

NATIONAL DEPARTMENT OF EDUCATION**PHYSICAL SCIENCE (HG) – PAPER 1 / NATUUR- en SKEIKUNDE (HG) – VRAESTEL 1****QUESTION 1 / VRAAG 1**

1:1	C	1.2	A	1.3	D	1.4	B	1.5	A
1.6	B	1.7	D	1.8	B	1.9	C	1.10	A
1.11	B	1.12	D	1.13	C	1.14	B	1.15	A

[15 x 4 = 60]**QUESTION 2 / VRAAG 2**

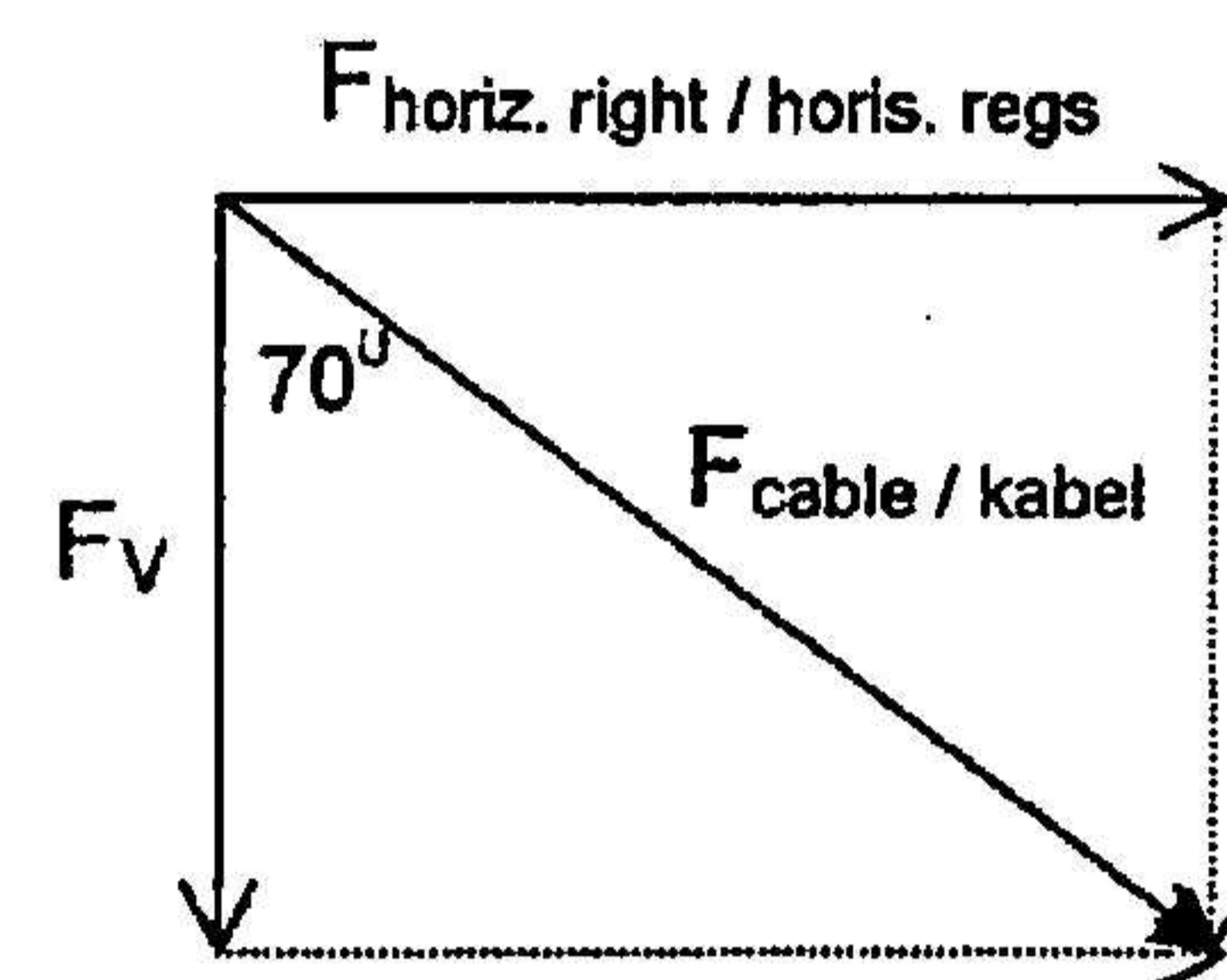
2.1

$$\frac{F_{\text{horiz. right / horis. regs}}}{F_{\text{cable / kabel}}} = \sin 70^\circ$$

$$F_{\text{horiz. right / horis. regs}} = F_{\text{cable / kabel}} \cdot \sin 70^\circ$$

$$= 1110 \cdot \sin 70^\circ$$

$$= 1043 \text{ N}$$



$$\frac{F_{\text{horiz. right / horis. regs}}}{F_{\text{cable / kabel}}} = \cos 20^\circ$$

$$F_{\text{horiz. right / horis. regs}} = F_{\text{cable / kabel}} \cdot \cos 20^\circ$$

$$= 1110 \cdot \cos 20^\circ$$

$$= 1043 \text{ N}$$

$$F_{\text{horiz. right / horis/regs}} = 1110 \cdot \sin 70^\circ = 1043 \text{ N}$$

OR / OF

$$F_{\text{horiz. right / horis/regs}} = 1110 \cdot \cos 20^\circ = 1043 \text{ N}$$

$$\frac{F_{\text{hor.}}}{\sin 70^\circ} = \frac{1110}{\sin 90^\circ}$$

$$F_{\text{hor}} = 1043 \text{ N}$$

If $\sin 20^\circ$ used
As $\sin 20^\circ$ gebruik:

