Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 11

NOVEMBER 2013

PHYSICAL SCIENCES P1/
FISIESE WETENSKAPPE V1
MEMORANDUM

MARKS/*PUNTE*: **150**

This memorandum consists of 8 pages./
Hierdie memorandum bestaan uit 8 bladsye.

QUESTION/VRAAG 1

1.1 Normal force/*Normaalkrag* (1)

1.2 Refractive index/*Brekingsindeks* (1)

1.3 Critical angle/*Kritiesehoek (grenshoek)* (1)

1.4 Electric field (strength)/*Elektriese veld (sterkte)* (1)

1.5 Energy (Work) done/*Energie* (*Arbeid) verrig* (1)
[5]

QUESTION/VRAAG 2:

2.1 C (2)

2.2 D (2)

2.3 C (2)

2.4 C (2)

2.5 B (2)

2.6 A (2)

2.7 C (2)

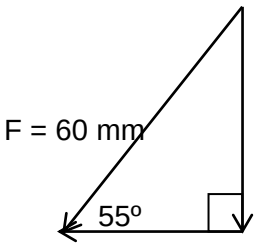
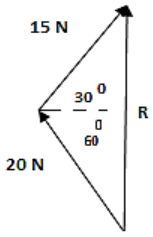
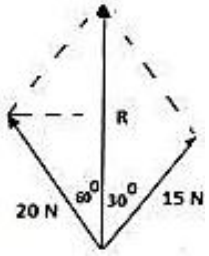
2.8 C (2)

2.9 A (2)

2.10 B (2)
[20]

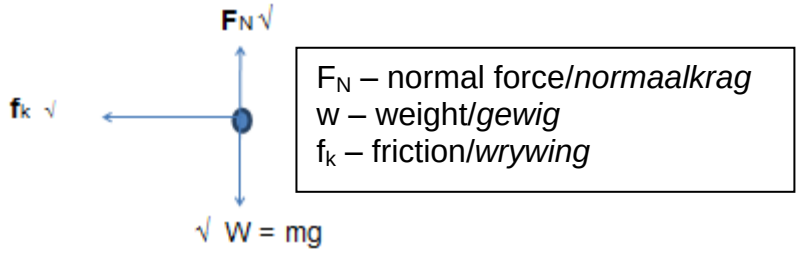
TOTAL SECTION/TOTAAL AFDELING A: 25

QUESTION/VRAAG 3

3.1	3.1.1		F = 60 mm √ = 55° √ X = 34 mm √ (accept/*aanvaar* 33 – 35) 102 N √ (accept/*aanvaar* 99 N – 105 N) left/*links* Y = 49 mm (accept/*aanvaar* 48 – 50) √ 147 N √ (accept/*aanvaar* 144 N – 150 N) down/*af* √ All 3 arrows correct/Al *3 pyle korrek* √	(7)
		If a calculation was done instead of a construction – max 4 out of 7 *Indien 'n berekening gedoen is i.p.v. 'n konstruksie – maks. 4 uit 7* Right angled triangle with information shown/*Reghoekige driehoek met inligting getoon* √ All 3 arrows correct/*Al 3 pyle korrek* √ X = 180 cos 55º = 103,24 N √ Y = 180 sin 55 º = 147,45 N √		
	3.1.2	Positive marking from Q3.1.1/*Positiewe nasien vanaf Vr3.1.1* w = mg = 30(9,8) √ = 294 N √ normal force/*normaalkrag* = 294 + 147 = 441 N √		(3)
3.2		A single vector √ with the same effect as a number of vectors acting on an object. √ *'n Enkel vektor √ wat dieselfde effek het as 'n aantal vektore wat saam op 'n voorwerp inwerk*. √		(2)
3.3	3.3.1	one mark for correct vector diagram/*een punt vir korrekte vektordiagram* R = $\sqrt{20^2 + 15^2}$ = 25 N √√		(3)
	3.3.2	tan θ = $\frac{15}{20}$ θ = 36,87° √ thus/*dus* 6,87° √ (clockwise from the positive y-axis/ *kloksgewys vanaf die y-as*)	 OR/*OF* 	(2)
3.4		When three or more vectors drawn <u>head to tail</u> form a closed figure, √ their resultant is zero or they are in equilibrium/balanced. √ *Wanneer drie of meer vektore <u>kop-stert geteken</u> word en 'n geslote figuur vorm, √ is hul resultant nul of is hulle in ewewig/gebalanseerd* √		(2)

