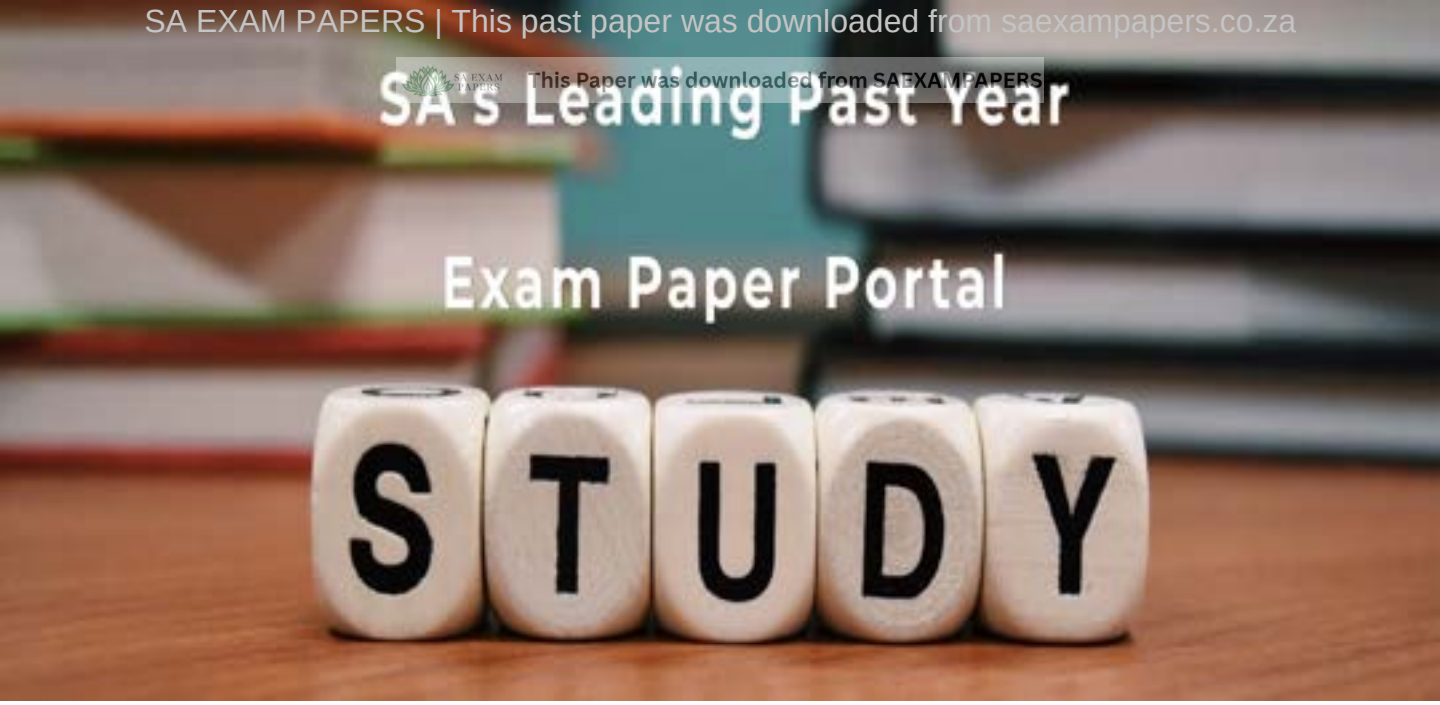


KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 12

PHYSICAL SCIENCES P1 (PHYSICS)

MARKING GUIDELINES

JUNE 2026

Marks: 150

This marking guidelines consists of 6 pages.

QUESTION 1

1.1 B ✓✓ (2)

1.2 A ✓✓ (2)

1.3 C ✓✓ (2)

1.4 D ✓✓ (2)

1.5 B ✓✓ (2)

1.6 D ✓✓ (2)

1.7 B ✓✓ (2)

1.8 C ✓✓ (2)

1.9 C ✓✓ (2)

1.10 B ✓✓ (2)

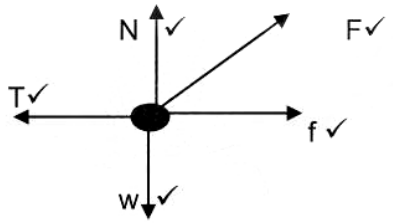
[20]

QUESTION 2

2.1 A body will remain in its state of rest or motion at constant velocity unless a (non-zero) resultant/net force acts on it. ✓✓ (2)

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

2.2



Accept	
F_N	Normal force
F_A	Applied force
F_T	Tension force
F_g	Weight

(5)