$$\frac{1}{4}$$

mark according to
memo

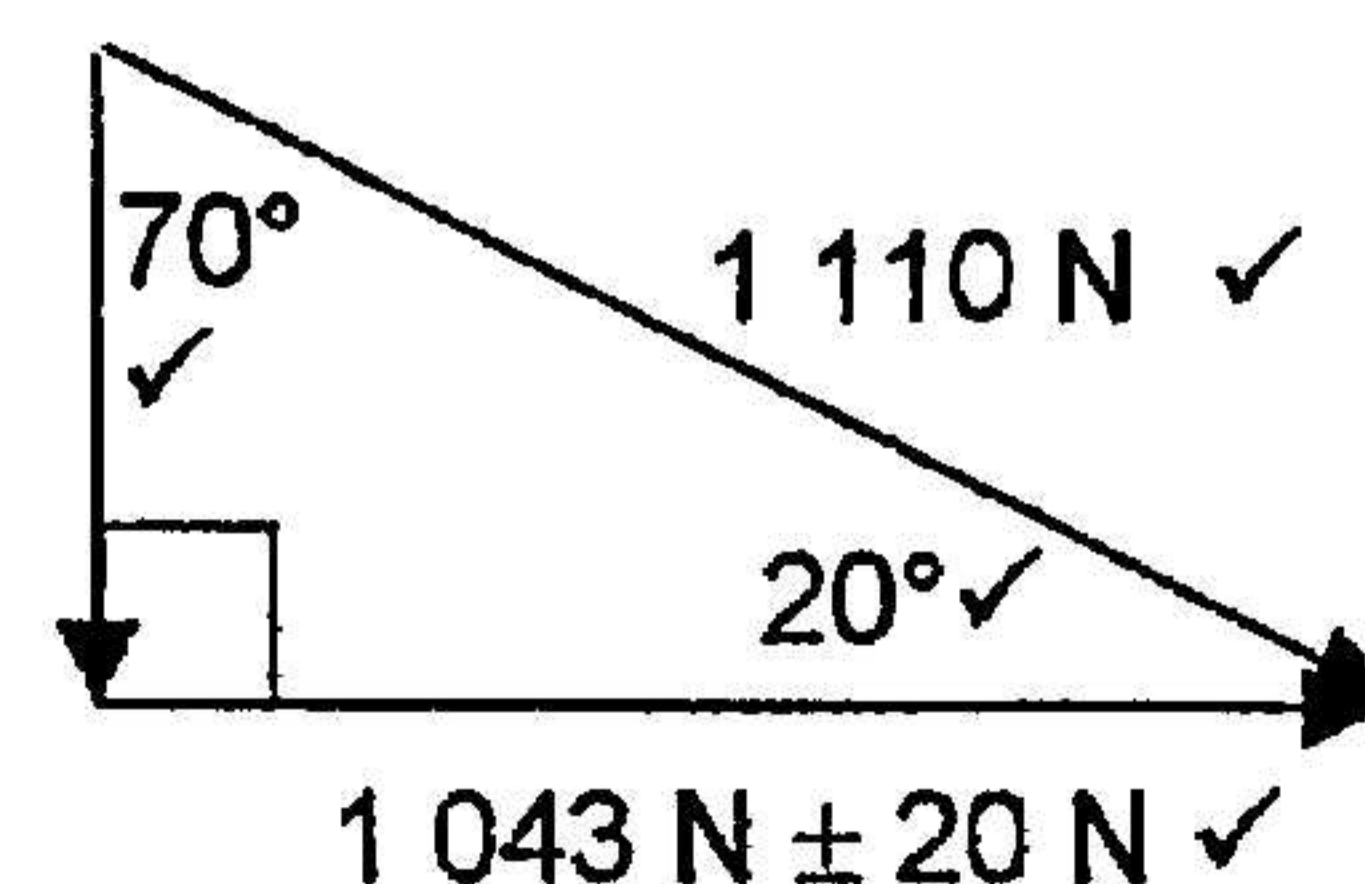
ONLY / SLEGS

$$1110 \cdot \sin 70^\circ = 1043 \text{ N} \rightarrow 4 \text{ marks}$$

If / as : $\sin 70^\circ = 0,93$
 $F_{\text{horiz. right / horis/regs}} = 1032,3 \text{ N}$

$$F_h = 1043 \text{ N} \cdot \frac{1}{4}$$

(4)

CONSTRUCTION OPTION / KONSTRUKSIE OPSIE

Positive marking from 2.1 / positiewe nasien vanaf 2.1 (1 043 N)

2.2

F on cable / F op kabel = 1 043 N ✓
 F on stay wire / F op ankerdraad = 1 043 N ✓
OR / OF 1 043N ✓✓ **OR** the force is 1 043 N ✓✓

1 043 N on both ✓✓
 1 043 N op beide ✓✓

(2)

2.3

For equilibrium / Vir ewewig
 $F_{\text{horiz. left / horis. links}} = F_{\text{horiz. right / horis. regs}}$
 $2000 \cdot \sin \theta = 1043$
 $\theta = 31,43^\circ$ ✓

(3)

$\frac{\sin \theta}{1043} = \frac{\sin 90^\circ}{2000}$
 $\theta = 31,43^\circ$ ✓

$\theta = 31,4^\circ$ ✓

$\frac{\sin 70^\circ}{2000} = \frac{\sin \theta}{1110}$
 $\theta = 31,43^\circ$ ✓

2.4

$$F_{\text{down}} = F_g + F_T \cdot \cos 31,43^\circ + F_C \cdot \cos 70^\circ$$

$$= (150 \cdot 10) + (2000 \cdot \cos 31,43^\circ) + (1110 \cdot \cos 70^\circ)$$

$$= 1500 + 1706,56 + 379,64$$

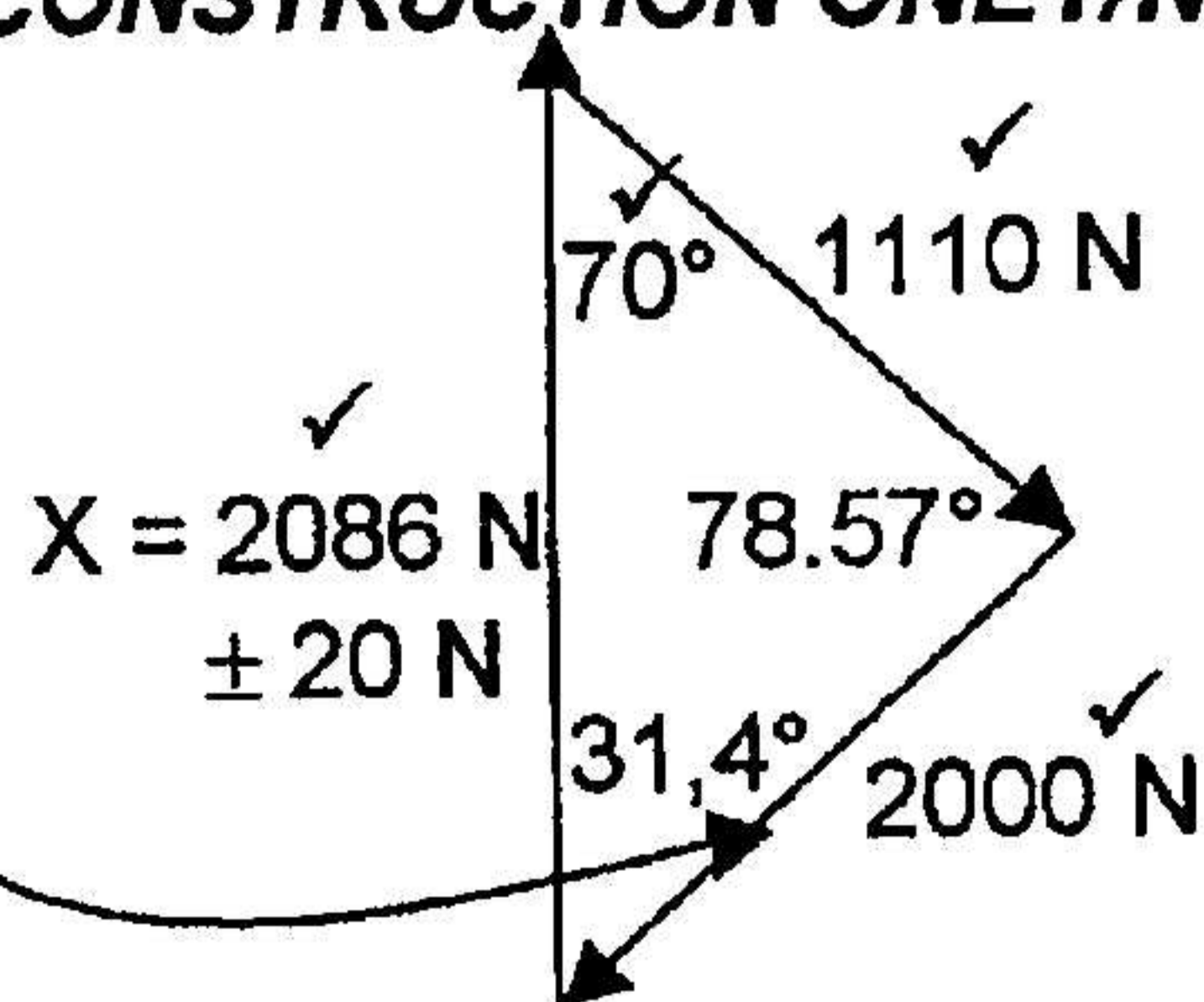
$$= 3586,62\text{N}$$
 ✓

alternatives
 alternatiewe

$\frac{1043}{\tan 31,43^\circ}$ OR / OF
 $1043 \times \tan 58,57^\circ$ OR / OF
 $2000 \times \sin 58,57^\circ$
 $2000^2 = F_v^2 + 1043^2$

$\frac{1043}{\tan 70^\circ}$ OR / OF
 $1043 \times \tan 20^\circ$ OR / OF
 $1110 \times \sin 20^\circ$
 $1110^2 = F_v^2 + 1043^2$

CONSTRUCTION ONLY / NET KONSTRUKSIE (max/maks : 4)



Vertical can also be downward
 Vertikaal kan ook afwaarts wees

OR/OF caculate with sine rule
 bereken met sinusreël

$$F_{\text{vert}} = X + F_g$$

$$= 2086 + 1500 = 3586\text{N} \pm 20\text{N}$$

$$\frac{\sin 70^\circ}{2000} = \frac{\sin 78,57^\circ}{X}$$

$$X = 2086,1\text{N}$$

$$\therefore F_{\text{vert}} = F_g + X$$

$$= 1500 + 2086$$

$$= 3586,1\text{N}$$

GENERAL COMMENT ABOUT DIRECTION (Q 3.2 ; 5.2.2 ; 7.2)
 If answer is incorrect, mark for direction is automatically lost.
 Indien antwoord verkeerd is, word punt vir rigting outomaties verloor.