[19]

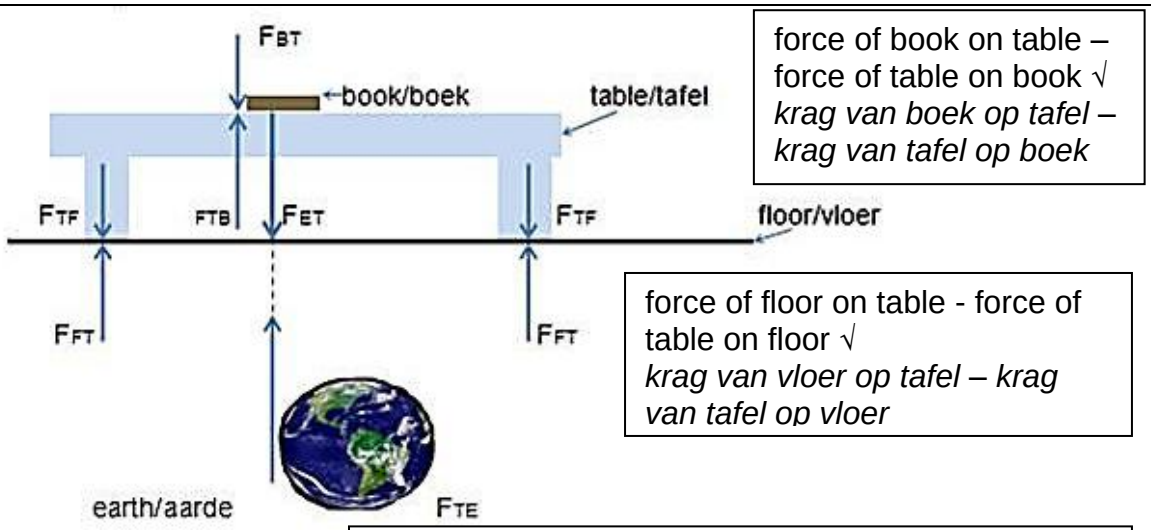
QUESTION/VRAAG 4

4.1			(3)
4.2	4.2.1	The kinetic frictional force is the only force acting on the sled in x direction and opposes the motion of the sled so the net force is given by/*Die kinetiese wrywingskrag is die enigste krag op die skild in x-rigting en staan die beweging van die slee teen sodat die krag gegee word deur*: F_{net} = ma √ OR/*OF* $f_k = \mu_k$ N √ = 0,06 m (9,8) √ = 0,588 m N $\mu_k$mg √ = ma F_{net} = ma √ 0,588 m = m a μ_kg = a a = 0,588 m.s^{-2} √ or/*of* 0,59 m.s^{-2} 6 x10^{-2} x 9,8 = a √ a = 0,588 m.s^{-2} √ or/*of* 0,59 m.s^{-2}	(4)
	4.2.2	POSITIVE MARKING FROM QUESTION 4.2.1 *POSITIEWE NASIEN VAN VRAAG 4.2.1* $v_f^2 = v_i^2 + 2a\Delta x$ √ $0^2 = 6^2 + 2$ (-0,588) Δx √ (the sled decelerates/*die slee vertraag*) Δx = 30,61 m √ (if/*as* a = 0,59 m.s^{-2} then/*dan* Δx = 30,51 m)	(3)

[10]

QUESTION/VRAAG 5

5.1	Bulie's applied force/*toegepaste krag*/250 N √  friction/*wrywing*/500N √ Douglie's applies force/*toegepaste krag*/400 N √	(3)
5.2	F_{net} = ma = 400 + 250 + (-500) √ = 2000 a √ 150 = 2000 x a a = 0,075 m.s^{-2} √ to the right/*na regs* √	(4)
5.3	$F_{g//} = F_g \sin\theta$ = mg sin θ √ = 2000 (9,8) sin 5˚ =1 708,25 N √	(2)
5.4	accelerate down the incline/*versnel teen die steilte af* √	(1)
5.5	Inertia is the tendency of an object to resist change √ *Traagheid is 'n voorwerp se vermoë om verandering teen te staan* √	(1)

