Physical Science SG P 1 **November 2007**

Candidates lost marks by not doing following:

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

A detailed analysis of the answered questions follows below.

Question 1

Candidates had difficulty interpreting the following questions.

1.4
1.7
1.15

Question 2

2.1 Based on a poor understanding of the law, many candidates stated the converse of the Triangle Rule of Forces in Equilibrium, instead of the rule itself.
e.g. If three sides of a triangle are drawn in order, then the forces are in equilibrium.

2.2 Poorly answered. Candidates simply redrew the sketch instead of applying the triangle rule.
Those who drew the triangle of forces had difficulty in identifying the angles opposite the correct sides.

2.3 In spite of the given diagram, students had difficulty drawing the triangle of forces
The following were areas of concern:
- Using a scale
- Forces drawn without arrows
- Orientation of the triangle of forces
- Labelling the forces acting at a point

Very few candidates converted the weight to the mass of the body.

2.4 Well answered

Question 3

3.1.1 Well answered

3.1.2 Well answered

3.2.1 Equations of motion were used at will. The data provided could not be analysed, even though it was provided with a sketch which included the data.

N.B. Instantaneous velocity (V_{DE}– average velocity in the middle of the time interval if the acceleration is constant)

3.3 Poorly answered
Candidates could not see the connection between 3.2 and 3.3. Very few candidates could calculate the ? t to determine the acceleration.

Question 4

4.1 Poorly answered. Candidates had difficulty identifying the frictional force acting on the object. Constant velocity is something that many candidates do not understand. The drawing of force diagrams needs attention.

4.2 Poorly answered.
Note: If an object experiences a constant accelerations, its velocity will <u>increase uniformly</u>.

4.3 Poorly answered.
The candidates could not identify the resultant force acing on the object because they failed to identify the frictional force.

Question 5

5.1 Very poorly answered.
It is quite evident that the definition of the law was not learnt.

5.2 Well answered
The following were areas of concern:

- Use of the wrong formula, e.g. $F = \frac{kmM}{r^2}$ instead of $F = \frac{Gm_1m_2}{r^2}$
- Substitution into the formula
- Use of the calculator
- Unit of F
- Conversion of the kilometres to metres.

Question 6

6.1 The definition was not well learnt. Many candidates omitted the "total" from their definition.

6.2 Calculation using Law of Conservation of Momentum. Approximately half the candidates used "change in momentum".
(i.e. $p = mv - mu$) to solve,and then became totally confused with the formula. This is a very unusual way of solving the problem.

Question 7

7.1 Mechanical energy is the sum of $E_p + E_k$
Conservation of mechanical energy is therefore: $E_p + E_k$ = constant
Many candidates simplified write E_p top = E_k bottom, instead of $(E_p + E_k)_{top} = (E_p + E_k)_{bottom}$

7.2 Poorly answered
Candidates could not apply the principle of conservation of mechanical energy.

Question 8

8.1 Candidates had difficulty drawing the electric field pattern.

8.2 Very poorly answered. Many candidates clearly do not understand "charge", in terms of electron transfer, and therefore could not calculate the number of electrons transferred.

8.3 Well answered.
The following were areas of concern:

- Use of the wrong formula e.g. $F = \frac{kmM}{r^2}$ instead of $F = \frac{kQ_1Q_2}{r^2}$

- Substitution into the formula
- Converting to metres
- Use of the calculator
- Unit of F

8.4 Poorly answered
Candidates could not apply the Law of Conservation of Charge.

Question 9

9.1 Was relatively well answered
9.2 Many candidates did not realise that $V_2 = \text{emf} - V_1 = 18 - 12 = 6$ V.
9.3 Many candidates did not realise that $I_3 = I_{cir} - I_2 = 3 - 1 = 2$ A.
9.4 Was answered relatively well.