

UNIVERSITY OF ESWATINI

Faculty of Education

Department of Curriculum and Teaching

Main Examination Paper

August 2020

PGCE

Title of Paper: **Curriculum Studies in Physics II**

Course Number: **CTE 534**

Time allowed: **Three Hours (3hrs)**

Information and INSTRUCTIONS

1. This paper contains TWO Sections
2. Section 1 is **COMPULSORY** and carries 40 marks.
3. Choose any **THREE** questions from Section 2. Each question carries 20 marks.
4. Any written material not intended for marking should be **CLEARLY CROSSED OUT**.
5. Ensure that **EACH** page clearly shows the question answered.

THIS PAPER SHOULD NOT BE OPENED UNTIL INSTRUCTED BY THE INVIGILATOR

Section 1. Compulsory (40 marks)

1. When investigating a new cancer-fighting drug, medical researchers give some of the subjects a pill that contains the drug. Some of the other subjects are given a pill that does not contain the drug. The drug-free pill serves what purpose in the design of the investigation?
 - A. A control
 - B. A variable
 - C. A separate trial
 - D. A qualitative comparison

2. Which statement **best** describes the process of science?
 - A. Scientists are objective and free of prejudice.
 - B. Generally, scientists work independently and discover new ideas without the help of others.
 - C. Scientific ideas evolve or change over time.
 - D. New ideas in science result from planned and well-designed experiments.

3. **Students were asked to measure a string. The actual length of the string was 8.25 cm long. Which of the following shows the measurements from the most accurate group and why?**
 - A. 7.25cm, 7.75cm, 8.25cm, because these were the closest to the actual length.
 - B. 7.2cm, 7.25cm, 7.3cm, because these had the most agreement between lengths.
 - C. 8.25cm, 8.75cm, 9.25cm, because these had the most agreement between lengths.
 - D. 8.2cm, 8.25cm, 8.9cm, because these were the closest to the actual length.

4. **Hypothesis and models are constructed to give the best explanation of a set of data. Models and hypotheses based on experimentation and research are**
 - A. generally accepted by all scientists who are experts.
 - B. modified if necessary as new data and observations are collected.
 - C. not modified once completed if based on careful experimentation.
 - D. generally only accepted if scientists agree with collected data.

5. **Which of the following is NOT a goal of science?**
 - A. to investigate and understand the natural world
 - B. to explain events in the natural world
 - C. to establish a collection of unchanging truths
 - D. to use derived explanations to make useful predictions

6. In a controlled experiment, the researcher typically manipulates one variable, called the independent variable, to determine how this variable affects the final outcome, called the dependent variable. In the following hypothetical example, a researcher applies varying amounts of fertilizer (0, 2, 4, 8, 10 units) to potted tomato plants. All other variables that may affect the outcome (watering, temperature, sunlight, plant size, etc.) are kept the same from pot to pot. At the end of the growing season, the tomatoes grown on each plant are weighed to determine which fertilizer level produces the largest tomato yield. Which variable was the independent variable and which was the dependent variable?

- a. Independent = Fertilizer amount, Dependent = Temperature
- b. Independent = Temperature, Dependent = Yield
- c. Independent = Fertilizer amount, Dependent = Yield
- d. Independent = Yield, Dependent = Fertilizer amount

7. What does the term "theory" mean to a scientist?

- a. A collection of accepted hypotheses that explain a wide range of natural phenomena
- b. A guess
- c. A proposed explanation for an observed phenomenon
- d. A hypothesis that has been supported by the evidence of an experiment

8. A recent commercial advertised for a wristband that claimed to restore health and balance by taking advantage of natural frequencies of your biofield. It even showed several people struggling to balance first without the wristband and then balancing fine with the wristband. For only \$20 plus shipping and handling this device can be yours. Why should you be skeptical of the claims made in this ad?

- a. Health cannot be tested via the scientific method
- b. You cannot believe anything you see on television.
- c. The study was too objective
- d. It was not a controlled experiment

9.

Gathering information just to add to the knowledge base, such as measuring the beak length of various bird species, is known as _____.

- A. discovery science
- B. applied science
- C. hypothesis-driven science
- D. investigative science

10. Suzy wanted to know if thicker candles burn longer than thinner candles. Her hypothesis was that if she used a thick candle that it would burn for the longest amount of time. She got ten candles that were all the same brand, height, smell, and colour. The only difference in the candles was they were all a different size. She lit them at the same time and recorded how long it took for each candle to burn out. What was her independent variable?