5.6	A person will keep on moving forward in a straight line at constant velocity unless acted on by a resultant force √ The seatbelt acts as a net force √ which hold you safely in the seat. *'n Liggaam sal aanhou beweeg in 'n reguit lyn teen 'n konstante snelheid tensy 'n resultante krag daarop inwerk*. √ *Die veiligheidsgordel is die net krag* √ *wat jou veilig in die sitplek hou*. OR/OF In an accident seatbelts hold you safely in place because of Newton's First law of motion and inertia. √ When a car suddenly slows down the seatbelt acts as net force √ which helps the passengers from being hurt. *In 'n ongeluk hou die veiligheidsgordel jou veilig in plek a.g.v. Newton se eerste wet/traagheid.* √ *Wanneer 'n motor skielik stadiger ry, tree die veiligheidsgordel as die netto krag op* √ *wat help dat die passasier nie seerkry nie.*	(2)
5.7	Newton's third law of motion states that when object A exerts a force on object B, object B simultaneously exerts an oppositely directed force of equal magnitude on object B. √√ *Volgens Newton se derde bewegingswet: as voorwerp A 'n krag op voorwerp B uitoefen, oefen voorwerp B terselfde tyd 'n teenoorgestelde krag van dieselfde grootte op A uit.* √√	(2)
5.8	 force of book on table – force of table on book √ *krag van boek op tafel – krag van tafel op boek* force of floor on table - force of table on floor √ *krag van vloer op tafel – krag van tafel op vloer* force of earth on table - force of table on earth √ *krag van aarde op tafel – krag van tafel op aarde*	(3)

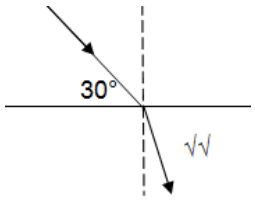
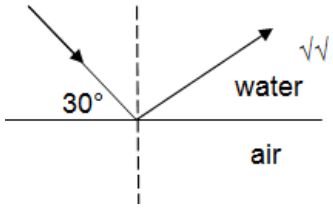
[18]

QUESTION/VRAAG 6

6.1	$F_{sun\ earth} = G\frac{M_{sun}M_{earth}}{d^2}$ √ $= \frac{6,67 \times 10^{-11} \checkmark (1,99 \times 10^{30})(5,98 \times 10^{24})}{(2 \times 10^{11})^2 + (4 \times 10^{8})^2} \checkmark$ $= 1,98 \times 10^{22}$ N √	(5)
6.2	$g_{moon} = \frac{GM_{moon}}{d^2}$ √ OR/OF $F = mg = \frac{GmM}{d^2}$ $= \frac{6,67 \times 10^{-11} (7,35 \times 10^{22)}}{(1,6 \times 10^{6})^2} \checkmark$ $= 1,92\ m.s^{-2}$ √	(4)
6.3	W = mg √ = 50 x 10^{-3} x 9,8 √ = 0,49 N √	(3)

[12]

QUESTION/VRAAG 7

7.1	7.1.1	$n_1\sin\Theta_1 = n_2\sin\Theta_2$√ 1,00 x sin 47°√ = 1,33 $\sin\Theta_2$ √ $\sin\Theta_2 = 0,55$ Θ_2 = 33,36° √			(4)
	7.1.2	$n_1\sin\Theta_1 = n_2\sin\Theta_2$ 1,33 sin 47° √ = 1,00 $\sin\Theta_2$ √ Θ_2 = 76,58°√			(3)
7.2	$n = \frac{c}{v}$ √ $1,33 = \frac{3 \times 10^{8}}{v}$ √ v = 2,26 x 10^{8} $m.s^{-1}$ √				(3)
7.3	$n_1\sin\Theta_1 = n_2\sin\Theta_2$ 1,33 $\sin\Theta_1$ √ = 1,00 sin 90° √ Θ_1 = 48,75°				(2)
7.4	7.4.1		(2)	7.4.2 	(2)
7.5	(any of the following/*enige van die volgende*) -telecommunications/*telekommunikasie* √ -video communications/*videokommunikasie* -computer-data communications/*rekenaardatakommunikasie* -medicine - endoscope)/*medisyne - endoskoop*				(1)

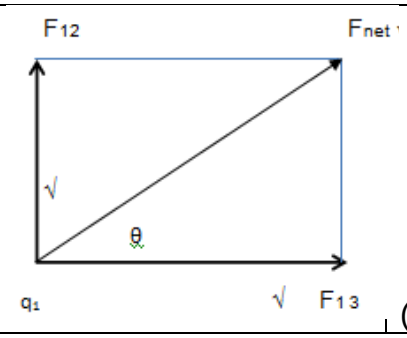
[17]

