



**General Certificate of Secondary Education**

**Separate Science Physics 4451**

**PHY3F Unit Physics 3**

**Report on the Examination**

*2008 examination - January series*

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*Dr Michael Cresswell Director General.*

## **Physics**

### **Foundation Tier PHY3F**

#### **General**

Many candidates had been entered for, what was for them, the more appropriate tier.

However, for the future, centres should note that it is in the best interests of their candidates that they are not entered for the Higher Tier paper unless this choice is justified. This needs to be in terms of the particular candidate's general ability and his or her scientific knowledge and understanding of the whole of the content of the Physics 3 Unit, including those parts identified as only for the High Tier. Candidates who are inappropriately entered will be faced with a paper which may not be matched to their abilities and which may not allow them to demonstrate adequately what they know, understand and can do.

Most candidates did well on the How Science Works aspects of the unit but showed a relatively poor understanding of the more traditional Physics content.

In answering questions that involved calculations, some failed to secure a mark, which they may otherwise have gained, by not setting down their method of working or paying attention to the appropriate unit.

In parts that involved extended writing, some candidates were hindered by lack of knowledge and understanding combined with poor expression and inadequate knowledge of the correct scientific terminology.

**Question 1 (Low demand)**

- 1(a) This question was well-answered with the great majority of candidates placing the centre of mass at the point where the axes of symmetry cross.
- 1(b)(i) A majority of candidates were able to identify the centre of the tyre as the location of  
and 1(b)(ii) the centre of mass, though those who did were generally unable to offer an appropriate explanation.  
Some candidates erroneously stated that an object with an empty space in the middle does not have a centre of mass.

**Question 2 (Low demand)**

- 2(a)(i) The incident ray was usually correctly identified. However, most candidates did not seem to know how to show an angle of reflection.
- 2(a)(ii) Most candidates did not know that, in this diagram, the dashed line is the normal.
- 2(b) Almost all candidates correctly identified the plane mirror but the other two mirrors were often confused.

**Question 3 (Low Demand)**

- 3(a) Most candidates correctly selected 'tension'.
- 3(b)(i) More candidates chose the incorrect response 'the string is made longer' than candidates who chose the correct response 'the speed of the ball is increased'.
- 3(b)(ii) Only a small minority of candidates correctly associated 'acceleration' with a change in direction.
- 3(c) A large majority of candidates correctly selected 'centripetal'.

**Question 4 (Low Demand)**

- 4(a)(i) A large majority of candidates correctly selected 'more than'.
- 4(a)(ii) The correct response 'less than' was the most popular response by a narrow margin.
- 4(b) Only a small minority of candidates offered two correct features of a geostationary orbit such as that it is above the equator, takes 24 hours to orbit the Earth, remains above the same point or appears to stay in the same place.
- 4(c) Few candidates chose the correct answer 'low polar'.

**Question 5 (Low Demand)**

- 5(a) Most candidates nominated Venus but Mercury was also credited because the alternative interpretation of the data gives Mercury as the 'odd one out'.
- 5(b) Most candidates correctly estimated a value in the range  $-75\text{ }(^{\circ}\text{C})$  to  $-150\text{ }(^{\circ}\text{C})$  inclusive, though the mark was sometimes lost because the minus sign was omitted.
- 5(c) Most candidates were able to complete a correct response usually ...increases and ... increases or sometimes ...decreases and ...decreases.
- 5(d) The overwhelming majority of candidates chose the correct response; that today's scientists have new evidence about Mars.

**Question 6 (Low Demand)**

- 6(a) Most candidates chose 'increase the current' or a correct way of doing this, such as to increase the p.d. or increase the number of cells, and some also suggested 'have a stronger magnet'. However writing 'have a bigger magnet' did not gain credit as a bigger magnet would not necessarily be stronger and the poles could be further from the conductor.
- 6(b) Some candidates correctly suggested that the battery would need to be connected the other way round or that the magnet would need to be put the other way round. However some answers were so poorly expressed that it was impossible to be reasonably sure what was being suggested.
- 6(c) Few candidates knew that there would be no force on the conductor when the conductor is parallel to the magnetic field or, put another way, when the lines of magnetic force and the path of the electricity do not cross.

**Question 7 (Low Demand)**

- 7(a) Usually the lens was incorrectly identified as a diverging or concave lens rather than as a converging or convex lens.
- 7(b) Only about a quarter of candidates recognised that the point is a principal focus or a (focal) point.
- 7(c) More able candidates were able to take appropriate values from the diagram and to calculate the magnification.
- 7(d) A very small minority of candidates gained the mark because they stated that the image could be put on a screen. No one referred to a correct diagram and stated that the image is real because it is formed where real rays cross.

**Question 8 (Standard Demand)**

- 8(a) Only about a quarter of candidates knew that a turning effect is a 'moment'. There were many responses which appeared to be guesses involving other terms used in Physics.
- 8(b) Many candidates obtained one mark for '400' but few took account of the units and so the correct response '4 (Nm)' was infrequently seen.
- 8(c) Most candidates knew that increasing the force and/or using a longer spanner could increase the turning effect.

**Question 9 (Standard Demand)**

- 9(a) A majority of candidates knew that sound waves are caused by vibrations.
- 9(b) The great majority of candidates correctly identified graph K.
- 9(c)(i) Many candidates correctly showed reflection at the surface towards microphone X and, by eye, the angle of incidence appeared to equal the angle of reflection. However some candidates did not gain a second possible mark as they failed to indicate the direction with an arrow.
- 9(c)(ii) About half the candidates were able to give an appropriate reason such as 'to keep the other conditions the same'. However those who just offered 'so it's a fair test' did not gain credit.
- 9(c)(iii)[A & B] Most candidates correctly identified 'wood'. However only about a quarter of candidates were able to translate the data into a proportion and many just suggested 15 (arbitrary units).
- 9(d) The great majority of candidates were able to gain a mark for a practical suggestion but many just went on to 'repeat the question' by way of explanation. For example, '...and this will reduce the transmitted noise' rather than, for example, '...and more of the sound will be absorbed/reflected back'.

**Mark ranges and award of grades**

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA website: