Western Cape Government

METRO NORTH EDUCATION DISTRICT
METRO NOORD ONDERWYSDISTRIK

SCHOOL-BASED ASSESSMENT
SKOOLGEBASEERDE ASSESSERING

SEPTEMBER TRIAL COMMON EXAMINATION
SEPTEMBER VOORBEREIDENDE EKSAMEN

PHYSICAL SCIENCES P1 (PHYSICS)
FISIESE WETENSKAPPE V1 (FISIKA)

MARKING GUIDELINES/*NASIENRIGLYNE*

SEPTEMBER 2026

MARKS/*PUNTE*: 150

This marking guidelines consists of 13 pages.
Hierdie nasienriglyne bestaan uit 13 bladsye.

QUESTION/*VRAAG* 1

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

[20]

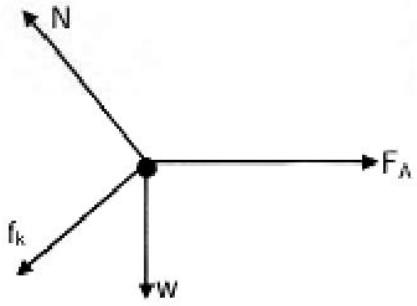
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QUESTION 2/ *VRAAG 2*

2.1.1 It is a ratio of the magnitude of two forces.✓ (1)
Dit is 'n verhouding van die grootte van twee kragte.

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

2.1.3



Accepted labels	
N✓	Normal force/ F_N/$F_{surface\ on\ crate}$ *Normaal krag/F_N /$F_{oppervlakte\ op\ krat}$*
F_k✓	Frictional force /kinetic frictional force/f *Wrywingskrag /kinetiese wrywingskrag/f*
F_A✓	Applied force/$F_{applied}$/F *Toegepaste krag/$F_{toegepas}$/F*
w✓	F_g/mg/weight/gravitational force/ $F_{Earth\ on\ crate}$/3333,2 N *F_g/mg/gewig/gravitasiekrag/* *$F_{aarde\ op\ krat}$/3333,2 N*

Notes/Aantekeninge:
- Mark is awarded for label and arrow/
  Punt word toegeken vir benoeming en pyl
- Do not penalize for length of arrows/
  Moenie penaliseer vir lengte van pyle nie
- Deduct 1 mark for any additional force/
  Trek 1 punt af vir enige bykomende krag
- If force(s) do not make contact with dot/body: 3/4/
  Indien krag(te) nie kontak maak met kol/voorwerp nie: 3/4
- If arrows missing: 3/4 /*As pyle ontbreek: 3/4*

(4)

2.1.4

$f_k = \mu_k N$

$f_k = \mu_k (mg\cos\theta + F_A \sin\theta)$

Any one/ *Enige een* ✓

$= 0,25$✓$[(34)(9,8)(\cos 25) + F \sin 25°]$✓
$= 75,495 + 106 \cdot F$

(3)

2.1.5

$F_{net} = 0$ ACCEPT: $F_{net} = ma$ Any one/ *Enige een* ✓

$F\cos 25^\circ - f_k - mg\sin 25^\circ = 0$

$F\cos 25^\circ - 75{,}495 - 0{,}106 \cdot F - (34)(9{,}8)(\sin 25^\circ)$ ✓ $= 0$

$F(0{,}800307787) = 216{,}3114048$

$F = 270{,}2853$ N✓

(3)

