



PHARMACY COLLEGE ADMISSION TEST

Interpreting PCAT Scores

Effective: July 2016

PEARSON

PEARSON

Copyright © 2004, 2008, 2012, 2014, 2015, 2016 NCS Pearson, Inc.

Warning: No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without the express written permission of the copyright owner.

Pearson, PCAT, and the **PCAT logo** are trademarks in the U.S. and/or other countries of Pearson Education, Inc., or its affiliates.

NCS Pearson, Inc., 5601 Green Valley Drive, Bloomington, MN 55437
800.622.3231 www.PCATWeb.info

Produced in the United States of America.

3.B

Product Number 65692PCAT

Table of Contents

Acknowledgments	iv
Introduction	1
Scoring Procedures	2
How the Multiple-Choice Subtests Are Scored	2
How the Writing Subtest Is Scored	2
Interpreting PCAT Scores	7
Interpreting Scaled Scores and Percentile Ranks	7
Understanding Raw Score to Scaled Score to Percentile Rank Relationships.....	8
Interpreting the Writing Score	12
Sample Essays.....	13
Comparing Older PCAT Scores to Current Scores	19
Using PCAT Scores As Criteria for Admission.....	19
Glossary	22
Tables	
1 Average Subtest Scaled Score (SS) and Percentile Rank (PR) Change per 1 Raw Score (RS) Point Change for the 2011–15 PCAT Normative Sample.....	10
Figures	
1 PCAT Writing Scoring Rubric	3
2 Distribution of Candidates Earning Composite Scaled Score Points for the 2011–15 Normative Sample	11



Acknowledgments

This document was prepared by the following members of the Pearson Clinical Assessment group:

Donald G. Meagher, EdD
Senior Research Director

Tianshu Pan, PhD
Psychometrician

Rachel Wegner, MA
Test Development Manager

Jeffrey R. Miller, MA
Editor

Introduction

The *Pharmacy College Admission Test* (PCAT®) is a norm-referenced, standardized test that is developed to measure the abilities, aptitudes, and skills that pharmacy schools deem essential for success in basic pharmacy curricula. In an effort to ensure the continuing relevance and usefulness of the PCAT for assessing the prerequisite knowledge and skills of candidates for admission to professional pharmacy programs, the test content is periodically reviewed and revised to ensure that it accurately reflects current pharmacy school entrance requirements in the sciences, math, and language arts.

Since the July 2011 PCAT administration, all PCAT tests have been delivered in computer-based test (CBT) format. All CBT test forms constructed for PCAT test administrations meet the same item-selection criteria as formerly used for paper-and-pencil test (PPT) forms, and comparability study results have shown that scaled scores earned on CBT tests are comparable to scaled scores previously earned on PPT forms.

The current PCAT scaled score range of 200–600 was first determined based on a 1998–2003 normative sample, and these scaled scores continue to represent unchanging criteria against which candidates can be evaluated from year to year going back to March 2004. Though changes in the population of PCAT candidates do not affect the relevance of the scaled scores, new percentile ranks must be calculated periodically, based on the performance of a current normative sample. The scaled score and percentile rank information presented in this document is based on all PCAT candidates who took the test for the first time between July 2011 and January 2015 ($n = 64,652$), with the current percentile ranks in effect for all PCAT test administrations since July 2016.

This publicly available document provides information useful in interpreting all PCAT scaled scores, percentile ranks, and Writing scores. During the 2011–2015 normative sample period, the PCAT consisted of a Writing subtest and five multiple-choice subtests: Verbal Ability, Biology, Chemistry, Reading Comprehension, and Quantitative Ability. However, beginning with the July 2016 PCAT administration, the test no longer contains a Verbal Ability subtest, and the four remaining multiple-choice subtests have been renamed as Biological Processes, Chemical Processes, Critical Reading, and Quantitative Reasoning. So that the information in this document remains current and relevant going forward, references to the multiple-choice subtests will be to the four that are currently part of the PCAT.

The following additional publications are also available on the PCAT website: PCAT Basics, with information about PCAT history, contents, structure, administration, and score reporting; and PCAT Reliability and Validity, with information and research results related to the reliability and validity of the test. Also available only to qualified professionals is the printed *PCAT Technical Manual*, which contains detailed data for the current normative sample, the current 2015 percentile ranks, compendium tables that can be used to compare the previous 2011 percentile ranks with the current percentile ranks, and a table showing differences in Composite percentile rank between those with and without the Verbal Ability subtest.

To request a copy of the *PCAT Technical Manual*, or to offer suggestions regarding the PCAT or about this or any other related publications, please contact PCAT Customer Relations at the following email address: Scoring.Services@Pearson.com.

Scoring Procedures

PCAT test forms are developed several months prior to the test administrations for which they are intended and are constructed to address specific test blueprint content objectives (see the separately available PCAT Basics document). At the time a new test form is developed, the multiple-choice operational items (items that are counted toward a candidate's score) are selected based on content requirements specified in the test blueprint and according to specific difficulty estimate range criteria. The operational writing prompt (a statement of a problem for which candidates must suggest a solution) is selected based on criteria regarding mean-score and score-point distribution data obtained when the prompt was originally field-tested. After a test administration, all candidates' multiple-choice score data are processed electronically, and all essays are read and scored both electronically and manually.

How the Multiple-Choice Subtests Are Scored

The 40 operational items selected for each multiple-choice subtest are analyzed using item response theory (IRT; the Rasch model) to determine ability estimates for each possible raw score total (the number of correct responses to operational items in a multiple-choice subtest). These ability estimates are then translated linearly into scaled-score points to create a raw-score-to-scaled-score table for each subtest. Scaled-score-to-percentile-rank tables are also created for each subtest, based on the performance of all PCAT candidates who make up the current normative sample. These scaled-score-to-percentile-rank tables are used for all test forms to determine percentile ranks that correspond to scaled scores.

After a test administration, candidates' raw-score totals are calculated, the appropriate raw-score-to-scaled-score tables are used to determine each candidate's scaled score, and the scaled-score-to-percentile-rank tables are then used to determine the appropriate percentile rank that corresponds to each scaled score. Quality assurance checks are in place at various stages in the scoring process to ensure that no errors are made and that there are no delays in processing candidates' scores.

How the Writing Subtest Is Scored

Each essay is assigned a Writing score ranging from 1.0–6.0, with 6.0 representing the highest earned score possible and 1.0 representing the lowest earned score possible. Essays are scored as 0 (invalid) if left blank, if written in a language other than English, if written on a topic other than the one assigned, or if answered in a manner that otherwise indicates a refusal to write.

All scoring is preceded by training done in advance of a testing window using multiple essays representing examples of each score point. These representative sample essays are selected from candidates' responses to the writing prompts from either the original field-testing or from previous operational use. Scoring for the Writing subtest is also guided by a scoring rubric that describes the characteristics of each score point, as shown on the following pages.

Score Point 6: Superior

Conventions of Language

- The writer skillfully applies the conventions of language.
- The writer makes very few, if any, mistakes in sentence formation, usage, and mechanics, and no errors are serious enough to interfere with the overall flow of the response or with its meaning.

Problem Solving

- The response exhibits a more sophisticated structural pattern that incorporates a greater variety of transitional words/phrases and shows some evidence of advanced rhetorical techniques.
- The response represents a persuasive essay showing strong evidence of efficient composition skills.
- The solution discussed is clearly related to the problem and is developed with relevant, convincing support (e.g., facts, examples, anecdotes).
- The main tenets of the problem and the solution are discussed and explained with in-depth support and detail.
- One or more alternative solutions, or multiple possible solutions, are included with clear discussion, analysis, and evaluation.
- The response is a logical and effectively organized argument that is purposefully presented.

Score Point 5: Proficient

Conventions of Language

- The writer is proficient in applying the conventions of language.
- Though some mistakes in sentence formation, usage, or mechanics are present, these errors do not interfere with the overall flow of the response or with its meaning.
- The response proficiently exhibits a structural pattern of multiple paragraphs with a clear beginning, middle, and end.

Problem Solving

- This response represents a persuasive essay showing evidence of effective compositional skills.
- The discussion of the problem and solution is clear.
- The solution discussed is clearly related to the problem, and the support presented is appropriate and relevant, but the response lacks the detailed, in-depth support characteristic of the highest score point.
- One or more alternative solutions or multiple possible solutions are discussed, with some attempt at analysis or evaluation.
- The argument progresses logically with an organizational plan consisting of clear, transitional elements.

Figure 1 PCAT Writing Scoring Rubric

Score Point 4: Effective

Conventions of Language

- The writer is generally successful in applying the conventions of language.
- Mistakes in sentence formation, usage, or mechanics are present that may interfere with the overall flow of the response, but these errors do not interfere with its meaning.
- The response exhibits a structural pattern of multiple paragraphs with a beginning, middle, and end.

Problem Solving

- This response is generally successful in using important principles of effective composition.
- Though the presentation may be general, the discussion of the problem and solution is reasonably clear.
- The solution discussed is generally related to the problem, and most of the support presented is appropriate and relevant, but the response lacks the depth of support characteristic of the higher score points.
- The argument may be rather loosely organized or may contain digressions in the organizational structure that lessen the effectiveness of the presentation.

Score Point 3: Satisfactory

Conventions of Language

- The writer adequately applies the conventions of language.
- Several mistakes in sentence formation, usage, or mechanics are present that may interfere with the overall flow of the response and with its meaning.
- The response exhibits a structural pattern of multiple paragraphs with elements of a beginning, middle, and end.

Problem Solving

- This response is fairly successful in using important principles of effective composition.
- Though the presentation may remain too general to be convincing, the discussion of the problem and solution is adequate.
- The solution discussed is adequately related to the problem, and most of the support presented is appropriate and relevant.
- The argument may progress logically, but the loosely organized presentation results in digressions from the organizational plan or unnecessary redundancies that make the presentation less straightforward and compromise its effect.

Figure 1 PCAT Writing Scoring Rubric (continued)

Score Point 2: Marginal

Conventions of Language

- The writer is marginally successful in applying the conventions of language.
- Patterns of mistakes in sentence formation, usage, and mechanics significantly detract from the presentation.
- At times the meaning of the response may be impaired.

Problem Solving

- The response is marginally successful in using important principles of effective composition.
- The response may not always exhibit a cohesive structural pattern.
- The writer may seem more concerned with self-expression than with presenting a logical argument.
- The problem is discussed and a solution related to the problem may be discussed, though the solution may be either implicit or not clearly stated.
- Support is sketchy and, at times, interrupted with redundancies, digressions, irrelevancies, and/or conditions/qualifications not clearly related to the problem.
- Organization of the argument may be rather haphazard, with a loose structuring of ideas that weakens the effectiveness of the discussion.

Score Point 1: Inadequate

Conventions of Language

- The writer's achievement in applying the conventions of language is limited.
- Frequent and serious mistakes in sentence formation, usage, and mechanics make the response difficult to understand.

Problem Solving

- The response does not successfully embody important principles of effective composition.
- It is unclear how the discussion of the problem or solution presented relates to the problem stated in the prompt.
- The support is either fragmentary, unconvincing or is a combination of material that does not contribute to the presentation (e.g., contradictions, digression, redundancies, and outright irrelevancies).
- Chaotic organization may make it hard to follow the logic of the presentation.

