Upcoming PCAT Blueprint Changes for 2016-2017: How to Help Students Prepare

Webinar for Pre-Health Advisors

October 29, 2015

PCAT
PHARMACY COLLEGE ADMISSION TEST

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Presenters

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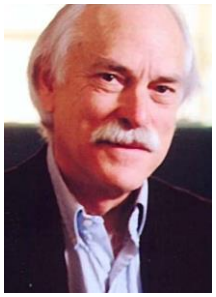

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Overview

1. PCAT Performance & Demographic Data
2. PCAT Blueprint Changes & Rationale
3. Passage-based Questions
4. Resources for Preparing for the PCAT
5. Future Directions in Pharmacy Admissions Testing: WPI and SJT

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The PCAT & Pharmacy Admissions

- Used to differentiate between colleges attended and the perceived rigor of the coursework at different colleges
- Generally the composite percentile score is used in admissions review
  - Some will look at individual subtests
- How many schools use it? 110 out of 134
  - California pharmacy schools will likely be adding a PCAT requirement in the next few years

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PCAT Basics

2015-2016 Testing Dates:

Registration Opened March 2nd

- July 9-10, 2015
- September 16-18, 2015
- January 5-6, 2016

Registration Opened September 18th

- October 26-30, 2015
- November 2-6, 2015

Six Sub-Sections: *Currently*

- Writing
- Verbal Ability
- Biology
- Chemistry
- Reading Comprehension
- Quantitative Ability

Scoring:

- Multiple choice sub-sections scored on scale of 200–600
- Percentile Ranks (1–99) based on 2011 norm groups
- Writing scored on 6-point scale

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Performance & Demographic Data

Mean PCAT Scores by Test Cycle

PCAT Subtest	2010–11 PR	2011–12 PR	2012–13 PR	2013–14 PR	2014–15 PR
Verbal Ability	49	49	49	47	47
Biology	53	55	57	57	57
Reading Comprehension	45	43	37	37	37
Quantitative Ability	51	53	47	49	51
Chemistry	55	57	59	61	64
Composite	50	52	50	50	52
Writing	—	—	3.27	3.36	3.35
Writing: CL	2.84	2.86	—	—	—
Writing: PS	2.88	2.82	—	—	—
n	32,968	28,298	27,753	25,811	23,404

Note. PR = Percentile rank (current 2011 PRs); *n* = Number of valid cases; CL = Conventions of Language; PS = Problem Solving; Writing score changed in 2012–13 from separate CL and PS scores on a 5-point scale to a single score on a 6-point scale.

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Performance & Demographic Data

Mean Scores by Number of Attempts

PCAT Subtest	Only 1 Attempt	More Than 1 Attempt					
		1st	2nd	3rd	4th	5th	≥6th
Verbal Ability	54	35	41	36	33	36	35
Biology	63	44	55	53	51	53	51
Reading Comprehension	45	27	32	26	21	23	20
Quantitative Ability	58	39	47	45	41	41	39
Chemistry	72	51	61	57	57	59	53
Composite	59	36	45	40	38	40	36
Writing	3.39	3.33	3.31	3.25	3.25	3.29	3.29
n	12,034	3,260	5,625	1,775	511	129	70
%	51.4	13.9	24.0	7.6	2.2	0.6	0.3

Note. Data for all valid cases taking PCAT at least once during 2014–15 (with PCAT testing history going back to June 2009); Only 1 Attempt = Took the PCAT only once; 1st = The first attempt for examinees who took the PCAT more than once; 2nd–≥6th = Repeat attempt numbers.

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Performance & Demographic Data (2014-2015)

Mean Scores by Current Education Level

PCAT Subtest	High School		Current Year of College				College Grad.	Unknown
	Enrolled	Grad.	1	2	3	4		
Verbal Ability	38	33	51	45	45	45	51	43
Biology	49	55	49	49	57	59	65	59
Reading Comprehension	30	26	49	39	37	34	36	34
Quantitative Ability	55	49	61	53	53	47	45	55
Chemistry	68	63	59	61	68	64	65	70
Composite	47	43	54	50	52	50	52	52
Writing	3.31	3.10	3.61	3.42	3.39	3.31	3.26	3.29
n	16	36	1,155	4,047	4,977	5,224	4,477	3,472
%	0.1	0.2	4.9	17.3	21.3	22.3	19.1	14.8

Note. Current Year of College = Enrolled or completed; Unknown = Information not reported by examinee.