QUESTION 3 / VRAAG 3

3.1

$$\bar{v}_{0-5} = \frac{\Delta s}{\Delta t} = \frac{90}{5} = 18 \text{ m.s}^{-1}$$

$$\bar{v}_{0-5} = \frac{s}{t} = \frac{90}{5} = 18 \text{ m.s}^{-1}$$

$$\bar{v}_{0-5} = \frac{90}{5} = 18 \text{ m.s}^{-1}$$

$$\bar{v} = 18 \text{ m.s}^{-1}$$

$$\bar{v}_{0-5} = \frac{\Delta s}{\Delta t} = \frac{510-600}{5} = \frac{-90}{5} = -18 \text{ m.s}^{-1}$$

$$\bar{v}_{0-5} = \frac{\Delta s}{\Delta t} = \frac{-90}{-5} = 18 \text{ m.s}^{-1}$$

(4)

3.2

$$\therefore a_{0-10} = \frac{\Delta v}{\Delta t} = \frac{14-18}{5} = -0,8 \text{ m.s}^{-2}$$

$$a = \frac{v}{t}$$

0 marks

or $a = \frac{v-u}{t}$

$= 0,8 \text{ m.s}^{-2}$; opposite direction to motion
 teenoorgestelde rigting van beweging

$$s = \frac{u+v}{2} t = \frac{18+14}{2} \times 5 = 80 \text{ m}$$

$$v^2 = u^2 + 2as$$

$$14^2 = 18^2 + 2 \cdot a \cdot 80$$

$$a = -0,8 \text{ m.s}^{-2}$$

$= 0,8 \text{ m.s}^{-2}$ opposite to direction of motion
 teenoorgestelde rigting van beweging

only if 80 m is calculated as shown
 slegs as 80 m bereken is soos getoon
 otherwise / anders max / maks 4/6

IF / AS
 u & v swopped loose marks for subst. & answer & direction
 \therefore 2 marks max

For 3.2 and 3.3 / Vir 3.2 en 3.3
Backwards can be taken as positive - then make sure the signs are reversed/
terugwaarts kan aanvaar word indien positief – maak dan seker die tekens is omgeruil.

- NB: Calculations ends with / Berekening eindig met**
- | | |
|---|---------|
| 1. $-0,8 \text{ m.s}^{-2}$ | 5 marks |
| 2. $-0,8 \text{ m.s}^{-2}$ opposite direction to motion | 5 marks |
| 3. $-0,8 \text{ m.s}^{-2}$ in direction of motion | 5 marks |
| 4. $0,8 \text{ m.s}^{-2}$ in direction of motion | 4 marks |

To 3.3

(6)

From / van 3.1

From / van 3.2

3.3 $v_{11,5} = u_{0,5} + at$ ✓
 $= 18 + (-0,8)(9)$ ✓
 $= 10,8 \text{ m.s}^{-1}$ ✓

$v_{11,5} = u_{5,10} + at$ ✓
 $= 14 + (-0,8)(4)$ ✓
 $= 10,8 \text{ m.s}^{-1}$ ✓

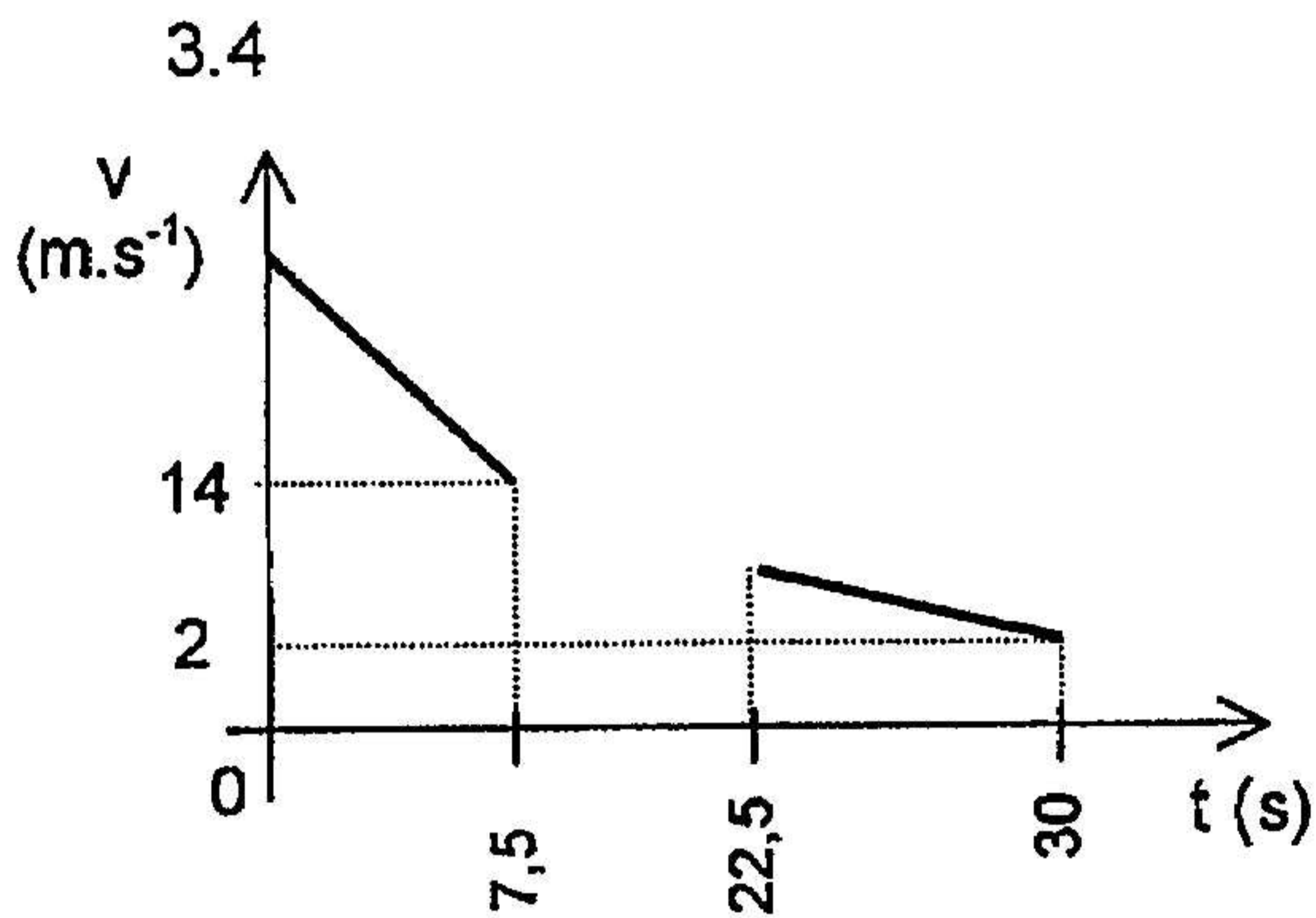
combinations for u & t
 18 & 9
 16 & 6,5
 14 & 4
 12 & 1,5

velocity at t=0
 $s = ut + \frac{1}{2}at^2$
 $90 = (u \cdot 5) + \frac{1}{2}(-0,8 \cdot 5^2)$
 $u = 20 \text{ m.s}^{-1}$