2.3.1 $F_k = \mu_k N$ ✓
$F_k = \mu_k(mg - F\sin\theta)$ } Any of the TWO
$= 0,7[(5 \times 9.8) - (40 \sin 30°)]$ ✓
$= 20,30N$ ✓ (3)

2.3.2 **POSITIVE MARKING FROM 2.3.1**
5 kg block
$F_{net} = ma$ ✓
$T - F\cos\theta - f_k = ma$ } Any of the TWO
$T - 40\cos 30° - 20,30$ ✓ $= 0$ ✓
$T = 54,94$ N
Block M
$F_{net} = ma$
$mg\sin\theta - \mu_k mg\cos\theta - T = ma$
$m(9,8)\sin 60° - (0,7)m(9,8)\cos 60° - 54,94$ ✓ $= 0$
$m = 10,86kg$ ✓ (5)

2.4.1 Remains the same. ✓ (1)

2.4.2 Decreases. (Accept increases - the acceleration changes from zero) (1)

2.4.3 By decreasing the angle:
- The horizontal component of the applied force (F_x) increases. ✓
- The kinetic friction experienced by the 5 kg block increases. ✓
- The net force decreases. ✓

(3)

2.5.1 Each body in the universe attracts every other body with a force that is directly proportional to the product of their masses ✓ and inversely proportional to the square of the distance between their centres. ✓
Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.
(2)

2.5.2 $F = \frac{Gm_1m_2}{r^2}$ ✓
$= \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24} \times 1,92 \times 10^{27}}{(6,38 \times 10^6 + 6,27 \times 10^{11})^2}$ ✓ ✓
$F = 1,95 \times 10^{18}N$ ✓ (4)

[26]

QUESTION 3

3.1 The motion during which the only force acting on an object is the gravitational force. ✓✓ (2/0) (2)

3.2.1 P ✓ (1)

3.2.2 Q ✓ (1)

3.3 0 ($m.s^{-1}$) ✓ (1)

3.4.1 $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$✓

$100✓ = \{0\Delta t + \frac{1}{2}(9.8)\Delta t^2\}$✓

$\Delta t = 4,52s$✓

OR

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

$-100✓ = 0\Delta t + \frac{1}{2}(-9.8)\Delta t^2$✓

$\Delta t = 4,52s$✓

OR

$v_f^2 = v_i^2 + 2a\Delta y$

$= (0)^2 + 2(9,8)(100)$

$v_f = 44,27 m{\cdot}s^{-1}$

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

$100✓ = \frac{(0+44,27)}{2}\Delta t$✓

$\Delta t = 4,52s$✓ (4)

3.4.2 **POSITIVE MARKING FROM 3.3**
Option 1 (DOWN AS POSITIVE)

$v_f^2 = v_i^2 + 2a\Delta y$✓

$= (0)^2 + 2(9,8)(100)$✓

$v_f = 44,27 m{\cdot}s^{-1}$✓

POSITIVE MARKING FROM 3.3 & 3.4.1
Option 2(DOWN AS POSITIVE)

$v_f = v_i + a\Delta t$✓

$= 0 + 9,8(4,52)$✓

$v_f = 44,30 m{\cdot}s^{-1}$✓

(3)

3.5 $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$

$\Delta y = 0 + \frac{1}{2}(9.8).3^2$✓

$\Delta y = 44,1$ m

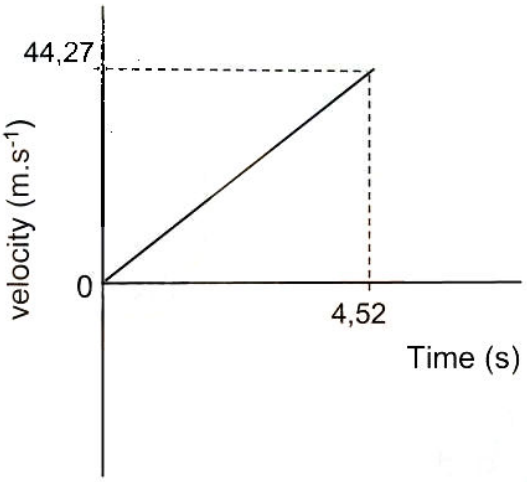
Height traveled by hot-air balloon = 62,1 – ✓ 44,1 = 18 m.

