KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES
COMMON TEST
MARKING MEMORANDUM
SEPTEMBER 2025

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MARKS: 100

DURATION: 2 hours

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QUESTION 1

1.1 C ✓✓ (2)

1.2 B✓✓ (2)

1.3 C ✓✓ (2)

1.4 B ✓✓ (2)

1.5 B ✓✓ (2)

1.6 D ✓✓ (2)

[12]

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QUESTION 2

2.1

2.1.1 <u>OPTION 1</u>

$\text{speed} = \frac{\text{distance}}{\text{time}}$ OR $v = \frac{\Delta x}{\Delta t}$ ✓

$30 \checkmark = \frac{60 \checkmark}{\Delta t}$

$\Delta t = 2$ s ✓

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<u>OPTION 2</u>

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

$60 \checkmark = (30)\Delta t + \frac{1}{2}(0)\Delta t^2 \checkmark$

$\Delta t = 2$ s ✓

<u>OPTION 3</u>

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

$60 \checkmark = \left(\frac{30 + 30}{2}\right)\Delta t \checkmark$

$\Delta t = 2$ s ✓ (4)

2.1.2 <u>POSITIVE MARKING FROM 2.1.1</u>

<u>OPTION 1</u>

$v = \frac{\Delta x}{\Delta t}$

$22 = \frac{\Delta x}{2}$ ✓

$\Delta x = 44$ m ✓ east (Accept: Right)✓

<u>OPTION 2</u>

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

$= (22)(2) + \frac{1}{2}(0)(2)^2 \checkmark$

$\Delta x = 44$ m ✓ east (Accept: Right)✓

<u>OPTION 3</u>

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

$= \left(\frac{22 + 22}{2}\right)(2) \checkmark$

$\Delta x = 44$ m ✓ east (Accept: Right)✓ (3)

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2.1.3 The rate of change of position/ The total displacement over the total time.✓✓ (2)

2.1.4 OPTION 1

[POSITIVE MARKING FROM 2.1.1]

Time taken for the buck to move from B to C:

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$22 = \frac{132}{\text{time}} \quad ✓$$

$\Delta t = 6$ s

Time taken for the cheetah to move from B to C = 6 – 2 ✓ = 4 s

$$v = \frac{\Delta x}{\Delta t} ✓$$

$$= \frac{132 ✓}{4 ✓}$$

v = 33 m·s^{-1} east ✓

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OPTION 2

[POSITIVE MARKING FROM 2.1.2]

Distance covered by the buck = 132 – 44 ✓ = 88 m

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$22 = \frac{88}{\text{time}} \quad ✓$$

$\Delta t = 4$ s

$$v = \frac{\Delta x}{\Delta t} ✓$$

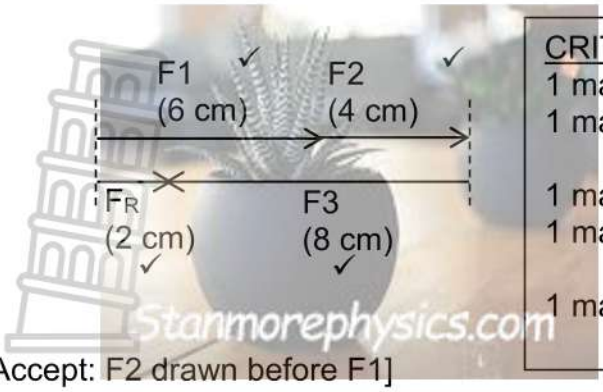
$$= \frac{132 ✓}{4 ✓}$$

v = 33 m·s^{-1} east ✓ (6)

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2.2



[Accept: F2 drawn before F1]

CRITERIA
1 mark – F1 drawn with correct scale and direction
1 mark – F2 drawn from the head of F1 with correct scale and direction
1 mark – F_R drawn with correct direction and scale.
1 mark – F3 drawn right from the head of F2 with the correct scale and direction.
1 mark – Final answer (160 N). Can include on diagram or on its own.

$F_3 = 160$ N ✓ (5)

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QUESTION 3

3.1 The cyclist changed direction / The direction changed from west to east. ✓ (1)

3.2 $v = \frac{\Delta x}{\Delta t}$ OR $v = \frac{y_2 - y_1}{x_2 - x_1}$ ✓

$= \frac{60 - 0}{30 - 0}$ ✓✓

= 2 m·s^{-1} west ✓ (4)

3.3 0 m·s^{-2} / Zero/ 0 ✓ (1)

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3.4 The graph is a straight line OR Graph has a constant gradient. ✓
The velocity is constant. ✓ (2)

3.5 $v = \frac{y_2 - y_1}{x_2 - x_1}$

$-2,5$ ✓ $= \frac{60 - X}{60 - 70}$ ✓

X = 35 m

Distance = 60 + (60 – 35) ✓

= 85 m ✓ (4)

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QUESTION 4

4.1 The total path length travelled. ✓✓ (2)

4.2

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

$= 32(3) + \frac{1}{2}(0)(3)^2$ ✓

$\Delta x = 96$ m ✓

OR

$v = \frac{\Delta x}{\Delta t}$

$32 = \frac{\Delta x}{(3)}$ ✓

$\Delta x = 96$ m ✓ (2)

4.3

OPTION 1

$v_f = v_i + a\Delta t$ ✓

0 ✓$= 32 + (-2,5)\Delta t$ ✓

$\Delta t = 12,8$ s ✓

OPTION 2

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

$0^2 = (32)^2 + 2(-2,5)(\Delta x)$

$\Delta x = 204,8$ m

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

$204,8$ ✓$= \frac{0 + 32}{2}\Delta t$ ✓

$\Delta t = 12,8$ s ✓

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

$204,8$ ✓$= 32\Delta t + \frac{1}{2}(-2,5)\Delta t^2$ ✓

$\Delta t = 12,8$ s ✓ (4)