2.2

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 1***
$F_{net} = F_g$ $ma = \frac{GmM}{r^2}$ $a = \frac{GM}{r^2}$ $a = \frac{(6{,}67 \times 10^{-11})(5{,}98 \times 10^{24})}{(6{,}38 \times 10^{6} + 1000 \times 10^{3})^2}$ ✓ $a = 7{,}32\ m \cdot s^{-1}$ towards the Earth/ *na die Aarde toe.* $\frac{a_{E/A}}{a_s} = \frac{9{,}8}{7{,}32}$✓ $= 1{,}338797814$ $w_{E/A} = (3\,600)(1{,}338797814)$✓ $= 4819{,}67$ N ✓downwards *afwaarts*	$F_{net} = F_g$ $ma = \frac{GmM}{r^2}$ $a = \frac{GM}{r^2}$ $a = \frac{(6{,}67 \times 10^{-11})(5{,}98 \times 10^{24})}{(6{,}38 \times 10^{6} + 1000 \times 10^{3})^2}$ ✓ $a = 7{,}32\ m \cdot s^{-1}$ towards the Earth. *na die Aarde toe* $w_{1000\ km} = mg$ $3\,600 = m(7{,}32)$ $m = 491{,}80$ kg $w_{E/A} = mg$✓ $= (491{,}80)(9{,}8)$✓ $= 4819{,}67$ N ✓downwards *afwaarts*

(4)

[17]

QUESTION/*VRAAG* 3

3.1 An object which has been given an initial velocity and then it moves under the influence of gravitational force only. (2 or 0) ✓✓
'n Voorwerp wat 'n beginsnelheid gegee was en dan slegs beweeg onder die invloed van gravitasiekrag. (2 of 0) (2)

3.2

OPTION/*OPSIE* 1: **UP AS POSITIVE/*OP AS POSITIEF*** $v_f^2 = v_i^2 + 2a\Delta y$ ✓ $(0)^2 = (8)^2 + 2(-9,8)\Delta y$ ✓ $\Delta y = 3,265$ m Height above the ground/*Hoogte bo grond*: 80 + 3,265✓ = 83,265 m ✓	**DOWN AS POSITIVE/*AF AS POSITIEF*** $v_f^2 = v_i^2 + 2a\Delta y$ ✓ $(0)^2 = (-8)^2 + 2(9,8)\Delta y$ ✓ $\Delta y = -3,265$ m $\Delta y = 3,265$ m Height above the ground/*Hoogte bo grond*: 80 + 3,265 ✓= 83,265 m ✓
OPTION/*OPSIE* 2: **UP AS POSITIVE/*OP AS POSITIEF*** $v_f = v_i + a\Delta t$ ✓ $0 = (8) + (-9,8)\,\Delta t$ ✓ $\Delta t = 0,816$ s $\Delta y = v_i\,\Delta t + \frac{1}{2}\,a\,\Delta t^2$ $\Delta y = (8)(0,816) + \frac{1}{2}\,(-9,8)(0,816)^2$ ✓ $\Delta y = 3,265$ m Height above the ground/*Hoogte bo grond*: 80 + 3,265 = 83,265 m [accept 83,27 m] ✓	**DOWN AS POSITIVE/*AF AS POSITIEF*** $v_f = v_i + a\Delta t$ ✓ $0 = (-8) + (9,8)\,\Delta t$ ✓ $\Delta t = 0,816$ s $\Delta y = v_i\,\Delta t + \frac{1}{2}\,a\,\Delta t^2$ $\Delta y = (-8)(0,816) + \frac{1}{2}\,(9,8)(0,816)^2$ ✓ $\Delta y = -3,265$ m $\Delta y = 3,265$ m Height above the ground/*Hoogte bo grond*: 80 + 3,265 = 83,265 m [Accept 83,27 m]✓

(4)

3.3

OPTION/*OPSIE* 1: **UP AS POSITIVE//*OP AS POSITIEF*** $\Delta y = v_i\,\Delta t + \frac{1}{2}\,a\Delta t^2$ ✓ (-80) ✓$= (8)\,\Delta t + \frac{1}{2}\,(-9,8)\Delta t^2$ ✓ $4,9\,\Delta t^2 - (8)\Delta t - 80 = 0$ $\Delta t = 4,94$ s OR/*OF* $\Delta t = -3,31$ s $\Delta t = 4,94$ s ✓	**DOWN AS POSITIVE/*AF AS POSITIEF*** $\Delta y = v_i\,\Delta t + \frac{1}{2}\,a\Delta t^2$ ✓ (80) ✓$= (-8)\,\Delta t + \frac{1}{2}\,(9,8)\Delta t^2$ ✓ $4,9\,\Delta t^2 - (8)\Delta t - 80 = 0$ $\Delta t = 4,94$ s OR/*OF* $\Delta t = -3,31$ s $\Delta t = 4,94$ s ✓

