

Practice Exam Answer Key

GRADING KEY

This examination has the following six parts:

Part A: Multiple-choice questions (*30 marks*)

Part B: Nonexperimental briefs (*10 marks*)

Part C: Computing a correlation coefficient (*10 marks*)

Part D: Key concepts in Research Methods (*15 marks*)

Part E: Experimental briefs (*10 marks*)

Part F: Design an experimental study (*25 marks*)

Part A: Multiple-choice questions (30 marks)

This part includes 30 questions, each of which is worth 1 mark.

1. An example of an operational definition for anxiety is a:
 - a. **score on an anxiety questionnaire**
 - b. person's description of anxiety
 - c. how tense or nervous a person is presently feeling
 - d. punctuality

2. The most accurate research method of determining whether caffeine supplements improve memory performance is
 - a. case study
 - b. correlational study
 - c. **experimental study**
 - d. naturalistic observation

3. An elasticized measuring tape is used to measure a child's waist. In the first measurement, the tape is stretched tightly. In the second measurement, the tape is held loosely. This is a good example of:
 - a. **poor test-retest reliability**
 - b. good test-retest reliability
 - c. good alternate forms reliability
 - d. poor alternate forms reliability

4. Researchers find a correlation of +1.20 between coffee consumption and mental alertness. This indicates that:
 - a. drinking more coffee is associated with mental alertness
 - b. drinking less coffee is associated with mental alertness
 - c. **there is a flaw in the computation of the correlation coefficient**
 - d. drinking coffee increases mental alertness

5. Evidence reveals a correlation between the number of hours toddlers spend watching television and their level of hyperactivity in later childhood. What does this definitively indicate?
- a. that television watching causes hyperactivity
 - b. that hyperactive children watch television
 - c. that parents of hyperactive children rely on television as a means of managing hyperactivity
 - d. that there is a relationship between television viewing and hyperactivity**
6. An advantage of the case study method is
- a. it allows for definitive conclusions
 - b. it is hypothesis generating**
 - c. it is hypothesis confirming
 - d. it allows for broad conclusions
7. The standard deviation tells us?
- a. how much, on average, individual scores differ from the mean**
 - b. how much, on average, individual scores differ from one another
 - c. the midpoint of individual scores in a distribution
 - d. the distance between the highest and lowest individual scores in a distribution
8. The results of a study are found to be statistically significant. This means that
- a. the researchers have proven their hypotheses
 - b. the results are greater than what would be expected by chance**
 - c. the study was conducted flawlessly
 - d. there was a large difference between the experimental and control groups on the dependent variable

9. Researchers manipulate or control variables in order to conduct
- naturalistic observation.
 - the double-blind procedure.
 - case studies.
 - a true experiment.**
10. Which of the following is the strongest correlation coefficient?
- 0.50
 - 0.92**
 - 0.75
 - 0.75
11. Researchers studied language development in the same group of children every year over a five-year period. This research design is called:
- cross-sectional
 - longitudinal**
 - placebo-controlled
 - correlational
12. Calculate the median of the following distribution of scores: 5, 2, 3, 8, 1, 4, 5
- 4**
 - 5
 - 4.5
 - 8
13. Calculate the mode of the following distribution of scores: 5, 2, 3, 8, 1, 4, 5
- 4
 - 5**
 - 4.5
 - 8

14. In science, a theory is a(n)
- a. strongly held opinion
 - b. specific prediction about causal factors
 - c. testable explanation for a set of observations**
 - d. scientific law
15. Jasmeet is interested in conducting an experiment in which she manipulates the amount of food she gives her Siamese fighting fish. She ensures that the size of the fish tank is identical for each fish, and that fish are assigned into groups randomly. What aspect of this experiment has Jasmeet not worked out?
- a. Independent variables
 - b. Confounding variables
 - c. Dependent variables**
 - d. Sampling bias
16. To avoid experimenter bias and subject bias researchers employ
- a. the single-blind procedure
 - b. the double-blind procedure**
 - c. random sampling
 - d. the naturalistic observation method
17. A concern when using self-report measures is:
- a. the hindsight bias
 - b. reaction time validity
 - c. the social desirability bias**
 - d. a small sample size

18. Researchers are testing baby James' ability to recognize his mother's face. James is presented with an image of his mother's face and a stranger's face. The researchers examine how long James looks at each image. What type of measure are the researchers using?
- a. self-report
 - b. report by others
 - c. behavioral**
 - d. physiological
19. What would be the best method for studying the situations in which people pick their nose?
- a. case study
 - b. naturalistic observation**
 - c. correlational method
 - d. experimental method
20. What would be the best method for examining the relationship between age and driving behavior?
- a. case study
 - b. naturalistic observation
 - c. correlational method**
 - d. experimental method
21. Uncontrolled factors that can reduce internal validity are termed _____.
- a. Dependent variables
 - b. Bias variables
 - c. Subject variables
 - d. Confounding variables**