QUESTION/VRAAG 8

8.1	Every point in a wave front acts as the source of secondary wavelets √ that spread out in all directions with the same speed as a wave. √ *Elke punt op die golffront dien as 'n bron van sekondêre golwe √ wat uitsprei in alle rigtings met dieselfde spoed as die golf.* √		(2)
8.2	A – Central bright broad band/*breë sentrale ligte band* √ B – dark band/*donker bande* √		(2)
8.3	A √		(1)
8.4	8.4.1	broader/*breër* √	(1)
	8.4.2	broader/*breër* √	(1)
8.5	diff α wavelength/*diff α golflengte* √√		(2)

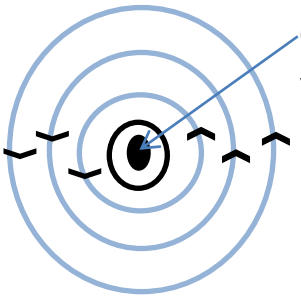
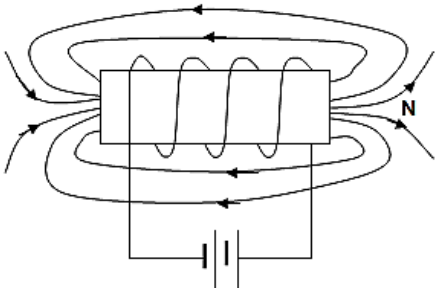
[9]

QUESTION/VRAAG 9

9.1	 (3)	9.2	$F_{12} = \frac{k q_1 q_2}{r^2}$ √ $= \frac{9 \times 10^9 (4 \times 10^{-6})(6 \times 10^{-6})}{(0,15)^2}$ √√ = 9,6 N √ (4)
9.3	$F_{13} = \frac{9 \times 10^9 (4 \times 10^{-6})(5 \times 10^{-6})}{(0,1)^2}$ √√ = 18 N √ $F_{net} = \sqrt{9,6^2 + 18^2}$ √ = 20,4 N √ $\tan \theta = \frac{9,6}{18}$ √ θ = 28,07° √ (anticlockwise from positive x-axis) *(antikloksgewys vanaf die positiewe x-as)* OR/OF = 61,93° (clockwise from the positive y-axis) *(kloksgewys vanaf die positiewe y-as)*		(7)

[14]

QUESTION/VRAAG 10

10.1	10.1.1	 Current direction: up out of page/ *Stroomrigtin: uit papier* circular field/*sirkelvormige veld* √ anticlock wise/*antikloksgewys* √	(2)
	10.1.2	 shape/*vorm* √ position of north and direction N to S/ *posisie van noord en rigting N na S*√	(2)
10.2	10.2.1	Φ = BAcos θ √ = 0,72 (0,0176) cos 0° √ = 0,013 Wb √ (0,012672 Wb) POSITIVE MARKING FROM Q10.2.1/*POSITIEWE NASIEN VANAF VR*10.2.1	(3)
	10.2.2	$\varepsilon = -N\frac{\Delta\Phi}{\Delta t}$ √ $= -\frac{450\ (0 - 0{,}013)}{0{,}22}$ √ = 26,59 V √	(3)

[10]

QUESTION/VRAAG 11

11.1	11.1.1	3V √	(1)
	11.1.2	I = V/R √ = 3/5 √ = 0,6 A √	(3)
	11.1.3	I = V/R = 3 √ /7 √ = 0,43 A V_2 = IR √ = 0,43 x 4 √ = 1,72 V √ (accept/*aanvaar* 1,71 V)	(5)
11.2	11.2.1	$P = \frac{V^2}{R}$ √ OR/OF $2600 = \frac{220^2}{R}$ √ $R = 18{,}62\ \Omega$ √ P = VI 2600= 220 I √ I = 11,82 A R = V/I = 220/11,82 √ = 18,62 Ω √ both equations/ *beide vergelykings* √	(4)
	11.2.2	Cost = (2,6 x 3,5) √ x 1,04 √ = R9,46 √ OR/OF E = Pt = 2,6 kW x 3,5 h √ = 9,1 kWh Cost = 9,1 kWh x R1,04 √ = R9,46 √	(3)

[16]

TOTAL SECTION/*TOTAAL AFDELING* B: 125
GRAND TOTAL/*GROOTTOTAAL*: 150