OPTION/*OPSIE* 2:	
UP AS POSITIVE/*OP AS POSITIEF*	**DOWN AS POSITIEF/*AF AS POSITIEF***
$v_f^2 = v_i^2 + 2a\Delta y$ ✓	$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$v_f^2 = (8)^2 + 2(-9,8)(-80)$ ✓	$v_f^2 = (8)^2 + 2(-9,8)(-80)$ ✓
$v_f = 40,40\ m\cdot s^{-1}$	$v_f = 40,40\ m\cdot s^{-1}$
$v_f = v_i + a\Delta t$	$v_f = v_i + a\Delta t$
$-40,40 = (8) + (-9,8)\,\Delta t$ ✓	$-40,40 = (8) + (-9,8)\,\Delta t$ ✓
$\Delta t = 4,94\ s$ ✓	$\Delta t = 4,94\ s$ ✓

(4)

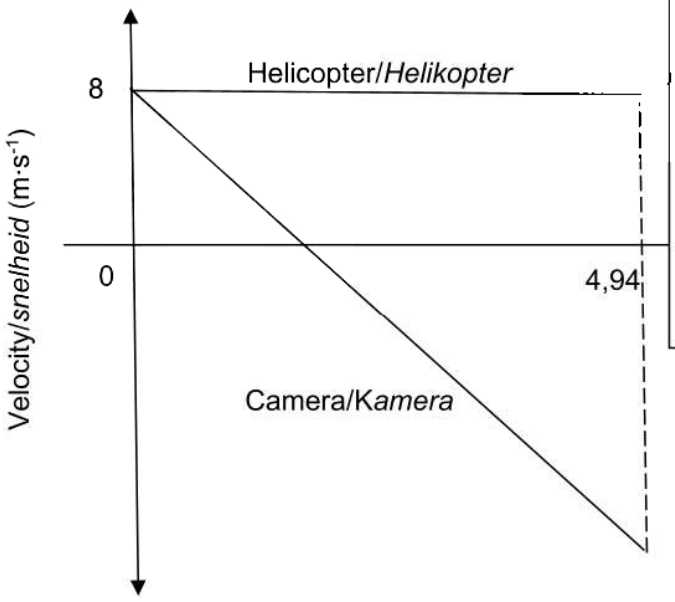
3.4

OPTION/*OPSIE* 1:	
RIGHT AS POSITIVE/*REGS AS POSITIEF*	**LEFT AS POSITIVE/*LINKS AS POSITIEF***
$\Delta y = v_i \Delta t + \frac{1}{2} a\Delta t^2$ ✓	$\Delta y = v_i \Delta t + \frac{1}{2} a\Delta t^2$ ✓
$20,3 = (0)(4,94) + \frac{1}{2} a\,(4,94)^2$ ✓	$-20,3 = (0)(4,94) + \frac{1}{2} a\,(4,94)^2$ ✓
$a = 1,67\ m.s^{-2}$ ✓ (right/*regs*)	$a = 1,67\ m.s^{-2}$ ✓ (right/*regs*)

(3)

3.5

UP AS POSITIVE/*OP AS POSITIEF*



CRITERIA/KRITERIA
- ✓ Initial velocity for camera and helicopter/*Beginsnelheid van kamera en helikopter*
- ✓ Shape for helicopter and final time/*Vorm vir helikopter en finale tyd*
- ✓ Shape of camera (longer section at the bottom)/*Vorm vir kamera (langer gedeelte onder)*

(3)

ACCEPT graph for DOWN AS POSITIVE/*AANVAAR grafiek vir AF AS POSITIEF*

[16]

QUESTION/*VRAAG* 4

4.1 In an isolated (closed) system, the total (linear) momentum remains constant/ is conserved.
In 'n geïsoleerde (geslote) sisteem, bly die totale (liniêre) momentum konstant/behoue.
*(*2 or*/of* 0) (2)