22. Science deals in _____ not _____; therefore, science cannot deal in absolute _____.
- a. **induction; deduction; truth**
 - b. deduction; induction; falsification
 - c. induction; deduction; falsification
 - d. deduction; induction; truth
23. Testing the reliability of a psychometric instrument by dividing the test items into two arbitrary groups and correlating the scores obtained in the two parts of the test is termed:
- a. **Split-half reliability**
 - b. Parallel forms reliability
 - c. Test-retest reliability
 - d. Half-form reliability
24. Factorial designs are designs with more than one:
- a. **independent variable**
 - b. dependent variable
 - c. significant interaction
 - d. significant main effect
25. In a 2 x 3 factorial design there are _____ treatment conditions.
- a. 2
 - b. 5
 - c. **6**
 - d. There is insufficient information to answer this question
26. When different participants are randomly assigned to each of the conditions it is termed:
- a. **An independent groups design**
 - b. A repeated measures design
 - c. A mixed design
 - d. A matched groups design

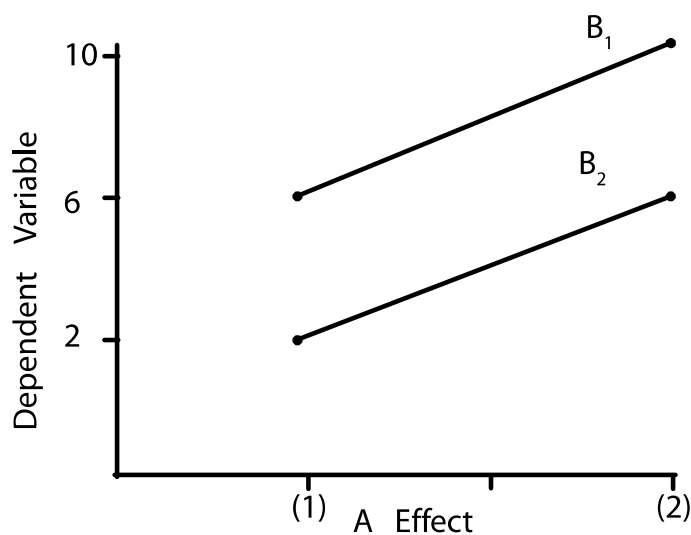
27. In quasi-experimental research:

- a. Researchers have no direct control over the independent variables
- b. There are subject variables
- c. Causal statements are not possible
- d. All of the above**

28. You read in the newspaper that Vancouver has been ranked as the second best city in the world in which to live. What kind of scale is being used here?

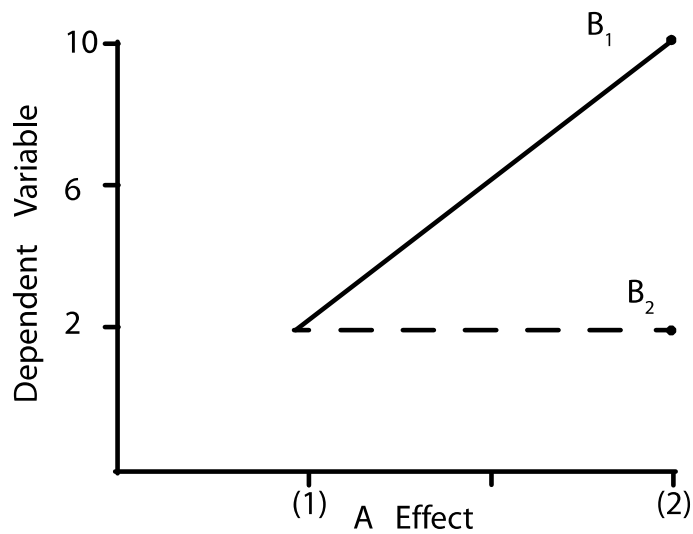
- a. Ratio
- b. Nominal
- c. Interval
- d. Ordinal**

29. The following outcome of a factorial design indicates:



- a. A main effect of A, a main effect of B, and an interaction
- b. A main effect of A, a main effect of B, and no interaction**
- c. A main effect of A, no main effect of B, and no interaction
- d. No main effect of A, a main effect of B, and no interaction

30. The following outcome of a factorial design indicates:



- a. **A main effect of A, a main effect of B, and an interaction**
- b. A main effect of A, a main effect of B, and no interaction
- c. A main effect of A, no main effect of B, and no interaction
- d. No main effect of A, a main effect of B, and no interaction

Part B: Nonexperimental briefs (10 marks)

Read the following descriptions of two nonexperimental studies. For both studies, answer the questions listed below. Each answer is worth 2.5 marks, for a total of 10 marks.