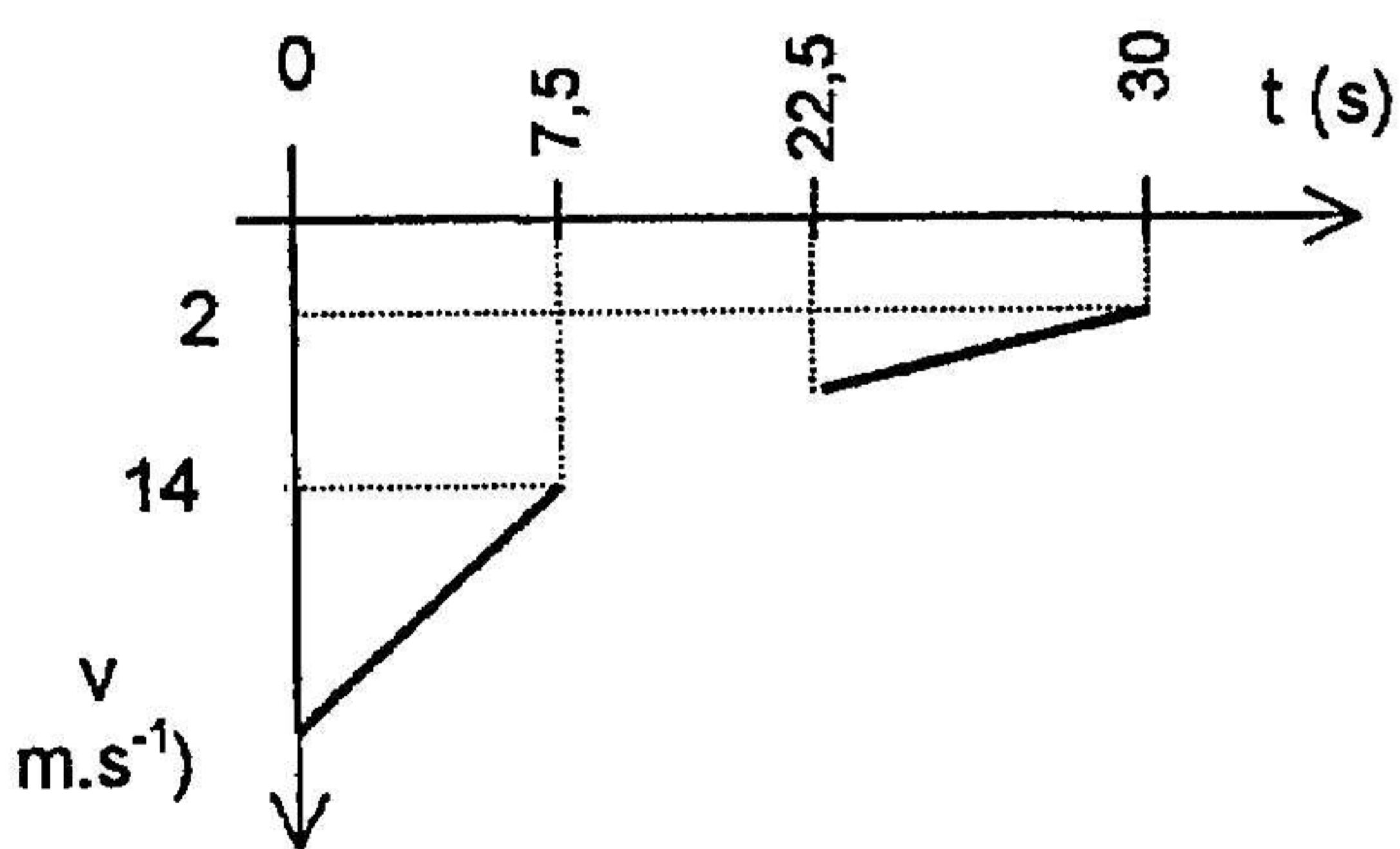
need not be calc.

$v_{11,5} = u + at$ ✓
 $20 + (-0,8)(11,5)$ ✓
 $= 20 - 9,2 = 10,8 \text{ m.s}^{-1}$ ✓

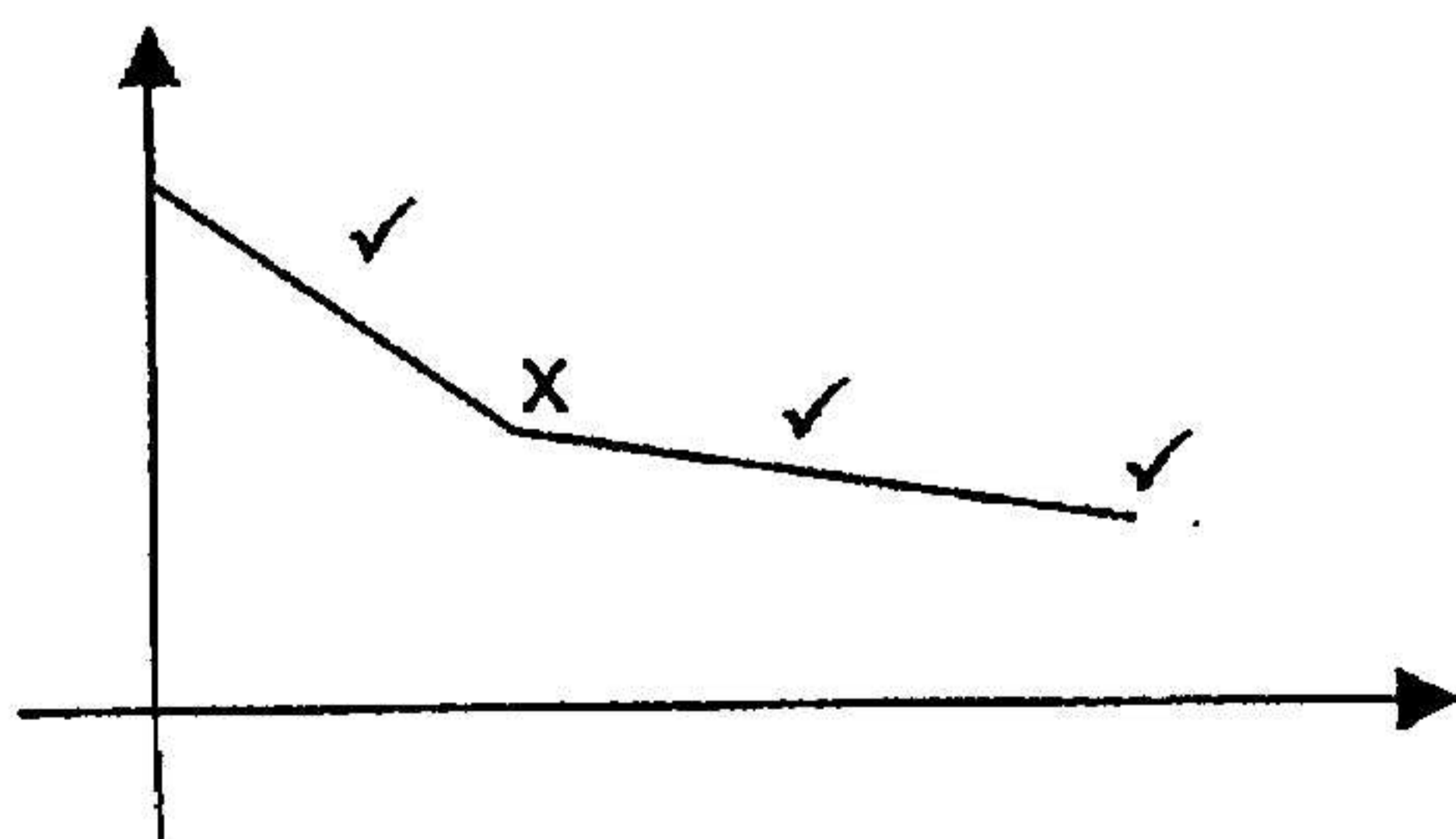
(5)



- ✓ straight line with negative gradient (between 0 and 7,5)
reguit lyn met negatiewe gradiënt (tussen 0 en 7,5)
- ✓ straight line with smaller negative gradient (22,5 to 30)
reguit lyn met kleiner negatiewe gradiënt (tussen 0 en 7,5)
- ✓ second line initial velocity < first line final velocity
tweede lyn beginsnelheid < eerste lyn eindsnelheid
- ✓ both lines above or below time axis (not intersecting time axis)
beide lyne of bo of onder tyd as (mag tydas nie sny nie)



