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| **Lesson Number: 28.3** | | |
| **Lesson Title: Charge coupled devices** | | |
| **Specification Reference** | | **3.9.1.4** |
| **Learning Objectives** | | |
| Comparison of the eye and CCD as detectors in terms of quantum efficiency, resolution, and convenience of use.  No knowledge of the structure of the CCD is required. | | |
| **Opportunities for Assessment** | | |
| Calculations on the final slides; discussion on digital cameras and the CCDs | | |
| **Starter:** | Slide #1 enables a discussion about how cameras work | |
| **Main:** | Slides #2 - #4 go through how a CCD works including a link to an external website animation. Although the details of how the internal structure is not needed for the course a general idea of how they work is useful  Slide #5 is an essential list of the advantages of CCDs  Slide #6 explains quantum efficiency – Some calculations comparing eyesight to a CCD can be done here  Slides #7 = #10 go through a series of complex questions – The idea of using ratios in the final step is an essential skill in astrophysics and one the students should practice | |
| **Plenary:** | Slide #11 is a brief summary | |

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| **Homework:** | Research CCDs in digital cameras and telescopes | |
| **Differentiation / Extension / S&C** | | |
| The final question is a higher level skills question; discussion of CCDs and their design can be researched for students interested in the field | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Use of formulae and ratios | | Uses of cameras; Morality and legal issues regarding photographing people |
| **RESOURCES:** | | |
| None | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None | | |
| **Working Scientifically (HSW)** | | |
| Space telescopes and their CCDs | | |

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