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Examiners' Report Summer 2009

GCSE

GCSE Astronomy (1627)

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Paper 01

Overall Impressions

The examiners were very pleased with the style of the examination paper; it tested knowledge and understanding over the range of topics in the Specification, posed a wide range of tasks from simple multiple-choice selection to open-ended explanations. They felt that most of questions were accessible to candidates of all abilities and were pleased that there were relatively few items in the examination that were unanswered.

Several questions proved good discriminators. For example, questions 7(a) on Saturn's rings and 14(e) on meteor showers attracted a wide range of responses and marks.

The examiners formed the opinion candidates favoured the more structured questions in which some degree of guidance was given e.g. '**Give two reasons why**…' and '**State two differences between**…' as opposed to more open-ended tasks. This style of asking questions will continue to be used in future papers.

Although there seemed to be a slight improvement this year, the examiners were still disappointed with some candidates' inability to explain clearly. Vague answers that do not really relate to the question leave examiners thinking, perhaps incorrectly, that candidates are merely guessing. This was evident in 12(b) in which candidates were asked to state two differences between refractors and reflectors, and in 15(c) in which they were asked to describe how an astronomer might demonstrate that the shell of a planetary nebula is expanding.

Question 1

All parts of this question on astronomical distances and sizes were answered correctly by the vast majority of candidates.

Question 2

Most candidates found no difficulty identifying each planet from its description, the only exception being (c) for which a number of candidates were unable to match Venus to the statement.

Question 3

Responses to the two objective items were either both correct or random guesses. In (c), the examiners asked for human problems in manned spaceflight and expected responses related to the physical body or physiological problems. Responses such as 'They might run out of fuel' and 'The atmosphere would not be breathable' did not gain credit.

Question 4

This question on eclipses and lunar phases was well answered by the majority of candidates. The examiners were pleased with responses to (d) which asked candidates to state why we always see the same side of the Moon from Earth.

Question 5

Many candidates mis-read (b) and gave Kepler as the incorrect response. Newton was the first to use mathematics to explain Kepler's laws.

Responses to (c) and (d) were sometimes vague. Some candidates were not aware that both Ceres and Pluto are now classified as dwarf planets.

Question 6

This question on observing various astronomical objects was answered well by most candidates. There were some accurate sketches of Cassiopeia in (d).

Question 7

Responses to part (a) on Saturn's rings showed that most candidates are aware of their nature and composition, but only a small number were able to score all 3 marks by mentioning for example the Cassini Division or the existence of shepherd moons in the system.

Part (b)(ii) was more demanding and the examiners were surprised that only a few candidates related the position of Saturn to the fact that it would be visible for most of the night.

Question 8

This fairly standard question on magnitudes did not pose many problems, but part (c) invited candidates to extend their knowledge of magnitudes beyond the normal scale, to which many responded well.

Question 9

There was a range of answers to question 9 on stellar co-ordinates and the ecliptic. In (d), that asked candidates to state an approximate latitude from which a certain star could be observed overhead, it was important that 'south' was somehow indicated since the star had a declination of -5 degrees.

Question 10

The three parts of this question about colour were quite demanding and required candidates to use more scientific terminology than in previous questions. Candidates responded well and were able to use terms like 'scattering' and 'refraction' to good effect. A surprising number of candidates thought incorrectly that the red/copper

colour of the Moon during a lunar eclipse was due to light reflected onto the Moon from Mars!

Question 11

Responses to this question about observing the Sun were also pleasing. It should be pointed out however that if 2 marks are available for an item, these can not be gained for stating just one fact. In (a), candidates were asked to explain why it is dangerous to observe the Sun directly. Responses such as 'You would damage your eyes' need to be backed by a statement such as 'because the Sun is so bright' to gain both marks.

Question 12

There were some clear, well written responses to (a) that clearly distinguished between the problems and benefits of observing with the Hubble Space telescope. Only a handful of candidates believed incorrectly that the telescope is used to observe Earth!

Responses to part (b) were less convincing and it appears that many candidates are unaware of the relative structures and uses of refracting and reflecting telescopes.

Question 13

This question on asteroids attracted some pleasing responses and most candidates scored high marks.

Question 14

In part (a), the Kuiper Belt was often confused with the main Asteroid Belt, and in (b), some candidates failed to draw convincing ellipses. The rest of this question was, however, well-answered and the examiners were particularly pleased with candidates' explanations of the connection between meteor showers and short-period comets.

Question 15

This was quite a demanding question and a change from questions that merely ask candidates to describe the evolution of a star. Many responses to part (c) were not very convincing; the examiners had hoped that candidates would relate the expansion of the nebula to Doppler shifts of spectral lines. Responses such as 'the astronomer would blow up a balloon to demonstrate the expansion' failed to score marks.

Responses to (d) were generally disappointing and often not attempted.

Question 16

There were some pleasing responses to (a), in particular (iii) in which candidates wee asked to sketch the position of the Plough six hours later. Part (b) proved more demanding and few candidates rotated this asterism by 180 degrees. Responses to (c) were pleasing and many candidates showed an awareness of the relative location of the planets in the night sky, but (d) proved more difficult; only a few candidates were able to relate the 'invisibility' of Orion to the fact that it is a seasonal constellation and the Earth's position in its solar orbit brings Orion 'behind the Sun' in June.

Question 17

Part (a) on observing Betelgeuse attracted some convincing answers, but explanations on the need for time zones in (b) were generally vague and disappointing.

Question 18

This question was a good discriminator. There were some very pleasing responses to both parts of the question, but a significant number of candidates wrote down random answers (particularly for astronomical discoveries using radio telescopes).

Question 19

Part (a) was fairly straightforward and correctly answered by most candidates.

In part (b) most candidates spotted the distance unit of megaparsecs and not parsecs, but then used a distance of 1 Mpc (not 10 Mpc) in their calculation.

Question 20

This was very demanding and was a mathematic question requiring a good deal of thought as opposed to using an equation.

In (b) candidates who knew that 1 pc = 3.26 light years were given credit in calculating the time taken for light to reach us from the Orion Nebula. Although the examiners ignored ridiculous numbers of significant figures in numerical answers, they were more strict on the correct unit of years and not light years given in the answer.

Paper 02 Coursework

As in previous years, the Moderators were impressed with the high standard of practical work submitted. In particular, this year showed a welcome increase in the range of project titles being attempted by students

Once again it is necessary to caution centres against the desire to extend significantly the range of project titles available to students. The need to meet the assessment objectives of this part of the examination remains the paramount factor in this respect. Centres are strongly advised to guide students towards the list of tried and tested project titles available in the Specification. Where a student is keen to complete a slightly different project title, centres **must** obtain confirmation of the suitability of the title from Edexcel **before** the student starts work.

The accuracy of marking, particularly from centres experienced in preparing candidates for this qualification was generally good, although a number of centres would benefit from looking closely at the exemplar pieces of marked work in the Coursework Guide when assessing the quality of students' observational work. Nevertheless, the majority of the sizeable number of new centres entering students for this qualification this year showed a good understanding of the standards required.

As in previous years, the use of PowerPoint slides to present information for one of the Graphical projects continues to result in generally poor marks for students. Centres should be aware that, in general, a linear sequence of text and images on an astronomical topic does not allow students access to the higher marks for Graphical work. In only a handful of examples did students use the capabilities of this program as the most effective way to present astronomical information. For example, one student produced an interconnected network of slides which allowed the user to explore the various evolutionary paths for stars of differing masses, thus allowing themselves access to the higher marks for Graphical work.

The use of digital photography has now almost completely removed the need to send any large Graphical or Constructional items to the Moderator, with some centres entering all their work as a series of carefully labelled photographs/scans on a single CD. This improves the smoothness of the moderation process considerably and ensures that centres do not incur the now very substantial charges involved in unnecessarily sending items larger than A4 in size.

Unfortunately, a small number of centres were not able to provide their sample of coursework in time for the published deadline. In so doing, they unfairly put the prompt publication of their candidates' results at risk.

Grade Boundaries

The subject is graded out of a maximum of 160 subject marks.

	A*	A	B	C	D	E	F	G
Mark/160	124	104	84	64	54	45	36	27

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