- ✓ straight line with positive gradient (between 0 and 7,5)
reguit lyn met positiewe gradiënt (tussen 0 en 7,5)
- ✓ straight line with smaller positive gradient (22,5 to 30)
reguit lyn met kleiner positiewe gradiënt (tussen 0 en 7,5)
- ✓ second line initial velocity > first line final velocity
tweede lyn beginsnelheid > eerste lyn eindsnelheid
- ✓ both lines above or below time axis (not intersecting time axis)
beide lyne of bo of onder tyd as (mag tydas nie sny nie)



(4)

QUESTION 4 / VRAAG 4

4.1 Down +ve

$$s = ut + \frac{1}{2}at^2 \checkmark$$

$$\checkmark \quad \checkmark \quad \checkmark$$

$$80 = 0 + \frac{1}{2}(10)t^2$$

$$t = 4s \checkmark$$

s & a
same
sign

$$s = \frac{1}{2}at^2$$

$$\checkmark \quad \checkmark$$

$$80 = \frac{1}{2} \cdot 10 \cdot t^2$$

$$t = 4s \quad \left(\frac{3}{5}\right)$$

The only correct
equation is :

$$s = ut + \frac{1}{2}at^2$$

Therefore all the other
options should get zero
-!!! We will however this
year be lenient – mark
the memo

If ut cancelled in first equation (5)
As ut gekanselleer in eerste
vergelyking (5)

$$s = ut + \frac{1}{2}at^2 \checkmark$$

$$\checkmark \quad \checkmark \quad \checkmark$$

$$80 = \frac{1}{2} \cdot 10 \cdot t^2$$

$$t = 4s \checkmark \quad \left(\frac{4}{5}\right)$$

$$v^2 = u^2 + 2as$$

$$= 0 + 2 \cdot 10 \cdot 80$$

$$v = 40 \text{ m.s}^{-1}$$

$$v = u + at \checkmark$$

$$\checkmark \quad \checkmark \quad \checkmark$$

$$40 = 0 + 10 \cdot t$$

$$t = 4s \checkmark$$

$$s = \frac{u+v}{2}t \checkmark$$

$$\checkmark \quad \checkmark \quad \checkmark$$

$$80 = \frac{0+40}{2}t$$

$$t = 4s \checkmark$$

If 0 left out in 4.1 – maximum 4

As 0 uitgelaat in 4.1 – maksimum 4

(5)

4.2

time taken to reach ground = $(4 - 1,5) = 2,5 \text{ s}$

$$s = ut + \frac{1}{2}at^2 \checkmark$$

$$\checkmark \quad \checkmark \quad \checkmark \quad \checkmark$$

$$80 = u(2,5) + \frac{1}{2}(10)(2,5)^2$$

$$u = 19,5 \text{ m.s}^{-1} \checkmark$$

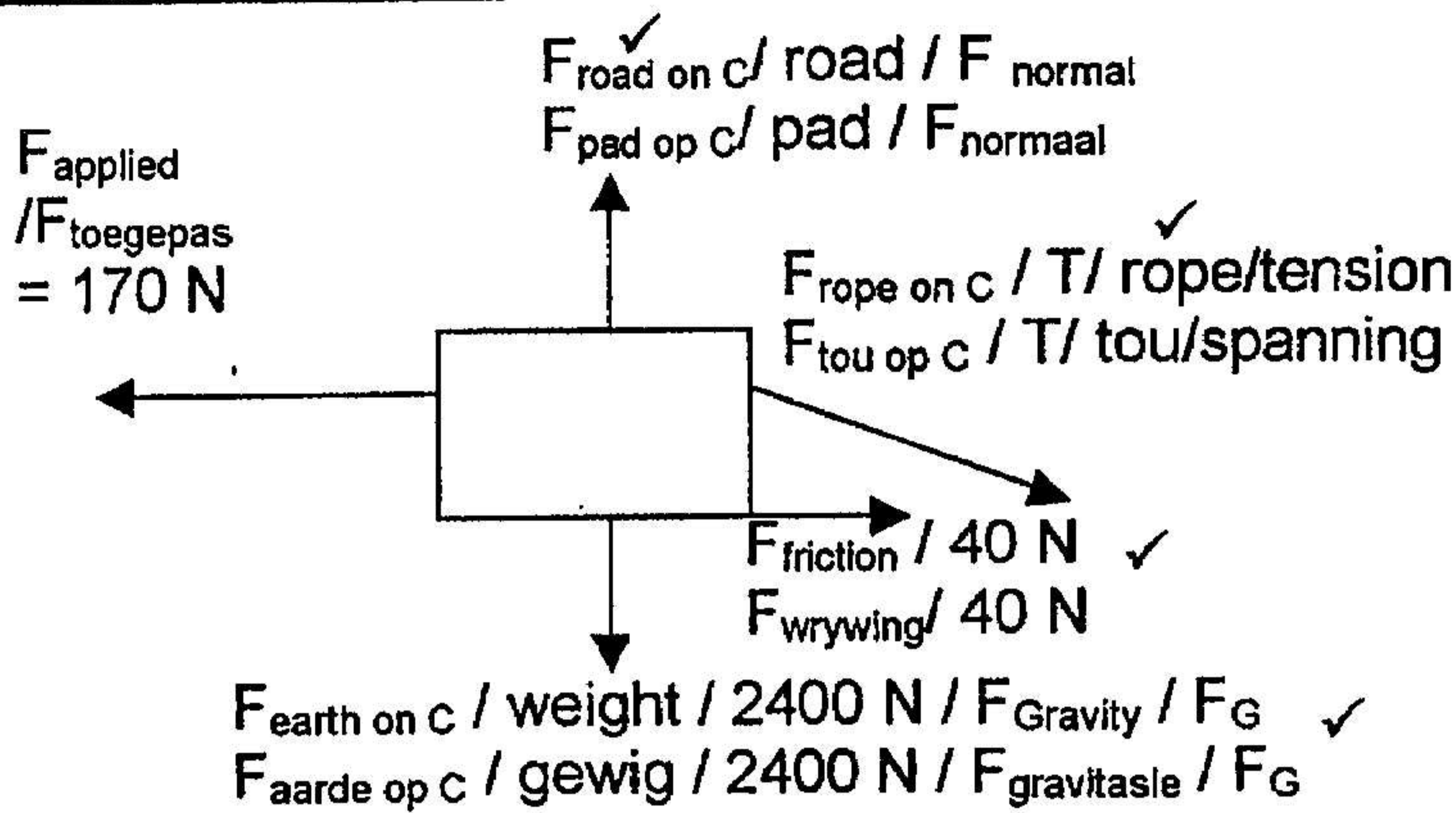
If "t" incorrect: --> 3 marks

(6)

[11]

QUESTION 5 / VRAAG 5

5.1



✓ label + direction of each force
 byskrif + rigting
 Arrows missing: penalise max 1 mark
 Pyle nie daar : penaliseer maksimum 1 punt

Not : W, F_{reaction}

(4)

If : $F_{\text{hor. rope}}$ given – no mark given (only part of force)
 As: $F_{\text{hor. tou}}$ gegee – geen punt (slegs deel van krag)

5.2.1

left positive / links positief
 $F_{\text{res}} = F_{\text{applied}} + F_{\text{friction}} + F_{\text{horiz. comp of rope on C}}$
 $ma = 170 + (-40) + (-T \cdot \cos 30^\circ)$
 $240 \times 0,3 = 170 - 40 - T \cdot \cos 30^\circ$
 $T = \frac{58}{\cos 30^\circ}$
 $= 66,97 \text{ N}$

(8)

$F_{\text{res}} = ma = 240 \cdot 0,3 = 72 \text{ N}$ $170 \text{ N} - 40 \text{ N} = 130 \text{ N}$
 $F_{\text{rope/tou}} = T \cdot \cos 30^\circ = (130 - 72)$
 $= 58 \text{ N}$
 $T = 66,97 \text{ N}$