- A. Ilan suspects that there is a relationship between the amount of choice people have when making a decision and their satisfaction with their eventual choice. He decides to study this question outside two ice-cream shops located in different parts of the city. Store A offers a choice of six flavours of ice cream whereas Store B offers a choice of thirty flavours of ice cream. For the same two-week period, Ilan positions his research assistants outside both stores between 3pm and 6pm. The research assistants approach customers who have just purchased some ice cream as they are leaving the store, introduce themselves and invite them to complete a brief questionnaire. One of the questions on the questionnaire asks the customers to rate their level of satisfaction with the ice cream. Statistical analyses show that the customers that bought their ice cream from Store A were more satisfied than those that bought their ice-cream from Store B.
- B. Sam is a graduate student who is interested in whether being extraverted causes people to have more friends on Facebook. He recruits a large number of students at his university to participate in his study. Before the study begins, the students give the research team permission to temporarily access their Facebook profile page. Sam gets four of his research assistants (none of whom know any of the participants personally) to browse through each of the Facebook profile pages and to record how many Facebook friends each student has. Sam also requests the students to complete a detailed questionnaire that accurately measures how extraverted they are. When Sam looks at both sets of scores he concludes that the being extraverted does cause people to have more Facebook friends.

1. Describe the type of nonexperimental research used in this study. How do you know this? (2.5 marks)

A. This is a quasi-experimental study (1 mark).

We know this because, although the study has an independent variable (the amount of choice), the participants were not randomly assigned to their condition. (1.5 marks)

B. This is a correlational study (1 mark).

We know this because the researchers are measuring two variables (number of Facebook friends & self-reported extraversion) among a group of participants and then examining the relationship between them (1.5 marks).

2. Describe one threat to internal validity faced by this study design. In your opinion what is the best way to overcome or account for this threat? (2.5 marks)

A. Selection of participants is the biggest threat to internal validity in this study (there may be pre-existing differences between the two groups of participants such as their level of income). One possible solution would be to restrict the sample to people from the same age range (or other demographic characteristics).

Another possible answer concerns a confounding variable like the quality of ice cream across the two shops. The students might suggest holding the quality of ice-cream constant (e.g., by conducting the study at the same store but having a different number of available choices on different days) or measuring the customer-rated quality and controlling for it statistically.

Some students may also suggest designing an experimental study in which participants are randomly assigned to one of the two conditions.

B. Because correlation does not equal causation, Sam cannot be certain that being extraverted is what caused his participants to have more Facebook friends (e.g., a third variable like openness to new experiences might have caused both). Social desirability might also have affected how participants completed the extraversion questionnaire (they might have wanted to appear more extraverted than they really are).

In some cases these additional variables may be measured and statistically controlled, or sub-groups (e.g., those above & below average on openness to experience) analyzed separately.

Part C: Computing a correlation coefficient (10 marks)

Professor Aknin is interested in the relationship between charitable giving (i.e., how much money people donate to charity) and happiness. She administers a questionnaire for life satisfaction among a sample of 5 people and also asks them to estimate how much money they donated to charity over the past year. The data collected are as follows:

Life satisfaction	Approximate amount donated to charity
24	\$600
29	\$400
14	\$20
20	\$80

1. Compute the correlation for these data and show your work. In determining your answer, show your computation and follow the correct procedure. For full marks, values must exactly equal the correct values. (10 marks)

Formula for computing a correlation:

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

1 mark for each correct computation of:

- Sum of $x = 87$
- Sum of x squared = 2013
- Sum of $y = 1100$
- Sum of y squared = 526800
- Sum of $xy = 27880$

3 marks for correct procedure (values correctly plugged into the formula, correct computation of each of the elements of the formula)

2 marks for correct answer (to at least two decimal places):

$$r = +.7599 \text{ (or just rounded to } +.76)$$

Part D: Key concepts in Research Methods (15 marks)

This section evaluates your understanding of four key concepts in the course and comprises 15 percent of your grade on the final examination. Each of the four tasks in this section is worth 5 marks. Do not answer all of the questions. Choose and answer only **three** of the four questions.

1. Discuss five threats to internal validity in studies that involve repeated testing (e.g., pretest-posttest, repeated measures, etc.). (5 marks)

1 mark for each threat properly described.

Possible threats to internal validity are: history, maturation, testing, mortality, regression to the mean, and instrumentation.

