



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL SENIOR
CERTIFICATE/NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

**TECHNICAL SCIENCES: PHYSICS (P1)/
TEGNIесе WETENSKAPPE: FISIKA (V1)**

EXEMPLAR/MODEL 2016

MARKS/PUNTE: 150

**This memorandum consists of 9 pages./
Hierdie memorandum bestaan uit 9 bladsye.**

QUESTION/VRAAG 1

1.1 D ✓✓

1.2 D ✓✓

1.3 B ✓✓

1.4 D ✓✓

1.5 D ✓✓

1.6 C ✓✓

1.7 C ✓✓

1.8 B ✓✓

1.9 D ✓✓

1.10 C ✓✓

(10 x 2) **[20]**

QUESTION/VRAAG 2

2.1.1 1 kg = 1 000 g ✓

$$4 \text{ kg} = (1\,000 \times 4) \text{ g}$$

$$= \underline{4\,000} \text{ g} \quad \checkmark \quad (2)$$

2.1.2 1 000 m = ___? km

$$1\,000 \text{ m} = 1\,000/1\,000 \text{ km} \quad \checkmark$$

$$= \underline{1} \text{ km} \quad \checkmark \quad (2)$$

2.1.3 $S_T = S_1 + S_2 + S_3$ ✓

$$= 15 \text{ km} + 1\,000 \text{ m} + 500 \text{ m}$$

$$= 15\,000 \text{ m} + 1\,000 \text{ m} + 500 \text{ m} \quad \checkmark$$

$$= 16\,500 \text{ m}$$

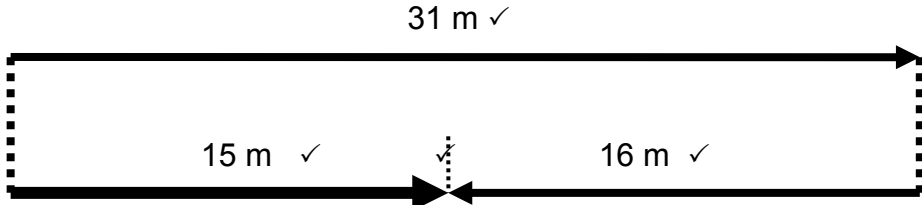
$$= \underline{1,65 \times 10^4} \text{ m} \quad \checkmark \quad (4)$$

2.2.1 A scalar physical quantity is a quantity with magnitude/size only. ✓✓ (2)
'n Skalaarhoeveelheid is 'n hoeveelheid met slegs grootte. ✓✓

2.2.2 $S_T = \text{Total distance travelled.} / S_T = \text{Totale afstand gereis}$
 $= (3+6+3+3+4+4+8) \text{ m} \checkmark$
 $= \underline{31} \text{ m} \checkmark$ (2)

2.2.3 speed = distance/change in time ✓ /spoed = afstand/tyd ✓
 $= 31 / (3,4 \times 60) \checkmark$
 $= \underline{0,152} \text{ m.s}^{-1} \checkmark$ (4)

2.2.4 $S_t = s_1 + s_2 \checkmark$
 $= 31 \text{ m} + (-16) \text{ m} \checkmark$
 $= \underline{15 \text{ m to the right}} \checkmark / \text{na regs}$ (3)

2.2.5  (4)

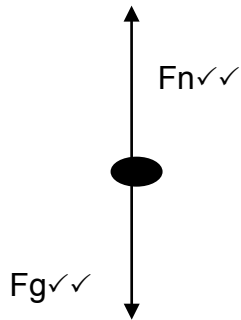
2.3.1 50 dots/kolletjies in 1 s
Time for 10 dots/Tyd vir 10 kolletjies = $10/50 \times 1 \checkmark \checkmark$
 $= \underline{0,25} \text{ s} \checkmark$ (3)

2.3.2 - The velocity remains constant/uniform ✓ /Die snelheid bly konstant ✓
- The acceleration zero ✓ /Die versnelling is nul. ✓ (2)

2.3.3 snelheid = displacement/time ✓ /snelheid = verplasing/tyd ✓
 $= 10 \text{ cm} / 0,2 \text{ s} \checkmark$
 $= 0,1 \text{ m} / 0,2 \text{ s} \checkmark$
 $= \underline{0,5} \text{ m.s}^{-1} \checkmark$ (4)
[32]

QUESTION/VRAAG 3

3.1

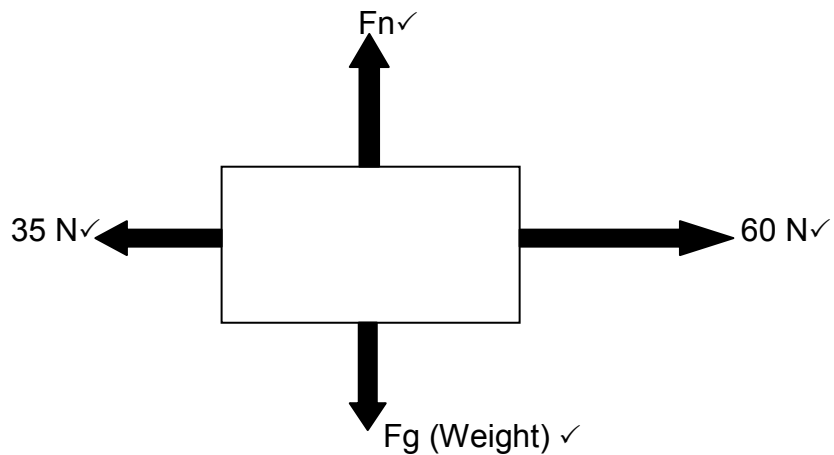


(4)

3.2.1 Applied force✓ in the direction of 60 N✓. (To the right)
Toegepaste krag. ✓ In die rigting van die 60 N✓ of na regs.

