

# AP<sup>®</sup> PSYCHOLOGY

## 2013 SCORING GUIDELINES

### Question 2

#### General Considerations

1. Answers must be presented in sentences, and sentences must be cogent enough for the student's meaning to come through. Spelling and grammatical mistakes do not reduce a student's score, but spelling must be close enough so that the reader is convinced of the word.
2. Do not score students' notes made on the question section of the booklet. Score only what has been written in the blanks provided in the booklet.
3. Within a point, a student will not be penalized for misinformation unless it *directly contradicts* correct information that would otherwise have scored a point.
4. A student can score points only if the student clearly conveys what part of the question is being answered. For example, it is possible to infer the part of the question being answered if it is consistent with the order of the question.
5. Examples provided for each of the followings point are not to be considered exhaustive.

#### Part A

##### **Point 1: What is the operational definition of the dependent variable?**

To earn this point the student must identify the operational definition as the speed or time in which participants recall definitions or vocabulary words or both. If a student refers to other variables or aspects of the study, the student must differentiate the dependent variable.

*Note:*

Reference to "speed and accuracy" will score, but "accuracy" alone will not.

*Example:*

Do not score "Recall test," "test scores," or "results" alone.

##### **Point 2: Explain how the ethical flaw in the study can be corrected.**

To earn this point the student must provide a correction to the release of participants' names. This correction can address future studies OR refer to correcting the mistake already made.

*Examples:*

Score "The researcher should provide a participant's data individually to each person."

Score "The researcher must obtain permission to release the participant's name and score."

Score "The researcher can't provide participants' names and scores to all participants."

##### **Point 3: Explain how the research design flaw in the study can be corrected.**

Since the independent variable (type of practice) varies with the age group of the participants, the student must discuss some mechanism to equalize these groups. To do this, students must:

- A. state or describe making the ages of the groups the same, OR
- B. name or describe random assignment, OR
- C. make the study technique a within-subjects (repeated measures) variable

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### Question 2 (continued)

*Note:*

Random sampling (random selection) does not score unless it occurs along with a clear description of random assignment.

*Examples:*

Score “The researcher should use random assignment.”

Score “The researcher should control for age.”

Score “The researcher should only include people under 25 in his study.”

Score “Subjects in both age groups should use both massed and distributed study methods to learn the vocabulary.”

#### **Point 4: In a well-designed study, what does it mean to say there is a statistically significant difference between groups?**

To earn this point the student must explain that the difference between groups is *less likely* due, OR *not* due, to chance OR is *more likely* due to the manipulation of the independent variable.

*Examples:*

Do not score “very different,” “strong effect,” or “important”

Do not score “The difference between groups is due to manipulation of the IV.”

Do not score  $p < .05$ , generalizability, or rejection of the null hypothesis without some additional reference to probability or chance

#### **Part B**

*Responses must address age group (not only individual) differences.*

#### **Point 5: Fluid intelligence**

To earn this point the student must explain that older people have less fluid intelligence, or perform worse on the task in the context of fluid intelligence, which would affect the results of this study OR that younger people have more fluid intelligence, or perform better on the task in the context of fluid intelligence, which would affect the results of the study.

#### **Point 6: Circadian rhythm**

To earn this point the student must explain that the age differences in circadian rhythms would lead to a difference in task performance of the two groups. The age group, time of day, AND the effect on the results of the study must be addressed.

The student may argue that older/younger participants are at a disadvantage because of the late study time OR that younger/older participants have an advantage because of the early testing time.

A. The operational definition of the dependent variable is quickly recalling the definitions.

The ethical flaw of failing to protect the participants' rights to privacy can be corrected by not providing a list of names and test scores for each individual to all participants.

The research design flaw can be corrected by randomly assigning participants to ~~the~~ one of the two groups after randomly selecting participants from a population. The two groups should not have ~~be~~ been differentiated by age group.

In a well-designed study, to say there is a statistically significant difference between groups means that the difference between the groups can be attributed to the independent variable and ~~it~~ can not be explained by chance alone.

B. Fluid intelligence might affect the results of the study because it decreases with age so ~~the~~ group B, which is made up of older participants, would be at a disadvantage in processing novel information. This caused group B's scores to be lower.

Circadian rhythm might affect the results of the study because it is the body's adjustment to the cycle

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2A (2 of 2)

**Question 2** is reprinted for your convenience.

2. A researcher compared the effectiveness of massed versus distributed practice in preparing for a memory test. Each of two groups memorized the definitions of 40 vocabulary words.

