education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT
PROVINSIALE ASSESSERING

GRADE/*GRAAD* 12

PHYSICAL SCIENCES: PHYSICS (P1)
FISIESE WETENSKAPPE: FISIKA (V1)
JUNE/*JUNIE* 2024
MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 16 pages including a cognitive grid.
*Hierdie nasienriglyne bestaan uit 16 bladsye en 'n kognitiewe tabel.*

QUESTION 1/*VRAAG 1*

1.1 B ✓✓ (2)

1.2 D ✓✓ (2)

1.3 C ✓✓ (2)

1.4 C ✓✓ (2)

1.5 A ✓✓ (2)

1.6 A ✓✓ (2)

1.7 B ✓✓ (2)

1.8 C ✓✓ (2)

1.9 D ✓✓ (2)

1.10 B ✓✓ (2)
[20]

QUESTION 2/*VRAAG 2*

2.1   A body will remain in its state of rest or motion at constant velocity
unless a non-zero resultant/net force acts on it. ✓✓
*'n Liggaam sal in rus of beweging teen konstante snelheid volhard
tensy 'n nie-nul resulterende/netto krag daarop inwerk.*   (2 or 0)   (2)

2.2
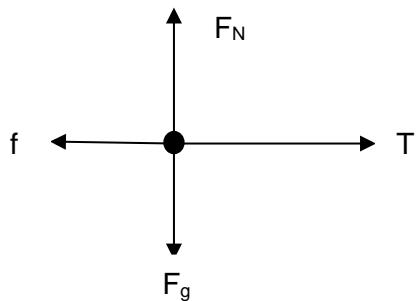
Accept the following symbols/*aanvaar die volgende simbole*	
F_N ✓	N /Normal/Normal force *Normaal/Normaalkrag*
T ✓	F_T/ F_t /Tension/*Spanningskrag*
F_g ✓	w /mg/weight/gravitational force G*ewig/gravitasiekrag*
f ✓	Ff /Force of friction/*Wrywingskrag*

Notes/*Aantekeninge:*
- Mark awarded for label <u>and</u> arrow./*Punt toegeken vir benoeming <u>en</u> pyltjie.*
- Do not penalise for length of arrows since drawing is not to scale./ *Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie.*
- Any other additional force(s)/*Enige ander addisionele krag(te): Max/Maks 3/4*
- If everything is correct, but no arrows/*Indien alles korrek is, maar geen pyltjies*: Max/*Maks ¾*

2.3.1

$F_Y = 0$
$N + F_g = 0$
$N - F_g = 0$ any one/*enige een* ✓
$N = mg$
$N = 8 × 9,8$ ✓
$N = 78,4$ N ✓   (3)

2.3.2

$F_{net} = ma$ ✓
(Direction of motion as positive)
(*Rigting van beweging as positief.*)

Block/*Blok* A
$T + f_K = ma$ ⎫
$T - f_K = ma$ ⎬   any one/*enige een*
$T - 23,52 = 8a$
        $T = 8a + 23,52$……………(1) ✓

Block/*Blok* B
$F - (T + F_g) = ma$ ⎫
$T = F - (ma) - F_g$ ⎬ any one/*enige een*
    $= 192 - 16a - 16(9,8)$…………..(2) ✓

Solving (1) and (2)/*Los (1) en (2) op*:
$8a + 23,5 = 192 - 16a - 156,8$
$a = 0,49$ m.s^{-2} ✓

Substitute a into (1) or (2)/*Vervang a in (1) of (2)*
T = 8a +23,52   **OR/*OF*** T = 192 - 16a - 156,8
  = 8(0,49) + 23,52   = 192 - 16(0,49) -156,8
T = 13,72 N ✓   = 13,72 N   (5)

2.4   To the left. ✓
The only force acting of the object is frictional force. (According Newton's second law), the body will accelerate in the direction of the (net) force. ✓
Na links.
Die enigste krag wat op die voorwerp inwerk is wrywingskrag. (Volgens Newton se tweede wet), die liggaam sal versnel in die rigting van die (netto) krag.   (2)

2.5   Increase ✓
Vermeerder   (1)
                                                                    [17]

QUESTION 3/*VRAAG 3*

3.1

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./ *Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

The force or the component of a force which <u>a surface exerts on an object</u> ✓ with <u>which it is in contact, and which is perpendicular to the surface.</u> ✓
Die krag of komponent van 'n krag wat deur die oppervlak uitgeoefen word op 'n voorwerp waarmee dit in kontak is, is loodreg op die oppervlak.