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Performance & Demographic Data (2014-2015)

Mean Scores by Cumulative Undergraduate GPA

PCAT Subtest	≤1.99	2.00–2.49	2.50–2.99	3.00–3.49	3.50–4.00	Unknown
Verbal Ability	27	38	40	43	52	43
Biology	21	40	46	55	67	59
Reading Comprehension	23	26	27	34	45	34
Quantitative Ability	35	31	35	45	63	55
Chemistry	49	39	49	61	76	68
Composite	25	29	36	47	64	52
Writing	3.25	3.28	3.27	3.32	3.44	3.29
n	14	328	3,211	8,724	7,478	3,649
%	0.06	1.4	13.7	37.3	32.0	15.6

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Performance & Demographic Data (2014-2015)

Mean Scores by Linguistic Background

PCAT Subtest	English	Spanish	Other	Unknown
Verbal Ability	52	20	27	45
Biology	57	44	57	61
Reading Comprehension	45	12	17	36
Quantitative Ability	51	23	58	55
Chemistry	64	49	71	70
Composite	54	21	43	54
Writing	3.45	2.73	3.07	3.31
n	15,685	955	3,271	3,493
%	67.0	4.1	14.0	14.9

Note. Linguistic background defined as the dominant language spoken at home.

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Performance & Demographic Data (2014-2015)

Mean Scores by Ethnicity

PCAT Subtest	Hispanic / Latino	Non-Hispanic/ Latino	Unknown
Verbal Ability	33	49	43
Biology	49	59	57
Reading Comprehension	25	41	32
Quantitative Ability	31	53	49
Chemistry	55	68	64
Composite	33	54	47
Writing	3.05	3.41	3.29
n	2,002	15,472	5,930
%	8.6	66.1	25.3

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Performance & Demographic Data (2014-2015)

Mean Scores by Race

PCAT Subtest	American Indian / AK Native	Asian	Black / African American	Native HI / Pacific Islander	White	Multi-racial	Unknown
Verbal Ability	40	40	32	35	52	56	43
Biology	51	63	46	46	57	57	59
Reading Comprehension	30	29	19	21	47	47	34
Quantitative Ability	33	65	29	37	49	49	51
Chemistry	51	74	53	55	63	63	65
Composite	38	54	29	33	54	54	50
Writing	3.23	3.30	3.06	3.12	3.46	3.44	3.26
n	123	4,932	2,374	46	11,254	624	4,051
%	0.5	21.1	10.1	0.2	48.1	2.7	17.3

Note. Candidates could select more than one category; Multiracial = Candidates that selected more than one category; data for all other categories reflect candidates that only selected one category.

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Performance & Demographic Data (2014-2015)

Mean Scores by Parent's/Guardian's Educational Level

Educational Level	*n*	%	Vbl.	Bio.	Rdg.	Quant.	Chem.	Comp.	Writing
No HS degree, certificate, diploma	1,422	6.1	35	55	26	45	63	43	3.15
HS degree or equivalent	4,527	19.3	40	53	32	43	59	43	3.30
Trade/tech. school certificate, diploma	1,070	4.6	51	57	39	47	61	50	3.41
Some college but no degree	1,971	8.4	49	53	41	45	59	50	3.40
Associate's degree	1,260	5.4	43	53	36	47	59	47	3.36
Bachelor's degree	5,026	21.5	51	59	41	55	70	57	3.41
Attended grad. school but no degree	73	0.3	61	59	49	63	68	61	3.36
Master's degree	1,993	8.5	56	63	47	58	71	61	3.47
Doctoral degree	1,056	4.5	56	69	45	63	76	64	3.44
Unknown/Other	750	3.2	35	51	25	43	59	38	3.12
Unknown (no response)	4,256	18.2	45	59	36	55	70	52	3.30
Total	23,404	100.0	47	57	37	51	64	52	3.35

Note. Parent's = Father's educational attainment (proportions and means for candidates' mother are nearly identical to father); Vbl. = Verbal Ability; Bio. = Biology; Rdg. = Reading Comprehension; Quant. = Quantitative Ability; Chem. = Chemistry; Comp. = Composite; HS = High school.

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Lessons Learned from Data

- More education resulted in better scores, especially in science sections
- Some students at a disadvantage on PCAT may benefit from additional support or preparation
  - URM students
  - First-generation college students
  - Non-native English speakers

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How is the PCAT Changing?

- Greater critical thinking and reasoning
- Items based on more extensive reading
  - Reading passages in Biological and Chemical processes sections, with 4 questions per passage
  - Stem text set-up in Quantitative Reasoning section
- Increased humanities and social science content in Critical Reading Section
- Decreased test duration
  - Goal is approximately 3.5 hours not including breaks

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Why is the PCAT changing?

- Measure critical thinking and reasoning skills important for success as a pharmacist
- Encourage students to delve deeper into their education
  - Memorizing facts is not enough!
- Changing nature of the pharmacy profession
  - Need for problem-solvers

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PCAT Test Blueprint for 2014–15 & 2015–16: Field-Testing New Item Types

PCAT Subtest	Number of Operational Items	Number of Experimental Items / Passages	Time Allowed
Part 1: Writing	1 Prompt (operational)		**30 min.**
Part 2: Verbal Ability	40	0	**25 min.**
Analogies	25	0	
Sentence Completion	15	0	
Part 3: Biology	40	8 / 2 (experiment, scenario, or other context in passage)	**35 min.**
General Biology	20–22	4	
Microbiology	7–8	1–2	
Anatomy & Physiology	12–13	2–3	
Part 4: Chemistry	40	8 / 2 (experiment, scenario, or other context in passage)	**35 min.**
General Chemistry	20–22	5–6	
Organic Chemistry	12–13	2–3	
Basic Biochemistry Processes	7–8	1–2	
Rest Break			**15 min.**
Part 5: Reading Comprehension	40 / 5 passages	8 / 1 (humanities or social sciences content)	**50 min.**
Comprehension	12–13	2–3	
Analysis	15	3–4	
Evaluation	12–13	2–3	
Part 6: Quantitative Ability	40	8 (problem or scenario stated in stem text)	**45 min.**
Basic Math	5–6	1–2	
Algebra	7–8	1–2	
Probability & Statistics	7–8	1–2	
Pre-Calculus	9–10	1–2	
Calculus	9–10	1	
Total Test	**200 multiple-choice items + 1 writing prompt**	**32 multiple-choice items**	**220 min. = 3 hrs. 40 min. + Rest Break**

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Changes to be Implemented in 2016-2017

- Elimination of Verbal Ability
- Biological and Chemical Processes:
  - 30% of items with passages (4 items per passage)
- Critical Reading
  - 40% of items with Humanities or Social Science passages
- Quantitative Reasoning
  - Greater focus on basic math and algebra, less on calculus and pre-calculus
  - 50% of items with stem text set-up
- Use of calculators and periodic table

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PCAT Test Blueprint for 2016-2017: Introducing New Operational Items

PCAT Subtest	Operational Items / Passages	Experimental Items / Passages	Time Allowed
Part 1: Writing	1 Prompt (operational)		**30 min.**
Part 2: Biological Processes (10–20% of items with passages)	40 Items / 4–5 Passages	8 Items / 2 Passages	**40 min.**
General Biology	20–22	4	
Microbiology	7–8	1–2	
Anatomy & Physiology	12–13	2–3	
Part 3: Chemical Processes (10–20% of items with passages)	40 Items / 4–5 Passages	8 Items / 2 Passages	**40 min.**
General Chemistry	20–22	5–6	
Organic Chemistry	12–13	2–3	
Basic Biochemistry Processes	7–8	1–2	
Rest Break			**15 min.**
Part 4: Critical Reading (20–40% of items with humanities or social science passages)	40 Items / 5 Passages	8 Items / 1 Passage	**50 min.**
Comprehension	12–13	2–3	
Analysis	15	3–4	
Evaluation	12–13	2–3	
Part 5: Quantitative Reasoning (20–40% of items with stem text set-up)	40	8	**45 min.**
Basic Math	9–10	1–2	
Algebra	9–10	1–2	
Probability & Statistics	7–8	1–2	
Pre-Calculus	7–8	1–2	
Calculus	5–6	1	
Total Test	**160 multiple-choice items + 1 writing prompt**	**32 multiple-choice items**	**205 min. = 3 hrs. 25 min. + Rest Break**

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About Passage-Based Questions

- Passages must be original content
- Science subtest passages should summarize experiments or published research
- For Biological Processes, Chemical Processes, and Critical Reading subtests items, each item must accompany a passage and must ***require information provided in the accompanying passage*** in order to answer it
- Each item associated with a passage must also ***require previously-acquired content knowledge*** beyond the information contained in the accompanying passage in order for the examinee to respond to the item.
- Each item associated with a passage must be able to be ***answered independently*** of the other items accompanying the same passage, so that the answer to one item does not depend on the content of another item.

