

# **CAAP Critical Thinking Test Summary**

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## Introduction

The Collegiate Assessment of Academic Proficiency (CAAP) is a standardized, nationally-normed assessment program from ACT that enables postsecondary institutions to assess, evaluate, and enhance student learning outcomes and general education program outcomes. There are six different CAAP tests that institutions can choose to administer: Reading, Writing Skills, Writing Essay, Mathematics, Science, and Critical Thinking.

Owens adopted the CAAP Critical Thinking test in the Spring of 2009, and it is administered every year to students enrolled in randomly-chosen sections of select 200-level courses. The test is 40 minutes in length and includes 32-items that measure students' skills in clarifying, analyzing, evaluating, and extending arguments. An argument is defined as a sequence of statements that includes a claim that one of the statements, the conclusion, follows from the other statements. The Critical Thinking Test consists of four passages that are representative of the kinds of issues commonly encountered in a postsecondary curriculum.

A passage typically presents a series of sub-arguments in support of a more general conclusion or conclusions. Each passage presents one or more arguments using a variety of formats, including case studies, debates, dialogues, overlapping positions, statistical arguments, experimental results, or editorials. Each passage is accompanied by a set of multiple-choice test items. A sample passage with test items is provided in Appendix A.

As indicated in Table 1, test questions fall within one of three content categories. Between 17 and 21 test questions (53 – 66% of questions) assess students' analysis of elements of an argument, between 5 and 9 (16 – 28%) assess students' evaluation of an argument, and 6 (19%) questions assess students' extension of an argument.

**Table 1. Content Specifications Summary for the CAAP Critical Thinking Test**

Content Category	Proportion of Test	Number of Items
Analysis of elements of an argument	.53–.66	17–21
Evaluation of an argument	.16–.28	5–9
Extension of an argument	.19	6
<b>Total</b>	<b>1.00</b>	<b>32</b>

## Methodology

In May 2009, the Critical Thinking Test was administered to students enrolled in randomly-selected sections of the following courses: Sociology 220, Psychology 220, Humanities 200, History 202, Biology 205, Physiology 202, English 230 and Math 215. A total of 207 students were enrolled in these sections during the Spring of 2010 and 107 completed the test, resulting in a 51.7% response rate and a 9.1% margin of error.<sup>1</sup> Table 2 shows self-reported demographic characteristics of test respondents.

**Table 2. Demographic Characteristics of Test Respondents**

<b>Ethnicity</b>	<b>#</b>	<b>%</b>	<b>Status</b>	<b>#</b>	<b>%</b>	<b>Major</b>	<b>#</b>	<b>%</b>
African American/Black	10	9%	Full-time	84	79%	Undecided	3	3%
Amer. Indian/Alaskan Nat.			Part-time	22	21%	Agriculture	1	1%
White/Caucasian	77	72%	No response	1	1%	Architecture	1	1%
Mexian American/Chicano	2	2%	<b>Cum GPA</b>			Biological Sciences	3	3%
Asian/Pacific Islander	1	1%	Below 2.00	9	8%	Business	7	7%
Puerto Rican/Cuban/Hisp.	1	1%	2.01 - 3.00	15	14%	Office Management		
Filipino			2.51 - 3.00	26	24%	Marketing & Purchasing		
Other	4	4%	3.01 - 3.50	21	20%	Communications	6	6%
Prefer not to respond	6	6%	3.51 and above	27	25%	Community Services	12	11%
No response	5	5%	No response	9	8%	Computer & Info. Sciences		
<b>Gender</b>			<b>Rank (self-reported)</b>			General Studies	4	4%
Male	49	46%	Freshman	39	36%	Education	13	12%
Female	56	52%	Sophomore	37	35%	Engineering	4	4%
No response	2	2%	Junior	11	10%	Fine & Applied Arts	2	2%
<b>Age</b>			Senior	7	7%	Foreign Languages		
18 and under	10	9%	Other	11	10%	Health Professions	20	19%
19 - 20	35	33%	No response	2	2%	Home Economics	1	1%
21 - 25	25	23%	<b>Enrolled at Owens as a Freshmen</b>			Letters	1	1%
26 - 30	15	14%	Yes	77	72%	Mathematics	1	1%
31 - 39	9	8%	No response	27	25%	Philosophy/Religion	1	1%
40 and older	13	12%	No response	3	3%	Physical Sciences	4	4%
No response						Social Sciences	17	16%
						Trade & Industrial	1	1%
						No response	5	5%