(2)

3.2
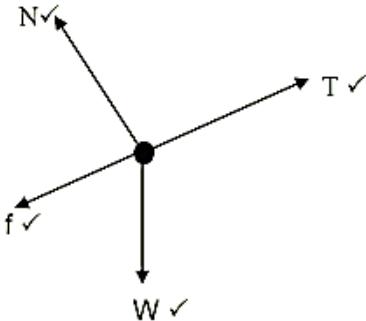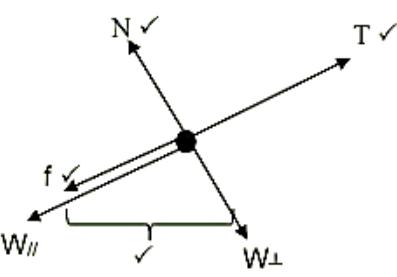
Accept the following symbols/*aanvaar die volgende simbole*	
N ✓	F_N/Normal/Normal force *Normaal/Normaalkrag*
T ✓	F_T/ F_t /Tension
f ✓	Ff /Force of friction/Wrywingskrag
w ✓	F_g/mg/weight/gravitational force F_g/mg/*gewig/gravitasiekrag*

Notes/*Aantekeninge:*
- Mark awarded for label <u>and</u> arrow./*Punt toegeken vir benoeming <u>en</u> pyltjie.*
- Do not penalise for length of arrows since drawing is not to scale./ *Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie.*
- Any other additional force(s)/*Enige ander addisionele krag(te):* Max/*Maks 3/4*
- If everything is correct, but no arrows/*Indien alles korrek is, maar geen pyltjies*: Max/*Maks 3/4*

(4)

3.3

OPTION/*OPSIE* 1:	**OPTION/*OPSIE* 2:**

F_{net} = ma ⎤
 F_{net} = 0 ⎦ any one/*enige een*✓
 T = F_g
 F_g = mg
    = 30(9,8) ✓
    = 294 N ✓
	F_{net} = ma ⎤
	 F_{net} = 0 ⎦ any one/*enige een*✓
	 T =$F_{g//}$+ f ⎦
	   <u>=(44 x 9,8 Sin 28,66˚) + 87,2</u> ✓
	   = 294 N ✓

(3)

3.4 **POSITIVE MARKING FROM QUESTION 3.3**
     POSITIEWE NASIEN VANAF VRAAG 3.3

> **To the right as positive/*Na regs as positief:***
> F_{net} =ma
> F_{net} =0   any one/*enige een*
> T - Wsinθ - f = ma
> 294 - 44x9,8sinθ - 87,2 = 0 ✓
> θ = 28,66˚ ✓

(2)

[11]

QUESTION 4/*VRAAG 4*

4.1
> **Marking criteria/*Nasienkriteria***
> If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

The net (or resultant) force acting on an object is equal to the rate of change of momentum of the object in the direction of the net force. ✓ ✓ (2)
Die netto/resultante krag wat op 'n voorwerp uitgeoefen word is gelyk aan die tempo van momentsverandering in die rigting van die netto krag.

4.2.1
> $Σp_i = Σp_f$
> $mv_{i1} + mv_{i2} = mv_{f1} + mv_{f2}$ any one/*enige een* ✓
> (0,41)(15) + (79)(0) ✓ = (0,41)(-12) + (79)v_{f1} ✓
> v_{f1} = 0,14 m.s^{-1} west/*wes* ✓

(4)

4.2.2 **Positive marking from Question 4.2.1/**
       Positiewe merk vanaf Vraag 4.2.1

> $F_{net}Δt = Δp$
> $F_{net} = \frac{Δp}{Δt}$ any one/*enige een* ✓
> $= \frac{mvf - mvi}{Δt}$
> $= \frac{(79)(0,14) - (79)(0)}{2}$ ✓
> = 5,53 N east/*oos* ✓

(3)

4.2.3 **Positive marking from Question 4.2.2/**
       Positiewe merk vanaf Vraag 4.2.2
       F_{net} = 5,53/4 N west/*wes* ✓

(1)

[10]

QUESTION 5/*VRAAG 5*

5.1 In an isolated system the total (linear) momentum is conserved/remains constant. ✓ ✓
In 'n geïsoleerde sisteem bly die totale (lineêre) momentum behoue/konstant. (2 or 0) (2)

5.2.1 $F_{net}\Delta t = \Delta p$
$Fnet = \dfrac{\Delta p}{\Delta t}$ ⎫ any one/*enige een* ✓

$= \dfrac{mvf-mvi}{\Delta t}$

$7,4 \times 10^5$ ✓ $= \dfrac{111\,000-0}{t_1-0}$ ✓

$t_1 = 0,15$ s ✓ (4)

5.2.2 Between t = t_1 and t = 0,25 s, there is a <u>decrease in momentum.</u>✓ Therefore, the velocity of the ball decreases which implies that there is a force opposing the motion of the ball (i.e friction) ✓ (2)
Tussen t = t_1 en t = 0,25 s, is daar 'n afname in momentum. Daarom sal die snelheid van die bal verminder, dus kan ons aflei dat daar 'n krag is wat beweging teenwerk (wrywing).

5.2.3
$\Sigma p_i = \Sigma p_f$
$p_{Ai} + p_{Bi} = p_{Af} + p_{Bf}$ ⎫ any one/*enige een* ✓
$100\,000 + 0 = 88\,800 + p_{Bf}$
$p_{Bf} = 11\,200$ kg.m.s^{-1} ✓
but/*maar* p = mv
$11\,200 = (15\,000)v$ ✓
$v = 0,75$ m.s^{-1} (to the right/*na regs*) ✓ (4)

5.3 According to Newton's second law, according to momentum
$F_{net}\Delta t = \Delta p$ ✓
Crumple zones causes an increase in collision time ✓ which results in a lesser/smaller force ✓
Volgens Newton se Tweede wet in terme van momentum
$F_{net}\Delta t = \Delta p$
Frommelsones veroorsaak 'n verlengde botsingstyd wat 'n kleiner krag tot gevolg het. (3)

[15]

QUESTION 6/*VRAAG 6*

6.1 An object which has been given an initial velocity and then it moves under the influence of the gravitational force only. ✓✓
'n Voorwerp met 'n aanvanklike snelheid beweeg slegs onder die invloed van gravitasiekrag. (2 or 0) (2)

6.2.1

OPTION/*OPSIE* 1	**OPTION/*OPSIE* 2**
UPWARDS POSITIVE	**UPWARDS POSITIVE**
OPWAARTS POSITIEF	***OPWAARTS POSITIEF***
$v_f^2 = v_i^2 + 2a\Delta y$ ✓	$v_f = v_i + a\Delta t$
$(-50)^2 = (-40)^2 + 2(-9,8)\Delta y$ ✓	$-50 = -40 + (-9,8)\Delta t$
$\Delta y = -45,92$	$\Delta t = 1,02$ s
$\Delta y = 45,92$ m	
downwards/*afwaarts* ✓	$\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓
	$= (-40)(1,02) + \frac{1}{2}(-9,8)(1,02)^2$ ✓
	$\Delta y = 45,90$ m ✓

(3)

6.2.2

UPWARDS POSITIVE/*OPWAARTS POSITIEF*
$v_f = v_i + a\Delta t$ ✓
$-50 = -40 + (-9,8)(\Delta t)$ ✓
$\Delta t = 1,02$ s (time to reach to ground)/*(tyd om die grond te bereik)*
$v_f = v_i + a\Delta t$
$0 = 24 + (-9,8)(\Delta t)$
$\Delta t = 2,45$ s ✓
(time to reach maximum height)/*(tyd om maks hoogte te bereik)*
$t = 1,02 + 2,45$
$t = 3,47$ s ✓

(4)

6.2.3

Positive marking from 6.1.1/*Positiewe merk vanaf 6.1.1*
UPWARDS POSITIVE/*OPWAARTS POSITIEF*
$v_f^2 = v_i^2 + 2a\Delta y$
$0 = 24^2 + 2(-9,8)\Delta y$ ✓
$\Delta y = 556,40$ m
Displacement/*Verplasing*
$= -556,40 + 45,90$ ✓
$= -510,50$
$= 510,50$ m (downwards/*afwaarts*) ✓

(3)

6.3
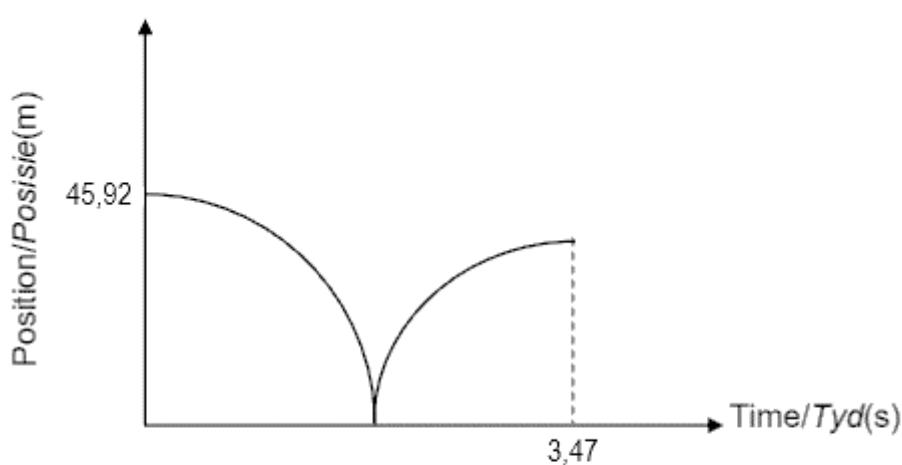
CRITERIA FOR MARKING/*MERK KRITERIA*	
Correct shape/*Korrekte vorm*	✓
Height indicated/*Hoogte aangedui*	✓
Time t indicated/*Tyd t aangedui*	✓