Figure 1 PCAT Writing Scoring Rubric (continued)

Writing Scoring Rules

The following scoring rules are used when assigning the Writing scores:

- Following the scoring rubric (see Figure 1), each essay is assigned two separate scores ranging from 1–6 (or 0 if deemed invalid). One score is assigned by a trained human scorer and one score by Pearson's Intelligent Essay Assessor™, an Internet-based tool designed to automatically score electronically submitted essays.
- The scoring of candidates' essays is done with consideration for the criteria for both conventions of language and problem solving.
- When the two assigned scores are the same (e.g., 3 and 3), or differ by no more than one score point (e.g., 3 and 4), the two scores are averaged, resulting in a final score represented to one decimal place (e.g., 3.0, 3.5).
- If the two assigned scores differ by more than one score point (e.g., 3 and 5), a human resolution leader reads the essay and assigns a score. The resolution score is then combined with the higher of the two original scores, with the average of these two scores representing the final score (e.g., an original high score of 5 and a resolution score of 4 would result in a final score of 4.5).

Writing Score Verification Procedures

Specific verification procedures are followed that allow supervisory staff to monitor the reliability of assigned scores and each individual scorer's work, which include the following:

- Daily and cumulative inter-rater reliability reports for each scorer and essay prompt provide information about how frequently scorers are in exact agreement or assign adjacent scores.
- Daily and cumulative frequency distributions are generated that show supervisors whether any individual scorers are scoring consistently high or low.
- Pre-scored essays are randomly assigned to scorers, which allow supervisors to monitor each scorer's validity agreement rate.
- Scoring supervisors back-read essays after scores have been assigned to monitor how consistently each scorer is performing in accord with the scoring rubrics and with other training materials.

These reliability and validity methods ensure that each scorer meets and maintains the quality metrics established for PCAT in order to continue scoring. If a scorer fails to meet the expected validity criteria, the person receives a warning and specific feedback. If a scorer fails to meet validity criteria a second time, he or she must then take and pass a scoring precision assessment in order to continue work as a PCAT essay scorer.

Interpreting PCAT Scores

Immediately after a candidate completes the PCAT exam, an unofficial preliminary score report is provided to the candidate at the test center. After verifying that no irregularities occurred that could have affected a candidate's performance, and after the candidate's essay has been scored, Pearson provides a personal Official Score Report to the candidate, sends Official Transcripts directly to schools and colleges of pharmacy as requested by the candidate, and sends score data to the Pharmacy College Application Service (PharmCAS) for subscribing institutions (see the PCAT Basics document for a sample Official Score Report and Transcript).

PCAT scores are intended to be only one set of indicators among several sources of candidate information considered in admissions decisions. Though research has consistently shown the PCAT to be a strong predictor of subsequent academic performance (see the PCAT Reliability and Validity document), PCAT scores are not intended to be used as the sole criteria for admission, nor are they intended to suggest any rigid performance standard, which may inadvertently exclude otherwise worthy candidates. Neither the AACCP nor Pearson establishes passing scores for individual PCAT subtests or for the PCAT as a whole.

PCAT scores represent a common standard against which candidates can be compared, regardless of educational background or other personal variables. When used along with other information available to admissions committees, PCAT scores represent a valuable tool for evaluating applicants to pharmacy programs. However, it is the responsibility of each college or school of pharmacy to determine how it can best use PCAT scores with its candidates.

Interpreting Scaled Scores and Percentile Ranks

PCAT scaled scores and percentile ranks reflect the general academic ability and specific content knowledge of the candidates in the normative sample. When constructing multiple forms of the same test, there are always slight variations in the level of difficulty between forms, regardless of the stringent item selection criteria used. For this reason, a given raw score obtained from different test forms may not always reflect the same level of performance. To adjust for these differences, PCAT test forms are equated by converting raw scores to scaled scores on a common scale (determined through IRT analysis and linear conversions of IRT ability scores). The use of psychometric procedures to equate raw scores on a common scale also facilitates the determination of percentile ranks—the percent of candidates in the current norm group who received a scaled score lower than a given score.

Scaled Scores

The PCAT scaled scores represent equal units on a continuous scale, ranging from 200–600. Scaled scores are calculated separately for each of the four PCAT multiple-choice subtests, with a total Composite score that is the unweighted average of the four multiple-choice subtest scaled scores. Because they represent equated scores, subtest scaled scores earned for a given subtest during one PCAT test administration are comparable to scaled scores earned for the same subtest during other test administrations, even though different forms of the test are administered. Composite scaled scores are also comparable in the same way. The method used to

determine the scaled scores and the scale on which they are reported (200–600) have remained unchanged since March 2004, making the PCAT scaled scores especially useful for longitudinal tracking.

Percentile Ranks

Percentile ranks range from 1–99. Percentile ranks for the multiple-choice subtests are comparable across subtests because they are based on performance relative to the current norm group. For this reason, the percentile ranks are more useful than the scaled scores for comparing individual candidates and for determining a candidate’s relative strengths and weaknesses. The subtest percentile ranks are most useful for comparing abilities in the specific subject areas, and the Composite percentile rank is most useful for general comparisons.

PCAT percentile ranks are based on the performance of the current normative sample—all first-time PCAT candidates from July 2011 through January 2015 ($n = 64,652$). However, percentile ranks obtained prior to July 2016 were based on the performance of the previous normative sample—all first-time PCAT candidates from June 2007 through January 2011. For this reason, the current percentile ranks are not directly comparable to previously earned percentile ranks.

Understanding Raw Score to Scaled Score to Percentile Rank Relationships

The current PCAT scaled scores were based on the raw scores for each test form subtest administered to the candidates in the 1998–2003 normative sample. Since the introduction of the current PCAT scaled scores in 2004, a raw-score-to-scaled-score correspondence has been calculated separately for each multiple-choice subtest in each new test form, based on difficulty statistics for the operational items making up a subtest and the overall statistical difficulty of a subtest.