In group A, there were 30 participants who were all under twenty-five years of age. Participants in group A used the method of distributed practice, studying for 30 minutes on each of four evenings. They were tested on the fifth morning at 7:00 A.M. In group B, there were 30 participants who were all over sixty years of age. Participants in group B used the method of massed practice, studying only from 6:30 P.M. to 8:30 P.M. on the evening before the test. They were tested the next morning at 7:00 A.M.

All participants completed a recall test. The test measured how quickly participants recalled the definitions. The results showed that the mean difference between the distributed practice group and the massed practice group was statistically significant. The researcher provided a list of the names and test scores for each individual participant in a letter to all participants.

Part A

- What is the operational definition of the dependent variable?
- Explain how the ethical flaw in the study can be corrected.
- Explain how the research design flaw in the study can be corrected.
- In a well-designed study, what does it mean to say there is a statistically significant difference between groups?

Part B

How might each of the following concepts affect the results of the study?

- Fluid intelligence
- Circadian rhythm

of the day and the exam was given at 7:00 AM. Because of circadian rhythm the body is most <sup>active</sup> prepared in the middle of the day when the sun is out, so a test that is given at 7:00 A.M. will have lower scores than if it were given later in the day. Also, with old age circadian rhythm cycles earlier and older individuals are less active later at night so group B was affected negatively because the studying lasted until 8:30 P.M.

The operational definition of the dependent variable is the speed at which participants are able to define vocabulary terms that were previously learned. The ethical flaw of the study can be corrected by only receiving your test results as opposed to receiving everyone's because this breaks the confidentiality ethical guideline. The research design flaw can be corrected by making the participants in group B the same age as in group A to better measure the effectiveness of massed versus distributed practice. In a well-designed study it means that ~~the results of the experiment were not affected by the fact that was corrected~~

Fluid intelligence might affect the results of the study because it decreases with age, so the participants in group B have an unfair disadvantage. Fluid intelligence is the ability to reason and think abstractly, and the younger participants have a greater fluid intelligence which will cause their scores to be higher. Circadian rhythm is your body's internal clock. This may affect the results of the study depending on how well you perform tasks in the early

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2B (2 of 3)

**Question 2** is reprinted for your convenience.

2. A researcher compared the effectiveness of massed versus distributed practice in preparing for a memory test. Each of two groups memorized the definitions of 40 vocabulary words.

In group A, there were 30 participants who were all under twenty-five years of age. Participants in group A used the method of distributed practice, studying for 30 minutes on each of four evenings. They were tested on the fifth morning at 7:00 A.M. In group B, there were 30 participants who were all over sixty years of age. Participants in group B used the method of massed practice, studying only from 6:30 P.M. to 8:30 P.M. on the evening before the test. They were tested the next morning at 7:00 A.M.

All participants completed a recall test. The test measured how quickly participants recalled the definitions. The results showed that the mean difference between the distributed practice group and the massed practice group was statistically significant. The researcher provided a list of the names and test scores for each individual participant in a letter to all participants.

Part A

- What is the operational definition of the dependent variable?
- Explain how the ethical flaw in the study can be corrected.
- Explain how the research design flaw in the study can be corrected.
- In a well-designed study, what does it mean to say there is a statistically significant difference between groups?

Part B

How might each of the following concepts affect the results of the study?

- Fluid intelligence
- Circadian rhythm

morning. People ~~who~~ whose circadian rhythm is out of sync due to things such as sleep deprivation may have a more difficult time recalling the words at 7 am. Also, if it is light out at 7 am ~~it~~ it will cause the participants circadian rhythms to make them more alert and perform better.

① the difference of results between the two groups was caused by measurable differences between the groups that were not confounded. For if you say

There is a statistically significant difference between the groups. This difference caused there to be scores that were outlying of the standard deviation. ~~There are outliers~~

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A. • The dependent variable is defined as the variable that is changed or depends by or on the independent variable. It is a result of the independent variable.

• The ethical flaw in this study is the lack of debriefing at the end of the experiment. Rather than (or along with) sending the participants a letter of names and test scores, the researcher should provide the participants with a reasoning or explanation of the experiment, and the significance of the results.

• The research design flaw in this study is the difference in age groups. The study is claimed to measure the effectiveness of the variables of massed versus distributed practice, not the variables of practice versus age. Also, the letter provided to the participants does not list age. The experiment should test either 25 years and under or 60 years and over.