(3)
[15]

OUESTION 7/*VRAAG 7*

7.1   free fall/*vry val* ✓   (1)

7.2   Newton's First Law/*Newton se Eerste Wet* ✓
A body will remain in its state of rest or motion at a constant velocity
unless a non-zero net/resultant force acts on it.✓✓
'n Voorwerp sal in sy posisie van rus of beweging bly teen 'n
konstante snelheid tensy 'n nie-nul netto/resulterende krag daarop
inwerk.   (3)

7.3   7.3.1

OPTION/*OPSIE* 1 (Upwards as positive/*Opwaarts as positief*)	**OPTION/*OPSIE* 2 (Downwards as positive/Af*waarts as positief*)**

$v_f^2 = v_i^2 + 2a\Delta y$ ✓
 $0 = (16)^2 + 2(-9,8)\Delta y$ ✓
$\Delta y = 13,06$ m
 	
Height/*Hoogte* = 13,06 + 25 ✓
                  = 38,06 m ✓
	$v_f^2 = v_i^2 + 2a\Delta y$ ✓
	 $0 = (-16)^2 + 2(9,8)\Delta y$ ✓
	$\Delta y = -13,06$ m
	
	Height/*Hoogte* = 13,06 + 25 ✓
	                  = 38,06 m ✓

(4)

7.3.2

OPTION/*OPSIE* 1 (Whole motion upwards as positive/*Hele beweging opwaarts as positief)*	**OPTION/*OPSIE* 2 (Whole motion downwards as positive/*Hele beweging afwaarts as positief)***
$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $= \underline{16(3,5)} + \underline{\frac{1}{2}(-9,8)(3,5)^2}$ ✓✓ $= -4,03$ m Height/*Hoogte* = 25 - 4,03 ✓ $= 20,97$ m ✓	$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $= \underline{-16(3,5)} + \underline{\frac{1}{2}(9,8)(3,5)^2}$ ✓✓ $= 4,03$ m Height/*Hoogte* = 25 - 4,03 ✓ $= 20,97$ m ✓
OPTION/*OPSIE* 3 (Whole motion upwards as positive/*Hele beweging opwaarts as positief)*	**OPTION/*OPSIE* 4 (Whole motion downwards as positive/*Hele beweging afwaarts as positief)***
$v_f = v_i + g\Delta t$ $0 = 16 - 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $= 0$ ✓ $+ \frac{1}{2}(-9,8)(3,5 - 1,63)^2$ ✓ $= -17,13$ m Height/*Hoogte* = 38,06 - 17,13 ✓ $= 20,93$ m ✓	$v_f = v_i + g\Delta t$ $0 = -16 + 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $= 0$ ✓ $+ \frac{1}{2}(9,8)(3,5 - 1,63)^2$ ✓ $= 17,13$ m Height/*Hoogte* = 38,06 - 17,13 ✓ $= 20,93$ m ✓
OPTION/*OPSIE* 5 (From point of projection upwards as positive/*Vanaf punt van projeksie beweging opwaarts as positief)*	**OPTION/*OPSIE* 4 (From point of projection downwards as positive/*Vanaf punt van projeksie beweging afwaarts as positief)***
$v_f = v_i + g\Delta t$ $0 = 16 - 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ $= -16(0,24)$ ✓ $+ \frac{1}{2}(-9,8)(3,5 - 3,26)^2$ ✓ $= -4,12$ m Height/*Hoogte* = 25 - 4,12 ✓ $= 20,88$ m ✓ RANGE/*GEBIED*: 20,88 - 20,98 m	$v_f = v_i + g\Delta t$ $0 = -16 + 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ $= 16(0,24)$ ✓ $+ \frac{1}{2}(9,8)(3,5 - 3,26)^2$ ✓ $= 4,12$ m Height/*Hoogte* = 25 - 4,12 ✓ $= 20,88$ m ✓ RANGE/*GEBIED*: 20,88 - 20,98 m

(5)

7.3.3

| OPTION/*OPSIE* 1 (Whole motion upwards as positive/*Hele beweging opwaarts as positief*)	OPTION/*OPSIE* 2 (Whole motion downwards as positive/*Hele beweging afwaarts as positief*)
$\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓ -25✓ $= 16\Delta t + \frac{1}{2}(-9,8)\Delta t^2$✓ $\Delta t = 4,42$ s ✓	$\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓ 25 ✓ $= -16\Delta t + \frac{1}{2}(9,8)\Delta t^2$✓ $\Delta t = 4,42$ s✓

