Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2010

PHYSICAL SCIENCES P1 MEMORANDUM

MARKS: 150

This memorandum consists of 8 pages.

SECTION A

QUESTION 1 ONE-WORD ITEMS

1.1	transverse✓	11.2.1	(1)
1.2	Iris✓	11.2.1	(1)
1.3	acceleration✓	11.2.1	(1)
1.4	dielectric✓	11.2.1	(1)
1.5	doping✓	11.2.1	(1)
			[5]

QUESTION 2: MULTIPLE-CHOICE QUESTIONS

2.1	A✓✓	11.1.3	(2)
2.2	C✓✓	11.2.2	(2)
2.3	B✓✓	11.2.3	(2)
2.4	B✓✓	11.1.2	(2)
2.5	B✓✓	11.1.2	(2)
2.6	C✓✓	11.2.2	(2)
2.7	A✓✓	11.1.3	(2)
2.8	B✓✓	11.2.1	(2)
2.9	A✓✓	11.2.1	(2)
2.10	A✓✓	11.3.3	(2)
			[20]

TOTAL SECTION A: 25

SECTION B

QUESTION 3

3.1 Since C is positively charged, it will induce✓ negative charges on the side of S facing C. As unlike charges attract,✓ S is attracted towards C. 11.2.2 (2)

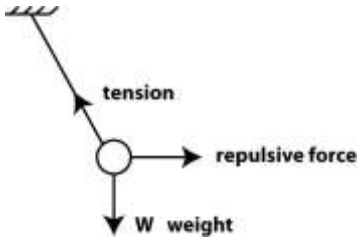
3.2 Sphere C +2 x 10^{-6} C ✓
Sphere S + 2 x 10^{-6} C ✓ 11.2.3 (2)

3.3 $F = \frac{kQ_1Q_2}{r^2}$ ✓

$= \frac{(9{,}0\text{x}10^{9}\checkmark)(2x10^{-6})(2x10^{-6})\checkmark}{(1\text{x}10^{-1})\checkmark^{2}}$

$= 3{,}6\text{x}10^{-2}$ N✓ repulsion✓ 11.2.3 (6)

3.4



No direction - no marks

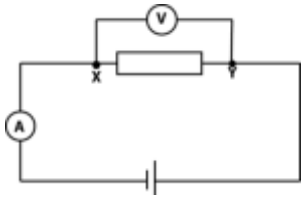
11.1.4 (3)

3.5 Lightning/thunderstorm✓ 11.3.3 (1)

[14]

QUESTION 4

4.1 4.1.1



✓

11.1.1 (1)

4.1.2 $\text{Resistance} = \frac{\text{voltmeterreading}}{\text{ammeterreading}}$✓ 11.1.1 (1)

4.1.3 What is the relation between electrical resistance and temperature?
OR
Does electrical resistance increase/decrease with rise in temperature?✓✓ 11.1.1 (2)

4.1.4 (a) Increases,✓ because current decreases✓ 11.1.4 (2)

(b) Decreases,✓ because current increases✓ 11.1.4 (2)

4.2 4.2.1 $\frac{1}{R_{//}} = \frac{1}{r_1} + \frac{1}{r_2}$

$\frac{1}{R_{//}} = \frac{1}{6} + \frac{1}{6}$✓

$\frac{1}{R_{//}} = \frac{2}{6}$

$\therefore R_{//} = 3\ \Omega$✓

$\therefore R_{\text{TOTAL EXTERNAL}} = 3\ \Omega + 6\ \Omega = 9\ \Omega$✓ 11.1.3 (3)

4.2.2 $V = I_{main} \text{x} R_{external}$✓

$= 2\text{x}9$✓

$= 18\ V$✓ 11.2.3 (3)

4.2.3 $E = IR + Ir$✓

$24 = (3)(6) + (3r)$

$24 = 18 + 3r$✓

$r = 2\ \Omega$✓ 11.2.3 (3)

[17]

QUESTION 5

5.1 To step down✓ the alternating voltage from a high value to a low value.✓
11.2.2 (2)

5.2 To reduce heat loses✓ in the cable since a low current✓ will now flow in the cables.
11.1.4 (2)

5.3 If the cable is thicker, resistance is lower.✓ Therefore the loss of energy is less.✓
11.1.4 (2)

5.4 $\frac{N_S}{N_p} = \frac{V_S}{V_p}$✓

$N_p = \frac{(48\,000)(20)}{(275)}$✓

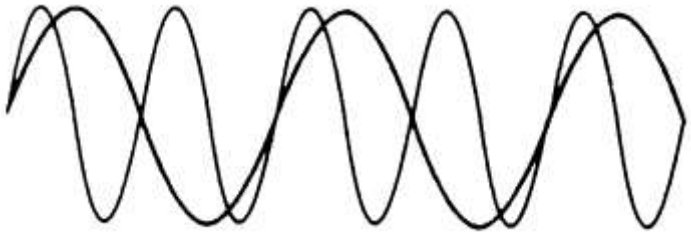
$= 3\,500$ turns✓
11.2.3 (4)
[10]

QUESTION 6

6.1 $wavelength \quad \lambda = \frac{53}{2,5}$✓ $= 21,2\ mm$✓
11.2.3 (2)

6.2 $v = f\lambda$✓ $= (20)\left(\frac{21,2}{1\,000}\right)$✓ $= 0,42\ m.s^{-1}$✓
11.2.3 (3)

6.3 6.3.1

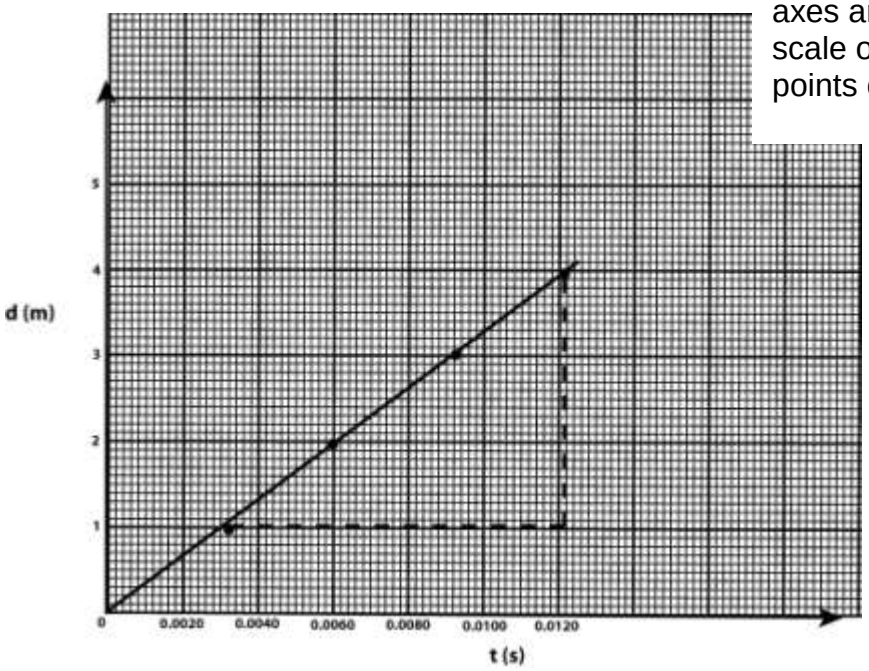


Same Amplitude ✓
Half wavelength
OR Frequency is double ✓
11.2.2 (2)

6.3.2 $wavelength = 10,6\ mm$✓
11.2.3 (1)
[8]

QUESTION 7

7.1 7.1.1



axes are labelled ✓
scale on both axes ✓
points correct ✓✓✓

11.1.2 (5)

7.1.2 Speed of sound in air = gradient of graph✓

$= \frac{4{,}00-1{,}00}{0{,}0121-0{,}0031}$ ✓

$= 333\ m.s^{-1}$✓ 11.1.2 (3)

7.1.3 The time measured will be very short - difficult. ✓
OR
The walls of the building produce echoes. 11.1.1 (1)

7.2 7.2.1 Decreases ✓ 11.2.2 (1)

7.2.2 Speed of sound in water is greater than the speed of sound in air✓
11.2.2 (1)

7.3 7.3.1 Exposure to loud noise✓ 11.3.2 (1)

7.3.2 Diaphragm✓ 11.2.1 (1)

7.3.3 Ultra sound ✓ 11.3.3 (1)

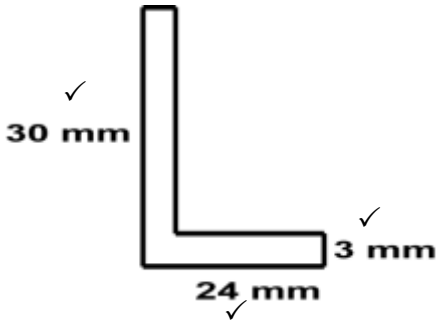
7.3.4 Treat kidney stones✓/to exam unborn babies/to see organs in human body which cannot be seen by x-rays. 11.3.3 (1)

[15]

QUESTION 8

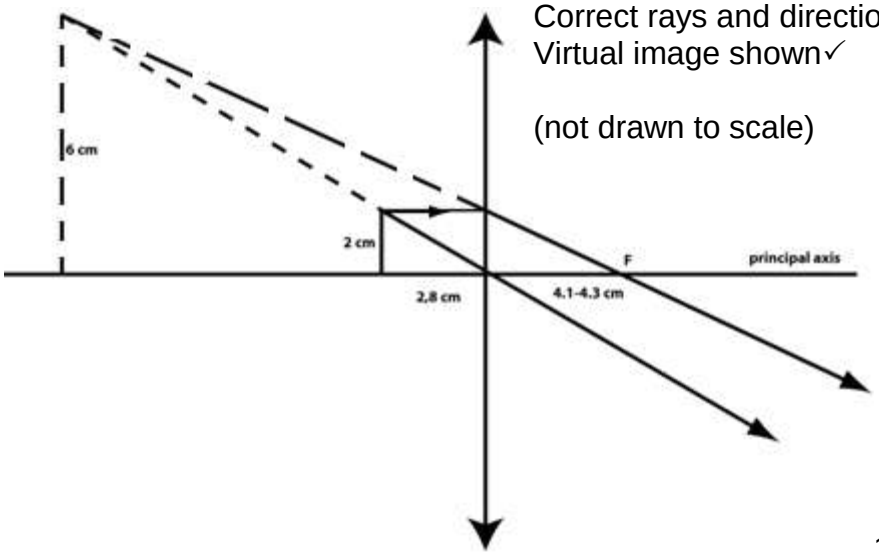
8.1 8.1.1 Convex/converging lens.✓✓ 11.2.1 (2)