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Sample Passage-Based Questions

Consider:

1. What background knowledge or skills would students need to answer this question?
2. What challenges might students encounter when answering this question on a timed exam?

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Sample Passage-Based Questions

A group of n students orders a blueberry pie and a rhubarb pie. All of the students want a piece of the blueberry pie, so they each get $\frac{1}{n}$ of the pie. Three of the students do not want rhubarb pie, so those that do each get $\frac{1}{n-3}$ of the pie. A student who eats a piece of each pie eats a total of $\frac{5}{18}$ of a pie. Which equation below can be used to find the value of n?

A. $\frac{2n-3}{n^2-3n}=\frac{5}{18}$

B. $\frac{2n-3}{n-3}=\frac{5}{18}$

C. $\frac{n^2-3}{n^2-3n}=\frac{5}{18}$

D. $\frac{2n^2-3}{n-3}=\frac{5}{18}$

Correct Answer: A

Explanation: $\frac{1}{n}+\frac{1}{n-3}=\frac{5}{18}$ is equivalent to $\frac{2n-3}{n^2-3n}=\frac{5}{18}$.

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Sample Passage-Based Questions

Bacteria Strains

During the early part of the 20th century, independent investigations provided insight into the mechanisms of DNA transfer and bacterial transformation by DNA uptake that are widely understood today. In one such investigation following the deadly flu epidemic of 1918, a researcher studied two strains of *Streptococcus pneumonia*, one with a smooth appearance and the other with a rough appearance. The smooth outer coating on the first strain conferred good protection against an immune response by the infected host, while the rough strain was more susceptible to an immune response. The purpose of this study was to determine whether material in dead bacterial could transform living bacterial cells. The results of this work are shown in Table 1.

Table 1: Experimental Methods and Results

Research Method	Results
1. Inject living virulent S strain cells into mouse	Mouse dies (living S strain cells found in heart)
2. Inject living nonvirulent R strain bacteria into mouse	Mouse healthy (no bacterial cells found in heart)
3. Kill virulent S strain cells by heating and then inject into mouse	Mouse healthy (no bacterial cells found in heart)
4. Inject mixture of dead S strain cells with living nonvirulent R strain bacteria into mouse	Mouse dies (living S strain cells found in heart

Based on these finding, the researcher concluded that a chemical substance from one cell had indeed transformed another cell, in this case into the more virulent form. However, the most that the researcher was able to identify about the chemical nature of this transformation was that it had survived the application of heat.

Sample Passage-Based Questions

What would have happened if the R strain shown in Table 1 of the passage had been killed along with the S strain prior to injection?

A. Since a live bacterial host for the DNA is needed, the mouse would have survived.

B. The mouse would have died when the DNA that encoded virulence transformed its cells.

C. A high antigen titer would trigger a successful immune response in the mouse.

D. The mouse would have died because the peptides formed prior to heating would still be present.

***Correct Answer*: A**
***Explanation*:** As described in Research Method 4 shown in Table 1, a mixture of dead S strain and living nonvirulent R strain bacteria was injected into a live mouse, with living S strain then found in the heart of the animal after it subsequently died. The mouse died because the R bacteria were transformed by DNA from the dead S strain into a virulent S bacteria. However, if the R strain had been killed prior to injection along with the S strain, the mouse would have survived, since the transformation could not have taken place. The type of transformation described in option B occurs in prokaryotes, not eukaryotes such as mice. Option C is incorrect because if the bacteria were all dead, they could not multiply, and the immune response would be muted. If option D were true, the virulent S strain would have killed the mouse even after heating, which was not the case as shown for the results of Research Method 3 in Table 1.

PCAT Preparation from Pearson

- Online, Timed Practice Tests
  - Multiple-choice items for all subtests with explanations for each correct answer
  - Three tests available
- Writing Practice Tests
  - Four tests available
- Study Guide
  - Downloadable 200-page document with sample questions

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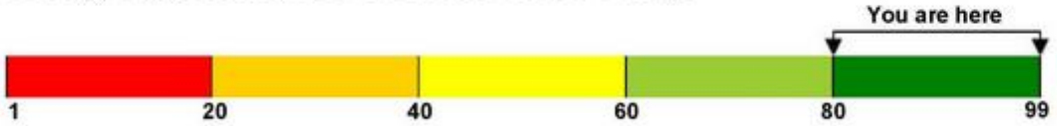
Online Practice Test Score Report

Subtest Diagnostic Report

Biology Approximate Percentile Score Range



Biology Details

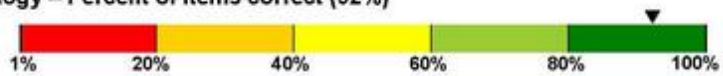
PCAT Subtest	# of Core Items Correct	# of Total Core Items
Biology	36	40
General Biology	19	21
Microbiology	6	7
Human Anatomy & Physiology	11	12

Biology – Percent of items correct (90%)

General Biology – Percent of items correct (90%)

Microbiology – Percent of items correct (86%)

Human Anatomy & Physiology – Percent of items correct (92%)



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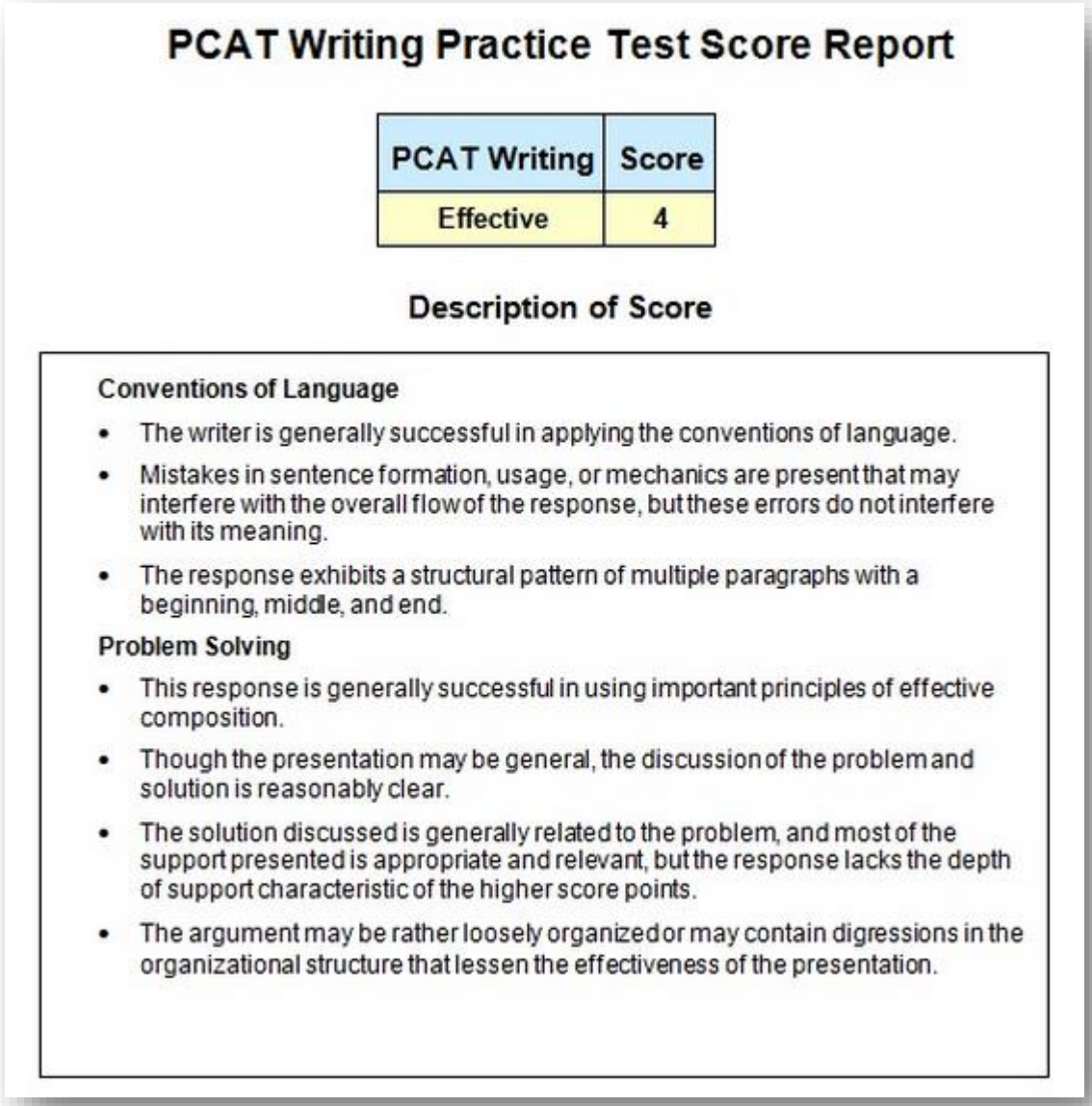
Writing Practice Test Score Report



PCAT Writing Practice Test Score Report

PCAT Writing	Score
Effective	4

Description of Score

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.

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Online Practice Test (2014-2015)

Mean PCAT Scaled Scores and Writing Scores by OPT Use

PCAT Subtest/Composite	OPT Use Prior to 1st Attempt PCAT			
	0 OPT	1 OPT	2 OPTs	3 OPTs
Verbal Ability	400.6	408.6	409.2	409.2
Biology	407.7	417.8	423.0	428.9
Reading Comprehension	394.3	402.0	402.4	402.3
Quantitative Ability	401.8	411.1	414.7	423.8
Chemistry	409.9	423.8	431.3	442.1
Composite	402.9	412.6	416.1	421.3
Writing	3.35	3.52	3.66	3.67
n	13,303	517	372	382

Note: 0–3 indicates how many OPTs candidates completed during the 2014–15 testing cycle prior to their first-attempt at the PCAT.

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Study Guide 2014-2015

Mean PCAT Scaled Scores and Writing Scores by Study Guide Purchase

PCAT Subtest/Composite	SG Purchase Prior to 1st Attempt PCAT	
	No SG	SG
Verbal Ability	401.3	404.5
Biology	409.1	411.4
Reading Comprehension	395.0	396.2
Quantitative Ability	403.2	404.4
Chemistry	412.0	415.6
Composite	404.1	406.4
Writing	3.38	3.38
n	14,458	670

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PCAT Prep Updates

- **Kaplan-PCAT Prep Program**
  - **http://www.kaptest.com/pcat/kaplan-pcat-prep/kaplan-aacp-partnership**
  - **AACP endorses Kaplan as the Official Provider of PCAT® Prep.**
  - **Kaplan and AACP have partnered to make PCAT prep more accessible for students everywhere**
  - **Starting line**
  - **Scholarships**

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Admission Testing Future Directions

