edexcel

Examiners' Report

Summer 2014

Pearson Edexcel GCE in Mechanics 4R (6680/01R)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2014
Publications Code UA039504

Mathematics Unit Mechanics 4

Specification 6680/01R

General Introduction

The students demonstrated a good understanding of all sections of the specification. They found this paper accessible, with the majority of them offering responses to all parts of all questions.

Much of the work was clearly set out and of a high standard. In many instances, taking the time to draw a clear diagram was the key to a successful outcome. It is apparent that some students are using their calculators for basic processes such as solving equations. They need to be aware of the risk that they take by showing no working - one small slip in deriving the equation can cause them to lose all subsequent marks if they have not demonstrated a clear method in their working.

Report on Individual Questions

Question 1

All students understood that they needed to start by considering the motion parallel and perpendicular to the plane. In forming the equation for the impulse, some solutions did not take account of the change in direction of the motion perpendicular to the plane due to the impact. Using the initial equations to form an expression for I in terms of m, u and e proved to be quite challenging, with most students making some progress but only a few reaching the correct conclusion.

Question 2

There were several fully correct solutions to this question. The majority of errors were due to premature rounding in the course of the work, or slips, but a few students missed the essential starting point of a correct vector triangle with $\boldsymbol{v}$ perpendicular to the relative velocity in Q02(a), and did not have a correct vector triangle in Q02(b).

Question 3

Although they were given no guidance on how to start, the students showed a good understanding of the topic by forming the correct differential equation in v and x and attempting to solve it. Although the integration is relatively straightforward, the direct approach did require the student to recognise that they were starting with a top-heavy fraction in v, which needed to be split before integrating. This was where the majority of errors occurred.

Question 4

Those students who started with a clear diagram showing the velocities of both spheres before and after the collision worked through Q04(a) with few problems other than algebraic slips. They all understood that if T was at rest before the collision then it would move along the line of centres.

Q04(b) required the students to recognise that the largest value of δ occurs when θ has the largest possible value. The majority of students made little progress with this part.

Question 5

A small number of students tackled Q05(b) of this question first, and then went back to work on Q05(a). In fact Q05(a) was relatively straightforward, and most students worked through it correctly.

In Q05(b) the method was well understood, but there were some slips in the algebra and the arithmetic, and at the very end some students gave no evidence in support of their conclusion. It is not sufficient to state $\frac{\mathrm{d}^2y}{\mathrm{d}\theta^2} > 0$ without showing an expression for the derivative which takes account of the constant factor $4mgl$, and clearly satisfies $\frac{\mathrm{d}^2y}{\mathrm{d}\theta^2} > 0$.

Question 6

In Q06(a) most students were able to use the information given to derive the required differential equation in x and t.

In Q06 (b) apart from a small number of slips in the algebra and arithmetic, the students demonstrated a good understanding of how to solve the differential equation, and most reached a correct conclusion.

In Q06 (c) with only a small number of exceptions, the students understood that the greatest value of x occurs when $\dot{x} = 0$ and gave a correct solution, often in exact form.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE