Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE/GRAAD 11

PHYSICAL SCIENCES – FIRST PAPER

MEMORANDUM

FISIESE WETENSKAPPE – EERSTE VRAESTEL

MARKS/PUNTE: **150**

TIME/TYD: **3 hours/uur**

This memorandum consists of 10 pages.
Hierdie memorandum bestaan uit 10 bladsye.

SECTION/*AFDELING* A

QUESTION 1/*VRAAG 1*

1.1 n-type/*n-tipe* ✓ [11.2.1] (1)

1.2 Coefficient of friction/*Wrywingskoëffisiënt*
Coefficient of static friction/*Statiese Wrywingskoëffisiënt*
Coefficient of kinetic friction/Kinetiese *Wrywingskoëffisiënt* ✓ [11.2.1] (1)

1.3 Accommodation/*Akkommodasie* ✓ [11.2.1] (1)

1.4 Lenz's Law/*Lenz se wet* ✓ [11.2.1] (1)

1.5 Static electricity/*Statiese elektrisiteit* ✓ [11.2.1] (1)
[5]

QUESTION 2/*VRAAG 2*

2.1 When you push a wheelbarrow filled with sand, it is an example of a **class-2** Lever/ [11.2.1]
Wanneer jy 'n kruiwa vol sand stoot is dit 'n voorbeeld van 'n ***klas-2*** *hefboom* ✓✓
Accept example of class 3 lever✓
Aanvaar 'n voorbeeld van 'n klas-3 hefboom (2)

2.2 Newton's second law defines the relationship between force, mass and **acceleration** of an object./*Newton se Tweede Wet definieer die verwantskap tussen die krag, massa en* ***versnelling*** *van 'n voorwerp.* [11.2.1]
✓✓ (2)

2.3 You hear dogs bark clearer at night due to the **refraction** of sound waves./
Jy hoor honde se geblaf duideliker in die aand as gevolg van ***breking*** *(****refraksie****) klankgolwe.* ✓✓ [11.2.2] (2)

2.4 The voltage decreases and the charge decreases while a capacitor discharges.
Die ***spanning*** *neem* ***af*** *en die lading neem af terwyl 'n kapasitor ontlaai.*✓✓ [11.2.1] (2)

2.5 **Alternating** current is induced during electromagnetic induction./***Wisselstroom word*** *geïnduseer tydens elektromagnetiese induksie*. ✓✓ [11.2.1] (2)
[10]

QUESTION 3/*VRAAG 3*

3.1 C ✓✓ [11.2.3] (2)

3.2 B ✓✓ [11.2.3] (2)

3.3 B ✓✓ [11.1.2] (2)

3.4 C✓✓ [11.2.2] (2)

3.5 A ✓✓ [11.2.1] (2)
[10]

TOTAL SECTION A:
TOTAAL AFDELING A: 25

SECTION B/*AFDELING B*

QUESTION 4/*VRAAG 4*

4.1 $F.\Delta t = m(v_f – v_i)$ ✓
✓ ✓ ✓ ✓
F x 7,5= 3600 (0 – 30)
F = -14 400 N ✓
= 14 400 N against the direction of motion. ✓
teen die bewegingsrigting. [11.1.3] (7)

4.2
4.2.1 INCREASES/*NEEM TOE* ✓✓ [11.2.2] (2)
4.2.2 DECREASES/*NEEM AF* ✓✓ [11.2.2] (2)
4.2.3 INCREASES/*NEEM TOE* ✓✓ [11.2.2] (2)

4.4 By increasing the mass (more passengers), the stopping distance✓ of the minibus-taxi increases. This endangers the lives of pedestrians. Do not overload the taxi✓./
Deur die massa te laat toeneem (meer passasiers), word die stop-afstand van die minibus-taxi meer. Dit stel die lewens van voetgangers in gevaar. Moenie die taxi oorlaai nie. [11.3.2] (2)
[15]

QUESTION 5/*VRAAG 5*

5.1 F_g(Andile) = $F_{g(A)}$ = mg = 60 x 9,8 = 588 N ✓
F_g(Nomi) = $F_{g(N)}$ = mg = 40 x 9,8 = 392 N ✓
F_g(Zuki) = $F_{g(Z)}$ = mg = 9 x 9,8 = 88,2 N ✓ [11.2.3] (3)
✓

