higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PHYSICAL SCIENCE
(First paper)
NQF LEVEL 2

XX February 2020

This marking guideline consists of 7 pages.

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SECTION A

QUESTION 1

1.1 Transverse wave
1.2 Vector (quantity)
1.3 Virtual image
1.4 Amplitude
1.5 Electric current

(5 × 1) **[5]**

QUESTION 2

2.1 G
2.2 C
2.3 H
2.4 B
2.5 F

(5 × 1) **[5]**

QUESTION 3

3.1 False
3.2 True
3.3 True
3.4 True
3.5 True

(5 × 2) **[10]**

QUESTION 4

4.1 A
4.2 B
4.3 D
4.4 A
4.5 D

(5 × 3) **[15]**

TOTAL SECTION A: 35

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SECTION B

QUESTION 5: MEASUREMENTS

5.1 5.1.1 3 500 mg
5.1.2 1 m
(2 × 1) (2)

5.2 5.2.1 mV
5.2.2 mg
(2 × 1) (2)

5.3 V = l × b × h
= 20 cm × 2,5 cm × 250 cm✓✓
= 12 500 cm^3✓✓
OR
= l × b × h
= 0,2 m × 0,025 m × 2,5 m✓✓
= 0'0125 m^3✓✓
OR
V = l × b × h
= 200 mm × 25 mm × 2 500 mm✓✓
= 12 500 000 mm^3✓✓ (4)
[8]

QUESTION 6: MECHANICS

6.1 Change of velocity over time/Rate of change of velocity (2)

6.2 6.2.1 v = u + at
0 = 36 + a(14)✓
14(a) = -36✓
a = 2,57 $m.s^{-2}$ backwards✓✓

6.2.2 S = ut + ½at^2
= 36(14) + ½(-2,57) × 14^2✓
= 504 – 251,86✓
= 252,14 m✓✓
(2 × 4) (8)

6.3 6.3.1
- weight
- displacement
- velocity
- acceleration (Any TWO)

6.3.2
- time
- mass
- distance
- speed (Any TWO)
(2 × 2) (4)

6.4 6.4.1 $E_k = \frac{1}{2}mv^2$ m = 40 + 5 = 45 kg
$= \frac{1}{2}(45)(6)^2$✓✓
= 810 J✓✓ (4)

6.4.2 $(E_k + Ep)$ at Q = $(E_k + Ep)$ at P

$\frac{1}{2}mv^2 + mgh = 810 + 0$ ✓
$\frac{1}{2}(45)(1)^2$ ✓+ (45)(9,8) × h✓ = 810
22,5 + 441 h = 810 J✓
441 h = 810 – 22,5 ✓
h = 1,79 m✓ (6)
[24]

QUESTION 7

7.1 Air friction:✓ contact force✓
Force of pulley:✓ contact force✓
Weight (gravitational force):✓ noncontact✓ (3 × 2) (6)

7.2 W = mg✓
1 480 = m × 9,8✓✓
m = 151,02 kg✓ (4)

7.3 Upward:✓✓ The resultant force is 50 N.✓✓ (4)

7.4 $E_{mech} = E_P + E_k$✓
$= mgh + \frac{1}{2}mv^2$✓
= (1 480)x 0,05 + 0✓
= 74 J✓
(4)
[18]

QUESTION 8: MECHANICAL ADVANTAGE

8.1 8.1.1 $MA = \frac{\text{load}}{\text{effort}}$ ✓
$= \frac{800}{115}$✓
= 6,9✓

8.1.2 $VR = \frac{De}{D_L}$
$= \frac{1\,600}{130}$✓
=12,3✓✓
(2 × 3) (6)

8.2 Velocity ratio is the ratio between the distance moved by the effort (F)✓ and the distance moved by the load (W).✓ (2)
[8]

QUESTION 9: WAVES, SOUND AND LIGHT

9.1

SOUND	LIGHT
• Speed of 340 $m.s^{-1}$	• Speed of 3×10^8 $m.s^{-1}$
• Longitudinal waves	• Transverse waves
• Needs a medium in which to travel	• Can travel through a vacuum

(3 × 2) (6)

9.2 V = 330 $m.s^{-1}$
Wavelength = 0,3 m

$f = \frac{v}{\lambda}$
$= \frac{330}{0,3}$✓✓
= 1 100 Hz✓✓ (4)