Note: For options **3** and **4** use any of the equations of motion containing Δt to calculate Δt and substitute into equation of $\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$.
*Nota: Vir opsies **3** en **4**, gebruik enige van die bewegingsvergelykings wat Δt bevat om Δt te bereken en vervang in vergelyking van $\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$.*

OPTION/*OPSIE* 3 (From maximum height upwards as positive/*Vanaf maksimum hoogte opwaarts as positief*)	OPTION/*OPSIE* 4 (From maximum height downwards as positive/*Vanaf maksimum hoogte afwaarts as positief*)
$v_f = v_i + g\Delta t$ $0 = 16 - 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓ $-38,06$✓ $= 0\Delta t + \frac{1}{2}(-9,8)\Delta t^2$✓ $\Delta t = 2,79$s $\Delta t = 2,79 + 1,63$ $= 4,42$ s ✓	$v_f = v_i + g\Delta t$ $0 = -16 + 9,8\Delta t$ $\Delta t = 1,63$ s $\Delta y = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓ $38,06$✓ $= 0\Delta t + \frac{1}{2}(9,8)\Delta t^2$✓ $\Delta t = 2,79$s $\Delta t = 2,79 + 1,63$ $= 4,42$ s ✓

(4)

7.4   **Positive marking from 7.3.3/*Positiewe merk vanaf 7.3.3*
UPWARDS POSITIVE/*OPWAARTS POSITIEF***
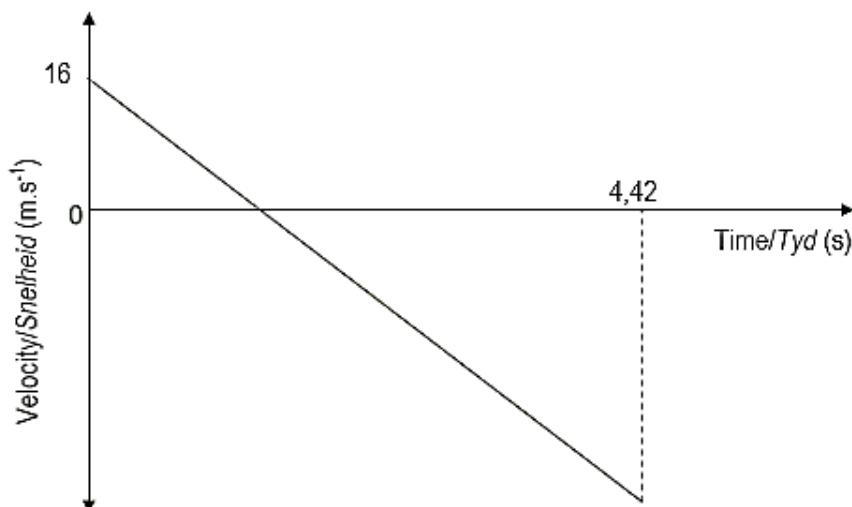
DOWNWARDS POSITIVE/AF*WAARTS POSITIEF*
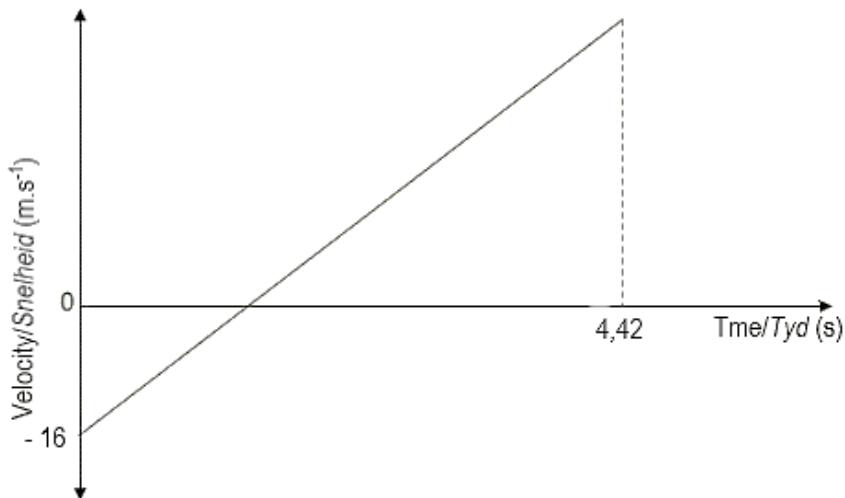
CRITERIA FOR GRAPH/*RIGLYNE VIR GRAFIEK*	
Shape of graph/*Vorm van grafiek*	✓
Initial velocity/*Aanvanklike snelheid*	✓
Time to complete motion/*Tyd vir volledige beweging*	✓

(3)

[20]

QUESTION 8/*VRAAG 8***

8.1
| **Marking criteria/***Nasienkriteria* |
| If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.* |

