Mean=

1680

Differences Summed

943000

Sum divided by

235750 n-1

standard deviation of sample

485.5409355

Verified by Excel

485.5409355

REFERENCE: (Submitted by Exam Committee)

ADVANCED ANALYSIS SAMPLE QUESTION #1

[Data Collection and Normalization]: (Data Collection Process)

QUESTION: Which of the following does not have the potential to impact the data collection process?

- a. New technologies
- b. Schedule
- c. Cost Reduction Initiatives
- d. Inflation
- e. Development of a new CER

ANSWER: D

SOLUTION: Inflation doesn't impact the method of collection

REFERENCE: Module 4 of CEBoK

ADVANCED ANALYSIS SAMPLE QUESTION #2

[Economic Analysis]: (Real Interest Rate)

QUESTION: Suppose the nominal interest rate is 9.0%. The rate of inflation is 6.0%. The real interest rate is approximately:

- a. 3.0%
- b. 1.5%
- c. -3.0%
- d. 15.0%
- e. Unknown

ANSWER: A

SOLUTION: The real interest rate is approximately the nominal rate of interest minus the rate of inflation.

REFERENCE: (Submitted by Committee)

CASE STUDY SAMPLE QUESTIONS

Because the questions within the Case Study section are related to the associated case study and reference material, we cannot provide you sample questions for this section. The premise of the case study states that you are a senior cost estimator who must review the work of a junior cost estimator. The Case Study will be approximately 15 pages in length to describe the requirements, and contextual information that will be pertinent to answer the case questions. Within this section you will be given information and required to judge and assess the work of the junior analyst.

For example, you will be given background information with a series of exhibits. Each question will refer you to a specific piece of information within the case study or an exhibit and you must answer the question using only the referred information.

Training Resources

Training is the most critical component of the cost career field. Without thorough training at all levels, it would be difficult to understand the breadth and depth of knowledge and skills required to generate quality cost estimates and nearly impossible to keep up with the continual updates in the profession. In recent years, SCEA had endorsed the creation of CostPROF, which is an excellent cost training guide. However, with the expansive changes to the cost certification program and an increased need for better training materials to prepare for the CCEA, CEBoK has been developed to provide a comprehensive and authoritative reference tool for cost estimators. The foundations of CEBoK and the initial development of the improved CCEA examination share common ground in covering the same Testable Topics List derived from the SCEA Body of Knowledge. Therefore, utilizing CEBoK to its fullest potential will enable cost estimators to best understand the foundational knowledge and practical applications of cost and, when combined with actual cost experience, will best enable an individual to pass both the Professional Cost Estimator and Analyst (PCEA) and the Certified Cost Estimator and Analyst (CCEA) exams. You may request a copy of CEBoK through the SCEA National Office.

Contact Information

For questions pertaining to the Certification Program and the PCEA or CCEA exams, please refer to the SCEA website at:

<http://www.sceaonline.org/>

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