<sup>1</sup> The margin of error is a statistic that reflects the amount of sampling error in a survey's results and is based on the size of the sample (n=107) in relation to the size of the population (N=1,267 students enrolled in all sections of the surveyed courses during the Spring of 2010). The lower the margin of error, the more confidence one can have that the data are representative of the full population. Ideally, the margin of error should be 5% or less. The way to reduce the margin of error, is to increase the sample size (i.e., survey more students).

## Summary of Test Results

As a general guide, differences in scores should be interpreted based on the standard deviation of the score distribution. Standard deviations are a measure of variation in the data such that 68% of scores fall within one standard deviation of the mean ( $60.7 \pm 5.4 = 55.3 - 66.1$ ), 95% fall within two standard deviations ( $60.7 \pm 10.8 = 49.9 - 71.5$ ), and 98% are within three ( $60.7 \pm 16.2 = 44.5 - 76.9$ ). Consequently, differences of one standard deviation or less are considered negligible, differences between one and two standard deviations are considered moderate, and differences between two and three or more are considered substantial.

Based on the guide above, the results (displayed in Table 3) show that Owens students (a) differed very little from the two-year public national average, (b) there was very little change from 2009 to 2010, and (c) there was very little difference between different student groups.

**Table 3. Average Scores by Student Group: Owens 2010, 2009, and National Average.**

	Owens 2010		Owens 2009		Current Natl. Ave.			Owens 2010		Owens 2009		Current Natl. Ave.	
	Ave.	#	Ave.	#	Ave.	S.D.		Ave.	#	Ave.	#	Ave.	S.D.
<b>Overall</b>	60.1	107	61.0	208	60.7	5.4	<b>Status</b>						
<b>Ethnicity</b>							Full-time	60.0	84	61.0	127	NA	NA
African American/Black	54.0	10	59.0	12	NA	NA	Part-time	60.0	22	62.0	35	NA	NA
Amer. Indian/Alaskan Nat.				1	NA	NA	No response		1	61.0	46	NA	NA
White/Caucasian	61.0	77	62.0	129	NA	NA	<b>Cum GPA</b>						
Mexian American/Chicano		2	59.0	10	NA	NA	Below 2.00	57.0	9	58.0	15	NA	NA
Asian/Pacific Islander		1		1	NA	NA	2.01 - 3.00	58.0	15	58.0	24	NA	NA
Puerto Rican/Cuban/Hispanic		1		2	NA	NA	2.51 - 3.00	59.0	26	61.0	36	NA	NA
Filipino				1	NA	NA	3.01 - 3.50	61.0	21	62.0	44	NA	NA
Other		4	61.0	5	NA	NA	3.51 and above	63.0	27	63.0	36	NA	NA
Prefer not to respond	61.0	6	61.0	8	NA	NA	No response	59.0	9	61.0	53	NA	NA
No response	57.0	5	61.0	39	NA	NA	<b>Major</b>						
<b>Gender</b>							Undecided		3	61.0	8	NA	NA
Male	61.0	49	62.0	69	NA	NA	Agriculture		1		4	NA	NA
Female	60.0	56	61.0	109	NA	NA	Architecture		1		1	NA	NA
No response		2	61.0	30	NA	NA	Biological Sciences		3	63.0	5	NA	NA
<b>Age</b>							Business	58.0	7	63.0	7	NA	NA
18 and under	61.0	10	60.0	58	NA	NA	Office Management					NA	NA
19 - 20	59.0	35	61.0	53	NA	NA	Marketing & Purchasing				1	NA	NA
21 - 25	60.0	25	61.0	46	NA	NA	Communications	61.0	6		3	NA	NA
26 - 30	62.0	15	61.0	23	NA	NA	Community Services	58.0	12	61.0	6	NA	NA
31 - 39	60.0	9	62.0	17	NA	NA	Computer & Info. Sciences					NA	NA
40 and older	59.0	13	62.0	11	NA	NA	General Studies		4		1	NA	NA
No response					NA	NA	Education	59.0	13	63.0	8	NA	NA
<b>Rank (self-reported)</b>							Engineering		4		1	NA	NA
Freshman	58.7	39	60.0	69	60.7	5.4	Fine & Applied Arts		2	62.0	5	NA	NA
Sophomore	60.2	37	62.0	72	60.7	5.4	Foreign Languages					NA	NA
Junior	61.0	11	63.0	23	NA	NA	Health Professions	59.0	20	61.0	45	NA	NA
Senior	64.0	7		3	NA	NA	Home Economics		1			NA	NA
Other	62.0	11	62.0	9	NA	NA	Letters		1		1	NA	NA
No response		2	60.0	32	NA	NA	Mathematics		1			NA	NA
<b>Enrolled as a Freshmen</b>							Philosophy/Religion		1			NA	NA
Yes	60.0	77	61.0	124	NA	NA	Physical Sciences		4		2	NA	NA
No response	60.0	27	62.0	36	NA	NA	Social Sciences	60.0	17	61.0	8	NA	NA
No response		3	61.0	48	NA	NA	Trade & Industrial		1			NA	NA
							No response	60.0	5	60.0	102	NA	NA