$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ (Or $\Delta y = v.\Delta t$) ✓

$18 = v.\ 3 + 0$ ✓

$= 6 m{\cdot}s^{-1}$ upwards✓ (5)

3.6 DOWN AS POSITIVE



(4)

Criteria	
Correct shape	✓
Initial velocity	✓
Final velocity	✓
Time taken for the ball to strike the ground	✓

[21]

QUESTION 4

4.1 The product of an object's mass and its velocity. ✓✓ (2)

4.2 $p = mv$ ✓
$= 0,02 \times 300$ ✓
$= \underline{6\ kg.m.s^{-1}, East}$/To the right ✓ (3)

4.3 The <u>total linear momentum</u> of an <u>isolated system</u> <u>remains constant</u> (is conserved). ✓✓ Stanmorephysics.com

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

(2)

4.4.1 POSITIVE MARKING FROM 4.2
$m_1v_i + m_2v_i = m_1v_f + m_2v_f$ ✓
$(0,02 \times 300)$ ✓ $+ 0 = (0,02 \times 180) + 5v_f$ ✓
$v_f = 0,48\ m.s^{-1}$ ✓ (4)

4.4.2 **OPTION 1**

$v_f^2 = v_i^2 + 2a\Delta y$

180^2 ✓$= \underline{300^2 + 2a(0, 3)}$ ✓

$a = - 96000\ m.s^{-2}$

$v_f = v_i + a\Delta t$ ✓

$\underline{180 = 300 + (-96000)\Delta t)}$ ✓

$\Delta t = 0, 00125$ s. ✓

$\Delta x = v_i\Delta t + ½\ a\Delta t$ ✓

$\underline{0, 3 = 300\Delta t + ½\ (-96000)}\ \Delta t^2$ ✓

$\Delta t = 0, 00125$ s ✓

OPTION 2

$v_f^2 = v_i^2 + 2a\Delta y$

$\underline{180^2 = 300^2 + 2a(0, 3)}$ ✓

$a = - 96000\ m.s^{-2}$

Fnet=ma

= 0,02 x 96000 ✓

= 1920 N

$F_{net}\Delta t = \Delta p$ ✓

$F_{net}\Delta t = m(v_f - v_i)$

$\underline{1920 \times \Delta t = 0,02\ (180 - 300)}$ ✓

$\Delta t = 0, 00125$ s. ✓

OPTION 3

Wnet = ΔEk

$F_{net}\Delta x\cos\Theta = ½\ m(v_f^2 - v_i^2)$

Fnet x 0, 3 x cos180° ✓$= ½\ 0, 02\ (180^2 - 300^2)$ ✓

Fnet= 1920 N

$F_{net}\Delta t = \Delta p$ ✓

$F_{net}\Delta t = m(v_f - v_i)$

$\underline{1920 \times \Delta t = 0,02\ (180 - 300)}$ ✓

$\Delta t = 0, 00125$ s. ✓

(5)
[16]

QUESTION 5

5.1 The total mechanical energy of an isolated system is conserved. ✓✓

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark. (2)

5.2 $mgh_i + \frac{1}{2}mv_i^2 = mgh_f + \frac{1}{2}mv_f^2$ ✓
$(0,1)(9,8)(0,3)$ ✓ $+ 0 = 0 + \frac{1}{2}(0.1)(v)^2$ ✓
$v = 2,42\ m.s^{-1}$ ✓ (4)

5.3 A collision during which (both momentum and) kinetic energy are conserved. ✓✓ (2)

5.4 **POSITIVE MARKING FROM 5.2**
$m_1v_i + m_2v_i = m_1v_f + m_2v_f$ ✓
$(0,1 \times 2,42)$ ✓ $+ 0 = 0,1\ v_{f1} + 0,92\ v_{f2}$ ✓
$0,242 = 0,1\ v_{f1} + 0,92\ v_{f2}$ … eqn (1)
$\sum E_{kbefore} = \sum E_{kafter}$
$\frac{1}{2}mv_i^2 + \frac{1}{2}mv_i^2 = \frac{1}{2}mv_i^2 + \frac{1}{2}mv_i^2$ ✓
$\{\frac{1}{2}(0,1)\,2,42^2$ ✓ $+ 0 = \{\frac{1}{2}0,1\ v_{f1}^2 + \frac{1}{2}0,92\ v_{f2}^2\}$✓
$0,29 = 0,05\ v_{f1}^2 + 0,46\ v_{f2}^2$ … eqn (2)
$V_{f2} = 0,48\ m.s^{-1}$✓ (7)

5.5 Frictional force. ✓ (1)

5.6 **POSITIVE MARKING FROM 5.4**
OPTION 1
$W_{nc} = \Delta E_p + \Delta E_k$ ✓
$Wnc = (0,92)(9,8)(0,01)$✓ $- 0 + (0-)\frac{1}{2}(0.92)(0,48)^2$ ✓
$Wnc = -0,016\ J$ ✓

