

Many candidates are losing marks unnecessarily by not doing the following when answering a question:

- 1 Starting the calculation with the correct equation
- 2 Supplying the correct SI unit in the final answer
- 3 Showing substitution into the correct equation

A question-by-question analysis follows:

### **QUESTION 1**

Candidates answered this question poorly.

### **QUESTION 2**

This question was poorly answered.

- 2.1 Candidates struggled with trig ratios.
- 2.2 Candidates answered this question poorly.
- 2.3 Candidates struggled with trig ratios.
- 2.4 Candidates found it difficult to resolve forces into horizontal and vertical components.

### **QUESTION 3**

The following equations were not accepted:

- $u = \frac{s}{t}$        $a = \frac{v}{t}$        $\Delta t = -5 \text{ s}$

- 3.1 This was well answered. Pay attention to the equation  $v = \frac{\Delta s}{\Delta t}$
- 3.2 Candidates had difficulty finding  $\Delta t$ .  
Candidates could not interpret a negative acceleration.  
Candidates swapped  $u$  and  $v$  when calculating the acceleration.
- 3.3 Candidates end with a negative acceleration in 3.2 and the substitute a positive acceleration  
in 3.3.  
That is incorrect.
- 3.4 The graph was poorly answered.  
Velocity vs time graphs (constant acceleration) cannot have curves. They can only be straight lines.

### **QUESTION 4**

$s = \frac{1}{2} at^2$  is not an acceptable equation. Candidates using this will be penalized in future.

- 4.1 This question was well answered. The following must be brought to the attention of the future candidates:
  - $s$  and  $a(g)$  must have the same sign.

- If  $u = 0 \text{ m.s}^{-1}$  (as in this case), then substitution must be shown.
- The unit for time is s, and not sec.
- The symbol for time is t, and not T.

4.2 This question was well answered.

- If u is asked and v is unknown, an equation containing u and v cannot be used.

### **QUESTION 5**

This question was poorly answered.

5.1 Candidates struggle to label forces. A label is not a symbol. If the label is tension then the symbol is T.

The label Tension is acceptable but the symbol T is not acceptable (exception to the rule this year).

The symbol W for weight is not acceptable.

5.2.1 The masses of the two different objects must not be added.

- The weight of cart C and wood W cannot be used to solve this question.
- Many candidates calculated the vertical component of the rope which could not be used to answer the question.

### **QUESTION 6**

This question was generally well answered.

6.1 In the definition of Newton's Law of Universal Gravitation, "... the distance between their Centres" is very important.

6.2 Many candidates did not complete the subscripts.

$\frac{GM_E M_S}{x^2}$  is not equal to mg.

### **QUESTION 7**

This question was generally well answered

7.1 The rate of change of momentum is not the definition for impulse.

Candidates defined impulse as "how long or how hard a force is acting". This was not accepted.

7.2 Candidates cannot interpret a negative answer for impulse.

7.3 Candidates tended not to write down the equation.

### **QUESTION 8**

This question was poorly answered by the majority of candidates.

8.1 Candidates must be informed to refrain from using West or East to indicate direction when no reference points are given.

8.2 The use of the word "mechanical" is important in the law *The conservation of mechanical energy*.

8.2.1 Candidates were penalised if they did not indicate that the  $E_p$  at the bottom and the  $E_k$  at the top were zero.

## QUESTION 9

9.1 Electrical field patterns were meant to be bookwork. However, many candidates couldn't draw the **shape** produced by a positive and a negative charge, correctly and neatly. They usually got  $2/4$  or  $3/4$ .

9.2 Generally well answered, However some of the problems were the following:

- ❖ Conversion of r from mm to m
- ❖ Squaring of r in the substitution step
- ❖ Not indicating the direction of the electrostatic force correctly
- ❖ Leaving out unit in the final answer
- ❖ Some wrote  $E = \frac{kQ}{r^2}$  instead of  $F = \frac{kQ_1Q_2}{r^2}$  and scored no marks for this.

9.3

- ❖ Many candidates did not show the complete substitution, they simply wrote the answer down and were penalised one mark.
- ❖ Calculators were not set on scientific notation and rounded off their answer to  $-1 \times 10^{-9}$  C instead of  $-1,5 \times 10^{-9}$  C. This was regarded as an incorrect answer and candidates were penalised.
- ❖ Labelling of forces was once again an issue: W for weight, T for tension, thread and  $F_{\text{repulsion}}$  were regarded as incomplete labels and therefore regarded as incorrect labels. *Labelling of forces should indicate the object that causes or produces the force and on what it is acting* e.g.  $F_{\text{earth on object}}$  instead of weight,  $F_{Y \text{ on } X}$  or  $F_{\text{electrostatic}}$  instead of simply  $F_{\text{repulsion}}$ .
- ❖ Many candidates did not indicate the direction of the arrows and were penalised.

9.4 Satisfactorily answered. Candidates must give answers and should be taught to convert answers on the calculator to scientific notation.

## QUESTION 10

General comments:

- ❖ Candidates do not know and do not apply basic current principles (Q 10.2 – that potential difference divides across resistors in series, but is the same across parallel resistors. They also do not know that current divides through resistors connected in parallel and is the same for resistors connected in series. They also need to be exposed to different ways of representing parallel resistor).
- ❖ Approximately 25% of candidates did not follow instruction 3 on the question paper (Show ALL formulae, etc.) and/or did not write units in their final answer. These candidates were penalised.
- ❖ Electrical symbols that were problematic:

### **Incorrect interpretation**

#### **Accepted Symbols**

PD / PV

Potential difference / potensiële verskil

$V_{\text{ext. cir}}$

E

Emf

Emf

Q  
(heat) energy  
energy transferred in resistor  
W for energy transferred

V V  
Verlore volts  
 $V_{\text{lost}}$

T  
Time  
T

Amps  
Ampere  
A

R  
Internal resistance  
R

- 10.1 The representation of the circuit diagram was similar to that of November 2003, yet many candidates could not interpret the diagram appropriately. Therefore this question was not very well answered, considering it is a Level B on the Levels of Complexity.
- 10.2 Generally very poorly answered. Although they may have calculated the current through the  $16 \Omega$  resistor, they did not add this 10.1 in order to determine  $I_{\text{circuit}}$ .
- 10.3 Calculations of the unknown resistor R was poorly done. They usually calculated the  $R_{\text{ext. cir}}$  and believe it to be the resistance of R.
- 10.4 Except for the incorrect use of E as the symbol of emf, this question was well answered. However, those who made errors could not distinguish between the answers to 10.1 or 10.2 that needed to be substituted.
- 10.5 When the formula  $W = VIt$  or  $W = \frac{V^2 t}{R}$  was used, the majority of the candidates substituted 20 V for V.
- 10.6 Generally satisfactorily answered.