Each item difficulty statistic is based on candidates’ performance on the item when it was field-tested and then equated (using the Rasch model) to all other items in a large pool of items of the same content area—an item bank. All test form subtests are constructed from equated items chosen from the appropriate content area item bank. This makes subtest scaled scores comparable across test forms and test administrations, even though the overall difficulty of the set of items on each test form varies.

The PCAT scaled score means have not been readjusted since the 200–600 range was established in 2004, with means for each subtest of 400 and standard deviations of 25. However, the percentile ranks that correspond to the scaled scores have been recalculated each time the test has been normed since then (2007, 2011, 2015), with the most recent renorming occurring during 2015 for release in 2016.

Raw Scores and Scaled Scores

Each raw score point on a given subtest (i.e., 1–40) corresponds to a unique scaled score. Since each PCAT multiple-choice subtest includes 40 operational items, and there are 401 possible scaled score points (200–600), a change of one raw score point necessarily results in a change of more than one scaled score point. This does not mean, however, that a change of one raw score point (one more item answered correctly) necessarily results in an equal unit change in scaled score points (e.g., 10 scaled score points).

Because the overall difficulty of each test form subtest varies, the difference in one raw score point on a given test form subtest reflects differing ability estimates required for candidates to have answered this many items

correctly. Since the difference between each difficulty estimate varies, the scaled score change associated with each change in raw score point also varies.

Thus, an increase of one raw score point does not necessarily correspond to an equally uniform change in scaled score points. The change in scaled score points resulting from a given raw score point change depends upon how near the mean the raw score point total is. The scaled score is assumed to indicate the ability needed to answer a given number of items correctly for a given test form subtest, with a greater proportion of cases occurring around the mean than at the extremities.

Raw Scores, Scaled Scores, and Percentile Ranks

For each subtest, a given raw score corresponds to a specific scaled score that corresponds to a theoretical percentile rank, based on the assumption that present PCAT candidates are equivalent in ability to those in the current normative sample. Table 1 shows average raw score to scaled score to percentile rank correspondences for all test form subtests administered for the 2011–15 PCAT normative sample (except for Verbal Ability, which is no longer part of the PCAT). This table shows how one-point changes in raw score result in corresponding changes in scaled score points and percentile ranks. Each row in Table 1 shows how each successive raw score point increase corresponds to a given average change in scaled score and percentile rank. For example, a change in the Biological Processes raw score from 22 to 23 results in an average 3-point scaled score change and a 6-point change in percentile rank (as shown on the row for a raw score of 23). Please note that the correspondences shown in Table 1 are averages that illustrate patterns observed across multiple test forms administered over several years, rather than exact score correspondences for a specific test administration.

Table 1 Average Subtest Scaled Score (SS) and Percentile Rank (PR) Change per 1 Raw Score (RS) Point Change for the 2011–15 PCAT Normative Sample

RS	Biological Processes		Chemical Processes		Critical Reading		Quantitative Reasoning	
	SS	PR	SS	PR	SS	PR	SS	PR
0	—	—	—	—	—	—	—	—
1	18	0	20	0	20	0	18	0
2	18	0	21	0	21	0	19	0
3	11	0	13	0	13	0	12	0
4	9	0	10	0	10	0	8	0
5	6	0	7	0	7	0	7	0
6	6	0	7	0	7	0	6	0
7	5	0	5	0	6	0	5	0
8	5	0	6	0	5	0	5	0
9	4	0	4	0	5	0	4	0
10	3	0	5	1	4	0	4	1
11	4	0	4	2	4	0	4	2
12	3	1	3	1	4	1	3	2
13	4	1	4	3	4	1	4	3
14	3	1	4	3	3	1	3	4
15	3	2	3	3	4	2	3	3
16	3	2	4	5	3	1	3	5
17	3	2	3	4	4	3	3	6
18	3	3	3	5	3	3	3	6
19	3	4	3	6	3	3	3	6
20	2	3	3	5	3	3	3	6
21	3	4	4	6	4	6	3	6
22	3	5	3	6	3	4	3	7
23	3	6	3	5	3	5	3	5
24	3	5	3	5	3	5	2	4
25	3	6	4	7	4	8	3	5
26	3	5	3	4	3	6	4	6
27	3	6	3	4	4	7	3	4
28	3	6	4	5	4	8	3	3
29	3	6	4	4	3	5	3	3
30	4	5	4	3	4	6	4	3
31	3	5	4	3	5	7	4	2
32	4	5	4	2	4	4	4	2
33	5	5	5	2	5	4	5	2
34	5	3	6	2	6	3	5	1
35	5	3	6	1	6	1	6	1
36	7	2	8	1	8	1	6	0
37	8	2	9	0	9	0	9	0
38	11	0	12	0	13	0	11	0
39	18	0	21	0	21	0	19	0
40	18	0	21	0	21	0	19	0

Table 1 illustrates what is typically seen in a subtest raw-score-to-scaled-score relationship: a one point raw score change near the lower and upper ends (i.e., low and high raw scores) results in greater scaled score changes than near the median, where corresponding changes in scaled scores are less. This occurs because the greater number of candidates with ability levels closer to the median results in greater scaled score precision (with smaller standard error of measurement) than at the low and high ends where there are fewer candidates with these ability levels.

Table 1 shows the opposite pattern in the relationship between scaled scores and percentile ranks for a different reason. The scaled score to percentile rank relationship illustrated in Table 1 reveals that around the subtest means, slight changes in scaled scores result in greater differences in percentile rank. The reason for this is that scaled scores are derived from an assumption that the candidates taking the PCAT constitute an approximately normal distribution of abilities. The large size of the normative sample used to determine the percentile ranks has resulted in the data forming a classically shaped bell curve characteristic of a normal distribution, with the majority of scores bunched around the mean. The result of this bunching is that slight scaled score changes result in greater percentile rank changes near the mean than at the extremities.

This bunching of scaled scores around the mean is illustrated graphically in Figure 2 by showing the bell curve formed when these scores are plotted for the current normative sample.

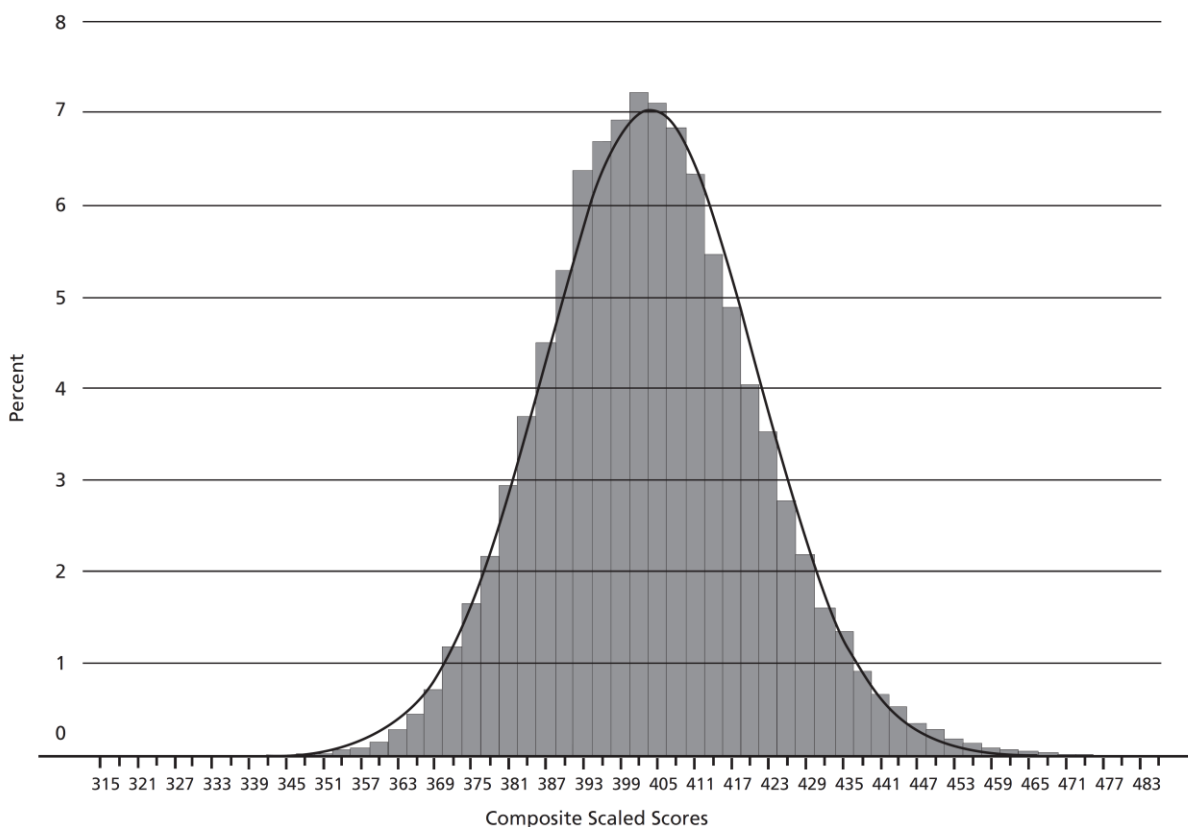


Figure 2 Distribution of Candidates Earning Composite Scaled Score Points for the 2011–15 Normative Sample

As shown in Figure 2, the percent of candidates earning a given scaled score is greatest near the mean. This illustrates why increases in scaled score near the mean correspond to greater changes in percentile rank than near the extremities, where there are fewer candidates and where each change in scaled score results in a smaller change in percentile rank.

Interpreting the Writing Score

Every candidate taking the PCAT currently receives a Writing score on a scale of 1.0–6.0, along with a mean score that represents the average of all Writing scores earned by candidates taking the PCAT during the 12 months prior to the national test administration window during which the candidate took the test. The Writing score reflects each candidate’s ability to apply conventions of language and problem solving skills in the composition of an original essay.

When used appropriately, the PCAT Writing score represents valuable information in the admissions process that can be used to identify a candidate’s written communication skill as a guide for placement purposes. Because the ability to create organized and coherent reports or correspondences under deadline pressure is a common feature of academic and professional life, it is important to assess a writing sample produced under time constraints, and the results of that assessment are important for college admission committees to consider.

The Writing score should be interpreted with reference to the mean score listed on the Official Transcript, as well as to the score-point descriptions in the scoring rubric and the sample essays of each score that are included in this document. For pharmacy schools already requiring candidates to submit an essay or other written statement, the PCAT Writing score can be useful as an indication of a candidate’s writing ability that is obtained through rigorous standardized administration and scoring processes.

Comparisons between candidates’ Writing scores must be made with some caution because these scores are reported for performances on specific prompts, and each test administration includes multiple operational prompts. Nevertheless, even though no equating method is applied to scores to make them precisely equivalent, all operational prompts are selected based on criteria requiring that a similar mean was obtained when each was originally field-tested.

When used with other information available to admissions committees, the PCAT Writing score represents a valuable tool for evaluating applicants to pharmacy programs. It is the responsibility of each college or school of pharmacy to determine how the PCAT Writing score is used.

Sample Essays

The six essays on the following pages represent examples of each earned Writing score point (1.0, 2.0, 3.0, 4.0, 5.0 and 6.0). Each sample essay is shown with the assigned score, and with brief summary notes (in parentheses following each score) to explain what a score point indicates.

The sample essays were all written on the following prompt, which has been field-tested and then used operationally on PCAT test forms, but will never again be used on a PCAT test:

As a response to terrorist attacks, the United States government has adopted measures intended to protect against future threats, but critics contend that some of these tactics have also compromised legally protected individual rights. Discuss a solution to the problem of assuring national security in an open and free society that is based on individual civil rights and liberties.

