



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2019

**PHYSICAL SCIENCES P1/
FISIESE WETENSKAPPE V1
MARKING GUIDELINE/NASIENRIGLYN
(EXEMPLAR/EKSEMPLAAR)**

MARKS 150

*This marking guideline consists of 12 pages/
Hierdie nasienriglyn bestaan uit 12 bladsye.*

QUESTION/VRAAG 1

1.1	C	✓✓	(2)
1.2	A	✓✓	(2)
1.3	D	✓✓	(2)
1.4	A	✓✓	(2)
1.5	B	✓✓	(2)
1.6	A	✓✓	(2)
1.7	B	✓✓	(2)
1.8	C	✓✓	(2)
1.9	D	✓✓	(2)
1.10	B	✓✓	(2)
			[20]

QUESTION/VRAAG 2

2.1 The resultant/net force of all forces acting on the block is equal to zero. ✓✓

OR

The forces acting on the block are balanced/in equilibrium.

OR

There is no resultant force acting on the box.

Die resultante / netto krag van al die kragte wat op die blok inwerk is gelyk aan nul. ✓✓

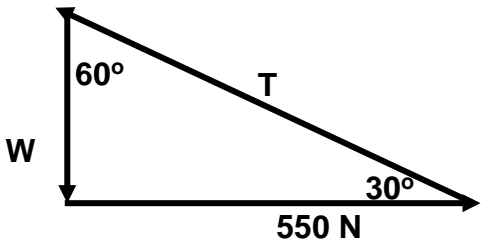
OF

Die kragte wat op die blok inwerk is gebalanseerd/in ewewig.

OF

Daar is geen resultante krag wat op die blok inwerk nie.

(2)

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$T_x = 550 \checkmark\checkmark$ $T = \frac{550}{\cos 30^\circ} \checkmark$ $T = 635,09 \text{ N} \checkmark$	

Criteria for marking

550 N force accurately measured and drawn with arrow. (5,5 cm) ✓

90° angle with the 550 N force measured and a vertical line representing the weight drawn with arrow. ✓

30° angle to the horizontal measured and T drawn with arrow. ✓

Measure magnitude of T (6,35 cm – 6,40 cm) T = (635 N – 640 N) ✓

Kriteria vir nasien

550 N krag akkuraat gemeet en met die pyl getrek. (5,5 cm) ✓

90° hoek met die 550 N krag gemeet en 'n vertikale lyn wat die gewig met die pyltjie voorstel. ✓

30° hoek na die horisontaal gemeet en T met die pyltjie getrek. ✓

Meet die grootte van T (6,35 cm – 6,40 cm) T = (635 N – 640 N) ✓

(4)

2.3 POSITIVE MARKING FROM 2.2/ POSITIEWE NASIEN VANAF 2.2

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$w = T_y$ $w = T \sin 30^\circ \checkmark$ } ✓ for any $w = 635,09 \sin 30^\circ \checkmark$ $w = 317,5426481 \text{ N}$ $w = mg \checkmark$ $317,5426481 = m \times 9,8 \checkmark$ $m = 32,40 \text{ kg} \checkmark$	Vector representing weight accurately measured. <i>Vektor wat gewig verteenwoordig is akkuraat gemeet.</i> (3,15 cm – 3,25 cm) ✓ Measured value converted to weight as/ <i>Die gemete waarde van gewig verander na 315 N – 325 N</i> ✓ $315 \text{ N} - 325 \text{ N} \checkmark$ $w = mg \checkmark$ $317 \checkmark = m \times 9,8 \checkmark$ $m = 32,35 \text{ N} \checkmark$ (32,14 N – 33,16 N)

(6)
[12]

QUESTION/VRAAG 3

3.1.1 As the (magnitude) of the tension/applied force increases, the acceleration increases ✓✓/

Soos die (grootte) van die spanning / toegepaste krag toeneem, neem die versnelling toe. ✓✓