5.2 T(Nomi) = $F_{g(N)}$ x $\perp$ r = 392 x 2,5 = 980 N.m ✓
T (Andile) = $F_{g(A)}$ x $\perp$ r = 588 x 2 = 1176 N.m ✓
Seesaw rotates clockwise/*Wipplank roteer kloksgewys*. ✓
[11.2.3] (4)

5.3 Advantage/*Voordeel* = 1176 – 980 = 196 N.m ✓
T(Zuki) = $F_{g(Z)}$ x $\perp$ r
196 = 88,2 x r ✓
∴ r = 2,22 m from fulcrum on Nomi's side/✓✓
∴ r = 2,22 m *vanaf spilpunt op Nomi se kant*. [11.2.3] (4)
[11]

QUESTION 6/*VRAAG 6*

6.1 $p_A = m_A v_{iA}$ ✓
= 1 800 x 20 ✓
= 36 000 kg.m.s^{-1} ✓ [11.1.2] (3)

6.2 v_{fA} = 8 m.s^{-1} ✓✓ [11.1.2] (3)

6.3 $m_A v_{iA} + m_B v_{iB} = (m_A + m_B)v_f$ ✓
✓ ✓ ✓
(1 800 x 20) + 1 600 v_{iB} = (1 800 + 1 600)(8) (direction of A is positive)
(*rigting van A is positief*)
v_{iB} = -5,5 m.s^{-1} ✓

= 5,5 m.s^{-1} to the left ✓
na links [11.1.2] (6)

6.4 Safety belts✓, air bags✓ and crumble zones✓/
Veiligheidsgordels, lugsakke en frommel-sones [11.3.2] (3)

6.5 Safety belts✓✓/Veiligheidsgordels [11.2.1] (2)
[16]

QUESTION 7/*VRAAG 7*

7.1 B. ✓ small energy gap✓/*klein energie gaping* [11.1.2] (2)

7.2 Adding small amounts of impurities to the semi-conductor (doping). ✓/
Byvoeging van klein hoeveelhede van ander stowwe aan die half-geleier (doping)
Increasing the temperature of the semi-conductor by heating. ✓
Om die temperatuur van halfgeleier te verhoog deur verhitting.
[11.2.2] (2)

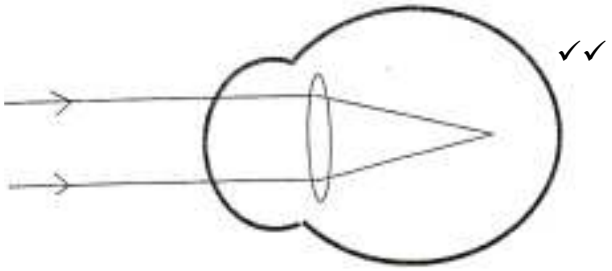
7.2 Computers/*Rekenaars*
Transistors/*Transistors*
Calculators etc. (**Any one**)/*Sakrekenaar ens. (**Enige een**)* ✓
[11.3.3] (1)
[5]

QUESTION 8/*VRAAG 8*

8.1 Jenny – short sightedness (myopia)/*bysiendheid (miopia)* ✓
Helen – far sightedness (hyperopia)/*versiendheid (hiperopia)* ✓
Aunty Barbara – defect due to old age (presbyopia)/ ✓
Tante Barbara – defek a.g.v. ouderdom (presbiopia) [11.2.1] (3)

8.2 Jenny – Focal length of the eye lens or is too short or eye ball is too long./*Brandpuntafstand van die ooglens is te kort of oogbal is te lank.* ✓✓
Helen - Focal length of the eye lens is too long or eye ball is not long enough./*Brandpuntafstand van die ooglens is te lank of oogbal is nie lank genoeg nie.* ✓✓
Barbara – Eye has lost power of accommodation/*Oog het die akkommodasie-vermoë verloor*. ✓✓ [11.2.3] (6)

