Kzn education

Department:
Education
KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES: PHYSICS (P1)
NOVEMBER 2022
MARKING GUIDELINE

Physics.com

MARKS: 125

TIME: 2½ hours

This Marking Guideline consists of 8 pages.

QUESTION 1 : MULTIPLE-CHOICE QUESTIONS

1.1 B ✓✓ (2)

1.2 A ✓✓ (2)



1.3 A ✓✓ (2)

1.4 C ✓✓ (2)

1.5 A ✓✓ (2)

1.6 D ✓✓ (2)

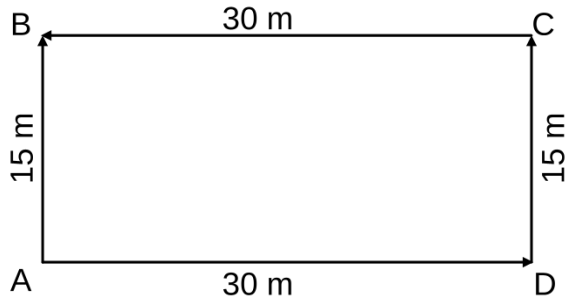
1.7 C ✓✓ (2)

[14]

QUESTION 2

2.1 the difference in position (in space). ✓✓ (2)

2.2



Marking Criteria
- ✓ lines drawn to scale
- ✓ 4 arrows shown, touching each other
- ✓ correct shape of drawing

(3)

2.3 Average velocity $= \frac{\Delta x}{\Delta t}$ ✓

$= \frac{90}{19}$ ✓

$= 4{,}74\ m.s^{-1}$ ✓ (3)

[8]

QUESTION 3

3.1 Acceleration is the rate of change of velocity. ✓✓ (2)

3.2

Option 1

$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$= (20)(1) + 0$ ✓

$= 20\ m$ ✓

Option 2

$\Delta x = \left(\frac{v_i + v_f}{2} \right) \Delta t$ ✓

$= \left(\frac{20 + 20}{2} \right) (1)$ ✓

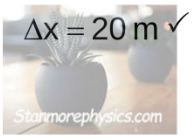
$= 20\ m$ ✓

Option 3

$v = \frac{\Delta x}{\Delta t}$ ✓

$20 = \frac{\Delta x}{1}$ ✓

$\Delta x = 20\ m$ ✓



(3)

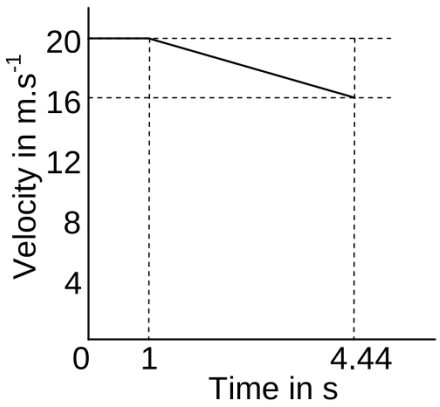
3.3 $\Delta x = 100 - 20 = 80\ m$

$\Delta x = \left(\frac{v_i + v_f}{2} \right) \Delta t$ ✓

80 ✓ $= \left(\frac{20 \text{ ✓} + 16 \text{ ✓}}{2} \right) \Delta t$

$= 4{,}44\ s$ ✓ (5)

3.4



Marking Criteria
- ✓ horizontal line 0 – 1 s
- ✓ sloped line 1 – 4,44 s
- ✓ labels on axes
- ✓ 4,44 s
- ✓ 16 $m.s^{-1}$

(5)

[15]

QUESTION 4 (Start on a new page)

4.1 The total energy of an isolated system remains constant. ✓✓ (2)

4.2 4.2.1 $U / E_p = mgh$ ✓

$= (200)(9{,}8)(40)$ ✓

$= 78\ 400\ J$ ✓ (3)

4.2.2 $78\ 400\ J$ ✓ (1)