4.4 POSITIVE MARKING FROM 4.2 AND 4.3

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

$= 5$ ✓$(15,8) + \frac{1}{2}(0)(15,8)^2$ ✓

$\Delta x = 79$ m

OR

$\Delta x = v_i\Delta t$

$= 5$ ✓$(15,8)$ ✓

$\Delta x = 79$ m

Distance $= 500 - 96 - 204,8 - 79$ ✓

$= 120,2$ m ✓ (4)

[12]

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QUESTION 5

5.1 The amount of substance having same number of particles as there are atoms in 12 g carbon -12. OR That quantity of substance that contains $6,02 \times 10^{23}$ elementary particles.✓✓ (2)

5.2 [Calculation can be in a single table but mark according to the mark allocation]

5.2.1 $n(KClO_3) = \frac{m}{M}$ ✓

$n(KClO_3) = \frac{30,3✓}{122,5✓}$

$= 0,25$ mol✓ (4)

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5.2.2 POSITIVE MARKING FROM 5.2.1

$KClO_3 : KCl$

1 : 1 (OR 2 : 2)

$n(KCl) = 0,25$ mol ✓

$n(KCl) = \frac{N}{N_A}$ ✓

$0,25 = \frac{N}{6,02 \times 10^{23}}$ ✓

$N(KCl) = 1,51 \times 10^{23}$ KCl formula units ✓ (4)

5.2.3 POSITIVE MARKING FROM 5.2.1

$KClO_3 : O_2$ OR $KCl : O_2$

2 : 3

$n(O_2) = 0,375$ mol ✓

$n(O_2) = \frac{V}{V_m}$ ✓

$0,375 = \frac{V}{22,4}$ ✓

$V(O2) = 8,4$ dm^3 ✓ (Accept 8,51 dm^3) (4)

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QUESTION 6

6.1.1 m (O) = 1000 – (265,31 + 353,74) ✓
= 380,95 g ✓ (2)

6.1.2 POSITIVE MARKING FROM 6.1.1

Element	mass (g)	$n = \frac{m}{M}$	Simplest Ratio		Simplest Ratio (Modified)	
K	265,31	$\frac{265,31}{39}$ ✓ $= 6,8$	$\frac{6,8}{6,8} = 1$	✓ (all simplest ratios)	1 x 2 = 2	✓ (all modified simplest ratios)
Cr	353,74	$\frac{353,74}{52}$ ✓ $= 6,8$	$\frac{6,8}{6,8} = 1$		1 x 2 = 2	
O	380,95	$\frac{380,95}{16}$ ✓ $= 23,81$	$\frac{23,81}{6,8} = 3,5$		3,5 x 2 = 7	

Empirical Formula: $K_2Cr_2O_7$ ✓ (6)

6.2 $\%\ H_2O = \frac{10 \times M(H_2O)}{M(X_2CO_3.10H_2O)} \times 100$

$62,937$✓ $= \frac{10 \times 18✓}{(2X + 12 + 16\times3)✓ + 10 \times 18✓} \times 100$

M(X) = 23 g.mol^{-1}

X is Na ✓ (5)

6.3

OPTION 1

$V(CO_2) = \frac{2}{3} \times 90$ OR $\frac{4}{6} \times 90$ ✓

= 60 cm^3

C_2H_2 : CO_2

1 : 2 (OR 2:4)

$V(C_2H_2) = \frac{1}{2} \times 60$ ✓

$V(C_2H_2)$ = 30 cm^3 ✓

OPTION 2

$V(H_2O) = \frac{1}{3} \times 90$ OR $\frac{2}{6} \times 90$ ✓

= 30 cm^3

C_2H_2 : H_2O

1 : 1 (OR 2:2)

$V(C_2H_2) = V(H_2O)$ ✓

$V(C_2H_2)$ = 30 cm^3 ✓

OPTION 3

6 gas moles → 90 cm^3

1 gas mole = $\frac{90}{6}$ ✓

= 15 cm^3

$V(C_2H_2)$ = 2 x 15 ✓

= 30 cm^3 ✓ (3)

[16]

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QUESTION 7

7.1 The number of moles of solute ✓ per cubic decimetre of solution. ✓ OR
The number of moles of a substance ✓ per unit volume (of a solvent) ✓

[Calculation can be in a single table but mark according to the mark allocation]

7.2.1 $c(HCl) = \frac{n}{V}$ ✓

$0,4 = \frac{n}{0,45}$ ✓

$n(HCl) = 0,18$ mol ✓

7.2.2 POSITIVE MARKING FROM 7.2.1

$Al_2(CO_3)_3$: HCl

1 : 6

$n(Al_2(CO_3)_3) = 0,03$ mol ✓

$n(Al_2(CO_3)_3) = \frac{m}{M}$

$0,03$ ✓ $= \frac{m}{234}$ ✓

$m(Al_2(CO_3)_3) = 7,02$ g ✓

7.2.3 POSITIVE MARKING FROM 7.2.1 AND 7.2.2

HCl: CO_2 OR $Al_2(CO_3)_3$: HCl

2 : 1 (or 6:3) 1 : 3

$n(CO_2) = 0,09$ mol ✓

$n(CO_2) = \frac{V}{V_m}$ ✓

$0,09 = \frac{V}{22,4}$ ✓

$V(CO_2) = 2,016\ dm^3$

$\%\ Yield = \frac{Actual\ Yield}{Theoretical\ Yield} \times 100$

$\%\ Yield = \frac{1,9}{2,016} \times 100$ ✓

$= 94,25\ \%$ ✓ (5)

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TOTAL: 100

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