It is important to note that while reviewing these sample essays—and indeed when considering a candidate’s Writing score—all candidates who write a PCAT essay are basically composing a rough draft under the pressure of a high-stakes testing situation without access to any reference materials. With a 30-minute time limit to plan and write the essay, candidates have very little time to proofread and make any desired revisions to their draft. There is not sufficient time allowed during the test for most candidates to entirely rewrite an essay.

The sample essays that follow are based on candidates’ essays that have been modified enough so that none are identifiable regarding authorship. The sample essays include errors in spelling, sentence structure, and word usage that are illustrative of the types of errors commonly made by candidates.

Sample Essay 1

Writing Score: 1.0 (Inadequate—very weak skills, many serious errors, difficult to understand, ineffective organization, development, and presentation):

A lot of social organization problems are presence in free society. A world lacking order is going to degenerated. To help order in the open and free society it is specially crucial to have a national security. With no honesty voluntary helping or self-consciousness of human actions. None of this could be possibility this ways.

Sample Essay 2

Writing Score: 2.0 (Marginal—marginal skills, patterns of errors, some impairment of meaning, disorganized, unclear development, unconvincing presentation):

A significant challenge in today's open and free society is guaranteeing national security. Several years have passed since the shocking 9/11 terror incidents in the States and some people are still fearful. Many are afraid that the States may be hit again.

I learned something new the other day. I went to the mall with a friend that I met in one of my classes to run some errands. When we got just inside the mall she told me that she was shocked that no one check her purse or search her body before entering. I looked at her confused. Then she told me that in Isriel the security check in everyone's bags and search their bodies before entering the mall. I told her that our security do that too, just when you are leaving the mall. After talking with her more she explained to me that Isriel has been dealing with security issues for a great deal longer time than States. To avoid this from occurring in States, like already have in Isriel, action needs to be taken quikly.

Sample Essay 3

Writing Score: 3.0 (Satisfactory—adequate skills; several errors; clear beginning, middle, and end; unclear organization, incomplete development, less-than-effective presentation):

The thought of national security being enforced would bring mixed views to society. While some individuals would view it positively, others would be skeptical. Freedom, individual rights, & privacy are all concerns that are likely to arise.

Of these concerns, privacy is sure to bring the most controversy. At the heart of the new national security operations there would likely be surveillance cameras & phone tapping. Both of which are currently allowed due to the patriot act which lets the government look through information on anyone. Sadly due to this someone is aware of who we are & what we do each day. Where is the privacy in that?

In order to guard our country with the highest level of security all citizens would need to temporarily give up their own freedom. No one would be able to just go somewhere spur-of-the-moment. Everyone, young & old, would all have to follow the same rules. Individuals could even be regarded as a terrorist if they do not follow their given schedules.

The individual rights that were once given as a gift would be stripped away, all due to a lack of trust. Individuality would be gone. Finally some sort of tyranny would come with a socialist viewpoint in its place, & a sense of security is all we would get. Who wants that to happen? Not me, and hopefully not you.

Is national security this important? For us to give up our most treasured rights of privacy, freedom, and individuality. Let us hope that we are not moving this way as a nation. Regrettably, we are falling with no one in sight to catch us.

Sample Essay 4

Writing Score: 4.0 (Effective—effective skills, minimal errors, clear structure, loose organization, appropriate development, adequate presentation):

In this time of uncertainty, the concern for national security must be addressed responsibly. Fortunately, there are several promising solutions that authorities can consider. Prior to adopting a specific plan, authorities must make sure that any decisions are consistent with the needs, views, and concerns as expressed by the public. Citizens must be allowed to freely express their views and to vote on which solutions they consider to be best for their country.

One possible solution that should be considered involves consulting with the leaders of other countries to resolve any differences. Each national leader should inform the others of specific policies and regulations followed in each country. Doing so could bring about coalitions between countries in order to safeguard all involved against potential enemies. Alliances of this sort would represent important steps toward ensuring our nation's security.

After assuring the cooperation of international allies, we can attempt to secure our nation through internal means by placing physical boundaries, such as electric fences and security devices, on all the borders. In order to stop people from entering this country without appropriate reasons, we could put gated entrances with security patrols at the locations where individuals most frequently attempt to cross the borders. In this way, strict entry policies can be adopted.

Another internal measure that should be explored involves enacting laws that restrict the private use of weapons and that enforce effective penalties on individuals who violate these regulations. Accurate and up-to-date records should be kept on all citizens that own and use weapons. Weapons laws should be firm, and anyone who uses weapons to threaten the sense of security held dear by law-abiding citizens should be disciplined.

With the rights and wishes of citizens in mind, and after making alliances with other countries, it is definitely possible to secure our nation.

Sample Essay 5

Writing Score: 5.0 (Proficient—solid skills, some errors, effective flow, solid organization, clear development, proficient presentation):

The continuing threat of terrorism has caused national security to be an issue in several countries. Ways to solve this problem are being discussed and modified by all. One solution is to initiate a community strengthening program in addition to having a reasonably paid volunteer army that is committed to national security. This solution appears promising in a free nation that encourages individual rights and liberties.

Within each community the leader would need to create a program that would meet the requests of everyone involved. In order to do this, a meeting would need to be held to establish an agreed upon goal and to start to develop a bond. With each of these programs being locally operated within each community it would allow citizens to start to form bonds with one another. This would then help build a trusting relationship and create a responsibility to look after each other in trying times. A united community that is built on trust would continue to provide support to their government due to their ability to act freely. Each citizen would then feel pride for their nation which will make them want to continue to protect everyone around them from harm.

