

# MEMORANDUM

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GRADE 11 EXAMINATIONS  
GRAAD 11-EKSAMEN

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## PHYSICAL SCIENCES – FIRST PAPER (PHYSICS) FISIÊSE WETENSKAPPE – EERSTE VRAESTEL (FISIKA)

This memorandum consists of 10 pages.

### SECTION A

#### QUESTION / VRAAG 1: ONE-WORD ITEMS / EEN-WOORD ITEMS

- |     |                                |         |     |
|-----|--------------------------------|---------|-----|
| 1.1 | Fulcrum ✓ / Draaipunt          | {2.1 A} | (1) |
| 1.2 | Accommodation ✓ / Akkommodasie | {2.1 A} | (1) |
| 1.3 | Resonance / Resonansie ✓       | {2.1 A} | (1) |
| 1.4 | Capacitor / Kapsitor ✓         | {2.3 A} | (1) |
| 1.5 | Coulomb ✓ or Charge            | {2.1 A} | (1) |
- [5]

#### QUESTION / VRAAG 2: MATCHING ITEMS / PAS-ITEMS

- |     |     |         |     |
|-----|-----|---------|-----|
| 2.1 | C ✓ | {2.1 A} | (1) |
| 2.2 | J ✓ | {2.1 A} | (1) |
| 2.3 | D ✓ | {2.3 A} | (1) |
| 2.4 | I ✓ | {2.3 A} | (1) |
| 2.5 | B ✓ | {2.3 A} | (1) |
- [5]

#### QUESTION / VRAAG 3: TRUE - FALSE / WAAR - ONWAAR

- |     |  |         |     |
|-----|--|---------|-----|
| 3.1 | FALSE ✓. All objects ✓<br>ONWAAR. Alle voorwerpe       | {2.3 A} | (2) |
| 3.2 | FALSE ✓. Diverging lens ✓<br>ONWAAR. Divergerende lens | {3.2 A} | (2) |
| 3.3 | TRUE / WAAR ✓ ✓  | {2.3 A} | (2) |
| 3.4 | FALSE ✓. Coulomb's Law ✓<br>ONWAAR. Coulomb se Wet     | {2.3 A} | (2) |
| 3.5 | TRUE ✓ ✓<br>WAAR                                       | {3.2 A} | (2) |
- [10]

#### QUESTION / VRAAG 4: MULTIPLE-CHOICE / MEERVOUDIGEKEUSE-VRAE

- |     |           |         |     |
|-----|-----------|---------|-----|
| 4.1 | A ✓ ✓ ✓ ✓ | {2.3 C} | (3) |
| 4.2 | D ✓ ✓ ✓ ✓ | {2.1 A} | (3) |
| 4.3 | D ✓ ✓ ✓ ✓ | {2.1 A} | (3) |
| 4.4 | C ✓ ✓ ✓ ✓ | {2.3 B} | (3) |
| 4.5 | A ✓ ✓ ✓ ✓ | {2.1 A} | (3) |
- TOTAL SECTION A: [15]  
35

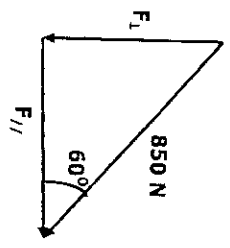
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SECTION B/AFDELING B

QUESTION /VRAAG 5

5.1 ..... {1.3 C} (3)

$F_{\perp} = F \sin \theta$   
 $= 850 \times \sin 60^{\circ}$   
 $= 736,12 \text{ N}$



5.2  $F_{\parallel} = F \cos \theta$   
 $= 850 \times \cos 60^{\circ}$   
 $= 425 \text{ N}$  (3)

5.3  $\mu_s = \frac{F_{\parallel}}{F_N}$   
 $= \frac{425}{736,12}$   
 $= 0,58$  (4)

{1.3 C} [10]