• A statistically significant difference means that the data displays two very different cause and effect relationships. This shows that one method was much more effective than the other.

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Question 2 is reprinted for your convenience.

2C (2 of 2)

2. A researcher compared the effectiveness of massed versus distributed practice in preparing for a memory test. Each of two groups memorized the definitions of 40 vocabulary words.

In group A, there were 30 participants who were all under twenty-five years of age. Participants in group A used the method of distributed practice, studying for 30 minutes on each of four evenings. They were tested on the fifth morning at 7:00 A.M. In group B, there were 30 participants who were all over sixty years of age. Participants in group B used the method of massed practice, studying only from 6:30 P.M. to 8:30 P.M. on the evening before the test. They were tested the next morning at 7:00 A.M.

All participants completed a recall test. The test measured how quickly participants recalled the definitions. The results showed that the mean difference between the distributed practice group and the massed practice group was statistically significant. The researcher provided a list of the names and test scores for each individual participant in a letter to all participants.

Part A

- What is the operational definition of the dependent variable?
- Explain how the ethical flaw in the study can be corrected.
- Explain how the research design flaw in the study can be corrected.
- In a well-designed study, what does it mean to say there is a statistically significant difference between groups?

Part B

How might each of the following concepts affect the results of the study?

- Fluid intelligence
- Circadian rhythm

B • Fluid intelligence deals with logic and problem solving. Some participants may not have a well developed fluid intelligence, meaning they cannot as easily recall the definitions.

• The circadian rhythm is the 25 hour sleep cycle one must maintain for proper functioning. If participants do not maintain this sleep cycle, the results may be skewed or incorrect (not valid.)

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## 2013 SCORING COMMENTARY

### Question 2

#### Overview

This question assessed students' ability to analyze characteristics of research design and apply specific psychological concepts to the scenario.

Part A required students to provide the precise operational definition of the dependent variable as described in the question. The question also assessed the students' understanding of ethics and research design by asking them to correct the flaws that are embedded in the question. The question also assessed how well students comprehend statistical significance and its relationship to differences between groups.

Part B asked students to explain two psychological concepts and how they affect the results of the study. Students were asked to explain the relationship between age and fluid intelligence and how this impacts the results of the study. This question also assessed how well students understand the connection between age differences in circadian rhythms and the resulting influence on participants' recall of vocabulary definitions.

#### Sample: 2A

##### Score: 6

Point 1 was awarded because the essay refers to time ("quickly") in which participants recall definitions. Point 2 was earned because the essay provides a method to correct the ethical flaw, namely that the researchers should "not [provide] a list of names and test scores." Point 3 was merited because the essay correctly explained that random assignment would equalize groups and correct the research design flaw. Point 4 was earned because the response explains that "statistically significant difference between groups means that the difference between the groups can be attributed to the independent variable and can not [*sic*] be explained by chance alone." Point 5 was awarded because the essay explains that fluid intelligence decreases with age and "older participants would be at a disadvantage in processing novel information." Point 6 was earned because the response provides the age group ("older individuals"), the time of day ("8:30 P.M."), and the effect on the results of the study ("affected negatively").

#### Sample: 2B

##### Score: 4

The response identifies the operational definition as "the speed at which participants are able to define vocabulary terms" and earned Point 1. Point 2 was earned because the essay correctly identifies an appropriate method for addressing the ethical flaw: "only receiving [*sic*] your test results as opposed to receiving [*sic*] everyone's" would correct this breach in confidentiality. Point 3 was earned because the response equalizes the groups by "making the participants in group B the same age as in group A." Point 4 was not earned because the essay incorrectly describes a statistically significant difference between groups. Point 5 was earned because the response describes fluid intelligence as decreasing with age and that the scores from the older participant group scores would be negatively affected by this difference. Point 6 was not earned because the essay does not address the age differences in circadian rhythms and how this would impact task performance.

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**Question 2 (continued)**

**Sample: 2C**

**Score: 1**

Point 1 was not earned because the response incorrectly identifies the operational definition. Point 2 was not earned because the essay incorrectly identifies debriefing as the ethical flaw in the study. Point 3 was earned because the response provides a correction that equalizes the age of the two groups (“The experiment should test either 25 years and under or 60 years and over”). Point 4 was not awarded because the essay does not correctly describe the meaning of statistical significance. The response does not explain the link between age and fluid intelligence and the resulting impact on test performance and did not earn point 5. Point 6 was not earned because the essay fails to link the age differences in circadian rhythms of the groups to task performance.