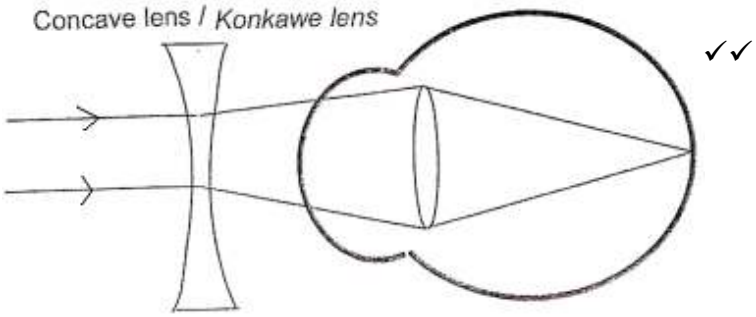
8.3.1



✓✓

[11.2.2] (2)

8.3.2

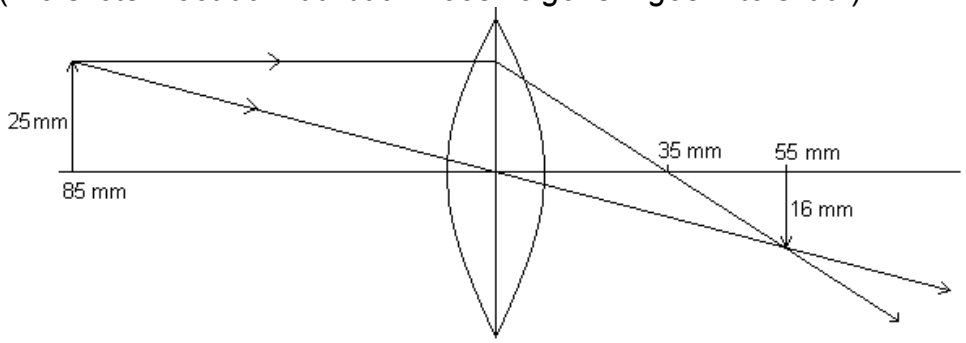


✓✓

[11.3.2] (3)
[14]

QUESTION 9/*VRAAG 9*

9.1 (Sketch must be accurate according to a suitable scale)
(*Die skets moet aanvaarbaar wees volgens 'n geskikte skaal*)



No arrows for direction ($^3/_5$ maximum)
Geen pyle vir rigting ($^3/_5$ maksimum)

Correct distance of object from lens and height of object/*Korrekte afstand van voorwerp vanaf lens en hoogte van voorwerp* ✓
Ray through optic center/*Straal deur optiese middelpunt* ✓
Ray parallel to Principal axis✓ and through to image (at 55 mm) ✓
Straal parallel aan hoofas en deur na beeld (by 55 mm)

9.1.1 Focal Length = 35 mm (±2 mm)/
Brandpuntafstand = 35 mm (±2 mm)✓ [11.1.2] (5)

9.1.2 Height of image = 16 mm (±2 mm)/
Beeldhoogte = 16 mm (±2 mm) ✓ [11.1.2] (1)

9.2 Magnification/Vergroting: M = $\frac{55\text{ mm}}{85\text{ mm}}$ = 0,65 (±0,02) ✓ ✓ [11.1.2] (2)

✓ ✓ ✓

9.3 Upright, Enlarged, Virtual/*Regop, Vergroot, Virtueel* [11.2.1] (3)

[11]

QUESTION 10/*VRAAG 10*

10.1 t (downwards)(*afwaarts*) = 4,30/2 = 2,15 s ✓

Distance/Afstand = v t ✓
= 1 522 x 2,15 ✓
= 3 272,3 m ✓ [11.2.3] (4)

10.2 Depth of ocean (*Diepte van oseaan*) = 3 272,3 + 1 015 = 4 287,3 m ✓ [11.2.3] (1)

[5]

QUESTION 11/*VRAAG 11*

11.1 Solid phase/*Vastestof fase* ✓ [11.1.2] (1)

11.2 Solids have high elasticity✓, which means that the particles vibrate faster.✓
Vastestowwe het hoë elastisiteit wat beteken dat die deeltjies vinniger vibreer.
[11.2.2] (2)

11.3 Increases/*Neem toe* ✓✓ [11.2.2] (2)

11.4 Particles of a warmer medium move faster✓ at a higher temperature✓./
Deeltjies van die medium beweeg vinniger by hoër temperature. [11.2.2] (2)

11.5 325 $m.s^{-1}$ ✓ [11.2.2] (1)

11.6 Air is less dense✓ on the mountain than at sea level and therefore sound travels✓ slower./*Lug is minder dig op die berg as by seevlak en daarom beweeg klank stadiger*.
[11.2.2] (2)
[10]

QUESTION 12/*VRAAG 12*

12.1 $F_{YX} = k\frac{Q_1 Q_2}{r^2}$ ✓

$= \frac{[(9X10^9)(2X10^{-6})(-6X10^{-6})}{(0,120)^2}$ ✓ ✓ ✓ (Use mm $^4/_6$ maximum) (Gebruik mm $^4/_6$ maksimum

= -7,5 N✓

= 7,5 N towards Y/attractive/to the right ✓(negative sign may be omitted)
na Y/aantrekkend/na regs (negatiewe teken mag uitgelaat word)

[11.2.3] (6)

12.2 new charge/*(nuwe lading)* $= \frac{2x10^{-6} + -6\ x\ 10^{-6}}{2}$ ✓ ✓

$= -2 \times 10^{-6}$ C ✓ [11.2.3] (3)

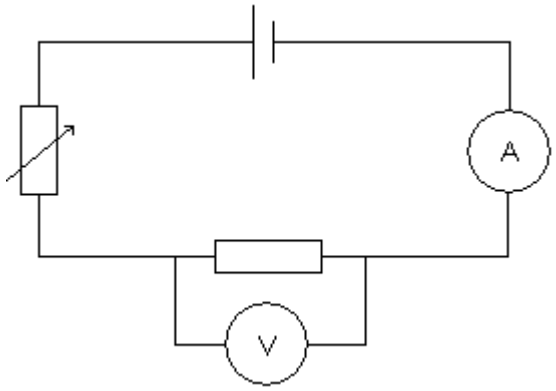
12.3 **Any 3:**
Be indoors when a thunderstorm is approaching. ✓
Stay away from trees or tall objects out in the open. ✓
Use a lightning conductor at home (it provides an easy passage for the lightning to follow.) ✓
The inside of a car is safe (because the metal of the car will mean that the charge will only go outside without affecting those on the inside)
Avoid getting wet during a thunderstorm (any contact with water would make it easier to be struck by lightning.) [11.3.2]

Enige 3:
Bly binnenshuis as die donderstorm naderkom.
Bly weg van bome of hoë voorwerpe buite.
Gebruik 'n weerlig-afleier tuis (dit bied 'n maklike pad vir die weerlig om te volg.)
Binne-in 'n motor is dit veilig (want die metaal van die motor beteken dat die lading buite bly en nie die insittendes affekteer nie)
Vermy om nat te word tydens 'n donderstorm (enige kontak met water sal dit makliker maak om deur weerlig geslaan te word.) (3)

[12]

QUESTION 13/*VRAAG 13*

13.1



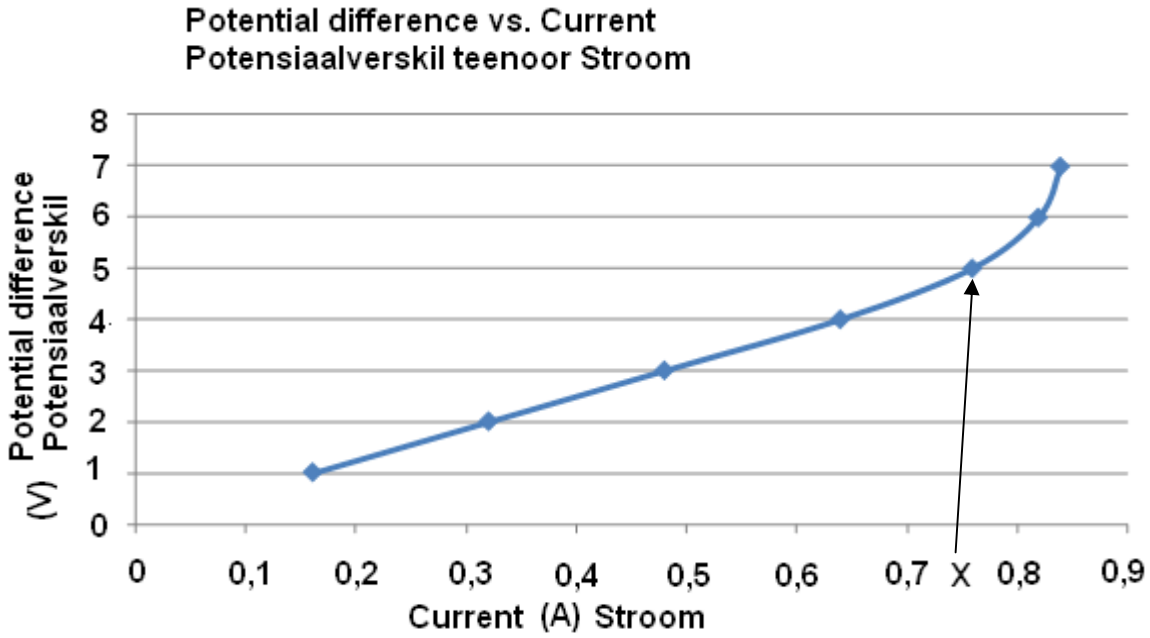
Voltmeter in parallel across resistor/*Voltmeter in parallel oor weerstand*✓
Rheostat and ammeter in series/*Reostaat en ammeter in serie*✓
Power source and complete circuit/K*ragbron en voltooide stroombaan*✓

[11.1.1] (3)

13.2 What is the relationship between potential difference and electric current for a fixed resistor?/*Wat is die verwantskap tussen die potensiaalverskil en elektriese stroom vir 'n vaste weerstand*? ✓✓ [11.1.1] (2)

13.3 Temperature/*Temperatuur* ✓ [11.1.1] (1)

13.4



Both Axes correctly labeled with units/*Albei asse met korrekte byskrifte* ✓
Plotting of points/*Plot van die punte* ✓
Straight line up to point X/*Reguitlyn tot by punt X* ✓
Upward curve beyond point X/*Opwaartse kurwe verby punt X* ✓ [11.1.2] (4)

13.5 The potential difference is directly proportional to the current./*Die potensiaalverskil is direk eweredig aan die stroom* ✓✓ [11.1.2]
Or/Of (V α I) (2)

13.6 On Graph/*Op Grafiek* ✓ [11.1.2] (1)

13.7 Increase/*Toeneem* ✓ [11.1.2] (1)
[14]

QUESTION 14/*VRAAG 14*

14.1 Step-down transformer✓/*Spanningsverlagingstransformator*
The number of turns in the primary coil is greater✓ than the number of turns in the secondary coil. ✓/*Die aantal draaie in die primêre klos is groter as die aantal draaie in die sekondêre klos.* [11.1.2] (3)

14.2 $\frac{V_s}{V_p} = \frac{n_s}{n_p}$ ✓

$\frac{V_s}{22_0}$ ✓ $= \frac{2_5}{55_0}$ ✓

$V_s = \frac{25 \times 22_0}{55_0}$ = 10 V

Yes✓ 10 V is between 6 V and 12 V./
Ja; 10 V is tussen 6 V en 12 V. [11.2.3] (4)

14.3 Alternating✓ current must be changed to direct current✓./
Wisselstroom moet verander word na gelykstroom [11.3.3] (2)

14.4 Mutual induction. ✓/*Wedersydse induksie*
A changing✓ magnetic field created by the alternating current in the primary coil induces✓ a current in the secondary coil./
'n Veranderende magneetveld wat deur 'n veranderende stroom in 'n primêre klos gevorm word induseer 'n stroom in sekondêre klos. [11.2.1] (3)

[12]

TOTAAL AFDELING B:
TOTAL SECTION B: 125

GRAND TOTAL/GROOTTOTAAL: 150