QUESTION /VRAAG 6

6.1 Class 1 / Klas 1 (2.1 A) (1)

6.2 Mechanical advantage =  $\frac{\text{length of effort arm}}{\text{length of load arm}}$  (Meganiese voordeel =  $\frac{\text{lengte (mag)}}{\text{lengte (las)}}$ )

$= \frac{3 \text{ m}}{0,25 \text{ m}}$

$= 12$  (2.3 C) (4)

6.3 Mechanical advantage =  $\frac{\text{effort load}}{\text{load effort}}$  (Meganiese voordeel =  $\frac{\text{mag}}{\text{las}}$ )  
 $12 = \frac{1500}{\text{load effort}}$   
 $\text{load effort} = 125 \text{ N}$  (2.3 C) (4)

[9]

QUESTION / VRAAG 7

7.1 Newton's Second Law / Newton se Tweede Wet (2.1 B) (1)

7.2 As the mass increases, the acceleration decreases if force remains constant. Soos die massa toeneem, verminder die versnelling as krag konstant bly. (1.4 B) (2)

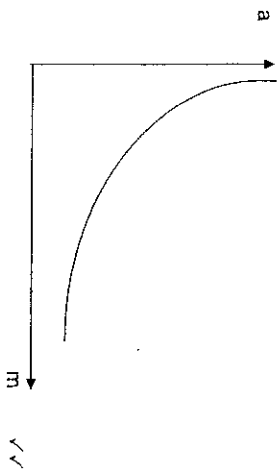
7.3  $m = 10 \text{ kg}$  (1.2 B) (2)

7.4 Resultant force/ Resultierende krag OR Force (1.2 C) (1)

7.5  $F = \text{gradient of graph} = 5/0,25 = 20 \text{ N}$  OR  $F_{res} = m \cdot a$  (1.3 C) (4)

$F = \text{gradient van grafiek} = 5/0,25 = 20 \text{ N}$  (1.3 C)

7.6



(1.4 C) (2)

[12]

QUESTION 8 VRAAG 8

Assume the distance from the centre of the earth to the spaceship = R  
Aanvaar dat die afstand vanaf die middelpunt van die aarde na die ruimtevaartuig = R

∴ Distance from moon to spaceship =  $(3,82 \times 10^8 - R)$   
∴ Die afstand vanaf die maan na die ruimtevaartuig is =  $(3,82 \times 10^8 - R)$

When  $F_R = 0$   
Wanneer  $F_R = 0$

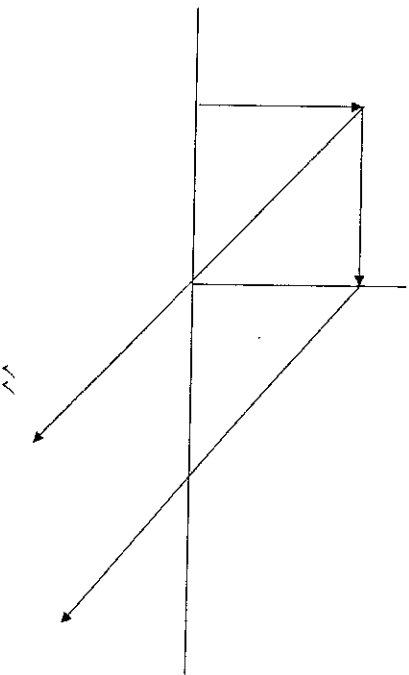
$$F_{Earth} = F_{moon}$$
$$F_{Aarde} = F_{Maan}$$

$$\frac{GM_{Earth}m_s}{R^2} = \frac{GM_{moon}m_s}{(3,82 \times 10^8 - R)^2}$$
$$\frac{6,67 \times 10^{-11} \times 6 \times 10^{24} \times 3,5 \times 10^4}{R^2} = \frac{6,67 \times 10^{-22} \times 3,5 \times 10^4}{(3,82 - R)^2}$$
$$\frac{6 \times 10^{24}}{R^2} = \frac{7,6 \times 10^{22}}{(3,82 - R)^2}$$
$$\frac{3,82 \times 10^8 - R}{R} = 0,111$$
$$R = 3,44 \times 10^8 \text{ m}$$