- A. Thickness of the candle
- B. Length of time the candle burned
- C. Colour of the candle
- D. Length of the candle wick

11. The controls of an experiment...

- A. Is the part of the experiment that stays the same so you can compare changes.
- B. Is the part of the experiment that will change.
- C. Is the part of the experiment that makes everything work.
- D. The standard book value of the experiment

12. Science differs from other disciplines, such as history and the arts, because science relies on

A. facts. B. testing explanations. C. observations. D. theories.

13. Science is best described as a

A. set of facts. B. way of knowing. C. collection of beliefs. D. list of rules.

14. The work of scientists usually begins with

A. testing a hypothesis. B. careful observations. C. creating experiments. D. drawing conclusions.

15. Information gathered from observing a plant grow 3 cm over a two-week period is called

A. inferences. B. variables. C. hypotheses. D. data.

16. Based on your observations, you suggest that the presence of a drought could accelerate the rate of cooling of a hot object. This is
- A. a conclusion. B. a hypothesis. C. an experiment. D. an analysis.
17. A scientific hypothesis
- A. can be based on personal beliefs or opinions.
B. can be tested by experiments or observations.
C. does not have to be tested to be accepted as correct.
D. is a proven fact with much evidence to support it.
18. During a controlled experiment, a scientist isolates and tests
- A. a conclusion. B. a mass of information.
C. a control group. D. a single variable.
19. A student sees a bee on a flower. The student wonders how the bee finds flowers. This student is displaying the scientific attitude of
- A. creativity. B. curiosity. C. open-mindedness. D. skepticism.
20. Suppose that a scientist proposes a hypothesis about how a newly discovered virus affects humans. Other virus researchers would likely
- A. reject the hypothesis right away. B. change the hypothesis to fit their own findings.
C. design new experiments to test the proposed hypothesis. D. assume that the hypothesis is true for all viruses.
21. Why is creativity considered a scientific attitude?
- A. Scientists need creativity to make good posters to explain their ideas.
B. Creativity helps scientists come up with different experiments.
C. Creative scientists imagine the results of experiments without doing them.
D. Scientists who are creative are better at handling and training animals.
22. After a scientist publishes a paper, someone else finds evidence that the paper's hypothesis may not be correct. The scientist is unhappy, but studies the new evidence anyway. The scientist is showing which scientific attitude?
- A. creativity B. curiosity C. open-mindedness D. skepticism
23. Suppose a scientist must choose whether to publish a report in a newspaper or in a peer-reviewed journal. What is a benefit of publishing in the journal?
- A. Other scientists will know that everything in the report is true.
B. The reviewers will fix mistakes in the report's experiment.
C. The report will be published more quickly in the journal.
D. The quality of the report will meet high scientific standards.

24. Who reviews articles for peer-reviewed journals?
- A. friends of the scientists who wrote the articles
 - B. anonymous and independent experts
 - C. the scientists who did the experiments
 - D. people who paid for the experiments
25. How does sharing ideas through peer-reviewed articles help advance science?
- A. Peer-reviewed articles are published only when the ideas they contain have been accepted by most scientists.
 - B. Experiments in peer-reviewed articles do not need to be repeated.
 - C. Scientists reading the articles may come up with new questions to study.
 - D. Ideas in the articles always support and strengthen dominant theories.
26. A scientist discovers an important breakthrough in cancer treatment. The scientist thinks the information could save thousands of lives and immediately announces the results on national television, skipping peer review. How might other scientists react to this news?
- a. They will be skeptical because the report was not peer-reviewed.
 - b. They will quickly start to use the new treatment on their patients.
 - c. They will congratulate the scientist for the discovery.
 - d. They will denounce the work and call the scientist a fraud.
27. Suppose that a scientific idea is well-tested and can be used to make predictions in numerous new situations, but cannot explain one particular event. This idea is a
- A. hypothesis that is incorrect.
 - B. hypothesis that must be retested.
 - C. theory that should be discarded.
 - D. theory that may need revision.
28. A personal preference or point of view is
- A. a bias.
 - B. a theory.
 - C. a hypothesis.
 - D. an inference.
29. How does society help science advance?
- A. Society's biases steer scientists toward studying certain ideas.
 - B. Society produces technology that can be used in science.
 - C. Society's morals help scientists make good decisions.
 - D. Society raises questions that science can help answer.