4.2

$\sum p_{initial/aanvanklik} = \sum p_{final/finaal}$

$(m_1v_1 + m_2v_2)_i = (m_1 + m_2)v_f$ ✓

$(1200)(24)+(1800)(-12)$ ✓ $= (1200+1800)v_f$ ✓

$v_f =$ 2,4 m·s^{-1} east/*oos* ✓

(4)

4.3

$F\Delta t = \Delta p = mv_f - mv_i$ ✓	$F\Delta t = \Delta p = mv_f - mv_i$ ✓
$F(0,25)$ ✓$= (1200)(2,4) - (1200)(24)$ ✓	$F(0,25)$ ✓$= (1800)(2,4) - (1800)(-12)$ ✓
$F(0,25) = -25920$	$F(0,25) = 25920$
$F =$ 103 680 N ✓(west/*wes*)	$F =$ 103 680 N ✓ (west/*wes*)

(4)

4.4 EQUAL TO/*GELYK AAN* ✓ (1)

4.5 Newton's Third Law /*Newton se Derde Wet* ✓ (1)
[12]

QUESTION/*VRAAG* 5

5.1 A force for which the work done in moving an object between two points is independent of the path taken. (2 or 0) ✓✓
'n Krag waarvoor die arbeid/werk verrig word om 'n voorwerp tussen twee punte te beweeg onafhanklik is van die pad wat gevolg word. (2 *of* 0) (2)

5.2 Gravitational force / weight / *Gravitasiekrag / Gewig* ✓ (1)

5.3 $W_g = F\Delta x\cos\theta$ ✓
$W_g = mg\Delta x\cos\theta$
$W_g = (3)(9,8)(5)\cos 0°$ ✓
$W_g = 147\ J$ ✓ (3)

5.4 The net/total work done on an object is equal to the change in the object's kinetic energy. OR
The work done by a net force on an object equals the change in its kinetic energy. (2 or 0) ✓✓

Die netto/totale werk/arbeid verrig op 'n voorwerp is gelyk aan die verandering in die kinetiese energie van die voorwerp. OF
Die werk/arbeid verrig deur 'n netto krag op 'n voorwerp is gelyk aan die verandering in die kinetiese energie van die voorwerp. (2 or/of 0) (2)

5.5 $W_{nc} = \Delta E_k + \Delta E_p$ ✓ **OR Use/*OF Gebruik*** $W_{net} = \Delta E_k$
$W_f = \left(\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2\right) + \left(mgh_f - mgh_i\right)$
$W_f = \left[\frac{1}{2}(3)(7^2) - 0\right]$ ✓ $+ [0 - (3)(9,8)(5)]$ ✓
$W_f = 73,5 - 147$
$W_f = -73,5\ J$ ✓ (4)

5.6

OPTION/*OPSIE 1*:	**OPTION/*OPSIE 2*:**
$W_{net} = \Delta E_k$ ✓ $W_g + W_N = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ $(mg\sin\theta)d\cos 180° + 0 = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ $(3)(9,8)\sin 30°(d)(-1)$ ✓ $= 0 - \frac{1}{2}(3)(7^2)$ ✓ $-14,7d = -73,5$ $d = 5\ m$ ✓	$W_{net} = \Delta E_k$ ✓ $mg\Delta y\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ $(3)(9,8)\Delta y\cos 180°$ ✓$= 0 - \frac{1}{2}(3)(7^2)$ ✓ $-29,4\Delta y = -73,5$ $\Delta y = 2,5\ m$ $\sin 30° = \frac{\Delta y}{d}$ $d = \frac{2,5}{\sin 30°}$ $d = 5\ m$ ✓

(4)
[16]

QUESTION/*VRAAG* 6

6.1 Doppler effect is the change in frequency (or pitch) of the sound detected by a listener because the sound source and the listener have different velocities relative to the medium of sound propagation. ✓✓
OR
The (apparent) change in frequency of sound due to the relative motion between listener and source.