(2)

3.1.2 $F_{\text{net}} = F_{\text{app}} + f_k$
 $F_{\text{net}} = F_{g(\text{masspiece})} + f_k$ } Any one ✓/Enige een ✓

(1)

3.2 The applied force is not directly proportional to the acceleration of the trolley.

OR

There is frictional force acting on the trolley. ✓✓

*Die toegepaste krag is nie direk eweredig aan die versnelling van die trollie nie.***OF***Daar is wrywingskrag wat op die trollie inwerk.*

(2)

3.3 The frictional force ✓/

Wrywingskrag

(1)

3.4 Mass of the trolley ✓/

Massa van die trollie

(1)

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$\text{Gradient} = \frac{\Delta F}{\Delta a} \checkmark$ $\text{Gradient} = \frac{1,20 - 0,4}{0,25 - 0} \checkmark \checkmark$ $\text{Gradient} = \text{mass} = 3,2 \text{ kg} \checkmark$	$F_{\text{net}} = F_{\text{app}} + f_k$ } Any one / Enige een ✓ $ma = F_{\text{app}} + f_k$ } $m \times 0,125 \checkmark = 0,8 - 0,4 \checkmark \checkmark$ $m = 3,2 \text{ kg} \checkmark$

(4)

3.6 Greater than. ✓

The intercept on the vertical axis represents the frictional force. Frictional force increases when mass increases. ✓✓ ($F_k = \mu mg$)

Groter as.

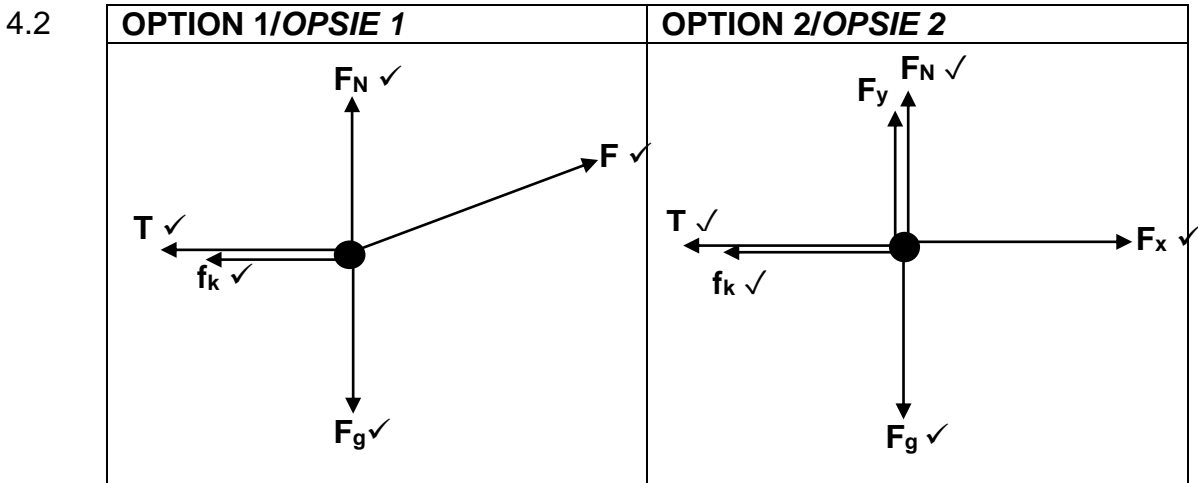
Die afsnit op die vertikale as stel die wrywingskrag voor. Wrywingskrag neem toe wanneer massa toeneem. ($F_k = \mu mg$)

(3)
[14]

QUESTION/VRAAG 4

4.1 When a net (resultant) force acts on an object, the object will accelerate in the direction of the force. The acceleration is directly proportional to the net (resultant) force ✓ and inversely proportional to the mass ✓ of the object.
Wanneer 'n netto (resulterende) krag op 'n voorwerp inwerk, sal die voorwerp versnel in die rigting van die krag. Die versnelling is direk eweredig aan die netto (resulterende) krag en omgekeerd eweredig aan die massa van die voorwerp.

