

# PHYSICAL SCIENCE HIGHER GRADE PAPER 1

## GENERAL COMMENTS

1. Candidates were penalised for the use of incorrect / unacceptable SYMBOLS and UNITS

QUANTITY	Acceptable Symbol	Unacceptable Symbol	unit	Not recommended unit	Unacceptable unit
displacement	s	d (distance)	m	-	-
velocity	v	s (speed)	m.s <sup>-1</sup>	m/s	ms <sup>-1</sup>
acceleration	a	v	m.s <sup>-2</sup>	m/s <sup>2</sup>	ms <sup>-2</sup>
weight	F <sub>g</sub>	W or E	N	kg.m.s <sup>-2</sup> or kg/m/s <sup>2</sup>	
electrostatic force	F <sub>E</sub>		N.C <sup>-1</sup> or V.m <sup>-1</sup>	F only or N/C or V/m	
energy	E <sub>P</sub> or E <sub>K</sub> or E <sub>whatever</sub>		J	W unless equated to a work done equation	N.s or kg.m <sup>2</sup> .s <sup>-2</sup>
work done	W	Anything else	J		N.s or kg.m <sup>2</sup> .s <sup>-2</sup>

1. Instruction 3 on the Question Paper (Page 9):  
“Show ALL the formulae, as well as the calculations, including substitution.”

Some candidates

- ❖ Wrote down the formula and the answer ONLY → No marks given for substitution.
- ❖ Showed substitution and answer WITHOUT formula → Lost ALL marks.

2. The use of “uniform motion” and / or “unbalanced forces” was penalised.

## SPECIFIC COMMENTS

### QUESTION 2

- 2.1 Point P was required and not a box to represent point P.
- 2.2 The majority of candidates solved for the “force exerted in rope **S**” (which **points to the right**) without first solving for the “horizontal component of the force in rope **R**” (which **points to the left**).
- 2.3 A small minority of learners realised that “the vertical component remains constant “ is an important part of the explanation.

### QUESTION 3

- 3.1 , 3.2 and 3.3 were satisfactorily answered.
- 3.4 A number of candidates assumed, incorrectly, that the motorcycle accelerated from 10 seconds to 15 seconds. It accelerated from 0 to 10 seconds and then travelled at constant velocity from 10 seconds to 15 seconds.

### QUESTION 4

- 4.2 “v” and “u” were swapped in their substitution. This then gave a positive acceleration (which would never bring the lift to rest).
- 4.3 Many candidates either gave “ $F_{res} = ma = 2\,700\text{ N}$ ” as the answer OR had no idea how to correctly manipulate the formula. The interpretation of the direction and the insertion of the correct sign that then goes with “a” and “g” was problematic.

## QUESTION 5

- 5.3 **Uniform motion** is not acceptable in the definition as this could imply “uniform acceleration” instead of the intended meaning of “uniform velocity”.

## QUESTION 6

6.1 + 6.2 Well done

- 6.3 Many failed to understand the fact that the spring had stored potential energy which was transferred to the trolley.

## QUESTION 7

- 7.1 Many candidates stated “Conservation of energy” and therefore were penalised at least two (2) marks.

7.2 + 7.3 Well done

## QUESTION 8

- 8.1  $F_{up}$  &  $F_{down}$  OR  $F_E$  &  $F_g$  OR **electric field & gravity** were not accepted as LABELS for the two forces. It is intended that learners give proper labels for such (or any other) forces.

- 8.3 This question was marked very strictly. It seems that candidates lacked attention to detail.
- ❖ Lines drawn free-hand
  - ❖ Field lines touched especially with end-effects.

- 8.4 Generally well answered, except that too many HG candidates cannot distinguish between W (weight) and W (work done). ∴ the formula  $mg = QEs$  was used repeatedly. Units are still a problem –  $NmC^{-1}$  instead of V.

- 8.5 Many used  $\frac{Q_1 + Q_2}{2}$  instead of  $Q_1 + Q_2$  - showing a lack of conceptual understanding of Millikan's Experiment.

- 8.6 Too many candidates divided by  $1,6 \times 10^{-19} \text{ C}$  (charge of proton) instead of  $-1,6 \times 10^{-19} \text{ C}$  (charge of electron).

## QUESTION 9

- 9.1 Many candidates omitted to mention that PD across  $L_2 = \text{PD across } L_3 + L_4$ .

- 9.2 Well handled except that many candidates divided by 4,5 or 3 instead of 1,5 showing that they did not fully understand question 9.1 or Ohm's Law.

- 9.3 While generally well handled, candidates made mistakes regarding notation. Special attention needs to be devoted to this aspect of work since candidates lose a lot of marks for work they know but do not transcribe correctly.

- 9.4 Extremely poorly done – showed a lot of guesswork.

## QUESTION 10

- 10.1 The definition of “alternating current” will have to be learnt completely and consolidated.

10.2.1 + 10.2.2      Generally well done – although many candidates failed to change from minutes to seconds.