Doppler-effek is die verandering in frekwensie (of toonhoogte) van die klank waargeneem deur 'n luisteraar omdat die klankbron en die luisteraar verskillende snelhede relatief tot die medium waarin die klank voortgeplant word, het.
OF
Die (skynbare) verandering in die frekwensie van klank as gevolg van die relatiewe beweging tussen luisteraar en bron. (2)

6.2 Any one/*Enige een*:
- Speed cameras/radar speed guns/*Spoed kameras/Radar-spoedmeettoestelle*
- Ship navigation/*Skeepsnavigasie*
- Collision avoidance systems/*Botsingsvoorkomingstelsels* ✓ (1)

6.3 $f = \frac{v}{\lambda}$
$= \frac{340}{0.68}$ ✓
$= 500Hz$ ✓ (2)

6.4 TOWARDS/*NADER NA* ✓
Detected frequency (500 Hz) is greater than the emitted frequency (465 Hz). ✓
Waargenome frekwensie (500 Hz) is groter as die uitgestraalde frekwensie (465 Hz). (2)

6.5 $f_L = \frac{v \pm v_S}{v \pm v_L} f_S$ ✓
500 ✓ $= \left(\frac{340+0}{340-vs}\right)(465)$ ✓

$340 - vs = \frac{465 \times 340}{500}$
v_S = 23,80 m·s^{-1} ✓

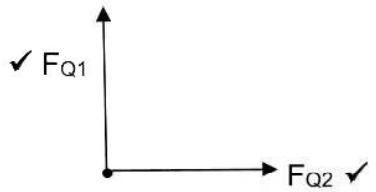
23,80 m·s^{-1} = (23,8)(3,6) ✓ km·h^{-1} = 85.6 km·h^{-1}
∴ car was speeding/*die motor oorskry die spoedgrens* ✓ (6)

6.6 INCREASE/*NEEMTOE* ✓ (1)
[14]

QUESTION/*VRAAG 7*

7.1 The (magnitude) of the electrostatic force exerted by one (point) charge on another (point) charge is directly proportional to the product of the charges ✓ and inversely proportional to the square of the distance between them. ✓
Die grootte van die elektrostatiese krag wat een (punt)lading op 'n ander (punt)lading uitoefen, is direk eweredig aan die produk van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. (2)

7.2



(2)

7.3 $F = \frac{kQ_1Q_2}{r^2}$ ✓

$F_{Q1} = \frac{(9\times10^{9})(4\times10^{-9})(5\times10^{-9})}{(1\times10^{-2})^2}$ ✓ ✓ $= 1{,}8\times10^{-3}$ N

$F_{Q2} = \frac{(9\times10^{9})(2\times10^{-9})(5\times10^{-9})}{(1\times10^{-2})^2}$ ✓ $= 9{,}0\times10^{-4}$ N

$R^2 = (1{,}8\times10^{-3})^2 + (9{,}0\times10^{-4})^2$ ✓ (mark for Pyth/*punt vir Pyth*)

$R =$ 2,01 x 10^{-3} N ✓ (5)

7.4 $E = \frac{kQ}{r^2}$ ✓

$E_{Q2} = \frac{(9\times10^{9})\times(2\times10^{-9})}{(50\times10^{-3})^2}$ ✓= 7 200 N·C^{-1} right/*regs*

$E_{Q3} = \frac{(9\times10^{9})\times(5\times10^{-9})}{(40\times10^{-3})^2}$ ✓= 28 125 N·C^{-1} right/*regs*

E_{net} = 7 200 + 28 125 ✓
= 35 325 N·C^{-1} right/*regs* ✓ (mark for magnitude AND direction/*punt vir grootte EN rigting*) (5)
[14]

QUESTION/*VRAAG* 8

8.1.1 The potential difference across a conductor is directly proportional to the current in the conductor at constant temperature. ✓✓

Die potensiaalverskil oor 'n geleier is direk eweredig aan die stroom in die geleier by konstante temperatuur. (2)

8.1.2 $\frac{1}{R_P} = \frac{1}{R_4} + \frac{1}{R_8} + \frac{1}{R_{12}}$ ✓

$\frac{1}{R_P} = \frac{1}{4} + \frac{1}{8} + \frac{1}{12}$ ✓

$R_P = 2{,}18\ \Omega$ ✓ (3)