(2)



Mark awarded for arrow and label. /
Punt toegeken vir beskrywing en pyltjie

Do not penalise for length of arrows since drawing is not drawn to scale,
Moenie vir die lengte van die pyltjies penaliseer nie.

Any other additional force(s) $\frac{4}{5}$

Enige ander addisionele krag (te) $\frac{4}{5}$

If force(s) do not make contact with body. Max $\frac{4}{5}$

As krag (te) nie kontak met die liggaam maak nie. Maks. $\frac{4}{5}$ (5)

4.3.1 **4 kg block**

$F_{net} = ma$ $F_{net} = T - f$	} Any one / Enige een ✓✓
$4 \times 2,72 \checkmark = T - 2,5 \checkmark$ $T = 13,38 \text{ N} \checkmark$	

(4)

4.3.2 Positive marking from 4.3.1/POSITIEWE NASIEN VANAF 4.3.1

10 kg block

$$F_{\text{net}} = ma$$

$$F_{\text{net}} = F_x - T - f$$

$$10 \times 2,72 \checkmark = \underline{58 \cos 25^\circ - 13,38 \checkmark} - f$$

$$f = 11,99 \text{ N}$$

$$f_k = \mu N$$

$$f_k = \mu (mg - F \sin \theta)$$

$$11,99 \checkmark = \mu (10 \times 9,8 - 58 \sin 25^\circ) \checkmark$$

$$\mu = 0,16 \checkmark$$

Any one /Enige een ✓

(6)

4.4 Remain the same. ✓

The coefficient of kinetic friction only depends on the type of surface. ✓

*Bly dieselfde.**Die kinetiese wrywingskoëffisiënt hang slegs af van die tipe oppervlak wat in kontak is.*

(2)

[19]

QUESTION 5/VRAAG 5

5.1 Every particle attracts every other particle in the universe with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres. ✓✓

Elke deeltjie lok elke ander deeltjie in die heelal met 'n krag wat direk eweredig is aan die produk van hul massas en omgekeerde eweredig aan die kwadraat van die afstand (r) tussen hulle.

(2)

5.2

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$W = mg$ $W = 200 \times 9,8 \checkmark = 1\,960 \text{ N}$ $W_{\text{new}} = 0,9 \times 1\,960 \checkmark$ $W_{\text{new}} = 1\,764 \text{ N}$ $F = \frac{Gm_1m_2}{d^2}$ $1764 \checkmark = \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24} \times 200}{d^2} \checkmark$ $d = 6,72479758 \times 10^6 \text{ m}$ $d \text{ from surface} = 6724797,58 - 6,38 \times 10^6 \checkmark$ $= 3,45 \times 10^5 \text{ m} \checkmark$	$10\% \text{ of weight} = 0,1 \times 1960 \checkmark = 196 \text{ N}$ $W_{\text{new}} = 1960 - 196 \checkmark$ $= 1764 \text{ N}$ $F = \frac{Gm_1m_2}{d^2}$ $1764 \checkmark = \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24} \times 200}{d^2} \checkmark$ $d = 6,72479758 \times 10^6 \text{ m}$ $d \text{ from surface} = 6724797,58 - 6,38 \times 10^6 \checkmark$ $= 3,45 \times 10^5 \text{ m} \checkmark$

OPTION 3/OPSIE 3
$g_e = 9,8 \text{ m}\cdot\text{s}^{-2}$
$g_{\text{new}} = 0,9 \checkmark 9,8 \checkmark$
$g_{\text{new}} = 8,82 \text{ m}\cdot\text{s}^{-2}$
$g = \frac{GM}{d^2} \checkmark$
$8,82 \checkmark = \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24}}{d^2} \checkmark$
$d = 6,72479758 \times 10^6 \text{ m}$
$d \text{ from surface} = 6\,724\,797,58 - 6,38 \times 10^6 \checkmark$
$= 3,45 \times 10^5 \text{ m} \checkmark$

(7)

5.3.1 $F \propto \frac{1}{d^2} \checkmark$ OR $W \propto \frac{1}{d^2} \checkmark$

(1)

5.3.2

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$F_{\text{new}} = \frac{1}{4} F \checkmark$	$F = \frac{Gm_1m_2}{d^2} \checkmark$
$F_{\text{new}} = \frac{1}{4} \times 1960 \checkmark$	$F = \frac{6,67 \times 10^{-11} \times 200 \times 5,98 \times 10^{24}}{(2 \times 6,38 \times 10^6)^2} \checkmark$
$490 \text{ N} \checkmark$	$F = 489,95 \text{ N} \checkmark$

(3)
[13]**QUESTION 6/VRAAG 6**

6.1.1

$$n = \frac{\sin \theta_i}{\sin \theta_r}$$

$$n = \frac{0,570}{0,375} \checkmark$$

$$n = 1,52$$

$$n = \frac{c}{v}$$

$$1,52 = \frac{3 \times 10^8}{v} \checkmark$$

$$v = 1,97 \times 10^8 \text{ m}\cdot\text{s}^{-1} \checkmark$$

Any one *Enige een* \checkmark

(4)

6.1.2

$$\frac{n_2}{n_1} = \frac{\sin \theta_1}{\sin \theta_2} \checkmark$$

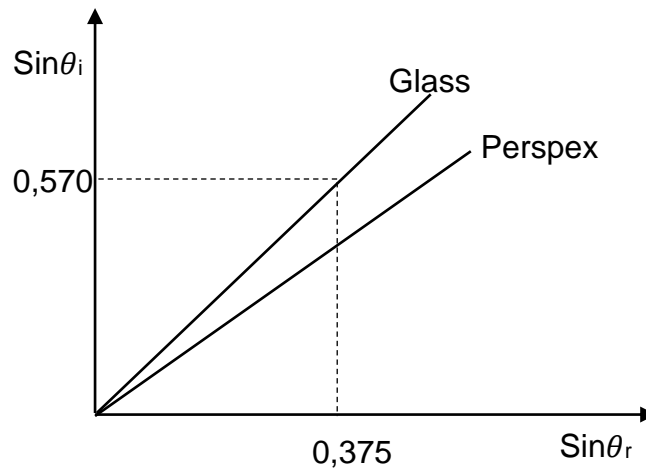
$$\frac{1}{1,52} \checkmark = \frac{\sin \theta_c}{\sin 90^\circ} \checkmark$$

$$\theta_c = 41,14^\circ \checkmark$$

(4)

6.1.3 $\frac{n_2}{n_1} = \frac{\sin \theta_1}{\sin \theta_2} \checkmark$
 $\frac{1}{1,52} \checkmark = \frac{\sin \theta_1}{\sin 25^\circ} \checkmark$
 $\theta_1 = 16,14^\circ \checkmark$ (4)

6.2

**Criteria for marking**

Graph drawn with gradient for Perspex less than gradient for glass. ✓✓

Kriteria vir nasien

Grafiek geteken met gradiënt vir Perspex minder as helling vir glas. (2)

6.3 Perspex ✓

The refractive index is less. It is less optically denser than glass. ✓/

Die brekingsindeks is minder. Dit is opties minder digter as glas. (2)

6.4

- The light must travel from a denser medium to a less dense medium. ✓
- The angle of incidence must be greater than the critical angle of the denser medium. ✓/
- Die lig moet van 'n digter medium na 'n minder digte medium beweeg.
- Die invalshoek moet groter wees as die grenshoek van die digter medium. (2)

[18]

