

EASTERN CAPE DEPARTMENT OF EDUCATION

GRADE 11

PHYSICAL SCIENCES CONTROLLED TEST

MEMORUNDUM

TERM 2



INSTRUCTIONS AND INFORMATION

1. Write your NAME and SURNAME in the appropriate spaces on the ANSWER BOOK.

2. Answer ALL the questions in the ANSWER BOOK.

3. You may use a non-programmable calculator.

4.You may use appropriate mathematical instruments.

5. Number the answers correctly according to the numbering system used in this question paper.

6. You are advised to use the attached DATA SHEETS.

7. The formulae and substitutions must be shown in ALL calculations.

8. Give brief motivations, discussions, et cetera where required.

9. Round off your final numerical answers to a minimum of TWO decimal places.

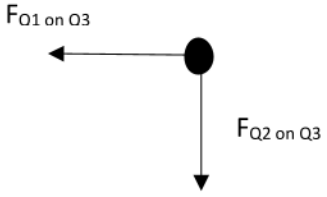
10. Start EACH question on a NEW page.

11. All diagrams are not necessarily drawn according to scale.

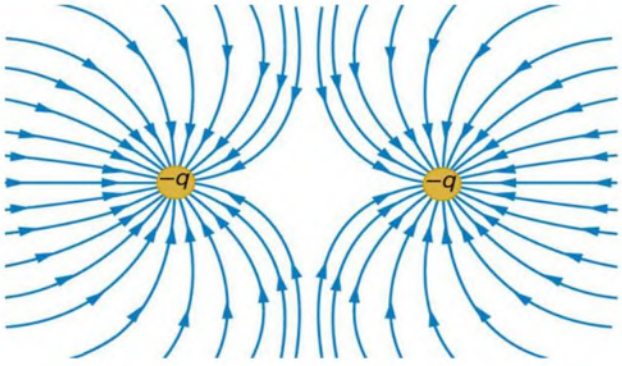
12. Write neatly and legibly.



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	Question 1	
1.1	D✓✓	
1.2	B✓✓	
1.3	A✓✓	
1.4	D✓✓	
1.5	D✓✓	
1.6	A✓✓	
1.7	D✓✓	
1.8	A✓✓	
1.9	D✓✓	
1.10	B✓✓	
	Question 2	
2.1	The magnitude of the electrostatic force exerted by two point charges on each other is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance between them.	
2.2		Marking guide $F_{Q2 \text{ on } Q3}$ ✓ $F_{Q1 \text{ on } Q3}$ ✓

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2.3	$F_{Q2\ on\ Q3} = \frac{kQ_2Q_3}{r^2}$ ✓ $F_{Q2\ on\ Q3} = \frac{(9\times10^9)(3\times10^{-6})(5\times10^{-6})}{0.1^2}$ ✓ ✓ $F_{Q2\ on\ Q3} = 13.5\ N\ downwards$ $F_{Q1\ on\ Q3} = \frac{(9\times10^9)(6\times10^{-6})(5\times10^{-6})}{0.3^2}$ ✓ ✓ $F_{Q1\ on\ Q3} = 3\ N\ left$ $F_{net} = F_{Q2\ on\ Q3} + F_{Q1\ on\ Q3}$ $F_{net} = \sqrt{13.5^2 + 3^2}$ ✓ $F_{net} = 13.83\ N$ $\theta = \tan^{-1}\frac{3}{13.5}$ ✓ $\theta = 77.47°$ $F_{net} = 13.83\ N\ in\ the\ direction\ \theta = 77.47°$ ✓	(8)
2.4.1	The electric field strength at a point is the electrostatic force experienced per unit positive charge placed at that point. ✓ ✓	(2)
2.4.2		

Marking guidelines	
Correct shape	✓
Correct direction of field lines	✓
No field lines crossing	✓