$F_{\text{res}} = ma = 240 \cdot 0,3 = 72 \text{ N}$
 $F_{\text{res}} = F_A - F_f - F_H$
 $72 = 170 - 40 - F_H$
 $F_H = 58 \text{ N}$
 $T \cos 30^\circ = 58$
 $T = 66,97 \text{ N}$

Only : 58 N as final answer $\frac{5}{8}$

$F_{\text{res}} = ma$ (for system – both bodies) (vir sisteem – beide liggame)
 $170 - 40 + F_{\text{friction / wrywing}} = 320 \cdot 0,3$ (320 = 240 + 80)
 $F_{\text{friction / wrywing}} = (320)(0,3) + 40 - 170$
 $= -34 \text{ N}$
 $F_{\text{friction / wrywing}} \text{ (on W / op W)} = 34 \text{ N (to the right / na regs)}$
 $F_{\text{res(W)}} = ma$
 $F_{\text{hor. (rope/tou)}} - 34 = 80 \cdot 0,3$
 $F_{\text{hor. (rope/tou)}} = 58 \text{ N}$

Only : 58 N as final answer $\frac{5}{8}$

Adding the two masses (320 kg)
 Die twee massa bymekaar
 (320 kg) : $\frac{5}{8}$

$F_{\text{rope/tou}} = \frac{58}{\cos 30^\circ} = 66,7 \text{ N}$

5.2.2

positive marking **58 N** from 5.2.1 / positiewe nasien met 58 N vanaf 5.2.1
 positive marking with **66,97 N** also/ positiewe nasien met 66,97 N ook

Wood W / stomp W

$$F_{res} = F_{hor. component} \text{ of rope on } W + F_{friction}$$

$$F_{res} = F_{hor. komp. van} \text{ tou op } W + F_{wrywing}$$

$$(80 \times 0,3) = 58 + F_{friction / wrywing}$$

$$F_{friction / wrywing} = 24 - 58$$

$$= -34 \text{ N } \checkmark$$

$$= 34 \text{ N, right } \checkmark$$

(opp. to direction of motion)

teenoorgestelde rigting van beweging

$$F_{res} = F_{H \text{ rope on } W / \text{ tou op } W} - F_f$$

$$80 \times 0,3 = 58 - F_f$$

$F_f = 34 \text{ N}$, \checkmark right / regs \checkmark
 (opp. to direction of motion)
 teenoorgestelde rigt. beweging

**320 kg penalized 3 marks
 only once in question 5**

**320 kg slegs 1 keer met
 3 punte in vraag 5
 geenaliseer**

$$F_{res} = ma = 320 \cdot 0,3 = 96 \text{ N}$$

$$F_{res} = F_{app} + F_f$$

$$96 = 170 + F_f$$

$$F_f = -74 \text{ N}$$

$$= 74 \text{ N right / regs } \checkmark$$

$$F_{frict / wrywing}(\text{wood / stomp}) = 74 \text{ N} - 40 \text{ N} = 34 \text{ N } \checkmark$$

$\frac{3}{6}$

Any other value:

Enige ander waarde: $\frac{3}{6}$

If 34 N was calculated in 5.2.1 and only answer is supplied with correct direction :

As 34 N reeds bereken in 5.2.1 en slegs antwoord word hier gegee met regte rigting: $\frac{6}{6}$

(6)
[18]

QUESTION 6 / VRAAG 6

6.1

Every particle in the universe exerts a gravitational force on every other particle and the force is directly proportional to the product of their masses ✓ and is inversely proportional to the square of the distance between them. ✓✓

Elke deeltjie in die heelal oefen 'n gravitasiekrag op elke ander deeltjie uit en die krag is direk eweredig aan die produk van hulle massas ✓ en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle ✓✓ (4)

If bodies used and not particles – **between their centres must be mentioned**
As liggeme en nie deeltjies gebruik word nie – **tussen hulle middelpunte moet genoem word.**

6.2 English version

$$\frac{GM_E M_S}{x^2} = \frac{GM_M M_S}{(r-x)^2}$$

$$\therefore \frac{GM_E}{x^2} = \frac{GM_M}{(r-x)^2}$$

Afrikaans weergawe

$$\frac{GM_A M_R}{x^2} = \frac{GM_M M_R}{(r-x)^2}$$

$$\therefore \frac{GM_A}{x^2} = \frac{GM_M}{(r-x)^2}$$

$$\frac{GM_E M_S}{x^2} = mg \left(\frac{1}{4} \right)$$

OR ✓ cancelling M_S

Subscripts can vary but must be linked to the distances – subscripts must be consistent

Onderskrifte kan varieer maar moet gekoppel word aan die afstande – onderskrifte moet konsistent wees

OF ✓ kanselling M_R

1 equation wrong : max 2
1 vergelyking verkeerd : maks 2

(4)

[8]

QUESTION 7 / VRAAG 7

7.1

Impulse is the product of the force and the time of application of the force
 OR change in momentum

Impuls is gelyk aan die produk van die krag en die tyd wat die krag toegepas
 word OF verandering in momentum

force applied in a certain time ✓✓
 krag toegepas in 'n sekere tyd ✓✓

force times time ✓
 krag maal tyd ✓

rate of change in momentum – 0
 tempo van verandering in momentum - 0

(2)

7.2

<p>away from bat + weg van kolf +</p> $F_{res} \Delta t = m(v - u)$ $= (0,175)[(30 - (-12))]$ $= 7,35 \text{ kg.m.s}^{-1}, \text{ away from bat}$ <p>opposite direction / towards bowler weg van kolf / teenoorgestelde rigting / na bouler</p>	<p>towards bat + na kolf toe +</p> $F_{res} \Delta t = m(v - u)$ $= (0,175)[(-30 - (12))]$ $= -7,35 \text{ kg.m.s}^{-1}$ $= 7,35 \text{ kg.m.s}^{-1}, \text{ away from bat}$ <p>opposite direction / towards bowler weg van kolf / teenoorgestelde rigting / na bouler</p>
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(5)

If u and v swapped then loose mark for subst. & answer & direction
 As u en v omgeruil is, word punte vir subst., antwoord en rigting verloor

Unit : N.s also acceptable
 Eenheid : N.s ook korrek

$\frac{2}{5}$

7.3

$$F_{res} \Delta t = \Delta p$$

$$F(0,05) = 7,35$$

$$F = 147 \text{ N}$$

$$F_{res} \Delta t = \Delta p$$

$$F(0,05) = -7,35$$

$$F = -147 \text{ N}$$

$$v = u + at$$

$$30 = -12 + a(0,05)$$

$$a = 840 \text{ m.s}^{-2}$$

$$F_{res} = ma = 0,175 \cdot 840$$

$$= 147 \text{ N}$$

negative sign need not be carried from 7.2
 negatiewe teken hoef nie ooraedra te word van 7.2 nie

(3)
[10]

QUESTION 8 / VRAAG 8

8.1 backwards / terugwaarts (to the left / links) ✓✓ (2)

(west or her left is not acceptable / wes of haar linkerkant is nie aanvaarbaar nie)

8.2 ✓ Conservation of (linear) momentum / Behoud van (liniêre) momentum
 ✓ Conservation of Mechanical energy / Behoud van meganiiese energie
 NOT Conservation of energy (2)