Workplace Personality Inventory

Situational Judgment Tests

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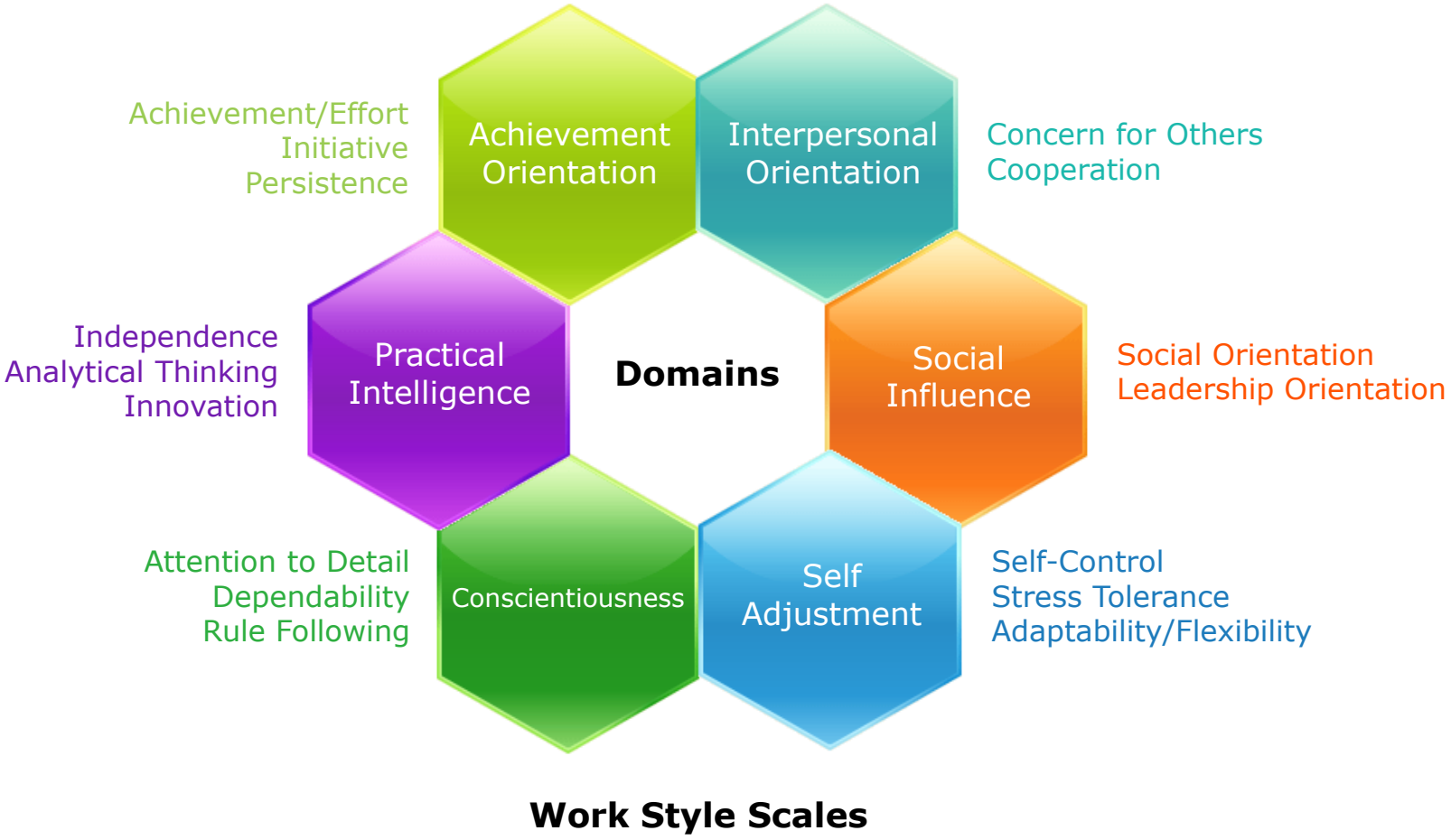
Workplace Personality Inventory



Workplace Personality Inventory

- Work Personality Inventory (WPI) launched in 2007
- Measurement aims:
  - Work relevant
  - Easy to interpret
  - Reliable, valid and fair
  - Resistant to faking
  - Reasonably short
- 16 Work Styles linked directly to O*Net

WPI Next Steps

- Project 1 – Student Pharmacists:
  - To identify the Work Styles that distinguish top student performers from the rest
  - To collect a sample of students for norm group (comparison group) purposes
- Project 2 - Pharmacists:
  - To identify the Work Styles most prevalent in samples of pharmacists
  - To collect a sample of pharmacists for norm group (comparison group) purposes

Situational Judgement Tests

- What is a Situational Judgement Test (SJT)?
- Used to assess a wide range of behaviors, skills and competency areas
- Typically involve presentation of hypothetical situations or scenarios following which a person is asked to rate responses or actions related to dealing with the situation
- AACP will likely partner with other health education associations in the development of an SJT

SJT Example Question

Situation 2

It is 10.45am and you have just arrived by car at one of your shops in Birmingham. You are about to go into a meeting and receive a text message from Head Office:

The Nottingham South shop is in your region. It is a 1 hour drive from where you are.

