**Gr 11 Test Oct 2020 Green MEMO**

1.1    C

1.2    A

1.3    B

1.4    B

1.5    A


2.1    The electrostatic force between two charges is <u>directly proportional to the product (of the magnitude) of the charges</u> and <u>inversely proportional to the square of the distance</u> between their centres. ✓✓


2.2    $F = \dfrac{kQ_1Q_2}{r^2}$ ✓ $= \dfrac{(9\times10^9)(12\times10^{-9})(3\times10^{-9})}{(0,625)^2} = 8,29 \times 10^{-7}\ N$ ✓


2.3    ✓ correct field pattern / lines perpendicular to surface of charge

       ✓ correct field line direction


2.4    $E = \dfrac{kQ}{r^2}$ ✓

       $E_{net} = E_Q - E_P$ ✓

       $E_{net} = \dfrac{(9\times10^9)(3\times10^{-9})}{(0,15)^2}$ ✓ $- \dfrac{(9\times10^9)(12\times10^{-9})}{(0,775)^2}$ ✓

       $E_{net} = 1,02 \times 10^3\ N.C^{-1}$ to the right ✓

       (ACCEPT: 1020,19)


2.5    $E = \dfrac{F}{q}$

       $1,02 \times 10^3 = \dfrac{F}{1,6\times10^{-19}}$
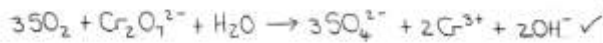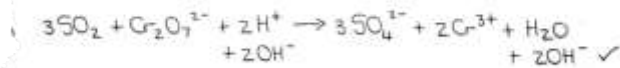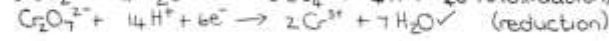
       $F = 1,63 \times 10^{-16}\ N$ to the left ✓

4.1 $HNO_3$ will produce a hydronium ion in water. ✓✓

4.2 $Ca(NO_3)_2$ ✓

4.3 water ✓(not $H_2O$)

4.4 CaO ✓
   $Ca(NO_3)_2$ or $NO_3^-$ ✓ (positive marking from 4.2)
   (6)

5.1 Oxidation increase in oxidation number. ✓✓

   $3SO_2 + 2H_2O \longrightarrow 3SO_4^{2-} + 8H^+ + 2e^-$ x3 (oxidation) ✓ ✓ ✓

   $Cr_2O_7^{2-} + 14H^+ + 6e^- \longrightarrow 2Cr^{3+} + 7H_2O$ ✓ (reduction)

   $3SO_2 + Cr_2O_7^{2-} + 2H^+ \longrightarrow 3SO_4^{2-} + 2Cr^{3+} + H_2O$
   $+ 2OH^-$ $+ 2OH^-$ ✓

   $3SO_2 + Cr_2O_7^{2-} + H_2O \longrightarrow 3SO_4^{2-} + 2Cr^{3+} + 2OH^-$ ✓
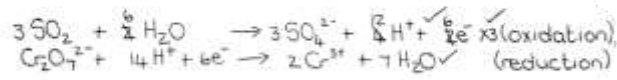
5.2 $Cr_2O_7^{2-}$ ✓
   (8)

5.1 Ohm's law: the potential difference is directly proportional to the current strength ✓ at constant temperature ✓

5.2 Rate of flow of charge ✓✓

5.3.1 $Rp = {}^{R1 \times R2}/_{(R1 + R2)}$ ✓ $= {}^{4 \times 8}/_{(4+8)}$ ✓ $= 2{,}67\Omega$ ✓

5.3.2 $V = IR$ ✓

   $3{,}17 = I(3)$ ✓

   $I = 1{,}06$ A ✓

5.3.3 $I_{2\Omega} = 1{,}06 \times {}^{4}/_{12}$ ✓✓ $= 0{,}353$ A ✓   OR using $V = IR$

5.3.4 V decreases ✓

5.3.5 $R_{tot}$ increases ✓, thus I decreases, and $V \alpha I$ ✓

5.3.6 Q and R equally bright ✓, P brighter than Q and R ✓

5.4       Cost    = kW x h x unit price ✓

   $367{,}50$ ✓ $= Q \times {}^{140}/_{60} \times 30$ ✓ $\times 2{,}10$

   $Q = 2{,}5$ ✓