QUESTION 7/VRAAG 7

- 7.1 Every point on a wavefront serves as a point source of spherical secondary wave that move forward with the same speed as the wave. ✓✓
Elke punt op 'n golffront dien as 'n puntbron van sferiese sekondêre golf wat vorentoe beweeg met dieselfde snelheid as die golf. (2)

7.2.1



Criteria for marking/Kriteria vir nasien	
Central broad band. <i>Sentrale helderband</i>	✓
Alternating dark and coloured bands on either side of the central band. <i>Afwisselende donker en gekleurde bande weerskante van die sentrale band.</i>	✓
The other coloured bands narrower than the central band <i>Die ander gekleurde bande kleiner as die sentrale band</i>	✓

(3)

- 7.2.2 The bright (coloured) bands are formed due to constructive interference ✓ and the dark bands due to destructive interference. ✓
Die helder (gekleurde) bande word gevorm as gevolg van konstruktiewe interferensie en die donker bande as gevolg van destruktiewe interferensie. (2)

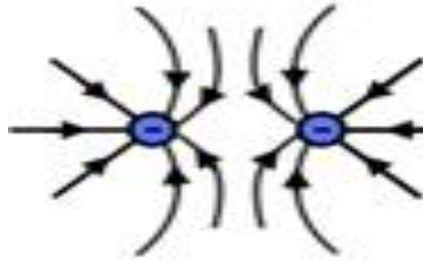
- 7.3 GREATER THAN. ✓
 GROTER AS (1)

- 7.4 The central bright bands for red light will be broader (bigger) than the central band for blue light. ✓✓
Die sentrale helder bande vir rooi lig sal breër (groter) wees as die sentrale band vir blou lig. (2)

[10]**QUESTION 8/VRAAG 8**

- 8.1 $Q_{\text{net}} = \frac{-15}{2}$
 $Q_{\text{net}} = -7,5 \mu\text{C}$
 $n = \frac{Q}{q_e}$ ✓
 $n = \frac{-7,5 \times 10^{-6}}{-1,6 \times 10^{-19}}$ ✓
 $n = 4,6875 \times 10^{13}$ electrons /elektrone ✓ (3)

8.2



Criteria for marking/ Kriteria vir nasien	
Correct shape. <i>Korrekte vorm</i>	✓
Correct direction of arrows <i>Korrekte rigting van pyltjie</i>	✓
Lines starting from the charge and not crossing each other. <i>Lyne wat vanaf die ladings begin kruis nie mekaar nie</i>	✓

(3)

8.3

$$F = \frac{KQ_1Q_2}{r^2} \checkmark$$

$$F = \frac{9 \times 10^9 \times 7,5 \times 10^{-6} \times 7,5 \times 10^{-6}}{(0,1)^2} \checkmark \checkmark$$

$$F = 50,63 \text{ N} \checkmark$$

(4)

8.4

Equal to. ✓

Doubling both charges, F will increase 4 times (4)F. Doubling the distance,

F will decrease 4 times $(\frac{1}{4})F$. ✓*Gelyk aan.**Dubbel beide ladings, F sal toeneem 4 keer (4)F. Dubbel die afstand, F sal***OR/OF**

$$F_{\text{new}} = (4 \times \frac{1}{4}) F \checkmark = F \checkmark$$

(2)

8.5

$$E = \frac{KQ_1}{r^2} \checkmark$$

$$E_1 = \frac{9 \times 10^9 \times 6 \times 10^{-6}}{(r)^2} \text{ (right/regs)} \checkmark$$

$$E_2 = \frac{9 \times 10^9 \times 15 \times 10^{-6}}{(0,1-r)^2} \text{ (left links)} \checkmark$$

$$E_{\text{net}} = E_1 + E_2$$

$$0 = \frac{9 \times 10^9 \times 6 \times 10^{-6}}{(r)^2} - \frac{9 \times 10^9 \times 15 \times 10^{-6}}{(0,1-r)^2} \checkmark$$

$$r = 0,04 \text{ m (0,039) m} \checkmark$$

(5)