A force for which the work done in moving an object between two points depends on the path taken. ✓✓
'n Krag waar die werk gedoen op 'n bewegende voorwerp tussen twee punte, afhanklik is van die pad geneem. (2)

8.2   Frictional force./*Gravitasie krag* ✓ (1)

8.3 $f_k = \mu_k N$
         $= \mu_k(mg\cos\theta)$ ⎤ any one/*enige een* ✓
         $= 0,112 \times (70 \times 9,8\cos30°)$ ✓
         $= 11,85$ N ✓ (down the slide/*glyplank af*) (3)

8.4   **POSITIVE MARKING FROM QUESTION 8.3**
        POSITIEWE NASIEN VAN VRAAG 8.3

OPTION/*OPSIE* **1**
              $W_{net} = \Delta E_k$
$f\Delta x\cos\theta + F_{g//}\Delta x\sin\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ ⎤ any one/*enige een* ✓
$(11,85)(2,8)\cos180°$✓$+(70)(9,8)(2,8)\sin30°$✓$=\frac{1}{2}(70)v_f^2 - \frac{1}{2}(70)(0,35)^2$✓
$v_f = 7,39$ m.s^{-1} ✓

OPTION/*OPSIE* **2:**
$W_{nc} = \Delta E_k + \Delta E_p$
$f\Delta x\cos\theta = (\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2) + (mgh_f + mgh_i)$ ⎤ any one/*enige een* ✓
$(11,85)(2,8)\cos180°$✓$= [\frac{1}{2}(70)v_f^2 - \frac{1}{2}(70)(0,35)^2]$ ✓$+ [0 - (70)(9,8)(2,8)]$✓
$v_f = 7,39$ m.s^{-1} ✓ (5)

8.5   INCREASES ✓
The frictional force is proportional to the normal force ✓, and since the normal force increases ✓ with an increase in the angle of the slide, the frictional force also increases.
TOENEEM
Die wrywingskrag is direk eweredig aan die normaalkrag, en omdat die normaalkrag vermeerder as die hoek van die glyplank vermeerder, sal wrywingskrag ook meer word. (3)
[14]

QUESTION 9/*VRAAG 9*

9.1   The net/total work done (on an object) is equal to the change in the object's kinetic energy. ✓✓
Die netto/totale arbeid wat (op 'n voorwerp) verrig is,is gelyk aan die verandering in die voorwerp se kinetiese energie.
**OR/OF**
The work done on an object by a resultant/net force is equal to the change in the object's kinetic energy. ✓✓
Die arbeid verrig op 'n voorwerp deur die resultante/netto krag is gelyk aan die verandering in die voorwerp se kinetiese energie.
                             (2 or 0)   (2)

9.2
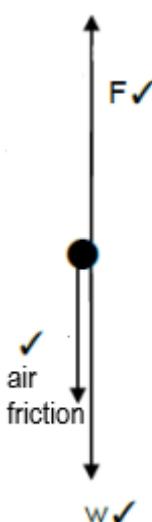
Accept the following symbols/*aanvaar die volgende simbole*	
air friction	f/f_{air}/*lugweerstand*
F ✓	F_A/F_T/
w ✓	F_g/mg/weight/gravitational force F_g/mg/*gewig/gravitasiekrag*

Notes/*Aantekeninge:*
- Mark awarded for label <u>and</u> arrow. /*Punt toegeken vir benoeming <u>en</u> pyltjie.*
- Do not penalise for length of arrows since drawing is not to scale. /
  Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie.
- Any other additional force(s)/*Enige ander addisionele krag(te):*
  Max/Maks 2/3
- If everything is correct, but no arrows/*Indien alles korrek is, maar geen pyltjies*: Max/*Maks 2/3*   (3)

9.3
OPTION/*OPSIE* 1
$W_{net} = \Delta E_k$
$W_T + W_W + W_f = \Delta E_k$ } any one/*enige een*✓
$F_T\Delta y\cos\theta + F_g\Delta y\cos\theta + W_f = 0$
<u>(15 000)(50)cos0˚</u> ✓ + <u>(2500)(9,8)(50)cos180˚</u> ✓ + $W_f = 0$ ✓
$W_f = 475\ 000$ J ✓   (5)

OPTION/*OPSIE* 2:
UPWARDS AS POSITIVE/*OPWAARTS AS POSITIEF*
$F_{net} = ma$
F + f + w = ma
15 000 - f - (2500)(9,8) = 0
f = 9 500 N   Both equations/*Beide vergelykings*

$W_f = f\Delta y\cos\theta$
    = 9500(50)cos180˚
    = 475 000 J   (5)

9.4

$$P = \frac{W}{\Delta t} \checkmark$$

$$= \frac{475\ 000}{(30 \times 60)} \checkmark$$

$$= 263,89\ W \checkmark$$

(3)

[13]

QUESTION 10/*VRAAG 10*

10.1

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./ *Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

The change in frequency (or pitch) $\checkmark$ of the sound detected by a listener because the sound source and the listener have different velocities relative to the medium of sound propagation. $\checkmark$

Die verandering in die frekwensie (toonhoogte) van die waargenome klank deur die luisteraar agv die klankbron en die luisteraar wat verskillende snelhede relatief tot mekaar het.