8.3 To reach point Q without the parcel (10 kg) Lindi should have :
 $\therefore (E_p + E_k)_X = (E_p + E_k)_Y$ Om Q sonder pakkie te bereik:

$$0 + \frac{1}{2}(70)v_x^2 = (70 \times 10 \times 1,8) + 0$$

$$v_x^2 = 36 \text{ m.s}^{-1}$$

$$v_x = 6 \text{ m.s}^{-1}$$

Deur die pakkie te gooi moet Lindi se snelheid gelyk wees aan 6 m.s^{-1}
 By throwing 10 kg parcel, Lindi should get $v_{\text{final}} = 6 \text{ m.s}^{-1}$
 $v_{\text{initial}} = 5 \text{ m.s}^{-1}$
 $m_1v_1 + m_2v_2 = mu$ OR $p_{\text{before}} = p_{\text{after}}$
 $p_{\text{voor}} = p_{\text{na}}$

$$(70)(6) + (10)v_2 = (80)(5)$$

$$v_2 = \frac{400 - 420}{10}$$

$$= -2 \text{ m.s}^{-1}$$

magnitude is $= 2 \text{ m.s}^{-1}$

If given and 0's not in next step :
 As gegee en 0'e nie in volgende stap: $\frac{5}{5}$

$$v = \sqrt{2gs}$$

0marks

Start with
 $E_k(X) = E_p(Y)$

OR

$$\frac{1}{2}mv^2 = mgh$$

OR

$$v = \sqrt{2gh}$$

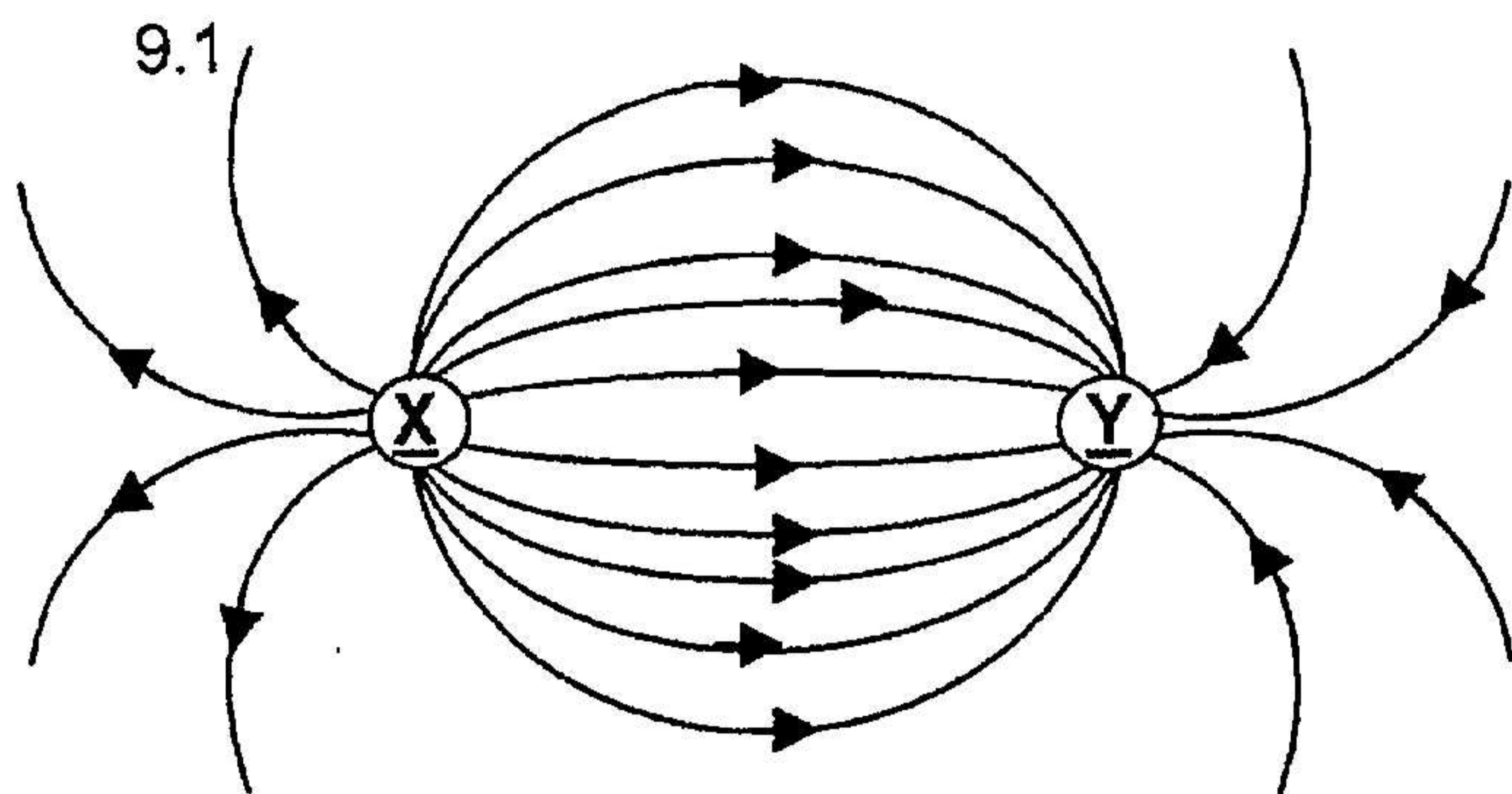
OR

This step first without 0's:
 Hierdie stap eerste sonder die 0'e :

$$\frac{3}{5}$$

(9) [13]

QUESTION 9 / VRAAG 9



- ✓ direction in between charge
 - ✓ shape in between and touching
 - ✓ direction outside charge
 - ✓ shape outside and touching
 - If not touching: -1 max.**
 - ✓ rigting tussen die ladings
 - ✓ vorm tussen die ladings en moet ladings raak
 - ✓ rigting buite die ladings
 - ✓ vorm buite die ladings en moet raak
 - Indien nie raak: -1 maks**
- (4)

9.2

$$F = \frac{kQ_1Q_2}{r^2}$$

$$= \frac{(9 \times 10^9) (5 \times 10^{-9}) (8 \times 10^{-9})}{(0,02)^2}$$

$$= 9 \times 10^{-4} \text{ N attraction / towards Y / to the right}$$

aantrekkend / na Y / na regs

neg. sign of charge is substituted: acceptable
 Neg. teken van lading ingestel: aanvaarbaar

Mark direction independant of calculation. Sien rigting onafhanklik van berekening na.

Incorrect conversion (r) mark answer positively
 Verkeerde omskakeling(r) sien antw. positief na $\frac{5}{6}$

Square of r in fomula but no square in subst. and wrong answer.
 Kwadraat van r in fomula maar nie in subst. nie en verkeerde antw. $\frac{4}{6}$

wrong fomula verkeerde fomule : 0

Conversion correct but the square is omitted in subst. however answer and direction correct
 Omskakeling korrek, kwadraat weggelaat in subst. maar antwoord korrek en rigting korrek $\frac{5}{6}$