(2)

3.2.2



(4)

3.2.3 $F_R = 60 \text{ N} + (-35 \text{ N})$ ✓
 $= \underline{25 \text{ N}}$ ✓ to the right✓/na regs

(3)
[13]

QUESTION/VRAAG 4

4.1.1 Moment of force: The turning effect of the force about that point. ✓✓
Moment van 'n krag: Die draai-effek van die krag om die spesifieke punt. ✓✓ (2)

4.1.2 Beam: A single rigid length of material supported horizontally to carry vertical loads. ✓✓
Balk: 'n Enkele onbuigsame lengte materiaal wat horisontaal gestut word en gebruik word om vertikale massa te dra. ✓✓ (2)

4.1.3 Mechanical advantage: Ratio ✓ of load to effort. ✓/
Meganiese voordeel: Verhouding van die las tot die mag. (2)

4.2.1 Moments at L/Momente by L

Anti-clockwise moments/*Antikloksgewyse momente* = Clockwise moments/*Kloksgewyse momente* ✓

$$10 \times R = (200 \times 3) \text{ Nm} + (100 \times 5) \text{ Nm} + (300 \times 6) \text{ Nm} \checkmark$$

$$10R = (600 + 500 + 1\,800) \text{ Nm}$$

$$= 2\,900 \text{ Nm}/10 \text{ m} \checkmark$$

$$= \underline{290 \text{ N}} \checkmark$$

(4)

Moments at R/Momente by R

Anti-clockwise moments/*Antikloksgewyse momente* = Clockwise moments/*Kloksgewyse momente* ✓

$$(300 \text{ N} \times 4\text{m}) + (100 \text{ N} \times 5\text{m}) + (200 \text{ N} \times 7\text{m}) = 10 \times L \checkmark$$

$$1200 \text{ Nm} + 500 \text{ Nm} + 1\,400 \text{ Nm} = 10L$$

$$L = 3\,100 \text{ Nm}/10 \text{ m} \checkmark$$

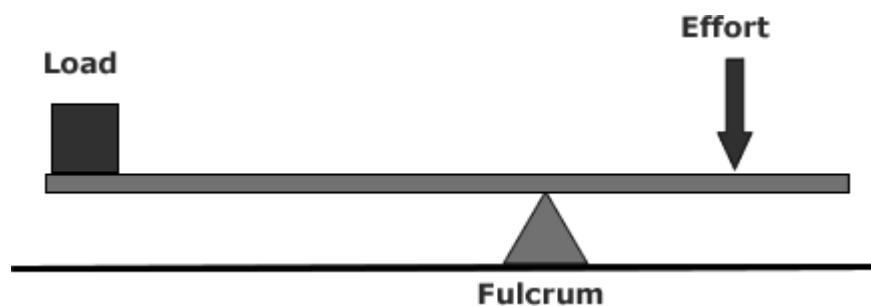
$$= \underline{310 \text{ N}} \checkmark$$

(3)

4.2.2 Upward force = Downward forces ✓
Opwaartse krag = Afwaartse krag
 $310 \text{ N} + 290 \text{ N} = 200 \text{ N} + 100 \text{ N} + 300 \text{ N} \checkmark$
 $\underline{600 \text{ N}} = \underline{600 \text{ N}} \checkmark$

(3)

4.3



Load/Las ✓✓

Effort/Mag ✓✓

Fulcrum/Draaipunt ✓✓

(6)

4.5 $MA = \text{Load}/\text{Effort} \checkmark / MV = \text{Las}/\text{Mag}$
 $= 500 \text{ N}/100 \text{ N} \checkmark$
 $= \underline{5} \checkmark$

(3)

[25]

QUESTION/VRAAG 5

- 5.1 The energy of an object due to its motion. ✓✓/
Die energie van 'n voorwerp as gevolg van sy beweging. ✓✓ (2)
- 5.2 $E_k = \frac{1}{2} mv^2$ ✓
 $= \frac{1}{2} \times 15 \times 5^2$ ✓
 $= \underline{187,5J}$ ✓ (3)
- 5.3 $E_p = mgh$ ✓
 $= 2 \times 9,8 \times 3$ ✓
 $= \underline{58,8 J}$ ✓ (3)
- 5.4.1 $v = \sqrt{(2E_k/m)}$ ✓
 $= \sqrt{(2 \times 0,5 / 8)} \text{ m.s}^{-1}$ ✓
 $= \underline{0,35 \text{ m.s}^{-1}}$ ✓ (3)
- 5.4.2 $E_p = E_M - E_K$ ✓
 $= 12 \text{ J} - 0,5 \text{ J}$ ✓
 $= \underline{11,5 \text{ J}}$ ✓
 $h = E_p / (mg)$
 $= 11,5 / (0,8 \times 9,8) \text{ m}$ ✓
 $= \underline{1,467 \text{ m}}$ ✓ (5)