OR/*OF*

An (apparent) change in (observed/detected) frequency (pitch), $\checkmark$ as a result of the relative motion between a source and an observer $\checkmark$ (listener).

'n (Skynbare) verandering in (waargenome) frekwensie (toonhoogte), as gevolg van die relatiewe beweging tussen die bron en 'n waarnemer/luisteraar.

(2)

10.2   EQUAL TO /*GELYK AAN* $\checkmark$

The driver of the taxi is at rest relative to the source of sound. $\checkmark$

Die bestuurder van die taxi beweeg nie relatief tot van die bron van klank nie.

OR/*OF*

No relative motion between the taxi driver and taxi. $\checkmark$

Geen relatiewe beweging tussen bestuurder en taxi nie.

(2)

10.3

OPTION/*OPSIE* 1:	**OPTION/*OPSIE* 2:**
$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ $\checkmark$	$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ $\checkmark$
$383 \checkmark = \frac{340}{340 + v_s} \checkmark\ 400 \checkmark$	$418,5 \checkmark = \frac{340}{340 - v_s} \checkmark\ 400 \checkmark$
$v_s = 15,09\ m.s^{-1} \checkmark$	$v_s = 15,03\ m.s^{-1} \checkmark$

(5)

10.4   **ANY TWO** ✓✓
- It is used (in flow meters) in medical science to measure the speed and direction (velocity) of blood flow.
- movement of the heart of a foetus.
- To find the rate of blood flow (Doppler scanning)
- To see the unborn child (Ultra sound scanning)
- To hear the heart of a foetus (Ultra sound scanning)
- It is used in medical sonography to generate images (and sounds) of flowing blood.
- To detect blood clotting (Doppler ultrasound test)

ENIGE TWEE
- *Dit word (in vloeimeters) gebruik in mediese wetenskap om die volgende te meet:*
- *Die spoed en rigting (snelheid) van bloedvloei.*
- *Beweging van 'n fetus se hart*
- *Om die tempo van bloedvloei te meet (Doppler skandering)*
- *Om 'n ongebore baba te sien (Ultraklankskandering)*
- *Om die hart van 'n fetus te hoor (Ultraklankskandering)*
- *Dit word gebruik in mediese sonografie om beelde (en klanke) te vorm van vloeiende bloed.*
- *Om vorming van bloedklonte op te spoor. (Doppler-ultraklamktoets)*   (2)

10.5   Doppler effect/*Doppler effek* ✓   (1)

10.6   **DIAGRAM 2** ✓
Star **Y**'s frequency is lower than star **X**/*Ster **Y** se frekwensie is laer as Ster **X**✓   (3)
Star **Y** is redshifted/*Ster **Y** ervaar rooiverskuiwing* ✓

[15]

TOTAL/*TOTAAL*: 150

SUBJECT:	Physical Sciences P1		ASSESSMENT TASK:				GRADE 12 - June exams		
QUESTION ANALYSIS GRID							2024		