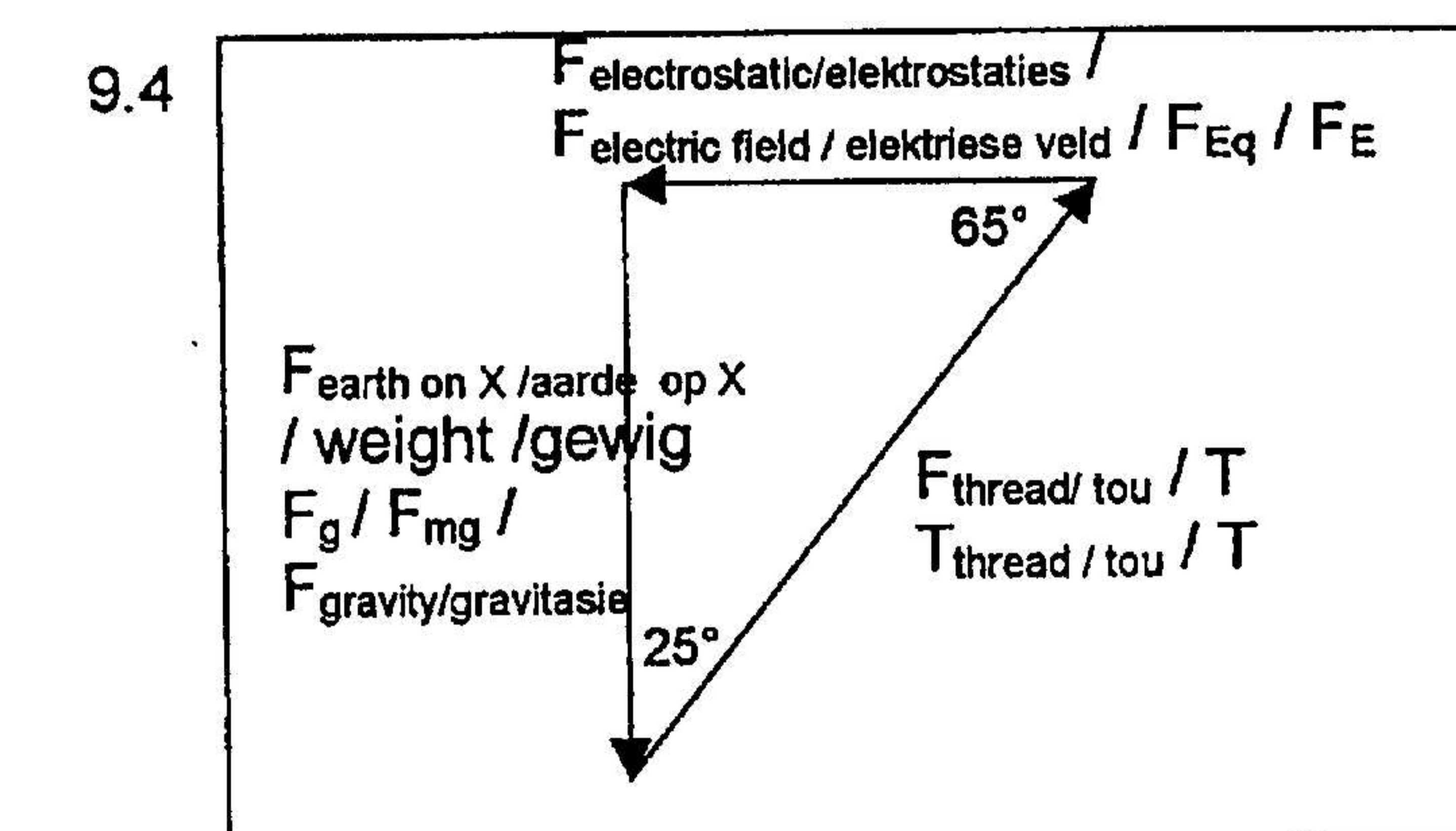
(6)

9.3

new charge / nuwe lading = $\frac{(-8 + 5) \times 10^{-9}}{2}$

$$= -1,5 \times 10^{-9} \text{ C } (-1,5 \text{ nC})$$

Answer only
 2 marks
 Slegs antwoord
 2 punte



- ✓ label and correct direction of each force / byskrif en korrekte rigting vir elke krag
- ✓ angle / hoek
- arrows missing, penalise max. 1 mark / pyle makeer, penaliseer maks. 1 punt

NOT: W for weight or F_repulsion
 Loose marks for labels

Force diagram given, not triangle - 0 marks
 Kragtediagram geteken, nie 'n driehoek - 0 punte

(4)

9.5

$$\tan 25^\circ = \frac{F_E}{F_g} = \frac{9 \times 10^{-5}}{F_g} \quad \checkmark$$

$$F_g = \frac{9 \times 10^{-5}}{\tan 25^\circ} = 1,93 \times 10^{-4} \text{ N} \quad \checkmark$$

$$\therefore m = \frac{F_g}{g} = \frac{1,93 \times 10^{-4}}{10} = 1,93 \times 10^{-5} \text{ kg} \quad \checkmark$$

(0,019g)

$$\tan 65^\circ = \frac{F_g}{F_E} = \frac{F_g}{9 \times 10^{-5}} \quad \checkmark$$

$$F_g = (9 \times 10^{-5})(\tan 65^\circ) = 1,93 \times 10^{-4} \text{ N} \quad \checkmark$$

$$\therefore m = \frac{F_g}{g} = \frac{1,93 \times 10^{-4}}{10} = 1,93 \times 10^{-5} \text{ kg} \quad \checkmark$$

(0,019g)

$$\frac{F_g}{\sin 65^\circ} = \frac{9 \times 10^{-5}}{\sin 25^\circ} \quad \checkmark$$

$$F_g = 1,93 \times 10^{-4} \text{ N} \quad \checkmark$$

$$\therefore m = \frac{F_g}{g} = \frac{1,93 \times 10^{-4}}{10} = 1,93 \times 10^{-5} \text{ kg} \quad \checkmark$$

(0,019g)

If 10 not indicated then this mark also allocated to answer
As 10 nie aangedui is nie, word hierdie punt ook aan antw. toegeken.

Construction / 0 mark
Konstruksie

(6)
[23]

QUESTION 10 / VRAAG 10

10.1

$$R_{4\Omega} = \frac{V_{4\Omega}}{I_{A2}} \checkmark$$

$$4 = \frac{4}{I_{A2}} \checkmark$$

$$I_{A2} = 1A \checkmark$$

$$R = \frac{V_P}{I_{A2}} \checkmark$$

$$8 = \frac{8}{I_{A2}} \checkmark$$

$$I_{A2} = 1A \checkmark$$

(4)

10.2

$$I_{A2} = 1A \checkmark \checkmark$$

$$\therefore I_{16\Omega} = 0,5A$$

$$\therefore I_{A1} = 1,5A \checkmark$$

$$\frac{1}{R_p} = \frac{1}{8} + \frac{1}{16}$$

$$R_p = 5,33\Omega$$

$$R_p = \frac{V_p}{I_{cir}} \checkmark$$

$$5,33 = \frac{8}{I_{cir}} \checkmark$$

$$I_{cir/A1} = 1,5A \checkmark$$

Answer only : 1 mark
Slegs antwoord : 1 punt

$$R = \frac{V_{16\Omega}}{I_{16\Omega}} \checkmark$$

$$16 = \frac{8}{I_{16\Omega}} \checkmark$$

$$I_{16\Omega} = 0,5A \checkmark$$

$$\therefore I_{A1} = 1,5A \checkmark$$

$$1 = I \times \frac{2}{3} \checkmark$$

$$I_{A1} = \frac{1 \times 3}{2} \checkmark$$

$$= 1,5A \checkmark$$

(3)

10.3

$$R = \frac{V}{I} = \frac{20 - 8}{1,5} = 8\Omega \checkmark$$

$$R_p = 5,33\Omega \checkmark$$

$$R_{ext\ cir} = \frac{V_{ext\ cir}}{I_{cir}} = \frac{20}{1,5} = 13,33\Omega \checkmark$$

$$\therefore R = R_{ext\ cir} - R_p = 13,33 - 5,33 = 8\Omega \checkmark$$

(4)

10.4

$$emf = I(R+r) \checkmark$$

$$= IR + Ir \checkmark$$

$$24 = 20 + 1,5r \checkmark$$

$$r = 2,7\Omega \checkmark$$

$$emf = V_{cir} + V_{lost} \checkmark$$

$$24 = 20 + V_{lost} \checkmark$$

$$V_{lost} = 4V \checkmark$$

$$\therefore Ir = V_{lost} \checkmark$$

$$1,5r = 4 \checkmark$$

$$r = 2,7\Omega \checkmark$$

$$R_p = 5,33\Omega \checkmark$$

$$R_{ext.\ cir} = 5,33 + 8 = 13,33\Omega \checkmark$$

$$emf = I(R+r) \checkmark$$

$$24 = 1,5(13,33+r) \checkmark$$

$$r = 2,7\Omega \checkmark$$

$$r = \frac{V_{lost}}{I} \checkmark$$

$$= \frac{4}{1,5} \checkmark \checkmark$$

$$= 2,7\Omega \checkmark$$

(5)

10.5

From 10.2

From 10.3

$$W = I^2 R t \checkmark$$

$$= (1,5)^2 (8) (600) \checkmark$$

$$= 10800 \text{ J} \checkmark$$

$$W = V I t \checkmark$$

$$= (12)(1,5)(600) \checkmark$$

$$= 10800 \text{ J} \checkmark$$

$$W = \frac{V^2 t}{R} \checkmark$$

$$\frac{(12)^2 (600)}{(8)} \checkmark$$

$$= 10800 \text{ J} \checkmark$$

(4)

10.6 Increase $\checkmark\checkmark$ (2)

[22]

 GRAND TOTAL [200] GROOT TOTAAL