9.3 9.3.1 1 vibration (wave) in $\frac{15}{3}$ = 5 seconds✓
Period (T) = 0,5 sec
Time taken for four waves = 4 × 0,5✓
= 20 seconds✓ (3)

9.3.2 T = 5 seconds✓ (time taken for one complete wave to move past a fixed point)✓ (2)

9.3.3 $\lambda = \frac{2}{2}$
= 1 m✓

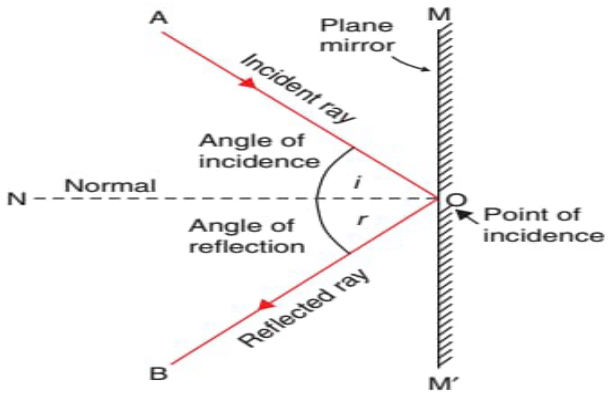
$f = \frac{1}{T}$
$= \frac{1}{5}$
= 0,2 Hz✓

V= f × λ
= 0,2 × 1 ✓
= 0,2 $m.s^{-1}$✓ (4)

9.4
- They need no medium of propagation. They travel through an empty space.
- They travel with a constant speed of $3x10^8$ $m.s^{-1}$ in a vacuum.
- They are propagated by oscillating electric and magnetic fields at right angles to each other.
- Electromagnetic waves are transverse waves.
- They are not deflected by an electric or magnetic field.
- Electromagnetic waves can show interference or diffraction. (Any 3 × 1) (3)

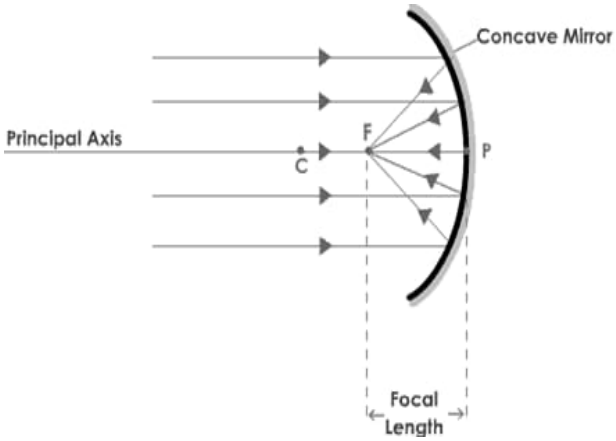
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9.5 9.5.1



(3)

9.5.2



(4)
[29]

QUESTION10: MAGNETISM AND ELECTRICITY

10.1 Charge cannot be created or destroyed – it can only be separated or transferred from one object to another. (3)

10.2 10.2.1 Negative charge (2)

10.2.2 Yes,✓ electrons are transferred✓ from the woollen cloth to the plastic ruler✓ and the cloth has fewer electrons✓ than before, acquiring a net positive charge.✓ (5)

10.2.3 No,✓ if a negative-charged✓ ruler is held near a piece of paper, the charges in the piece of paper become separated.✓ The electrons around the atomic nucleus✓ at the surface of the paper are repelled so that this side (closest to the ruler) is charged slightly positively and attracted to the ruler.✓ The piece of paper is still neutral overall. (5)
[15]

QUESTION 11

11.1 $\frac{1}{R_{II}} = \frac{1}{6} + \frac{1}{12}$✓

$= \frac{2 + 1}{12}$✓

$= 4\ \Omega$✓

$R_{tot} = 5 + 4 = 9\ \Omega$✓ (4)

11.2 $I = \frac{V}{R}$

$= \frac{12}{9}$✓

$= 1{,}33$ A✓✓ (3)

11.3 $V_{II} = IR_{II}$
$= 1{,}33 \times 4$✓
$= 5{,}33$ V✓✓ (3)

11.4 $I = \frac{V}{R}$

$= \frac{5{,}33}{6}$✓

$= 0{,}89$ A✓✓ (3)
[13]

TOTAL SECTION B: 115
GRAND TOTAL: 150

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