WEEK 1

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| **Learning Planner** |
| **Subject** | Physics | **Week 1** | 1 | **Duration** | 240 minutes | **Form** |  1 |
| **Strand** | Mechanics and matter | **Sub-Strand** | Introduction to physics |
| **Content Standard** | 1. Demonstrate knowledge and understanding of the characteristics of physics as exhibited in everyday life.
2. Classify quantities into fundamental, derived, scalars and vectors.
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| **Learning Outcome(s)** | 1. Explain how physics is applied in some sectors of the global and local (glocal) economy
2. Classify quantities into fundamental, derived, scalars and vectors.
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| **Learning****Indicator(s)** | 1. Identify careers that are related to physics in various sectors of the economy.
2. Use basic mathematical concepts to solve problems - trigonometric ratios, Pythagoras's theorem, sine and cosine rule, indices.
3. Identify the basic units in physics.
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| **Essential Question(s)**  | 1. How does physics contribute to technological advancements and everyday applications?
2. What is the best approach to teach the role of physics for all learners to benefit from the lesson?
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| **Pedagogical Strategies** | Collaborative learning, Deductive learning, Talk for learning |
| **Teaching & Learning Resources** | Audio-visuals (TV, Projector), Laptop, Internet, Resource persons, Calculators |
| **Key Notes on Differentiation** |
| **Learning tasks*** *Identify Physics-related careers across the various sectors of the economy*
* *Identify a selection of branches of Physics*
* *Give further explanation as to the scope of some of the branches of Physics*
* *Link the branches of Physics to examples of careers*

**Pedagogical exemplars*** *Learners could watch a documentary that illustrates how physics plays a vital role in shaping the world. Let learners identify Physics-related careers linking to branches of physics that the learner may have met before e.g. mechanics, electricity, waves*
* *In groups, learners should be given a list of Physics-oriented careers, cutting across indigenous careers (such as masonry, welding, vulcanising, etc), education, engineering, health and allied sciences, photonics, geophysics, materials science, metallurgy, laser physics, astrophysics, meteorology, climate science, computing, etc. Learners discuss the relation of these careers with Physics, the required education and inclusivity*
* *Organise a career panel with guest speakers from various Physics-related professions. Learners should prepare questions and engage in discussions with the panellists*

**Key assessment*** *Level 1: Identify at least five Physics related careers in your community*
* *Level 2: Describe at least three branches of Physics and give examples of careers which utilise the study of these*
* *Level 1: Discuss the application of the principles of Physics in any industry of your choice*
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| **Keywords** | Careers, Mechanics, Matter, Physical quantities, scalars, vectors, derived, trig ratios, Pythagoras’ theorem, sine, cosine, indices. |
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| **Lesson 1: APPLICATIONS OF PHYSICS IN VARIOUS SECTORS OF THE ECONOMY AND CAREER EXPLORATION** |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** |
| ***Teacher Activity***  | ***Learner Activity*** |
| **Starter *Activity (10 minutes)*** Learners introduce themselves and mention a physics term or Physicist who shares the same first letter as their name. They then mention the career in physics that they are interested in pursuing or want to know more about.  |
| ***Introductory Activity (15 minutes)***1. Using know – want to know – learning (KWL) strategy, help learners explore a variety of career paths that utilise physics; identifying formal and informal careers.

***Activity 1 (40 minutes)***1. Learners develop a web relationship between the careers mentioned identifying the various branches of physics, the skills and education required, and the types of challenges and rewards each might offer.

***Activity 2 (40 minutes)***1. Learners watch a predownloaded video on the applications of physics ranging from education, scientific research, engineering and technology to entrepreneurship and environmental science.

Note: Scan the QR code for a sample video on YouTube.  | ***Introductory Activity (15minutes)***1. Based on your previous knowledge, share with your teacher and colleagues the various careers that use physics principles both in the informal and formal sectors.

***Activity 1 (40 minutes)***1. Together with your colleagues, develop a web relationship of the various careers you mentioned earlier and relate them to the various branches of physics, the skills and education required and the types of challenges and rewards they offer.

***Activity 2 (40 minutes)***1. Watch a video on the applications of physics ranging from education, scientific research, engineering and technology to entrepreneurship and environmental science.

Note: Scan the QR code for a sample video on YouTube.  |
| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** |
| ***Level 1***1. You have created a TikTok account and you want to share some of the careers in your community. Identify at least five physics related careers in your community you would share in your TikTok post.
2. LinkedIn has chosen you to contribute to a discussion physics in industry. Contribute to this discussion on the application of the principles of physics in any industry of your choice.