[16]

QUESTION/VRAAG 6

6.1.1 More than ✓ / Meer as ✓ (1)

6.1.2 The sphere is negatively charged. ✓ / Die sfeer is negatief gelaa. ✓ (1)

6.1.3

$$\begin{aligned} n &= \frac{\text{charge}}{\text{electron charge}} \\ &= \frac{-6 \times 10^{-9} \checkmark}{-1,6 \times 10^{-19} \checkmark} \text{ OR/OF } \frac{6 \times 10^{-9}}{1,6 \times 10^{-19}} \\ &= 3,75 \times 10^{10} \checkmark \end{aligned} \quad (3)$$

6.2.1 The net charge of an isolated system remains constant ✓ during any physical process. ✓ /

Die netto lading ✓ van 'n geïsoleerde sisteem bly konstant gedurende enige fisiese proses. ✓ (2)

6.2.2 C to B ✓ / C na B ✓ (1)

6.2.3 C has an excess of electrons. ✓ / C het 'n oormaat elektrone. ✓ (1)

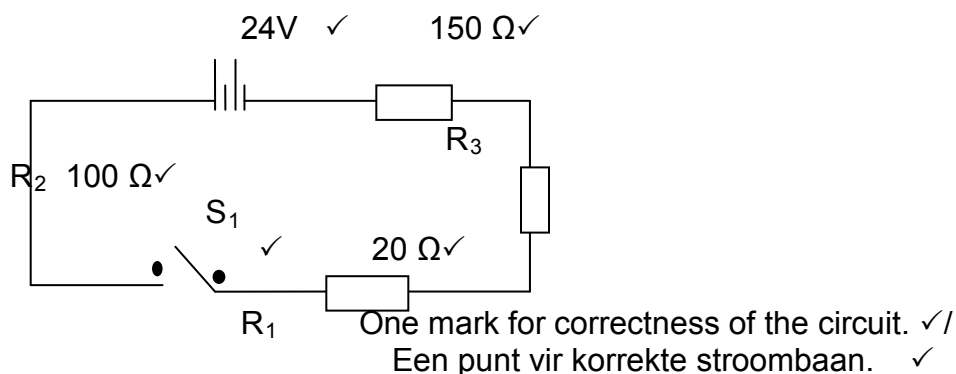
6.2.4

$$Q_B = Q_C = \frac{\overset{\checkmark}{+3 \times 10^{-9} + (-6 \times 10^{-9})}}{2\checkmark} = -1,5 \times 10^{-9} \text{ C} \quad (3)$$

[12]

QUESTION/VRAAG 7

7.1



(6)

7.2 Current is the rate at which the electric charges flow. ✓✓
Die tempo van die vloeï van lading. ✓✓

(2)

7.3 $I = Q / \Delta t$
 $= 3 \text{ C} / 0,6 \text{ s}$
 $= \underline{5} \text{ A}$

(3)

7.4 Resistance is the opposition ✓ to electric flow. ✓
Die teenstand ✓ teen die vloeï van elektriese stroom. ✓

(2)

7.5 Ω ✓

(1)

7.6 - Temperature. ✓ / *Temperatuur* ✓
 - Size of the conductor or the cross sectional Area of the conductor ✓ / *Dikte van die geleier.* ✓
 - Material from which the conductor is made. ✓ / *Materiaal waarvan geleier gemaak is.*
 - The length of the conductor ✓ / *Lengte van die geleier.* ✓

(4)

[18]

QUESTION/VRAAG 8:

8.1.1 They are ammeters. ✓/Beide is ammeters ✓ (1)

8.1.2 The reading of the series ammeters is the same. ✓/Lesings is dieselfde ✓ (1)

8.1.3 V_1 is a voltmeter. ✓ (1)

8.1.4 $V_T = V_1 + 4V$ ✓
 $V_1 = 12V - 4V$ ✓
 $= 8V$ ✓ (3)

8.2 EMF is the voltage measured across ✓ the source when current is not flowing. ✓/
Emk is die potensiaalverskil oor die batterye ✓ indien geen stroom in die baan vloeï nie. ✓ (2)

8.3.1 $I_T = I_1 + I_2 + I_3$ ✓
 $= 198 \text{ mA} + 165 \text{ mA} + 60 \text{ mA}$ ✓
 $= 423 \text{ mA}$ ✓ (3)

8.3.2 $1/R_p = 1/R_2 + 1/R_3 + 1/R_4$ ✓
 $= 1/100 + 1/120 + 1/330$ ✓
 $R_p = 47,62 \Omega$ ✓ (3)
[14]

TOTAL/TOTAAL: 150