8.2 8.2.1



11.1.2 (3)

8.3 8.3.1



Correct rays and directions✓✓✓
Virtual image shown✓

(not drawn to scale)

11.1.2 (4)

8.3.2 4,1 to 4,3 cm✓✓ 11.1.2 (2)

[11]

QUESTION 9

9.1 0 ✓ 11.2.1 (1)

9.2 $F_{net} = ma$✓
$F_{applied} - f_k = ma$✓
$F_{applied} - \mu_k F_N = ma$
$F_{applied} - \mu_k mg = ma$
$11\,520$✓ $- (0{,}05)(800\text{x}9{,}8)$✓ $= 800\text{x}a$✓
$a = 13{,}91\ m.s^{-2}$✓ 11.1.3 (6)

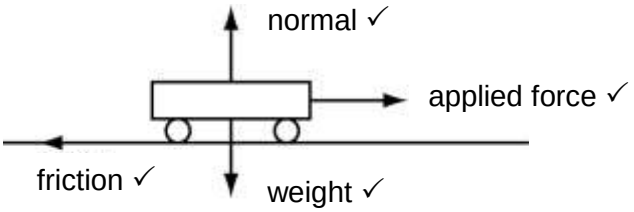
[7]

QUESTION 10

10.1 Acceleration is directly proportional to force.
OR
Acceleration is inversely proportional to force.✓✓ 11.1.1 (2)

10.2 mass✓ 11.1.2 (1)

10.3



11.1.4 (4)

10.4 Newton's Second Law✓ 11.1.2 (1)

10.5 Increases✓ 11.2.2 (1)
[9]

QUESTION 11

11.1 In an isolated system the total linear momentum remains constant in both magnitude and direction.✓✓ 11.2.1 (2)

11.2 $car\ B\ direction\ is + ve$
$total\ p\ before = total\ p\ after$✓
$(m_A v_A)_i + (m_B v_B)_i = (m_A v_A)_f + (m_B v_B)_f$
$(900\text{x}0) + (1\,100\text{x}20)$✓ $= (900)(10)$✓ $+ (1\,100)(v_B)$✓
$v_B = \dfrac{1\,100\text{x}20 - 900\text{x}10}{1\,100}$
$v_B = 11{,}81\ m.s^{-1}\ forward\ direction$✓ 11.2.3 (5)

11.3 Follow at a safe stopping distance/adapt speed to conditions of road/Increase following distance in wet weather. (Any 2) ✓✓ 11.3.3 (2)
[9]

QUESTION 12

12.1 Two bodies in the universe attract each other with a force which is directly proportional to the product of their masses and inversely proportional to the square of their distances between their centres.✓✓ 11.2.1 (2)

12.2 $F = \dfrac{Gm_1m_2}{r^2}$✓
$F = \dfrac{6{,}67\text{x}10^{-11}x100\text{x}100}{1^2}$✓
$F = 6{,}67\text{x}10^{-7}N$✓ 11.2.3 (4)

12.3 By FOUR.✓ 11.2.2 (1)

12.4 Remains the same.✓ 11.2.2 (1)
[8]

QUESTION 13

13.1 Class 1✓ Fulcrum is between the load and the effort. ✓ 11.2.1 (2)

13.2 Moment = force x perpendicular distance✓

= 12 000✓ x 20✓ = 240 000 N.m✓ 11.2.3 (4)

13.3 To keep the arm in equilibrium✓✓ **OR** to be able to vary the load carried by moving the counterweight. 11.2.1 (2)

[8]

QUESTION 14

14.1 They become better conductors✓ as their temperature increases.✓ 11.2.1 (2)

14.2 Germanium **OR** Silicon ✓ 11.2.1 (1)

14.3 14.3.1 Diode✓ 11.2.1 (1)

14.3.2 It allows electric current to flow only in one direction.✓ 11.2.1 (1)

14.4 14.4.1 Connect positive terminal of a battery to the n-type✓ and the negative terminal to the p-type side.✓ 11.2.2 (2)

14.5 14.5.1 Electrons/holes✓ 11.2.1 (1)

14.5.2 Ions✓ 11.2.1 (1)

[9]

TOTAL SECTION B: 125

GRAND TOTAL: 150