QUESTION	Mark	Cognitive Levels				Topic					TOTAL	Difficulty Levels		
		1	2	3	4	Newton's Laws	Momentum&Impulse	Vertical Projectile motion	Work, Energy and Power	Doppler effect		Easy	Moderate	Difficult
1.1	2	2				2					2	2		
1.2	2		2			2					2	2		
1.3	2		2					2			2		2	
1.4	2			2				2			2			2
1.5	2			2					2		2	2		
1.6	2		2						2		2	2		
1.7	2			2					2		2			2
1.8	2		2							2	2		2	
1.9	2			2						2	2	2		
1.10	2		2							2	2		2	
Ques 1	**20**	**2**	**10**	**8**	**0**	**4**	**4**	**2**	**4**	**6**	**20**	**10**	**6**	**4**
2.1	2	2				2					2	2		
2.2	4		4			4					4		4	
2.3.1	3			3		3					3	3		
2.3.2	5				5	5					5			5
2.4	2		2			2					2			2
2.5	1		1			1					1		1	
Ques 2	**17**	**2**	**7**	**3**	**5**	**17**	**0**	**0**	**0**	**0**	**17**	**5**	**5**	**7**
3.1	2	2				2					2	2		
3.2	4		4			4					4		4	
3.3	3			3		3					3			3
3.4	2			2		2					2		2	
Ques 3	**11**	**2**	**4**	**5**	**0**	**11**	**0**	**0**	**0**	**0**	**11**	**2**	**6**	**3**
4.1	2	2					2				2	2		
4.2.1	4			4			4				4		4	
4.2.2	3			3			3				3		3	
4.2.3	1		1				1				1	1		
Ques 4	**10**	**2**	**1**	**7**	**0**	**0**	**10**	**0**	**0**	**0**	**10**	**3**	**7**	**0**
5.1	2	2					2				2	2		
5.2.1	4			4			4				4		4	
5.2.2	2		2				2				2		2	
5.2.3	4			4			4				4	4		
5.3	3		3				3				3		3	
Ques 5	**15**	**2**	**5**	**8**	**0**	**0**	**15**	**0**	**0**	**0**	**15**	**6**	**9**	**0**
6.1	2	2						2			2	2		
6.2.1	3			3				3			3		3	
6.2.2	4			4				4			4			4
6.2.3	3			3				3			3			3
6.3	3		3					3			3		3	
Ques 6	**15**	**2**	**3**	**10**	**0**	**0**	**0**	**15**	**0**	**0**	**15**	**2**	**6**	**7**
7.1	1	1						1			1	1		
7.2	3		3					3			3	3		
7.3.1	4			4				4			4			4
7.3.2	5			5				5			5			5
7.3.3	4			4				4			4			4
7.4	3			3				3			3		3	
Ques 7	**20**	**1**	**3**	**16**	**0**	**0**	**0**	**20**	**0**	**0**	**20**	**4**	**3**	**13**

8.1	2	2							2		2	2		
8.2	1		1						1		1	1		
8.3	3			3					3		3		3	
8.4	5				5				5		5	5		
8.5	3		3						3		3		3	
Ques 8	**14**	**2**	**4**	**3**	**5**	**0**	**0**	**0**	**14**	**0**	**14**	**8**	**6**	**0**
9.1	2	2							2		2	2		
9.2	3		3						3		3		3	
9.3	5				5				5		5			5
9.4	3		3						3		3		3	
Ques 9	**13**	**2**	**6**	**0**	**5**	**0**	**0**	**0**	**13**	**0**	**13**	**2**	**6**	**5**
10.1	2	2								2	2	2		
10.2	2		2							2	2		2	
10.3	5			5						5	5			5
10.4	2		2							2	2	2		
10.5	1	1								1	1	1		
10.4	3		3							3	3		3	
Ques 10	**15**	**3**	**7**	**5**	**0**	**0**	**0**	**0**	**0**	**15**	**15**	**5**	**5**	**5**
SUMMARY														
QUES 1	**20**	**2**	**10**	**8**	**0**	**4**	**4**	**2**	**4**	**6**	**20**	**10**	**6**	**4**
QUES 2	**17**	**2**	**7**	**3**	**5**	**17**	**0**	**0**	**0**	**0**	**17**	**5**	**5**	**7**
QUES 3	**11**	**2**	**4**	**5**	**0**	**11**	**0**	**0**	**0**	**0**	**11**	**2**	**6**	**3**
QUES 4	**10**	**2**	**1**	**7**	**0**	**0**	**10**	**0**	**0**	**0**	**10**	**3**	**7**	**0**
QUES 5	**15**	**2**	**5**	**8**	**0**	**0**	**15**	**0**	**0**	**0**	**15**	**6**	**9**	**0**
QUES 6	**15**	**2**	**3**	**10**	**0**	**0**	**0**	**15**	**0**	**0**	**15**	**2**	**6**	**7**
QUES 7	**20**	**1**	**3**	**16**	**0**	**0**	**0**	**20**	**0**	**0**	**20**	**4**	**3**	**13**
QUES 8	**14**	**2**	**4**	**3**	**5**	**0**	**0**	**0**	**14**	**0**	**14**	**8**	**6**	**0**
QUES 9	**13**	**2**	**6**	**0**	**5**	**0**	**0**	**0**	**13**	**0**	**13**	**2**	**6**	**5**
QUES 10	**15**	**3**	**7**	**5**	**0**	**0**	**0**	**0**	**0**	**15**	**15**	**5**	**5**	**5**
Total marks	**150**	**20**	**50**	**65**	**15**	**32**	**29**	**37**	**31**	**21**	**150**	**47**	**59**	**44**
Norm marks	**150**	**22,5**	**45**	**67,5**	**15**	**32**	**30**	**32**	**32**	**24**	**150**	**45**	**60**	**45**
Total %		**14,6%**	**30,6%**	**44,6%**	**10,0%**									
Norm %	**100**	**15**	**30**	**45**	**10**						**100**	**30**	**40**	**30**