In getting the nation to participate by strengthening all communities, every citizen should feel as though they can relate with the person next to them. This should stop people from seeing one another in categories and instead as people they can depend on and wish to guard from all harm. A community strengthening program of this type would allow every citizen the right to choose to protect themselves and their neighbors in the community around them. This would eventually strengthen a person's belief in civic rights which consist of their liberties in an open society.

Another solution to the national security issue would be to create an improved national military that people can take pride in. From the locally established communities highly paid army units could be recruited. Since all of the members in the army unit would come from the same community they would all have the same values and beliefs. Everyone in these army units would feel extremely honored and more willing to serve their country and protect their nation.

Establishing these two programs would hopefully unite the nation as a whole to work together in order to assure national security. If these programs are created in a way that respects people's rights, citizens will make their own moral decisions to want to participate, which will make this country stronger and safer.

Sample Essay 6

Writing Score: 6.0 (Superior—impressive skills, minimal errors, clear structure, effective organization, convincing development, persuasive presentation):

Images of Lady Justice usually depict her with a sword in one hand and scales in the other. While this image has come to represent the ideal legal system, it can just as easily apply to a national security situation facing us today. To maintain security in an age of terrorism, the national and state political leaders must work together with the civilians of our nation to assure that we are all kept safe in more ways than one. Increasing security in our airports and along the borders and coastlines are measures that greatly help to ensure national security but, as important as these measures are, it is essential that they be implemented only while taking into consideration the individual rights and liberties of all people.

Increased security in the vulnerable entry points of our nation entails inspecting items that come into the country through the borders or via the air and seas. It also involves a detailed examination of luggage arriving on airplanes, as well as belongings coming into our country by any other means. Although these procedures are necessary, there should be no reason to violate an individual's rights in the process, especially when doing personal searches. For instance, many nuns are required to wear their habits and veils at all times, which includes going through airport security checks. When such individuals with religious affiliations that involve wearing specific cloths are asked by security at airports or customs to remove a piece of their required clothing, it violates their individual rights as well as their constitutional guarantee of freedom of religion. For this reason, border patrol and airport security staff must be willing to perform their searches without violating the civil rights and liberties of any individual.

To go along with increasing security, any new policies or changes to old policies should be made public knowledge. To do this news channels across the nation could all run stories regarding the new policies and all of the airports could post signs regarding what is and isn't allowed to enter and leave the country. Hopefully, doing things like this would help prevent inconveniences and misunderstandings when traveling. Another thing that can be done to help inform travelers to the U.S. about our national security changes is to inform officials from other countries about these policies. By doing this, officials from other countries would be able to inform their citizens about our new policies to prevent any misunderstandings they may have when traveling to our country.

In summary, feasible solutions to our national security problems are available to increase security at our airports, borders, and coastlines. In order to implement these measures, political leaders must take steps to make sure that all civilians of our country are made aware of the new policies and are informed enough to want to agree to follow them. In addition, our national policy makers need to ensure the public that all security officers will keep in mind the individual rights and liberties of all, regardless of gender, faith, race or origin. In these ways, like Lady Justice, the nation will hold the security sword in one hand and balance individual rights and liberties with the other.

Comparing Older PCAT Scores to Current Scores

All multiple-choice scores are currently reported on Official Transcripts as scaled scores and 2015 percentile ranks, with all percentile ranks obtained before July 2016 converted to 2015 equivalents (see the Score Reporting section of the PCAT Basics document). However, current Official Transcripts do not display Writing scores that were earned prior to July 2012 on a 5-point scale because either listing them as they are or attempting to convert them to a 6-point scale would be misleading due to the few number of score points and the differing nature of the scores.

PCAT percentile ranks listed on transcripts issued prior to the July 2016 PCAT administration may be compared to the current percentile ranks by using the compendium tables included in the 2016 edition of the *PCAT Technical Manual* (see The 2015 Norms section of the manual). No such compendium table is available for the Writing scores for reasons explained above.

It is important to note when comparing the current Composite scaled scores and percentile ranks to those obtained prior to July 2016 that the subtests included in the Composite average has changed. The 2011 Composite scaled scores and percentile ranks included the Verbal Ability subtest in the calculation, which weighted the Composite scores more toward the language skills than the 2015 Composite scores and percentile ranks, which does not include the Verbal Ability subtest. As a result, the Composite scores earned from July 2016 on are more weighted toward the sciences than previously earned Composite scores. PRs obtained prior to July 2016 were originally based on the **2011 norms** (June 2007 through January 2011) but for reporting purposes have been converted to the **2015 PRs**. Please also note that Composite percentile ranks reported on Official Transcripts for scores earned prior to July 2016 are based on recalculated scales scores that do not include the Verbal Ability subtest.

To compare a candidate's overall performance on the PCAT as indicated on an Official Transcript issued prior to July 2016 to current Composite scores, it is necessary to recalculate the candidate's Composite scaled score. To do so, sum the scaled scores earned for Biology, Reading Comprehension, Quantitative Reasoning, and Chemistry (the former subtest titles corresponding to the current Biological Processes, Critical Reading, Quantitative Reasoning, and Chemical Processes, respectively). The Verbal Ability scaled score is not included. Divide this total by 4, and round this average to the nearest whole number (.5 and greater rounds up). Then look up the recalculated scaled score in the "2015" column in Table 24 of the current *PCAT Technical Manual* to determine the current Composite percentile rank.

Using PCAT Scores As Criteria for Admission

The PCAT can be an important tool in the admissions process and as a guide for placing students appropriately. For example, PCAT standardized test results provide information about the abilities of applicants, which may offset problems that arise from the variability in standards among schools and geographic regions.

Colleges of pharmacy may use PCAT subtest scores to construct local norms and to evaluate subtest scores in terms of the specific nature of a pharmacy program. The PCAT may also be useful in identifying students' academic strengths and weaknesses as a means of suggesting academic support needed by candidates. By comparing percentile ranks across multiple-choice subtests, or by comparing earned Writing scores to mean Writing scores, a school may be able to determine candidates' areas of relative strengths and weakness and to identify those who may benefit from academic support.