**NOTES:** ACT does not provide data for groups with a sample size less than 5. National averages are only available in aggregate and for freshmen and sophomores.

The only average with a difference greater than 5.4 was that for African American students in 2010. However, because the sample size is extremely small (n=10) and because a national average for this group is not provided, this result should be interpreted with extreme caution.

### **Conclusions, Limitations, & Questions for Future Research**

Overall, results indicate that:

- Owens students do not differ meaningfully on their critical thinking skills from a national sample of students at other two-year public institutions.
- There was no real change in students' critical thinking skills from 2009 to 2010.
- There are no meaningful differences in critical thinking skills between different student groups of Owens students.

However, there are several limitations to the data that should be considered in the interpretation and use of results:

- Differences in scores from the national average, from year-to-year, and between groups are statistically very small and well within the normal range. Only differences of 5 points or more are unlikely to be due to chance and are of practical significance.
- Results are based on a small sample size (n=107) and have a high margin of error (9.7%), indicating that results may not be representative of the full population of students.
- Sample sizes for various student groups are very small and national averages for different student groups are not available; therefore, data by student demographic characteristics should be interpreted very cautiously.

Questions for future research and recommendations for maximizing the usefulness of results:

- Have students who take the CAAP Critical Thinking test completed courses that teach critical thinking skills?
  - Examine the curriculum map for the Critical Thinking general student learning outcome and identify what courses introduce and reinforce critical thinking skills.
  - Ensure that the CAAP is administered in courses that enroll a large proportion of students who have completed critical thinking courses.
  - Order unit-level CAAP data and examine how many test respondents have taken critical thinking courses. Perhaps limit the analysis to these students or compare students who have completed the critical thinking curriculum to those who have not.
- How do students perform on each of the various content areas of the test?
  - Knowing the average overall critical thinking score provides a general picture of students' skills. However, it does not provide actionable information for curriculum development and improvement.

- It is recommended that the Critical Thinking Content Analysis report be ordered from CAAP in order to identify strengths or weaknesses in specific critical thinking skills (e.g., analysis of arguments, evaluation of arguments, extension of arguments). This report also shows the percentage of students who test at each quartile on the test. For continuous improvement, ACT recommends that goals be established between test administrations to move a particular percentage of students (e.g., 3%) out of the bottom quartile into higher quartiles and develop an action plan to achieve this goal.
- Collect data from a larger sample of students (or collect data every other year with a larger sample), in order to have greater confidence in the representativeness of results and to have sufficient data to permit analysis on different student groups.

## Appendix A

### Sample Passage 1

Senator Favor proposed a bill in the state legislature that would allow pharmacists to prescribe medications for minor illnesses, without authorization from a physician (i.e., a "prescription"). In support of her proposal, Favor argued:

Doctors have had a monopoly on authorizing the use of prescription medicines for too long. This has caused consumers of this state to incur unnecessary expense for their minor ailments. Often, physicians will require patients with minor complaints to go through an expensive office visit before the physician will authorize the purchase of the most effective medicines available to the sick.