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2.4.3	A ✓  			(1)
2.4.4	$Q_{new} = \frac{Q_1 + Q_2}{2}$ ✓ $Q_{new} = \frac{(5\times10^{-9})+(-10\times10^{-9})}{2}$ ✓ $Q_{new} = -2.5 \times 10^{-9}$ C✓			(3)
2.4.5	$E_A = \frac{kQ_1}{r^2}$ ✓ $E_A = \frac{(9\times10^9)(2.5\times10^{-9}}{(45\times10^{-3})^2}$✓✓ = 11 111.11 N.C^{-1} right $E_B = \frac{(9\times10^9)(2.5\times10^{-9}}{(15\times10^{-3})^2}$ ✓ = 100 000 N.C^{-1} left E_{net} = 11 111.11 + (-100 000)✓ = - 88 888.89 = 88 888.89 N.C^{-1} left✓			(6)
2.4.6	$E = \frac{F}{q}$ ✓ F = Eq = (-88 888.89) x(-1.6x10^{-19}) ✓ F = 1.42 x 10^{-14} N✓			(3)
				[30]

	Question 3	
3.1	The pressure exerted by a vapour at equilibrium with its liquid in a closed system.✓ ✓	(2)
3.2	Water/H_2O ✓	(1)
3.3	H_2O: Hydrogen bond✓ H_2: London force/ Mutually induced dipole forces✓	(2)
3.4	Water/H_2O	
3.5	H_2O/water ✓ The stronger the intermolecular forces, the higher the boiling point. ✓✓	(3)
3.6	LOWER THAN✓	
	Molecular size of H_2 is lesser that the molecular size of O_2. ✓ The lesser the molecular size, the weaker the London forces✓	(3)
		[12]
	Question 4	
4.1.1	Mole is the SI unit for amount of substance. ✓✓	(2)
4.1.2	$n_C = \frac{3.758}{12} = 0.3131\ mol$✓ $n_H = \frac{0.316}{1} = 0.316\ mol$✓ $n_O = \frac{1.251}{16} = 0.078\ mol$✓ $\frac{0.3131}{0.078} : \frac{0.316}{0.078} : \frac{0.078}{0.078}$ ✓ 4 : 4 : 1 C_4H_4O✓	(5)
4.1.3	$n = \frac{136}{68}$ ✓ = 2 C_8H_8O✓	

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		(2)
4.2.1	One mole of any gas occupies the same volume at the same temperature and pressure. ✓✓	(2)
4.2.2	$n = \frac{v}{v_m}$ ✓ $n = \frac{0.336}{22.4}$ ✓ $n = 0.015\ mol$ ✓	(3)
4.2.3	N = nN_A = (0.015) (6.02 x10^{23}) ✓ =9.0 x1023 molecules✓	(2)
4.2.4	Mole ratio n(NaCl) : n(CO_2) 2 : 1 n(NaCl) = 0.03 mol ✓ m = nM ✓ = 0.03x58.5✓ = 1.76 g✓ 	(4)
4.2.5	Concentration is the amount of solute per litre of solution. ✓✓	(2)
4.2.6	n(HCl):n(CO_2) 2 : 1 n(HCl) = 0.03 mol✓ $V = \frac{n}{c}$ ✓ $V = \frac{0.03}{0.1}$ ✓ = 0.3 dm^3✓	(4)
4.3.1	Temperature of 0 °C (273 K) ✓ Pressure of 101.3 kPa/ 1atm✓	(2)

4.3.2	$n = \frac{m}{M}$ ✓ $n = \frac{50}{84}$ ✓ n = 0.593 mol ($MgCO_3$) ✓ n = cV = 0.75x0.5✓ = 0.375 mol (HCl) ✓ HCl is the limiting reagent✓	(6)
4.3.3	N(HCl) = 0.375 mol Ratio n(HCl):n(CO_2) 2:1 V(CO_2) = 0.1875 x 22.4✓ = 4.2 dm^3✓ V = 4.2 x 0.85 ✓= 3.57 dm^3✓	(4)
		[38]
	TOTAL :100	