OPTION 2
$Wnet = \Delta Ek$ ✓
$Wnet = \frac{1}{2}mv_i^2 + \frac{1}{2}mv_i^2$
$= 0 - \frac{1}{2}(0.92)(0,48)^2$ ✓
$= -0,106\ J$
$Wnet = W_N + W_{Fg} + W_{fk}$
$-0,106 = 0 + (0,92 \times 9,8 \times 0,01 \times \cos 180^o) + W_{fk}$ ✓
$W_{fk} = -0,016\ J$ ✓ (4)

[20]

QUESTION 6

6.1 The change in frequency of the sound detected by a listener, because the sound source and the listener have different velocities relative to the medium of sound propagation. ✓✓
Or
The change in frequency of the sound detected by a listener due to the relative motion between the source of the sound and the listener. ✓✓

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

(2)

6.2 $f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ ✓

$250 ✓ = \left(\frac{340+0}{340-v_s} \right)$ ✓ 228, 26 ✓

$v_s = 29,57 \text{ m.s}^{-1}$ ✓

$120 \text{km.h}^{-1} = 33,33 \text{ m.s}^{-1}$ which is greater than $29,57 \text{ m.s}^{-1}$, therefore car does not exceed the speed limit. ✓ (6)

6.3 **POSITIVE MARKING FROM 6.2**

$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$

$F_L = \left(\frac{340 - 0}{340+29,57} \right)$ ✓ 228, 26 ✓

$F_L = 210$ Hz ✓ (3)

6.4.1 Away ✓ (1)

6.4.2 Spectral lines of the star show a red shift✓, which is a shift towards longer wavelengths (lower frequency end) ✓ (2)

[14]

QUESTION 7

7.1 The magnitude of the electrostatic force exerted by one point charge (Q_1) on another point charge (Q_2) is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance (r) between them. ✓✓

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

(2)

7.2 $F = \frac{kQ_1Q_2}{r^2}$✓

$F = \frac{(9\times10^{9}\times8\times10^{-9}\times2\times10^{-9})}{(0,2)^2}$ ✓✓

$F = 3 \times 10^{-6}$N✓

(4)

7.3 **S** to **T**✓ (1)

7.4 The electric field at a point is the electrostatic force experienced per unit positive charge placed at that point. ✓✓

Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

(2)

7.5 $E_S = \frac{kQ}{r^2}$ ✓

$= \{\frac{9\times10^{9}\times3\times10^{-9}}{(0,3)^2}\}$✓

$= 300$ N.C^{-1} to the left.

$E_T = \frac{kQ}{r^2}$

$= \{\frac{9\times10^{9}\times3\times10^{-9}}{(0,1)^2}\}$✓

$= 2700$ N.C^{-1} to the left.

$E_{net} = E_S + E_T$

$E_{net} = 300 +$ ✓2700

$= 3000$ N.C^{-1} ✓ to the left ✓

(6)
[15]

QUESTION 8

8.1.1 Ohm's law. ✓
The potential difference across a conductor is directly proportional to the current in the conductor at constant temperature. ✓✓
Marking criteria
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark.

(3)

8.1.2 Gradient = $\frac{\Delta I}{\Delta V}$
$= \frac{(1,0-0,2)\checkmark}{(3,0-0,6)\checkmark}$ (any two correct points can be used)
$= \frac{1}{3}$
Resistance = 3 Ω ✓ (3)

8.1.3 Decreases. ✓ (1)

8.2.1 $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$\frac{1}{R_P} = \{\frac{1}{12} + \frac{1}{(6+2)}\}$ ✓

RP= 4, 8 Ω ✓

OR

$R_p = (\frac{1}{R_1} + \frac{1}{R_2})^{-1}$)✓

$R_p = (\frac{1}{12} + \frac{1}{(6+2)})^{-1}$ ✓

RP= 4, 8 Ω ✓ (3)

8.2.2 V = IR
= 0, 3 x 12 ✓
= 3, 6 V
$I_2 = \frac{V}{R}$
$= \frac{3,6}{8}$ ✓
= 0, 45 A
$I = I_1 + I_2$ = (0, 3 +✓ 0, 45)
I = 0, 75 A ✓ (4)

8.2.3

8.2.3 V_{lost} = Ir
V_{lost} = 0, 75 x 0.2 ✓= 0, 15 V (4)

$V_R = \mathcal{E} - V_{lost} - V_P = (6,75 - 0,15 - 3,6)$ ✓ = 3 V

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

$= \frac{3}{0,75}$ ✓

R = 4 Ω ✓

[18]

TOTAL [150]