In the process of reviewing PCAT scores with additional information about a candidate applying for admission to a program, schools may find some discrepancies that require further investigation. The following examples represent some common conflicting pieces of information and include suggestions for ways to resolve them.

Candidates With High Prerequisite Course Grades and Low PCAT Scores

In the case of candidates who have been out of school for several years, low scores may indicate that subject matter has been forgotten, or may suggest a lack of recent experience in taking standardized tests. In the case of younger candidates, it may be useful to know whether they came from schools with comparatively lenient academic standards. In such cases, it may have been relatively easy for a student to earn high grades, but those grades may not mean the same as those obtained at more competitive institutions.

It may also be useful to examine any pattern that may be apparent in course grades, such as subject areas in which a candidate received the highest grades or any noticeable changes in grades received from year to year. Because recent performance is typically thought to be the best indicator of future performance, it may be important to note any noticeable rise or decline in recent grades received. If these considerations do not help to explain a discrepancy between high grades and low PCAT scores, the candidate may be able to provide an explanation. At the time the PCAT was taken, the candidate may have been ill, been under some unusual personal stress, or be subject to high test anxiety. Other test results or other tools used to evaluate candidates for admission may provide useful comparisons by showing similarly inconsistent results in relation to grades.

Candidates With Low Prerequisite Course Grades and High PCAT Scores

Older candidates may have learned a great deal since leaving school and may have become more motivated than in the past. Competent students from highly competitive institutions might also have received grades that do not necessarily reflect their ability to succeed in a pharmacy program. For example, a student who carried an unusually heavy credit load, held a demanding job, or helped raise a family while attending school might have received lower grades than he or she would have otherwise. If nothing in the candidate's record provides an explanation of the discrepancy, the candidate may be able to help clarify the matter.

Candidates With Low PCAT Critical Reading or Writing Scores, High Scores for Other PCAT Subtests, and High Prerequisite Science and Math Courses

The Biological Processes, Chemical Processes, and Quantitative Reasoning subtests emphasize basic scientific and mathematic principles and knowledge. The content of these subtests is much more course-dependent than the Critical Reading and Writing subtest content, at least for students majoring in the sciences. Students who have taken as many science and math courses as they can in order to prepare for entry into a college of pharmacy may have taken their English composition, humanities, and social science prerequisite courses earlier in their college careers. Such candidates may receive high PCAT Biological Processes, Chemical Processes, and Quantitative Reasoning scores, but the language-oriented subtest scores may provide a more accurate picture of their general academic ability.

In addition, English may be a second language for some candidates. As a result, candidates whose native language is one other than English may have difficulty with Critical Reading items that require the analysis and interpretation of extended text, or with the writing task that requires the composition of an original essay. Even

though these individuals may be able to deal effectively with the scientific and mathematics material as reflected in prerequisite course grades or in performance on the PCAT Biological Processes, Chemical Processes, and Quantitative Reasoning subtests, they may be less able to deal with the more language-dependent content.

Candidates With High PCAT Biological Processes and Chemical Processes Scores but Low Scores on Other PCAT Subtests

Although the Biological Processes and Chemical Processes subtests do involve the application of interpretive and critical thinking skills, particularly in items associated with passages, they also include much content that is memorizable, such as specific technical knowledge in the natural and physical sciences. However, the Critical Reading, Quantitative Reasoning, and Writing subtests are much more skill-based than knowledge-based in that one requires the comprehension, analysis, and evaluation of complex ideas represented in text; one involves the performance of quantitative computation skills required to solve mathematical problems; and one involves the composition of an original essay that proposes a solution to a problem. These skills are not as dependent on identifying information as they are on knowing how to perform applications. For this reason, candidates with higher Biological Processes and Chemical Processes scores relative to their Critical Reading, Quantitative Reasoning, and Writing scores may be those whose cognitive strengths are more knowledge-based than application-based.

Field Test—An experimental administration of test items as a way to acquire examinee performance data in order to determine the items' suitability for use as future operational items.

Item Response Theory (IRT)—A mathematical model that relates the characteristics of test items and estimates of candidates' ability or proficiency to the probability of a positive response, such as the correct answer to an item.

Longitudinal Tracking—The tracking of particular data (e.g., mean entering PCAT scores) over a long period of time (e.g., 5 years) to establish trends.

Mean (M)—The average of a set of scores computed by adding all of the scores together and then dividing by the total number of scores.

N-count (n)—The total number of individuals who make up a sample (e.g., the number of candidates who took a test).

Normative Sample/Norm Group—The group of individuals (sample) earning scores on a test whose score data are used to determine scaled scores and/or percentile ranks.

Norm-Referenced Standardized Test—A measurement in which an individual's scores are interpreted by comparing them to scores obtained by a defined group of individuals (a norm group or normative sample) that has been used to determine scaled scores and/or percentile ranks.

Norms—Data that summarize the performance of a norm group (or normative sample) by showing how earned scores compare to one another, such as by listing scaled scores and corresponding percentile ranks.

Operational Items—Items on a test that are used to determine candidates' scores.

Percentile Rank (PR)—A whole number between 1 and 99 that represents the proportion of individuals from the normative sample who earned lower than a given score on a test.

Raw Score (RS)—The number of items answered correctly by a candidate on a test.

Scaled Score (SS)—A standardized test score on a specified common scale (e.g., 200–600) with a designated mean and standard deviation that is derived from a raw score (or an ability estimate). Scaled scores are especially useful for comparing performance of individuals or groups over time in a content area (e.g., biology).

Scoring Rubric—A list of detailed descriptions of the criteria that must be met in order for specific scores to be assigned to an assessment performance, such as essay results.