30. How does studying science help you be a better member of society?

- A. Learning the biases of science will help you know what is right or wrong.
- B. Understanding how science works will help you make better decisions.
- C. Memorizing science facts will help you become more intelligent.
- D. Knowing science will help you live without the aid of technology.

31. Which of the following is NOT a way that science influences society?

- A. Science provides answers to some of society's practical problems.
- B. Science gives society answers to difficult ethical issues.
- C. Science advances technology that is useful to society.
- D. Science increases society's understanding of how people affect the environment.

32. Scientists often try to repeat each other's results. Which of the following should a scientist do to make it easier for others to replicate his or her experiment?

- A. Not use a control to save time.
- B. Collect only one set of data.
- C. Skip peer-review so the results are available sooner.
- D. Use the metric system when communicating procedures and results.

Questions 33-40 are derived from the Attachment 2

33. Public understanding of the Science and Technology

- A. influences beliefs, fears and behaviour of people
- B. enables the common man to deduce world conspiracies
- C. is not necessary to the ordinary person
- D. requires that all people keep learning new principles of science.

34. Conspiracy theories connecting 5G network and Coronavirus abound because

- A. Covid-19 has been found in countries that launched 5G network
- B. The public is well aware of the mechanism of 5G
- C. Some members of the public have little understanding of 5G
- D. Covid-19 was caused by 5G network

39. The ever-changing Science and Technology innovations require
- A. public understanding of science
 - B. simplification of the physics of radio transmission and receiving
 - C. Science examinations must be given to all citizens
 - D. All of the above
- 35. What basic knowledge could have prevented erroneous theories about Covid-19**
- A. Radio waves do not cause viruses
 - B. Transmission mechanisms of pathogens
 - C. Long exposure to waves causes cancer
 - D. Einstein's theory of relativity
- 36. How is school science able to influence public policy in science**
- A. MPs learn basic science from school
 - B. Principles of science learnt in school are enduring
 - C. Science syllabuses do not change too much in decades
 - D. New ideas are not taught in school
- 37. High School physics education can support public understanding of 5G by**
- A. Emphasizing that hand cleanliness is hygienic
 - B. Teaching about radio transmission and receiving
 - C. Explaining frequency and bandwidth to learners
 - D. Returning all people to school and reteach them
- 38. Does Society lead or follow science and technology?**
- A. Change in society is very slow
 - B. Scientist and technologists are nerds, they are detached from society
 - C. Social needs drive scientists
 - D. Scientists determine social needs
- 39. School science is relevant for public understanding of science, because**
- A. Students learn everything about disease at school
 - B. School science includes content about frequency and cellphones
 - C. School science shows learners how to think
 - D. You do not need Physics in order to use technology
- 40. Confronted with 'conspiracy theories' based on incorrect science**
- A. Teachers of science must go back to school
 - B. School system has failed society
 - C. People must suspend judgment until informed by evidence
 - D. Bad theories always die out with time.

Section 2. Answer any Three questions

1. Diagnostic, formative, benchmark (or interim), and summative tests all serve distinct purposes and should work together to make up a balanced **assessment** program.

The objective of a diagnostic test is to gauge background knowledge, analytical, verbal and written communication skills, and deficiencies in students. Attachment 1 was used to diagnose deficiencies in a Grade 10 class. Analyse attachment 1

- i. Identify five deficiencies displayed in the lab report. [2x5] (10)
ii. Create activities to remedy any two deficiencies. [5x2] (10)

2. The Marzano version of educational objectives is ideal for Physics teaching.

Show the relevance of the following to practical work in Physics?

- i. Retrieval
ii. Comprehension
iii. Analysis
iv. Knowledge utilization [5x4] (20)

3. One of the aims of the SGCSE syllabus in Science is

To promote awareness that...the study and practice of science are subject to social, economic, technological, ethical and cultural influences and limitations. (

- i. How do the underlined concepts influence Physics teaching in Eswatini?
[2x5] (10)
ii. Show how digital technology confronts limitations to Physics education.
[2x5] (10)

4. Members of the public expressed the following views about school science:

- School science does not change the lives of African children
- The majority of school graduates sit at home and are unemployed
- Many Physics graduates teach in schools and never work as real physicists, so there is no point of learning much physics.
- Science innovations always come, and never from Africa.

Motivate students who hold such views to study Physics. [5x4] (20)

End of Paper