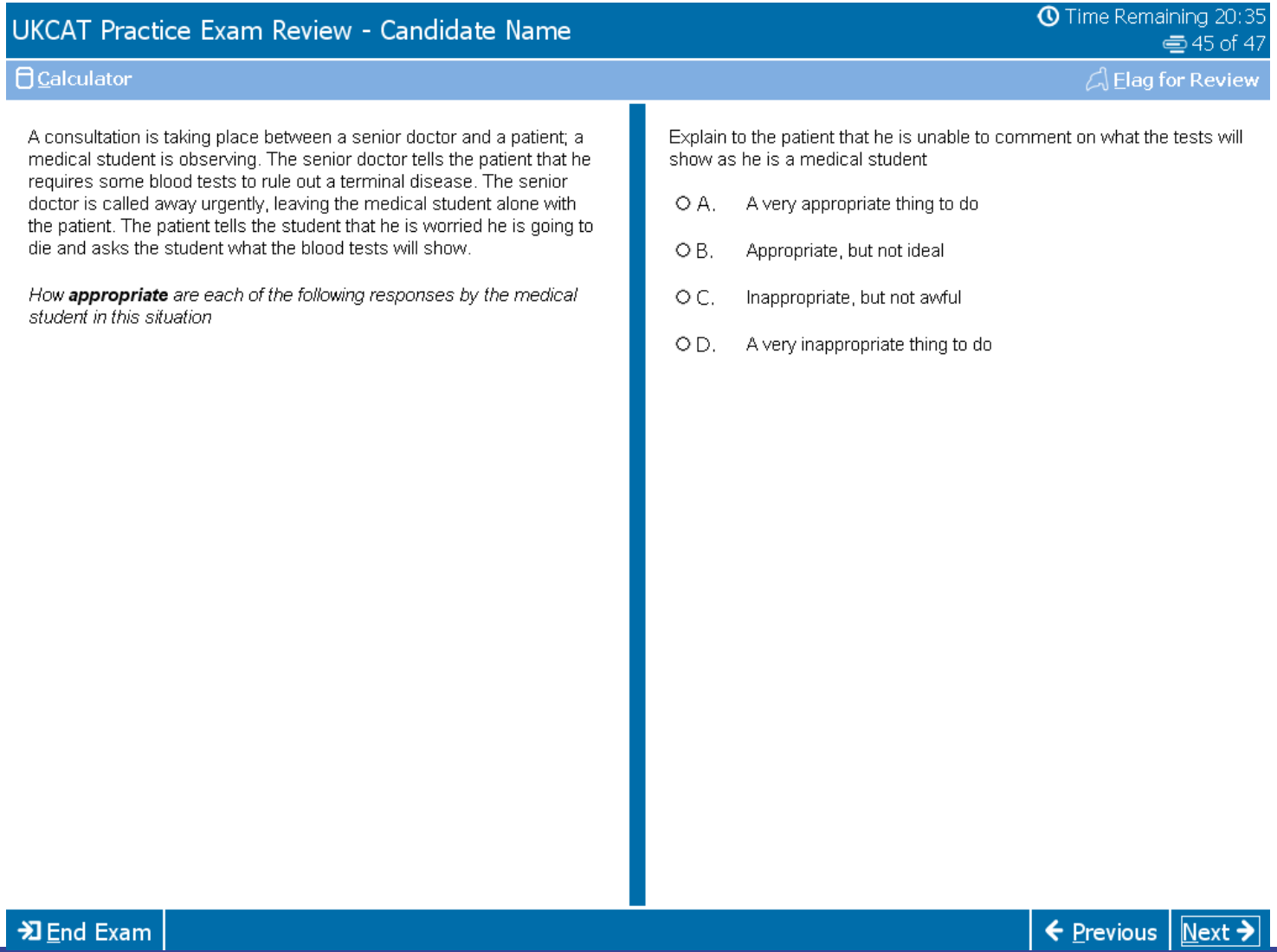
How appropriate is the following response to the situation?

2A.

Immediately telephone Head Office to clarify the message.

- Totally unacceptable
- Not helpful
- Ok, but not ideal
- A good thing to do

SJT Example Question



Situational Judgment Tests

- Content is typically derived from a job analysis and is designed to reflect a specific role or work based context.
- Sometimes referred to as 'low fidelity work simulations'
- SJTs have been around since the 1920s (Judgment in Social Situations, Moss, 1926) although more recently they have gained popularity in selection.
- Multifaceted in nature, often assessing a combination of cognitive and behavioral domains
- SJTs reflect the notion that a person's performance at work is the result of cognitive individual differences, job knowledge and personality (Motowidlo, Hansen & Crafts, 1997)

Benefits of SJTs

- Assess a mixture of cognitive and style attributes (Motowildo, Diesch, & Jackson, 2003)
- Face validity – Can be perceived by candidates as more realistic than some traditional assessment methods (Lievens, Peeters & Schollaert, 2008) " a day in the life of…"
- High relevance to role
- Consistent , objective and fair
- Linked to job performance (McDaniel et al., 2001;McDaniel et al., 2007)
- Reduced adverse impact can lead to improved diversity (Nguyen, McDaniel & Whetzel, 2005)
- Rigorous design allows them to stand up to challenge

PCAT
PHARMACY COLLEGE ADMISSION TEST

AACP