8.1.3

V = I R ✓		4 Ω : I = 3 A
12 = I(2,18) ✓	OR/*OF*	8 Ω : I = 1,5 A ✓✓
I = 5,50 A		12Ω : I = 1 A
		I = 5,50 A
ε = V + I r ✓	OR/*OF*	$V_{lost/verloor}$ = Ir ✓
16,5 = 12 +5,5r✓		16,5 – 12 = 5,5r ✓
r = 0,82 Ω ✓ (0,818 Ω)		r = 0,82 Ω ✓

(5)

8.2.1 Power is the rate at which work is done. ✓✓
Drywing is die tempo waarteen arbeid verrig word.
OR/*OF*
Power is the rate at which energy is expended. ✓✓
Drywing is die tempo waarteen energie oorgedra word. (2)

8.2.2 $P = \frac{V^2}{R}$ ✓

$= \frac{220^2}{55}$ ✓

= 880 W ✓ (3)

8.2.3 cost = kW x time x unit cost / *Koste = kW x eenheidskoste*
80 = 0,880 x t x 1,24 ✓
t = 73,31 hours/*ure* ✓ (2)
[17]

QUESTION/*VRAAG* 9

9.1.1 Slip rings/*Sleepringe* ✓ (1)

9.1.2 (Carbon) Brush(es)/*(koolstof)Borsel(s)* ✓ (1)

9.2 Maintains electrical contact with the slip rings OR to take current out / in the coil. ✓
Behou elektriese kontak met die sleepringe OF om die stroom uit / in die spoel te neem. (1)

9.3 Mechanical to electrical energy✓/*Meganiese na elektriese energie* (1)

9.4 1½ ✓ (1)

9.5 OPTION/*OPSIE 1*:

$f = \frac{1}{T}$ ✓

$= \frac{1}{0,02}$ ✓

= 50 Hz ✓

OPTION/*OPSIE 2*:

$f = \frac{number\ of\ cycles/aantal\ \ siklusse}{time/tyd}$

$= \frac{1,5}{0,03}$ ✓✓

= 50 Hz ✓ (3)

9.6 PARALLEL TO/*PARALLEL AAN* ✓ (1)

9.7 $P_{ave/gem} = V_{rms/wgk}\, I_{rms/wgk}$ ✓

$= (\frac{V\max/maks}{\sqrt{2}})\ (\frac{I\max/maks}{\sqrt{2}})$ ✓

$= (\frac{311}{\sqrt{2}})\ (\frac{21,21}{\sqrt{2}})$ ✓✓

= 3298,16 W ✓ (5)

[14]

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QUESTION/*VRAAG* 10

10.1 The process whereby electrons are ejected from a metal surface when light of suitable frequency is incident/shining on that surface. ✓✓

Dis die proses waardeur elektrone uit 'n metaaloppervlak vrygestel word wanneer lig van geskikte frekwensie invallend op die oppervlak is. (2)

10.2 $E = \frac{hc}{\lambda}$ ✓

$E = \frac{(6{,}63\times10^{-34})(3\times10^{8})}{300\times10^{-9}}$ ✓

$E = 6{,}63\times10^{-19}\text{ J}$

$E < W_0$ $(7{,}42 \times 10^{-19}\text{ J})$
∴ The ammeter will not show a reading. ✓ (3)
Die ammeter sal nie 'n lesing gee nie.

10.3.1

$E = W_0 + E_{k(max/maks)}$
$E = W_0 + \frac{1}{2}mv^2_{max/maks}$ ✓ Either one/*Enige een*
$9\times10^{-19} = 7{,}42\times10^{-19}$ ✓ $+ \frac{1}{2}(9{,}11\times10^{-31})v^2_{max/maks}$ ✓
$v_{max/maks} = 588\,958{,}04\text{ m·s}^{-1}$ ✓ $(5{,}89\times10^{5}\text{ m·s}^{-1})$ (4)

10.3.2 INCREASES/*VERMEERDER* ✓ (1)
[10]

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