2. List two advantages and two limitations (each) of case studies and quasi-experimental research. (5 marks)

0.625 marks for each advantage and each limitation of case studies and quasi-experimental research. See Unit 3 for some possible answers.

3. Describe four ways that you could improve the reliability of a study. (5 marks)

1.25 marks for each way that reliability could be improved, up to a maximum of 5 marks. Possible ways to improve reliability (there are many ways so allow some latitude):

- Automate the procedure (e.g., with computers)
- Train the researchers carefully and only keep those who are consistent during training
- Use more objective measures (e.g., count behaviors instead of rating the intensity of the behaviors)
- Ensure that the testing environment does not vary with repeated testing

4. Give an example of how a laboratory experiment can be valid but have low generalizability. Name at least four types of validity in your example. (5 marks)

2 marks for discussing at least four different types of validity. The validity types can include but are not limited to: internal, external, construct, ecological, predictive, discriminate, face, convergent etc.

3 marks for describing how an internally valid experiment can lack ecological, external, and predictive validity (or other types) outside the confines of the laboratory.

Part E: Experimental briefs (10 marks)

Part E contains two experimental briefs and is worth 10% of your final exam grade. Answer the sets of questions associated with each brief.

Brief 1 (2 marks)

Dr. Nervous was interested in the effects of caffeine on sleep. She randomly assigned 20 university students (10 men and 10 women), all of whom were healthy and of average weight, to four groups. The control group drank decaffeinated coffee, and the other three groups drank one, two, or three cups of coffee. She found that people took longer to fall asleep after they drank more coffee. Based on this study, provide one example of each of the following variables:

- a. Dependent variable
Time taken to fall asleep (0.5 mark)
- b. Independent variable
Amount of coffee consumed by the participants (0.5 mark)
- c. Control variable
All university students; average weight; healthy, etc. (0.5 mark)
- d. Extraneous or confounding variable
Age; typical daily coffee consumption, etc. (they can be creative here) (0.5 mark)

Brief 2 (8 marks)

You have developed an online test of “true” love. However, you are concerned about the validity of your test; you are not sure it actually measures true love. Briefly describe four different types of convergent validation studies that you could do to make sure that your study measures true love.

2 marks for each circumstance as follows, up to a maximum of 8 marks:

- **Predictive validity—relates one measure of behavior to another; criterion measure**
- **Construct validity—refers to the extent to which variables accurately reflect/measure the behavior**
- **External validity—refers to the extent to which observations can be generalized to other settings and subjects**
- **Internal validity—refers to whether one can make causal statements about the relationship between variables**

Part F: Design an experimental study (25 marks)

This part of the exam requires you to design a research experiment and is worth 25% of your final exam grade.

Hypokinetic disease is caused by insufficient activity and lack of regular exercise. Coronary heart disease, diabetes, high blood pressure, lower back problems, joint disorders, and obesity are just some facets of hypokinetic disease.

Research has shown that if a person does not start a consistent pattern of physical exercise as an adolescent or young adult, they are unlikely to develop the habit later. Imagine that you have been asked to design an experiment to increase physical activity in adolescents. You have reasonable access to funds and resources, but your study must be practical and feasible. Therefore, you will not be able to test all people and try all ways of increasing exercise. However, you should be able to identify some aspects of physical activity and think of some ways that might increase it for the long run. The following questions raise some of the important issues that you should consider when designing a longitudinal study.

Answer all of the following eight requests based on your design of an experiment. In each case, clearly state your reasons for your answers. In other words, justify your answers.

Students may find Part F difficult because it is at the end of a long exam and there are many possible answers to some of the questions. It is possible for a student to successfully devise an experiment that has little overlap with the guidelines outlined in this portion of the answer key. Therefore, it is critical that the OLFM rely on his or her own expertise and common sense. The guidelines offered here are meant to be exemplary, not required. Keep in mind that no single experiment is definitive, and all aspects of good research design cannot be addressed in a single answer here.