[17]

QUESTION/VRAAG 9

9.1.1

$$R = \frac{V}{I} \checkmark$$

$$3 = \frac{V}{1,5} \checkmark$$

$$V_s = 4,5 \text{ V}$$

$$V_{\text{Load}} = V_s + V_p \checkmark$$

$$12 = 4,5 + V_p \checkmark$$

$$V_p = 7,5 \text{ V} \checkmark$$

(4)

9.1.2

Positive marking from 9.1.1 / Positiewe nasien vanaf 9.1.1	
OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2
$R_p = \frac{V}{I} \checkmark$ $R_p = \frac{7,5}{1,5} \checkmark$ $R_p = 5 \Omega$ $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ $\frac{1}{5} = \frac{1}{6} + \frac{1}{R_2} \checkmark$ $R_2 = 30 \Omega$ $R_2 = 12 + R$ $30 = 12 + R \checkmark$ $R = 18 \Omega \checkmark$	$I_6 = \frac{V}{R} \checkmark$ $I_6 = \frac{7,5}{6} \checkmark$ $I_6 = 1,25 \text{ A}$ $I_{12+R} = 1,5 - 1,25 = 0,25 \text{ A}$ $R = \frac{V}{I}$ $R = \frac{7,5}{0,25} \checkmark$ $R_2 = 30 \Omega$ $R_2 = 12 + R$ $30 = 12 + R \checkmark$ $R = 18 \Omega \checkmark$

(5)

9.1.3

Positive marking from 9.1.1/Positiewe nasien vanaf 9.1.1

OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2	OPTION 3/ OPSIE 3
$P = \frac{V^2}{R} \checkmark$ $P = \frac{7,5^2}{6} \checkmark$ $P = 9,38 \text{ W} \checkmark$	$R = \frac{V}{I}$ $6 = \frac{7,5}{I}$ $I = 1,25 \text{ A}$ $P = I^2 R \checkmark$ $P = 1,25^2 \times 6 \checkmark$ $P = 9,38 \text{ W} \checkmark$	$R = \frac{V}{I}$ $6 = \frac{7,5}{I}$ $I = 1,25 \text{ A}$ $P = IV \checkmark$ $P = 1,25 \times 7,5 \checkmark$ $P = 9,38 \text{ W} \checkmark$

(3)

9.2

Increase. \checkmark The resistance will decrease. The current will increase. \checkmark *Toeneem.**Die weerstand sal afneem. Die stroom sal toeneem.*

(2)

9.3 $W = P\Delta t$ ✓
 $W = 2 \times 5$ ✓
 $W = 10 \text{ kWh}$
 $\text{Cost} = 10 \times 1,02$
 $\text{Cost} = \text{R}10,20$ ✓

(3)
[17]

QUESTION/VRAAG 10

10.1 The magnitude of the induced emf across the ends of a conductor is directly proportional to the rate of change in the magnetic flux linkage with the conductor. ✓✓

Die grootte van die geïnduseerde emk oor die ente van 'n geleier is direk eweredig aan die veranderingstempo in die magnetiese vloedverbinding met die geleier.

(2)

10.2.1 $\epsilon = -N \frac{\Delta\Phi}{\Delta t}$ ✓
 $0,25 = -200 \frac{\Delta\Phi}{0,01}$ ✓
 $\Delta\Phi = 1,25 \times 10^{-5} \text{ Wb}$ ✓

(3)

10.2.2 $\Delta\Phi = (B_2 - B_1) A \cos\theta$
 $\Delta\Phi = (B_2 - B_1) (\pi r^2) \cos\theta$ } Any one ✓

$1,25 \times 10^{-5} = (8 - 0) (\pi \times 0,001^2) \cos\theta$ ✓
 $\theta = 60,17^\circ$ ✓

(4)

10.3 Increase. ✓
Toeneem

(1)
[10]

TOTAL /TOTAAL: 150