



Research Methods and Senior Project Module (Phys3121): Worksheet for 3rd year students

Name: _____ ID. No: _____ Dept. _____

I. Write TRUE if the statements is correct and FALSE otherwise

- _____ 1. The null hypothesis always predicts that there will be no differences between the groups being studied.
- _____ 2. Independent variable is the factor that is manipulated or controlled by the researcher.
- _____ 3. Dependent variable is the one that is observed or measured in the experiment.
- _____ 4. Interviewing can be conducted through contacts of mailing or internet.
- _____ 5. Interviewing is the only suitable method for gathering information from illiterate or less educated respondents.
- _____ 6. Rejecting the null hypothesis means that there is a difference between the groups being studied.
- _____ 7. Closed- ended questions permit free responses that should be recorded in the respondent's own words.
- _____ 8. Scientists believe that gaining scientific knowledge is based on opinion, feeling, or perception of an individual.
- _____ 9. Research is one way you educate yourself.
- _____ 10. The main goal of applied research is adding knowledge to the scientific community.

II. Choose the correct answer from the given alternatives

- _____ 1. The type of research which is motivated to expand man's knowledge but not to create or invent solution to problems currently man or the community is facing is:
A. Basic B. Action C. Qualitative D. Quantitative
- _____ 2. All of the following are examples of nominal variables except:
A. Sex B. Race C. Models of vehicles D. Military rank
- _____ 3. All of the following are true about probability sampling except:
A. Used when sampling frame exists
B. Involve random selection procedures
C. Used when determinability of the results may not be of great importance.
D. All units of the population should have equal or at least a known chance of being included in the sample.
- _____ 4. During selecting samples by using simple random sampling; if there are many units, Selection of the units is greatly facilitated and made more accurate by using:



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- A. Table of random numbers C. Lottery method
B. Quota sampling D. Convenience sampling
- _____ 5. The representativeness of the sample is improved when researchers use:
A. Probability sampling B. stratified Sampling C. simple random sampling D. quota sampling
- _____ 6. Which of the following is an example of secondary sources?
A. Fossils
B. Blood sample collected for identification of malaria parasite
C. Interviews about prevalence of malaria in certain community
D. Annual reports and financial statements of companies
- _____ 7. Which of the following is the strength of observation?
A. The data may reflect observers' bias;
B. It gives no information about past or future;
C. If the sample subjects to be studied know your presence as observer, may show artificial behavior
D. Permits information on non-verbal behaviors
- _____ 8. The type of interview that do not utilize schedules of questions is:
A. structured B. Semi standardized C. Unstructured D. Focus group
- _____ 9. The step in writing research proposal that identify gap, question, or problem that motivates to conduct the study is:
A. Title B. Abstract C. Background D. Methodology
- _____ 10. During writing of research proposals, the method section should specify all of the following except:
A. Study population B. Type of data to be collected
C. Study area. D. Objectives of the study
- _____ 11. Which of the following is not included in the preliminary page of a scientific article?
A. Acknowledgements B. Table of contents
C. List of tables and figures D. Introduction
- _____ 12. When a source in the introduction part of any scientific article is written like Smith et al.,2003; this indicates that:
A. Smith is the only author B. The authors are Smith and others
C. The authors are Smith and John D. None
- _____ 13. The section of scientific article that explains about what the results mean or they differ from others' worker is:
A. Discussion B. Introduction C. Methodology D. Conclusion
- _____ 14. Which of the following is not component of a review paper?
A. Abstract B. Conclusion C. Result D. Methodology



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III. Give short answer for each of the following questions neatly and clearly.

1. A day before yesterday was cloudy day and there was rain; yesterday was cloudy day and there was rain and today it has been cloudy day and there has been rain, therefore, all cloudy days followed by rain. What type of reasoning is it? Explain how?
2. All female mammals secrete milk. Female cows are mammals and therefore female cows secrete milk; What type of reasoning is it? Explain how?
3. What is the type of research in which its main and direct goal is to improve the human life?
4. What is a tentative statement of the relation between two or more variables?
5. What are facts, figures and other relevant materials, past and present, serving as bases for study and analysis?
6. Mention the three main perspectives that are used to classify research into different categories?
7. List at least three sources that beginners can search for a research topic?
8. Mention the three criteria that good research problems must meet?
9. What are the two features of a good hypothesis?
10. Explain the difference and similarities of stratified and cluster sampling?
11. List at least four factors that determine sample size?
12. Mention three factors that cause measurement error?
13. Mention at least three mechanisms that are useful to minimize the impact of measurement errors?
14. List the two main features of secondary data sources?
15. In what methods are primary data collected?
16. Explain why reporting in science is important?
17. Mention at least four of the basic information's that should be included in writing the methodology section of a scientific article?
18. List at least three of the main qualities of a well-written results of a scientific article?
19. Explain the importance of writing a review paper (article)?
20. In what ways are research proposals, findings or review papers presented to the scientific community?
21. Distinguish the difference between the two types of plagiarism?
22. Explain the condition(s) when using non-probability sampling is inappropriate?
23. Determine to which of variable categories (ordinal, nominal, interval, and ratio) belongs the following four variables
A. Ethiopia B. Grade "A" in one of Physics courses C. Age D. Temperature



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- 23.** Identify the possible null and alternate hypotheses from the following research problems?
 - a. A research study investigating the effects of applied force on the work done.
 - b. The association between velocity and kinetic energy of an object.

- 24.** Discuss the following questions briefly.
 - 24.1. Write the criteria that good research problems should meet?
 - 24.2. The difference between the null and alternatives hypotheses?
 - 24.3. Differentiate directional and non-directional hypotheses?
 - 24.4. Write features of a good hypotheses?

- 25.** Discuss briefly about the following basic concept:
 - 25.1. Observation (discuss its strengths and limitations!)
 - 25.2. Unstandardized interview
 - 25.3. Semi-standardized interview
 - 25.4. Focus group interviewing

- 26.** Describe the following concept terms
 - 26.1. Convenience sampling
 - 26.2. Quota sampling
 - 26.3. Simple random sampling
 - 26.4. Systematic sampling
 - 26.5. Striated random sampling
 - 26.6. Cluster sampling

- 27.** What is the advantage of using?
 - 27.1. Closed ended questionnaire
 - 27.2. Open-ended questionnaire

- 28.** Write the major components' proposal and scientific paper.
 - 28.1. Proposal
 - 28.2. Scientific paper

- 29.** Write the salient features of the following components of scientific paper:
 - 29.1. Abstract
 - 29.2. Introduction
 - 29.3. Methods
 - 29.4. Results
 - 29.5. Discussions

- 30.** Write the major ethical issues a researcher should address while doing

- 31.** Write the measures used to reduce bias during experimentation?

- 32.** Explain the difference between Type I error and Type II error.