4.3 $E_T = E_p + E_k$ ✓

$78\ 400 = mgh + \frac{1}{2} m v^2$

$78\ 400$ ✓ $= (200)(9{,}8)(25) + \frac{1}{2}(200) v^2$ ✓

$v = 17{,}15\ m.s^{-1}$ ✓ (4)

[10]

QUESTION 5 (Start on a new page)

5.1 The net charge of an isolated system remains constant during any physical process. ✓✓ (2)

5.2 Opposite charges attract. ✓ (1)

5.3
$$Q_{new} = \frac{Q_1 + Q_2}{2} \checkmark$$
$$= \frac{(-5) + (2)}{2} \checkmark$$
$$= -1{,}5\,nC \checkmark$$

$$Q_{new} = \frac{Q_1 + Q_2}{2} \checkmark$$
$$= \frac{(-5 \times 10^{-9}) + (2 \times 10^{-9})}{2} \checkmark$$
$$= -1{,}5 \times 10^{-9}\ C \checkmark$$

(3)

5.4 X to Y ✓
Electrons move the move negative charge to the less negative charge. ✓ (2)
OR X has an excess of electrons. ✓

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[8]

QUESTION 6 (Start on a new page)

6.1
$$R_T = R_1 + R_2$$
$$= 6 + 6 \checkmark$$
$$= 12\,\Omega$$

$$V = IR \checkmark$$
$$12 = I(12) \checkmark$$
$$I = 1\,A \checkmark$$

(4)

6.2
$$V_2 = IR \checkmark$$
$$= (1)(6) \checkmark$$
$$= 6\,V \checkmark$$

(3)

6.3 Option 1
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$$
$$= \frac{1}{6} + \frac{1}{6} \checkmark$$
$$R_p = 3\,\Omega \checkmark$$

Option 2
$$R_p = \frac{R_1 R_2}{R_1 + R_2} \checkmark$$
$$= \frac{(6)(6)}{6 + 6} \checkmark$$
$$= 3\,\Omega \checkmark$$

(3)

6.4 Increases ✓ (1)

[11]

QUESTION 7

7.1 7.1.1 Destructive (interference) ✓ (1)

7.1.2 

Marking Criteria
✓ shape
✓ amplitude

(2)

7.1.3 Stay the same. ✓ (1)

7.2 7.2.1 A wave in which the particles of the medium vibrate at right angles to the direction of motion of the wave. ✓✓ (2)

7.2.2 $\lambda \left(= \frac{16}{8} \right) = 2\,\text{cm}$ ✓ (1)

7.2.3 $v = f\lambda$ ✓
$0,5$ ✓ $= f\,(0,02)$ ✓
$f = 25\,\text{Hz}$ ✓ (4)

7.3 Option 1

$E = \frac{hc}{\lambda}$ ✓

$= \frac{(6,6 \times 10^{-34})\,(3 \times 10^{8})}{2,1 \times 10^{-9}}$ ✓ ✓

$= 9,43 \times 10^{-17}\ \text{J}$ ✓

Option 2

$c = f\lambda$

$3 \times 10^{8} = f\,(2,1 \times 10^{-9})$ ✓

$f = 1,43 \times 10^{17}\,\text{Hz}$

$E = hf$ ✓

$= (6,63 \times 10^{-34})\,(1,43 \times 10^{17})$ ✓

$f = 9,43 \times 10^{-17}\,\text{J}$ ✓ (4)

[15]

QUESTION 8

8.1 Homogenous (mixture) ✓
All the component gases are in the same phase. ✓ (2)

8.2 C ✓ (1)

8.3 SiO_2 ✓ Accept: Si_2O_4 ✓ (1)

[4]

QUESTION 9

9.1 The temperature of a liquid at which its vapour pressure equals the external (atmospheric) pressure. ✓✓ (2)

9.2 10 ^{o}C ✓ (1)