[7]  
(2,3 D)

QUESTION 9 VRAAG 9

- 9.1 Concave lens produces virtual images OR ✓✓  
Concave lens produces real images OR  
Convex lens produces virtual images OR  
Convex lens produces real images  
Konkawe lens vorm virtuele beelde OF  
Konkawe lens vorm reële beelde OF  
Konvekse lens vorm virtuele beelde  
Konvekse lens vorm reële beelde  
{1.1 C} (2)
- 9.2 Concave lens / Konkawe lens ✓✓  
{2.1 A} (2)
- 9.3 Investigation 2 (At 2F) / Onderzoek 2 (By 2F) ✓  
{2.1 B} (1)
- 9.4 No image formed / Geen beeld gevorm nie ✓✓  
{1.1 A} (2)
- 9.5

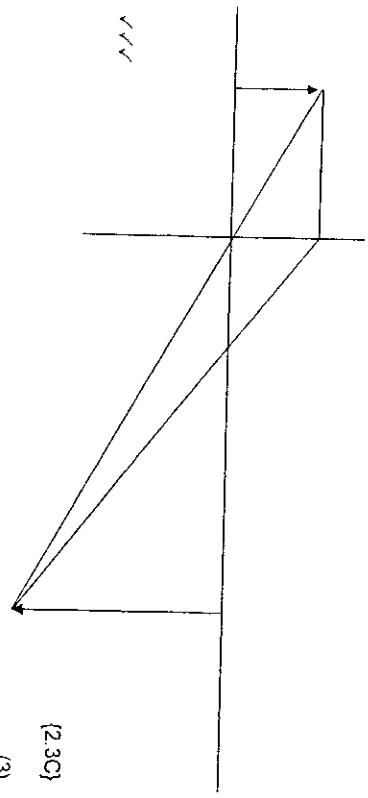


- 9.6 Investigation 5 (Between F and lens) / Onderzoek 5 (Tussen F en lens) ✓✓  
{3.2 C} (2)
- 9.7 A magnifying glass / Vergrootglas ✓✓  
Convex lens  
{3.3 C} (2)  
[13]

0 8 3 0 6 5

QUESTION / VRAAG 10

10.1.1



{2.3 C}

10.1.2 59 mm (2 cm) ✓✓

{3}

10.1.3 Magnification =  $\frac{D_i}{D_o} = \frac{120 \text{ mm}}{40 \text{ mm}} = 3$  ✓✓

{2.3 C}

{2}

10.2 The eye consists of a convex lens which converge light rays. This can endanger the eyes. ✓✓  
 Die oog bestaan uit 'n konvekse lens wat ligstrale konvergeer. Dit kan die oë beskadig. {3.2 C}

{2.3 C}

{4}

{2} [11]

QUESTION / VRAAG 11

11.1 Decreases ✓✓ / Verminder

{2.3 C} {2}

11.2 Decreases ✓✓ / Verminder  
 Stays the same ✓✓

{2.3 C} {2}

11.3 Distance between ship and submarine =  $1\ 522\ \text{m}\cdot\text{s}^{-1} \times \frac{1}{2}(12\ \text{s})$   
 Afstand tussen skip en duikboot =  $9\ 132\ \text{m}$   
 = 9,132 km

{3.3 C} {4}

11.4 Sound intensity near jet aircrafts is very high (130 dB) and the threshold pain is 120 dB. At 120 dB the ossicles vibrate so strongly that they strike the wall of the middle ear causing pain. ✓  
 Wear ear muffs to prevent ear damage. ✓  
 Die intensiteit van die klank naby die straalvliegtuig is baie hoog (130 dB) en die pynpunt is 120 dB. By 120 dB sal die oor die beenjies so erg vibreer dat hulle die wand van die middel-oor sal tref en pyn veroorsaak.  
 Oor-mots moet gedra word om oor skade te verhoed.