Consumers are tired of paying for these unnecessary visits. At a recent political rally in Johnson County, I spoke to a number of my constituents and a majority of them confirmed my belief that this burdensome, expensive, and unnecessary practice is widespread in our state. One man with whom I spoke said that his doctor required him to spend \$80 on an office visit for an uncommon skin problem which he discovered could be cured with a \$2 tube of prescription cortisone lotion.

Anyone who has had to wait in a crowded doctor's office recently will be all too familiar with the "routine": after an hour in the lobby and a half-hour in the examining room, a physician rushes in, takes a quick look at you, glances at your chart and writes out a prescription. To keep up with the dizzying pace of "health care," physicians rely more and more upon prescriptions, and less and less upon careful examination, inquiry, and bedside manner.

Physicians make too much money for the services they render. If "fast food" health care is all we are offered, we might as well get it at a good price. This bill, if passed into law, would greatly decrease unnecessary medical expenses and provide relief to the sick: people who need all the help they can get in these trying economic times. I urge you to vote for this bill.

After Senator Favor's speech, Senator Counter stood to present an opposing position, stating:

Senator Favor does a great injustice to the physicians of this state in generalizing from her own health care experiences. If physicians' offices are crowded, they are crowded for reasons that are different from those suggested by Senator Favor. With high operating costs, difficulties in collecting medical bills, and exponential increases in the costs of malpractice insurance, physicians are lucky to keep their heads above water. In order to do so, they must make their practices more efficient, relying upon nurses and laboratories to do some of the patient screening.

No one disputes the fact that medical expenses are soaring. But, there are issues at stake which are more important than money—we must consider the quality of health care. Pharmacists are not trained to diagnose illnesses. Incorrect diagnoses by pharmacists could lead to extended illness or even death for an innocent customer. If we permit such diagnoses, we will be personally responsible for those illnesses and deaths.

Furthermore, since pharmacies make most of their money by selling prescription drugs, it would be unwise to allow pharmacists to prescribe. A sick person who has not seen a physician might go into a drugstore for aspirin and come out with narcotics!

Finally, with the skyrocketing cost of insurance, it would not be profitable for pharmacists to open themselves up to malpractice suits for mis-prescribing drugs. It is difficult enough for physicians with established practices to make it; few pharmacists would be willing to take on this financial risk. I recommend that you vote against this bill.

### Sample Items for Passage 1

1. Favor's "unofficial poll" of her constituents at the Johnson County political rally would be more persuasive as evidence for her contentions if the group of people to whom she spoke had:
  - I. been randomly selected.
  - II. represented a broad spectrum of the population: young and old, white and non-white, male and female, etc.
  - III. not included an unusually large number of pharmacists.
  - A. I only
  - B. II only
  - C. III only
  - D. I, II, and III
  
2. In her example of the man who paid \$80 for an office visit to treat an uncommon skin problem, Favor seems to assume, but probably should not, that:
  - A. the man would have discovered this cure without the doctor's diagnosis.
  - B. two dollars is the average price of the cortisone lotion.
  - C. eighty dollars is the average price for an office visit of this kind.
  - D. cortisone lotion is effective on all rashes.
  
3. Counter's concern that a sick person who has not seen a physician might go into a drugstore for aspirin and come out with narcotics is probably unfounded because:
  - A. sick persons often send others to get their drugs.
  - B. narcotics are not normally prescribed for "minor ailments."
  - C. most people do not buy aspirin at the drugstore.
  - D. most people who need narcotics go to a physician to get them.
  
4. It is obvious from Favor's speech that she believes which of the following?
  - A. Most prescriptions are unnecessary.
  - B. Senator Counter will oppose the bill.
  - C. If the bill is passed into law, it will greatly reduce the cost of all medical treatment.
  - D. If the bill is passed, the average costs for treatment of minor ailments would be reduced significantly.
  
5. It is clear from Senator Counter's speech that he believes:
  - A. physicians are not having difficult economic times.
  - B. Favor's description of the crowded physician's office is not completely inaccurate.
  - C. the cost of malpractice insurance is not growing at an accelerated pace.
  - D. the quality of health care will not diminish if pharmacists are allowed to prescribe drugs.