9.3 Remain the same. ✓ (1)

9.4 All the heat energy supplied is used :
– to increase the kinetic energy of the particles (particles move faster) ✓
– to break the intermolecular forces ✓
– to move the molecules further apart ✓ (3)

9.5 Solid to liquid. ✓ (1)

[8]

QUESTION 10

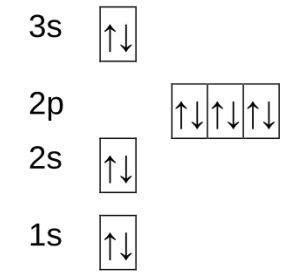
10.1 10.1.1 atoms of the same element having the same number of protons, but different numbers of neutrons. ✓✓ (1)

10.1.2 % abundance of Mg-25 = 100 – (42 + 10) = 48% ✓ (1)

10.1.3 $RAM = (23 \times \frac{42}{100}) + (24 \times \frac{10}{100}) + (25 \times \frac{48}{100})$ ✓✓

$= 24{,}06$ g ✓ (3)

10.1.4



Marking Criteria
✓ 3s
✓ 1s and 2s

(2)

10.2 10.2.1 3 ✓ (1)



10.2.2 Cl ✓ (1)

10.2.3 Ionic (bond) ✓ (1)

10.2.4 Mg^{x}_{x} ✓ + $\cdot\ddot{Cl}:$ ✓ ⟶ $[Mg]^{2+}[:\ddot{Cl}:]^{-}$ ✓ (3)

[13]

QUESTION 11

11.1 11.1.1 The simplest whole-number ratio of atoms in a compound. ✓✓ (2)

11.1.2 % abundance Cl = 100 – (65 + 9,33 + 2) = 23,67% ✓
Assume we have 100g of sample

Element	Pt	Cl	N	H
%	65	23,67	9,33	2
Mass	65	23,67	9,33	2
$n = \frac{m}{M}$	0,333	0,668	0,666	2,000
Ratio	1	2	2	6

✓ Calculation of n

✓ Division by 0,333

Empirical formula : $PtCl_2N_2H_6$ ✓ (4)

11.2 11.2.1 $M_{KMnO_4} = 39 + 55 + 14 + 16$ ✓

$= 158\ g.mol^{-1}$

$\%O = \frac{64}{158} \times 100$

$= 40,51\%$ ✓ (2)

11.2.2

<u>Option 1</u>

$c = \frac{n}{V}$

$0,45 = \frac{n}{0,25}$ ✓

$n = 0,11 mol$ ✓ Any one

$n = \frac{m}{M}$

$0,11 = \frac{m}{158}$ ✓

$m = 17,38\ g$ ✓

<u>Option 2</u>

$c = \frac{m}{MV}$ ✓

$0,45$ ✓ $= \frac{m}{(158)(0,25)}$ ✓

$m = 17,78\ g$ ✓

(4)

11.3 11.3.1 Option 1

2 mol NaI produces 1 mol PbI_2 ✓

300 g produces 461 g ✓

12 g produces x ✓

x = 18,44 g ✓ (4)

Option 2

$$n_{NaI} = \frac{m}{M}$$

$$= \frac{12}{150} \checkmark$$

$$= 0{,}08 \text{ mol}$$

$$n_{NaI} : n_{PbI_2} = 2 : 1 \checkmark$$

$$\therefore n_{PbI_2} = 0{,}04 \text{ mol}$$

$$n_{PbI_2} = \frac{m}{M}$$

$$0{,}04 = \frac{m}{461} \checkmark$$

$$= 18{,}44 \text{ g} \checkmark$$ (4)

11.3.2

$$n = \frac{\text{No. of molecules}}{n_A} \checkmark$$

$$0{,}04 = \frac{\text{No. of molecules}}{6{,}02 \times 10^{23}} \checkmark$$

No. of molecules = $2{,}41 \times 10^{22}$ molecules ✓ (3)

[19]

TOTAL: 125

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