***Level 2***1. In celebrating your school’s anniversary, you are writing a short article on careers in Physics for the anniversary brochure. Describe at least three branches of physics and give examples of careers which utilise the study of these.
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| **Lesson Closure**  |
| ***Activity (15 minutes)*** 1. Ask learners to summarise how physics principles are applied in various careers
2. Ask learners to summarise the interdisciplinary nature of physics in different sectors and how they influence everyday technology and industry.
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| **Reflection & Remarks** |
| 1. Were my learners able to identify a career in physics that interests them the most and why?
2. Were my learners able to identify the application of physics principles in solving real-world problems?
3. Studying physics is not just about understanding the universe; it's about using that knowledge to make a real-world impact.
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| **Lesson 2: THE INTERPLAY OF MATHEMATICS AND PHYSICS IN CONCEPTUAL UNDERSTANDING AND REAL-WORLD APPLICATIONS** |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** |
| ***Teacher Activity***  | ***Learner Activity*** |
| **Starter *Activity (15 minutes)*** In a game of “I spy” or “treasure hunt”, you mention an object and learners mention the shape of the object recalling their previous knowledge of plane geometrical figures such as triangles and trapeziums*.*  |
| ***Introductory activity (15 minutes)***1. From the objects mentioned, introduce and explain the basic mathematical concepts on trigonometric ratios, Pythagoras's theorem, sine and cosine rule, and indices. Help learners appreciate the importance of these in the engineering structures like bridges, video game development to simulate realistic and immersive 3-D environments, in sports to calculate the best angle to hit the ball to avoid other players and cover a certain distance.

***Activity 1 (25 minutes)***1. Utilise real-life challenges and use them to guide learners in solving practice solving problems involving the sine and cosine rules to deduce sides and angles within triangles.

***Activity 2 (25 minutes)***1. Engage learners to recall the various measuring units they are exposed to.
2. Using a measuring unit like the “olonka”, let learners justify whether it is a standardised unit or not.
3. Explain the differences between fundamental and derived units. Guide learners, using a Venn diagram to classify the units mentioned into fundamental and derived units.

***Activity 3 (25 minutes)***1. Provide a set of units from Physics for learners to classify as fundamental or derived units and to convert some fundamental units into derived quantities in groups. Groups present their answers explaining how they obtained their answers.
 | ***Introductory activity (15 minutes)***1. Listen to explanations, take notes, ask questions, participate in discussions, practice solving problems, and reflect on the concepts learned.

***Activity 1(25 minutes)***1. Practice using the sine and cosine rules to deduce sides and angles within triangles by solving various problems and asking questions for clarification.

***Activity 2 (25 minutes)***1. Recall the various measuring units used in the home, hospital, markets, etc.
2. Share your experiences using the “olonka” for measurement and justify whether you think it is a standard unit for measurement or not.
3. Engage in the activity to classify the units provided as fundamental or derived units using your knowledge of Venn diagrams. Remember that fundamental units and base units refer to the same thing.

***Activity 3 (25 minutes)***1. Participate actively in the group work to classify the given units as fundamental or derived units and convert the given fundamental units into derived quantities. Submit your answers and explain how you obtained them.
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| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** |
| ***Level 2***1. The Ghana National Fire Service (GNFS) established in 1963. The Ghana National Fire Service Act (Act 537) mandates the Service with the objective of prevention and management of undesired fires and other related matters. The recommended angle for correctly placing a ladder is 75o. If the bottom of a ladder of length 4.2 m is placed 3.8 m away from the wall, calculate if the ladder will be safe for climbing.

***Level 3***1. Supporting your answer with relevant trigonometric functions, how would increasing or decreasing the distance between the bottom of the ladder and the wall affect the angle the ladder makes with the wall?
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| **Lesson Closure**  |
| ***Activity (15 minutes)***  Ask learners, based on their experiences using the “olonka”, learners should state the importance of standard units. Share the story of how in 1999, due to a mistake in communication, the Mars Climate Orbiter which cost about$125 million crashed. This was because the miscommunication of the right units used. |
| **Reflection & Remarks** |
| 1. Could I assist my learners in understanding the importance of standard units in physics?
2. Were my learners able to understand how changing units affect the measurement and interpretation of data?
3. Understanding and using the basic units in physics is fundamental for accurate measurement and communication in science.
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