{3}

[11]

QUESTION / VRAAG 12

12.1

Conduction band / Geleidingsband
Energy gap / Energie gaping
Valence band / Valensband

{2.3 D} {4}

Conduction and valence band overlaps. ✓  
 Die geleidingsband en valensband oorvleuel.  
 Small energy gap. ✓  
 Klein energie gaping.  
 Electrons can cross this gap for small potential differences ✓  
 Elektrone kan die gaping kruis vir klein potensiaalverskille.

{5}

12.2 The higher the temperature, the more the electrons that can reach the conduction band and better the conductivity. ✓✓  
 Hoe hoër die temperatuur, hoe meer elektrone kan die geleidingsband bereik en hoe beter sal die geleiding wees.

{2.3 C} {2}

[7]

QUESTION / VRAAG 13

13.1

$$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$= \frac{1}{4} + \frac{1}{12}$$

$$\frac{1}{R_{eff}} = \frac{4}{12}$$

$$R_{eff} = \frac{12}{4} = 3\Omega$$

13.2

$$V_{eff} = R_{eff} I$$

$$6 = 3 \times 3$$

$$I = \frac{6}{3} = 2A$$

13.3

$$E = I(R_{int} + R_{ext})$$

$$12 = 2(5.5 + R)$$

$$R = \frac{1}{2} = 0.5\Omega$$

QUESTION / VRAAG 14

14.1

Step down / Veragings ✓

14.2

Mutual induction / Wedersydse induksie ✓✓

14.3

a.c / w.s ✓

14.4

$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$\frac{N_s}{900} = \frac{5}{220}$$

$$N_s = 20.45$$

$$= 20 \text{ or/of } 21 \text{ turns / draaie}$$

14.5

To reduce power loss / Om verlies aan drywing te verminder ✓✓

[1.1]

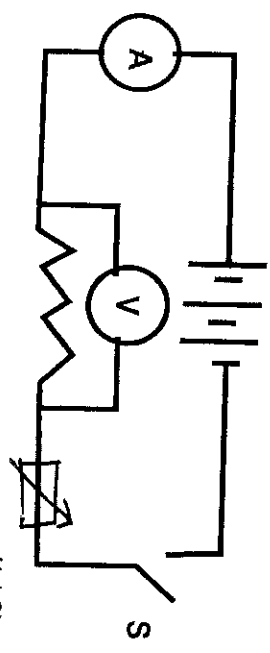
QUESTION / VRAAG 15

15.1

Temperature / Temperatuur ✓ OR no. of cells ✓✓

15.2

✓✓

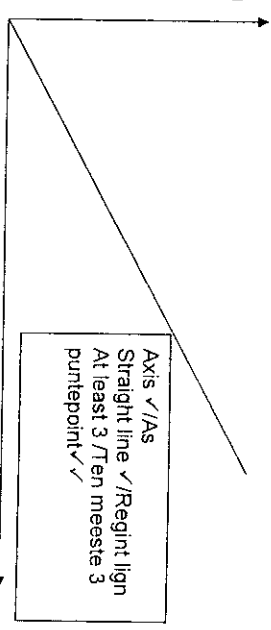


15.3.1

- (a) 4 ✓✓
- (b) 3
- (c) 2
- (d) 1

15.3.2

{1.2 B} (2)



15.3.3

Straight line graph R is directly proportional to L ✓✓  
 As the length of resistance wire increases, resistance also increases  
 Reguitlyn grafiek: R is direk eweredig aan L  
 As die lengte van die weerstandsdraad toeneem, neem die weerstand toe

TOTAAL AFDELING B/TOTAL SECTION B: 115  
 GROOTTOTAAL/GRAND TOTAL: 150

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