|  |  |  |
| --- | --- | --- |
| **Lesson Number: 22.5** | | |
| **Lesson Title: Point charges** | | |
| **Specification Reference** | | **3.7.3.1, 3.7.3.2, 3.7.3.3** |
| **Learning Objectives** | | |
| For a charged sphere, charge may be considered to be at the centre.  Electric field strength.  Magnitude of *E* in a radial field given by  Magnitude of *V* in a radial field given by  Graphical representations of variations of *E* and *V* with *r*.  *V* related to *E* by  Δ*V* from the area under graph of *E* against *r*. | | |
| **Opportunities for Assessment** | | |
| Page 374 questions | | |
| **Starter:** | Slide #1 enables a thought experiment on why we can consider planets and stars to be point masses and hence whether the same simplification can be done to charges – As an extended discussion protons and even neutrons have been shown to have charge differences across then due to their quarks | |
| **Main:** | Slide# 2 extends the students understanding of electric field strength by combining with Coulomb’s Law  Slide #3 recaps vector usage – this could take a full lesson if puils have forgotten their work on mechanics! – Extend this.as a discussion on what would happen to objects initially moving as they entered the field (needed for the syllabus) – Make an analogy with gravity and projectile motion from Year 1 (AS)  Slides #4 and #5 show the differences between, and how to sketch, graphs for both field strength and potential against distance. The analogy between this and the gravity versions of them are important – knowing the difference between 1/*r* and 1/*r*2 is important here  Slide #6 shows how to use the area under a graph to find Δ*V* (i.e. work done per unit charge) – Students can get confused here and think they are finding the work done, and forget that it is per unit charge | |
| **Plenary:** | Slide #7 is a summary | |

|  |  |  |
| --- | --- | --- |
| **Homework:** | Page 374 questions | |
| **Differentiation / Extension / S&C** | | |
| Drawing and sketching graphs of different functions and comparing them | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Sketching graphs and finding the area under a graph | | None |
| **RESOURCES:** | | |
| Optional   * Use a Van de Graff generator to show how discharge is quicker with a point (pin) than with a ball | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| Van de Graff generator should not be used close to sensitive electronic equipment including mobile phones and pacemakers | | |
| **Working Scientifically (HSW)** | | |
| None | | |

Image on slide #1:

By Nein Arimasen (Own work) [GFDL (http://www.gnu.org/copyleft/fdl.html), CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0/) or CC BY-SA 2.5-2.0-1.0 (http://creativecommons.org/licenses/by-sa/2.5-2.0-1.0)], via Wikimedia Commons