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Combined Science (Physics)

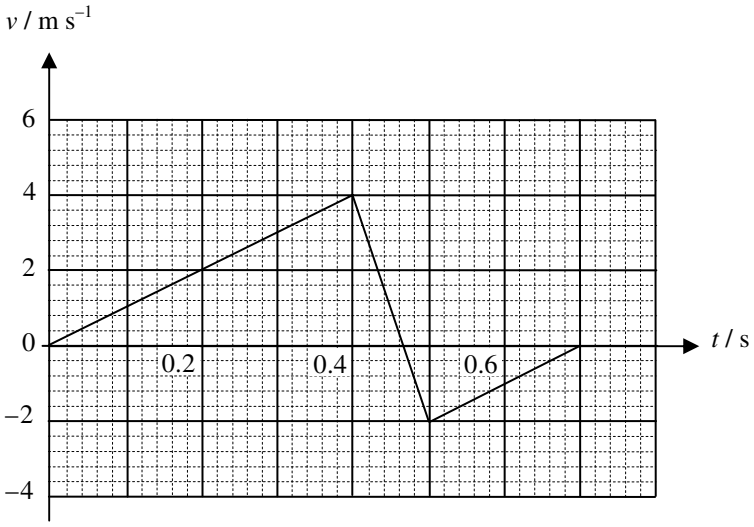
Report on Student Performance in the Practice Papers

Most questions in the Combined Science (Physics) paper, both Sections A and B, were extracted from the relevant sections of Physics Paper 1, with appropriate modifications. In view of the fact that the question types and the skills to be tested were largely the same in both the Physics papers and the Combined Science (Physics) paper, no piloting of the Combined Science (Physics) paper had been conducted. Nevertheless, the following observations and report on student performance in the Physics practice papers would be equally useful to students taking Combined Science (Physics). Readers are advised to study this report together with the selected samples of students' work from the piloting of the Physics practice papers so that they can gain a better understanding of the anticipated high, mid and low performance levels of students in the Combined Science (Physics) practice paper.

Section A (multiple-choice questions)

Section A consisted of 24 questions. Students' performance in the following items helps illustrate some of their misconceptions:

1 Q10



A ball of mass 0.2 kg is released from rest. It hits the ground and rebounds. The velocity-time graph of the ball is shown above. Which of the following statements are correct ?

(1) The magnitude of the change in momentum of the ball during the collision is 1.2 kg m s^{-1}.
(2) The magnitude of the average force acting on the ball by the ground during the collision is 12 N.
(3) There is mechanical energy loss during the collision.

A.	(1) and (2) only	(15%)
B.*	(1) and (3) only	(21%)
C.	(2) and (3) only	(27%)
D.	(1), (2) and (3)	(37%)

When considering the force acting on the ball by the ground during the collision, only 20% of the students considered the weight of the ball and correctly ruled out statement (2).

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2 Q19 Two metal rods, *X* and *Y*, of uniform cross-sectional area are made of the same material and ha
same volume. The length and resistance of *X* are *l* and *R* respectively. What is the resistance of
it has a length of 2*l* ?

A. *R*/4 (4%)
B. *R*/2 (13%)
C. 2*R* (64%)
D.* 4*R* (19%)

64% of the students wrongly chose option C; they had probably overlooked the difference in the cross-sectional areas between wires *X* and *Y*.

Section B (conventional questions)

Section B consists of 9 compulsory questions. The performance of students in the relevant items in Physics Paper 1 Section B is shown in the table below:

Question Number	Performance in General
1	Generally well answered. In part (a)(ii), some students just answered "reduce heat loss to the surroundings" without pointing out the means of heat transfer. In part (a)(iii), some students tried to explain how the direction of oil circulation helps to heat the water.
2	Many students forgot to include the weight of the parcel in the calculations in part (a). Part (b) was generally well answered. In part (d), many students did not mention the parcel rises first after the string breaks.
3	In part (a), some students tried to find the speed of ball *X* by using the conservation of energy. In part (c), some students mistook the horizontal speed of ball *Y* to be the initial speed in vertical motion. In part (d), many students were unable to explain why the time of flight of ball *Y* remains unchanged.
4	This question was generally well answered. In part (a), some students made a mistake in the unit. In part (b), some students failed to calculate the path difference in terms of wavelength.
5	Students used many different ways to describe the situation at critical angle. This shows that they have a good understanding of the phenomenon. While most students were able to describe the major steps of the experiment, they failed to mention the important details. Only a few students mentioned that the centres of the glass block and the protractor should coincide and few described how the light ray should be directed (towards the centre through the curved side).
6	Part (a) was generally well answered. Most students adhered to the conventions in drawing ray diagrams. In part (b), many students failed to explain why the focal length becomes longer when the refractive index of the liquid decreases.
7	Parts (a) and (b) are generally well answered. In part (c), many students failed to see that the current would double when one more identical parallel branch was connected, and they produced lengthy calculations to determine the new current.
8	The general performances of parts (a) and (b) were fair, though their mistakes revealed that students did not read the question carefully. For example, students just added forces in Figure 8.1 instead of drawing a free body diagram as required. And in part (b)(ii), some students used 0.07 kg, instead of 0.07 g, in their calculations. Part (c) revealed some of the misconceptions of the students about a parallel-plate system. Some students suggested angle θ would remain the same when the plates' separation was adjusted, and some suggested the ball would swing if the electric field was non-uniform.

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Question Number	Performance in General
9	In part (a), many students did not relate their answers to electromagnetic induction at all. Few students were able to explain the induced e.m.f. by a *change* of magnetic field. In part (b), most students pointed out that the secondary coil had a large number of turns, but failed to compare it to the primary coil. In part (c), while many students knew that the resistance of a thick wire is small, they failed to point out why this is important for the primary coil.

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