



**General Certificate of Secondary
Education**

Physics 4451

PHY3F Unit Physics 3

Report on the Examination

2012 Examination – January series

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PHYSICS

FOUNDATION TIER PHY3F January 2012

General

Questions 1 to 6 were low demand targeting grades E, F and G. Questions 7 and 8 were standard demand targeting grades C and D.

The majority of candidates attempted most parts of all questions. However there were six items which were omitted by more than 6% of candidates including three from question 8. One of these was omitted by nearly 10% of candidates.

Once again there were a number of candidates whose standard of handwriting was so poor as to be almost illegible and others whose writing was so small or so faint that it was almost impossible to read.

Once again there was evidence that a number of candidates did not have access to a calculator.

Candidates should make sure that they read the questions carefully. Many candidates have lost marks by not doing so for example parts of questions 6, 7 and 8.

Question 1 – low demand.

- (a) Nearly 72% of candidates achieved full marks for completing the periscope diagram, although 9% of candidates were completely wrong. Pupils without rulers did find this item more challenging.
- (b) Few candidates actually thought about the size of an image in a plane mirror and most answered the question in terms of their own rather inaccurate diagrams. Only 31% of candidates answered correctly.

Question 2 – low demand.

- (a) Most candidates were able to list the items in the correct order. The most common error was to put the universe in the wrong place.
- (b) Most candidates (93%) correctly described the state of the forces in the Sun.
- (c)(i) Less than 50% of candidates could describe a supernova.
- (c)(ii) Only 15% of candidates could explain why the Sun will not go through the supernova stage while Mira will. Many candidates described the relative sizes of the two stars incorrectly and a number of candidates stated that the Sun had already gone through the supernova stage. Nearly 8% of candidates did not attempt this part question.

Question 3 – low demand.

- (a)(i) The calculation was well done with 92% of candidates achieving full marks.
- (a)(ii) Just over 85% of candidates were able to identify the correct units for a moment from the list.

- (b) Not many candidates gained both marks for this question, mainly because they did not give a full explanation. A significant number of candidates lost marks by using careless terminology, with a considerable number of references to ‘centrifugal force’, ‘pressure’, ‘leverage’, and a few of ‘momentum’ and/or ‘weight’.

Question 4 – low demand.

- (a)(i) Just over 72% of candidates recognised which two traces had the same amplitude.
- (a)(ii) Nearly 83% of candidates knew which trace represented the loudest sound.
- (a)(iii) A large number of candidates incorrectly identified the ultrasound as trace M with the reason ‘because it can’t be heard’. Of the 53% of candidates who correctly identified trace L many went on to describe characteristics of ultrasound rather than relating their answer to the traces shown in the question and therefore failed to gain the second mark.
- (b) This question was well answered with 69% of candidates gaining both marks. Only 8.5% of candidates failed to score at least one mark.

Question 5 – low demand.

- (a)(i) Nearly 62% of candidates knew that the diagram showed a converging lens.
- (a)(ii) Those candidates able to read the diagram found that the calculation very simple. However a significant proportion of candidates multiplied their two numbers rather than divide them and therefore gained no marks, this was despite being given the equation.
- (b) Although the information required was provided in the diagram, only 58% of candidates correctly identified the effect on the image of moving the object closer to the lens.

Question 6 – low demand.

- (a)(i) Most candidates realised how the needle of the meter would move under the circumstances described although 20% of candidates scored zero.
- (a)(ii) There were some very good answers to this question but many candidates had clearly not read the question correctly and wrote about vibrations while other candidates did not realise what the meter was actually measuring.
- (b) Although 80% of candidates knew what sort of vibrations the instrument would detect only 27% of these could give an acceptable explanation.

Question 7 – standard demand.

- (a) Transformers again posed considerable problems; it was extremely disappointing that only 16% of candidates could explain why aluminium is not used for the core. Many candidates answered the question in terms of electrical conduction while others explained why iron is used rather than why aluminium is not used.
- (b)(i) Less than half the candidates could look at the graph and say what range of values had been used by the experimenters.

- (b)(ii) Nearly 80% of candidates could give the reason why one data point had been omitted from the line of best fit. Few candidates could spell anomalous correctly. Many candidates gained the mark by using simpler words to correctly describe what they meant.
- (b)(iii) As with the two earlier parts of 7(b) this part question related to the graph. However many candidates tried to answer by looking at the earlier diagram.
- (c) The answers to this part question were very disappointing, ‘the radio blowing up’ being a much more common answer than simply reducing the voltage which only approximately 19% of candidates wrote.

Question 8 – standard demand.

- (a)(i) Once again questions on the solar system and stars proved problematic. Only 41% of candidates could describe the orbit correctly.
- (a)(ii) Nearly 80% of candidates knew that the gravitational force provides the centripetal force.
- (a)(iii) Surprisingly only 57% of candidates could correctly draw an arrow to show the direction of the force acting on the planet. This was another example of a part question where the lack of a ruler caused difficulties.
- (a)(iv) Just over 50% of candidates scored at least one mark. Many candidates did not gain any credit due to giving vague answers such as ‘the size of the planet/Sun’.
- (b)(i) This part question was well answered, with 67% of candidates able to use the given data correctly.
- (b)(ii) Many candidates struggled to answer this part question about the discovery of Ceres. Most were side-tracked by the comment that it is no longer regarded as a planet.
- (b)(iii) Only 12% of candidates could suggest why a new version of Bode’s law might be needed.

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