GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2022

GRADE 10

MARKING GUIDELINES

PHYSICAL SCIENCES (PAPER 1)

6 pages

QUESTION 1

1.1 B ✓✓

1.2 C ✓✓

1.3 B ✓✓

1.4 B ✓✓

1.5 C ✓✓

1.6 A ✓✓

1.7 D ✓✓

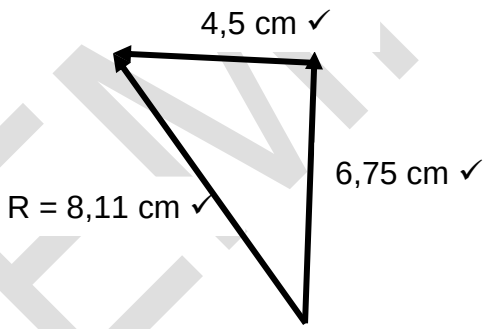
1.8 D ✓✓

(2 x 8) **[16]**

QUESTION 2

2.1 2.1.1 Scalar is physical quantity with magnitude only. ✓✓ (2)

2.1.2



(3)

2.1.3 $Fnet^2 = X^2 + Y^2$ ✓

$Fnet = \sqrt{(4{,}5)^2 + (6{,}75)^2}$ ✓✓

$Fnet = 8{,}11\ cm$ ✓ (4)

2.1.4 Yes ✓, the solution must be the same irrespective of method used.✓ (2)

2.2 2.2.1 Distance = 7,5 km ✓ (1)

2.2.2 Displacement = 4,5 – 3 = 1,5 km ✓, North ✓ (2)

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QUESTION 3

3.1 The total mechanical energy remains constant in an isolated system. ✓✓

OR

The sum of gravitational potential energy and kinetic energy at the top equals the sum of gravitation potential energy and kinetic energy at the bottom in the absence of friction. ✓✓ (2)

3.2 $Ep = m.g.h$ ✓

$= 112 \times 9,8 \times 10$ ✓

$= 10\ 976$ J ✓ (3)

3.3 $EM_{top} = EM_{bottom}$ ✓

$m.g.h + \frac{1}{2}.m.v^2 = m.g.h + \frac{1}{2}.m.V^2$

$(112 \times 9,8 \times 10) + 0$ ✓ $= (112 \times 9,8 \times 8) + \frac{1}{2} \times 112 \times V^2$ ✓

$10\ 976 = 8\ 780,8 + 56.V^2$

$\therefore V = 6,26\ m{\cdot}s^{-1}$ ✓ (4)

3.4 $EM_{top} = EM_{bottom}$ ✓

$m.g.h + \frac{1}{2}.m.v^2 = m.g.h + \frac{1}{2}.m.V^2$

$(112 \times 9,8 \times 10) + 0$ ✓ $= 0 + \frac{1}{2} \times 112 \times V^2$ ✓

$10976 = 56{\cdot}V^2$

$\therefore V = 14\ m{\cdot}s^{-1}$ ✓ (4)

3.5 Remains the same. ✓ Total mechanical energy is conserved. No friction. ✓ (2)

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QUESTION 4

4.1 Every charge in the universe consists of integer multiple of the electron charge. ✓✓ (2)

4.2 $n = \frac{Q}{q_e}$ ✓

$n = \frac{8,2\times10^{-9}}{1,6\times10^{-19}}$ ✓

$= 5,125 \times 10^{10}$ electrons ✓ (3)

4.3 Attraction force ✓ (1)

4.4.1 S to T ✓ (1)

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

4.4.3 $Q_{new} = \frac{Q_T + Q_S}{2}$ ✓

$= \frac{(+5,4\times10^{-9}) + (-8,2\times10^{-9})}{2}$ ✓

$= -1,4\times10^{-9}\,C$ ✓ (3)

4.5 Static electricity is formed much better when the air is dry or the humidity is low. When the air is humid, water molecules can collect on the surface of various materials. This can prevent the build-up of electrical charges. ✓✓ (2)

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QUESTION 5

5.1 Maximum energy given to each coulomb of charge passing through battery. ✓✓ (2)

5.2 Parallel ✓ (1)

5.3 5.3.1 $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$\frac{1}{R_p} = \frac{1}{24} + \frac{1}{16}$ ✓

$\therefore R_p = 9,6\ \Omega$ ✓ (3)

5.3.2 $I = \frac{V}{R}$ ✓

$I = \frac{12}{9,6}$ ✓

$I = 1,25\ A$ ✓ (3)

5.4 5.4.1 $R_s = R_1 + R_2$

$R_s = 24 + 16$ ✓

$R_s = 40\ \Omega$ $R_s = 40\ \Omega$ ✓ (2)

5.4.2 $I = \frac{V}{R}$

$= \frac{12}{40}$ ✓

$= 0,3\ A$ ✓ (2)

5.5 $I = \frac{Q}{\Delta t}$ ✓

$0,3 = \frac{Q}{120}$ ✓

$\therefore Q = 36\ C$ ✓ (3)

5.6 Circuit 1 ✓, connecting resistors in parallel decreases the total resistance of the circuit ✓, thus increasing the total current passing through the circuit/ increasing the brightness of the bulb. ✓ (3)

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QUESTION 6

6.1 Rate of change in velocity. **OR** Change in velocity per second. ✓✓ (2)

6.2 $\frac{77\ km.h^{-1}}{3\ 600} \times 1\ 000$ ✓ $= 21{,}39\ m{\cdot}s^{-1}$ ✓ (2)

6.3 $V_f = V_i + a\Delta t$ ✓

$V_f = 0 + (1{,}5)(6{,}5)$ ✓✓

$V_f = 9{,}75\ \text{m}{\cdot}\text{s}^{-1}$ ✓ (4)

6.4 $\Delta X = V_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$\Delta X = (0)(6{,}5) + \frac{1}{2}(1{,}5)(6{,}5)^2$ ✓✓

$\Delta X = 31{,}69\ m$ ✓ (4)

6.5 $\Delta X = \left(\frac{V_f + V_i}{2}\right)\Delta t$ ✓

$\Delta X = \left(\frac{21{,}39 + 0}{2}\right)(6{,}5)$ ✓✓

$\Delta X = 69{,}52\ m$ ✓ (4)

6.6 No, ✓ **CAR A** is moving with 2 times the speed of **CAR B**. ✓ (2)

6.7 $\Delta X = V_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$25 = (21{,}39)(2{,}5) + \frac{1}{2} a (2{,}5)^2$ ✓✓

$a = -9{,}112\ m.s^{-2}$ ✓ (Decelerating) (4)

[22]

TOTAL: 100