1. State the hypothesis of your experiment. (2 marks)
 - Hypothesis given is a cause-and-effect statement, not a question. (1 mark)
 - Hypothesis clearly states independent variable. (0.5 mark)
 - Hypothesis clearly states dependent variable. (0.5 mark)

2. Who will your subjects be, and how will you select them? (3 marks)
- **Participants should be young. (e.g., adolescents or young adults) (1 mark)**
 - **Participants should include inactive overweight youth as well as inactive thin youth. (1 mark)**
 - **Participants could be selected in many ways; including convenience (e.g., volunteers responding to advertisement, recruitment at schools). (1 mark)**
 - **Exclude potential participants. For example, exclude those who have medical problems or those who are already participating three times a week or more in physical activity programs. (1 mark)**
3. Describe your experimental situation (e.g., laboratory, schoolyard, city streets, etc.) and why you chose this situation. (3 marks)

Of importance here is not just the situation chosen but the reasons for this choice. Most choices could be justified for marks. Examples of reasons that would garner marks:

- **A laboratory was chosen because it afforded increased control and internal validity.**
- **A laboratory was chosen because measurement of dependent variable(s) could be more reliable (e.g., actual sedentary behavior could be directly observed over a period of time).**
- **Office cubicles could be used for increased external validity (i.e., more realistic situation with increased generalizability to “real world” sedentary behaviors).**
- **To increase external and internal validity, lack of exercise/movement (sedentary) behavior was tested in several environments (converging operations).**

4. Describe your independent variable(s) and the number of levels of each variable (be specific). (3 marks)
 - **Should state a variable here that is manipulated and differentiate groups (between-subjects) or conditions (within-subjects). For example, one group receiving education in a classroom on the harmful effects of non-movement (sedentary) behavior, one group receiving education on how to say “yes” to peers who pressure them to go for a walk, play a sport, or just get active, and a control group receiving a sham treatment (e.g., classroom education on cooking techniques) would garner marks. Both the variable (e.g., education) and levels (e.g., in the above example) need to be specified.**
 - **If the student only gives non-manipulated variables (e.g., specifies a quasi- experimental design comparing people who don't exercise at different ages or different levels of exercise) they should only receive 1.5 marks. However, combining manipulated and non-manipulated variables could get full marks.**

5. Describe your dependent variable(s). (3 marks)
 - **Students should state a variable here that is reliable, valid, and sensitive (e.g., death from inactivity would likely suffer from floor effects, and judging enjoyment of not moving using subjective measures may not be reliable). Most studies would benefit from multiple dependent variables. A weaker answer might only include one measurement such as the number of minutes of exercise per day.**
 - **For laboratory situations, wanting to exercise e.g., using a Likert scale), number of minutes of exercise per day, or the amount of strenuous exercise per day, or type and amount of exercise per day may all be included. For semi-controlled (e.g., schoolyard) and realistic environments, similar measures as laboratory could be included.**

6. What type of experiment (e.g., before-after, between-subjects, within-subjects, repeated measures) will you use? Briefly explain why you chose this type. (4 marks)

- **Basic choice is either a within- or between-subject design. Within-subject design has the advantage of controlling between-subject confounds (i.e., in a within-subject design, conditions involve the same people who serve as their own control) but has several limitations including practice and fatigue effects. For this study, this may be a reasonable choice as one could compare dependent variables (e.g., rates of working out) before and after treatment.**
- **Between-subject design may be a cleaner and a better choice because practice and fatigue effects are less of a concern but this design typically requires more participants.**

A pretest-posttest design (without a control group) is inappropriate.

7. Give an example of a possible confound and how you will control it. (4 marks)

Within-subject designs have problems including fatigue and practice effects, which can be reduced with extensive habituation/familiarization phases and evaluated with counterbalancing of the order of the levels of the independent variables.

Subject bias may be a problem because inactive participants may become more active simply based on their expectations, not based on their exposure to the actual independent variable. A placebo condition (a realistic sham condition that did not work though it appeared to the subjects that it was effective) could help control this.

Experimenter bias may be a problem because inactive participants may be shown to increase their activity rates as a result of biased observation and recordings of the researcher. Objective measures and double-blind procedures would help control this bias.

Participants' pre-experimental condition would be important to control. Time since last workout or current stress levels could all be held constant, varied between groups, or controlled through counterbalancing. Testing environment may differ across time or groups. To control for this, random assignment, counterbalancing, and control are used. For example, all groups are tested at the same time of day and not during exams, etc.

8. In what ways is your experiment a limited test of this hypothesis? (Hint: One way of answering this is to describe further experiments that would establish the generality of your findings). (3 marks)

All experiments have limits.

Participants are a sample, not the complete population, so some groups may not be included (e.g., sample does not include females, or participants who do not want to participate, or the full range of inactive people).

Situation does not include all conditions that adolescents and young adults would experience (e.g., time of year or studying for finals). Not all independent variables are tested (e.g., there are countless possibilities and permutations to increase activity and prevent hypokinetic disease and only a subset of these are included).

Inactivity has many effects (e.g., changes in blood flow, lung capacity, loss of muscle mass, increased fat, depression) and no single set of dependent variables will fully capture all that is involved in hypokinetic disease.

Laboratory experiments may have limited external validity.

Real world experiments may have limited internal validity.