



A-LEVEL PHYSICS

7408/3BA – Astrophysics
Report on the Examination

7408
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Overview

This was a typical cohort with a wide range of ability. Some students had a thorough knowledge and understanding of the whole option but others were more limited in their experience. There was a sense that some students had only been taught the material listed in the Advance Information, rather than using this as a focus for revision.

Comments on individual questions

Question 1

- 1.1 There were a few excellent diagrams which showed a good understanding. Unfortunately many students drew ray diagrams for a mirror, a simple case of not reading the question carefully.
- 1.2 There were many excellent diagrams for this question which students had learnt well. A common mistake was for the principal foci to be placed where the rays crossed rather than on the principal axis. Those students who scored less well appeared to be trying to reproduce a diagram they had seen but did not understand. The best way to teach this is to lead students through drawing the ray diagram.
- 1.3 A large proportion of students scored full marks on this question. Those who did not often just divided the length of the telescope by 750. This gives the same answer to 3 significant figures, but scored no marks.
- 1.4 Many students scored one or two marks on this question as they had a good knowledge of how a CCD works and the advantages it has over the naked eye. They rarely scored the third mark, however, as there was no attempt to link this knowledge to the situation in this question. A significant number of students did not seem to understand that the CCD was attached to the same telescope as was used with the naked eye.

Question 2

- 2.1 The majority of students scored one mark for understanding that one star blocked light from the other. A number of students were confused by the idea of a common centre of mass and wrote about a separate mass between the two stars. Very few students clearly stated that the deeper dips are caused by the cooler star passing in front of the hotter one.
- 2.2 Few students scored this mark. Many students seemed to think the laboratory value would be more accurate due to better equipment.
- 2.3 This calculation was often well done except that students did not use the average value as the denominator. There are other routes through this calculation which were given full credit.
- 2.4 This was generally well done. A surprising number of students could not correctly read the period from the graph, however.

- 2.5 A majority of students got this question right.
- 2.6 This proved to be a hard question. Very few students linked their knowledge of white dwarfs and neutron stars to the question.

Question 3

- 3.1 This question has appeared before so it is surprising how few students recalled that quasars were first discovered due to powerful radio emissions – even though there is no radio emission detected from many quasars.
- 3.2 A large majority of students scored full marks on this question. They were familiar with the equation and could manipulate it. Those who did not score full marks often converted distance between units incorrectly.
- 3.3 This question was also well done. It is a recurring problem that students have difficulty in clearly expressing that one magnitude is brighter than another. Examiners were flexible in accepting answers but students should be taught to use phrases like '*more negative*' to indicate '*brighter*'. Most students knew that the ratio depended on the difference in magnitudes but did not always work out the ratio correctly.
- 3.4 This was another calculation which was generally well done. Common mistakes included not including the mass of the sun in the calculation and using an incorrect equation for the volume of a sphere.

Question 4

Many students recognised that this was a black-body curve and correctly calculated the temperature from λ_{max} . When students went on to discuss CMBR in some detail they were half-way to a good mark. Unfortunately, many did not make a real effort to discuss the other predictions of the Big Bang theory. It was surprising that many students made no attempt at any calculation as this was requested explicitly in the question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.