Gr 11 Test Oct 2020 Blue MEMO

1.1 D

1.2 D

1.3 A

1.4 B

1.5 D

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

2.2 $F = \frac{kQ_1Q_2}{r^2} = \frac{(9\times10^9)(15\times10^{-9})(2\times10^{-9})}{(0,75)^2} = 4,8 \times 10^{-7}\ N$

2.3 ✓ correct pattern / lines perpendicular to surface and curling

✓ correct direction of field lines

2.4 $E = \frac{kQ}{r^2}$ ü

$E_{net} = E_P + E_Q$ ü

$E_{net} = \frac{(9 \times 10^9)(15 \times 10^{-9})}{(0,95)^2}$ ü $+ \frac{(9 \times 10^9)(2 \times 10^{-9})}{(0,2)^2}$ ü

$E_{net} = 6 \times 10^2\ N.C^{-1}$ to the right ✓

(ACCEPT: 599,58)

2.5 $E = \frac{F}{q}$ ✓

$6 \times 10^2 = \frac{F}{1,6\times10^{-19}}$ ü

$F = 9,6 \times 10^{-17}\ N$ to the right ✓

(ACCEPT: $9,59 \times 10^{-17}$)

4.1 OH^- accepted a proton to form H_2O.

4.2 Na_2SO_4 ✓

4.3 water ✓ (not H_2O)

4.4 H_2SO_4 ✓
H_2O ✓ (6)

5.1 Reduction: decrease in oxidation number

5.2 $5SO_2 + 10H_2O \rightarrow 5SO_4^{2-} + 20H^+ + 10e^-$ x5) (oxidation)
$2MnO_4^- + 16H^+ + 10e^- \rightarrow 2Mn^{2+} + 8H_2O$ x2) (reduction)
$5SO_2 + 2MnO_4^- + 2H_2O \rightarrow 5SO_4^{2-} + 4H^+ + 2Mn^{2+}$
$+ 4OH^-$ $+ 4OH^-$

$5SO_2 + 2MnO_4^- + 4OH^- \rightarrow 5SO_4^{2-} + 2H_2O + 2Mn^{2+}$

5.3 SO_2 ✓ (8)

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

5.2 The energy per charge transferred between two points in a circuit✓✓

5.3.1 $R_p = {}^{R1 \times R2}/_{(R1 + R2)}$ ✓ = ${}^{15 \times 25}/_{(15+25)}$ ✓= 9,375Ω✓

5.3.2 $V = I R$✓

$50 = I\ (45)$ ✓

$I = 1{,}11$ A✓

5.3.3 $I_{10\Omega} = 1{,}11 \times {}^{15✓}/_{40✓} = 0{,}416$ A✓ OR using $V = I R$

5.3.4 V increases✓

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

5.3.6 B and C equally bright✓, A brighter than B and C✓

5.4 Cost = kW x h x unit price✓

38,13✓ = 2 x ${}^{18}/_{60}$ x 31✓ x unit price

Unit price = R2,05✓