KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10



PHYSICAL SCIENCES
COMMON TEST
MARKING GUIDELINES
SEPTEMBER 2024

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MARKS: 100

DURATION: 2 hours

This marking guideline consists of 8 pages.

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QUESTION 1

1.1 C ✓✓ (2)

1.2 C✓✓ (2)

1.3 A ✓✓ (2)

1.4 C ✓✓ (2)

1.5 C ✓✓ (2)

1.6 B ✓✓ (2)

1.7 C ✓✓ (2)

1.8 A ✓✓ (2)

[16]

QUESTION 2

2.1

2.1.1 $v = \frac{\Delta x}{\Delta t}$ ✓

$5 = \frac{\Delta x}{10}$ ✓

= 50 m west ✓ (3)

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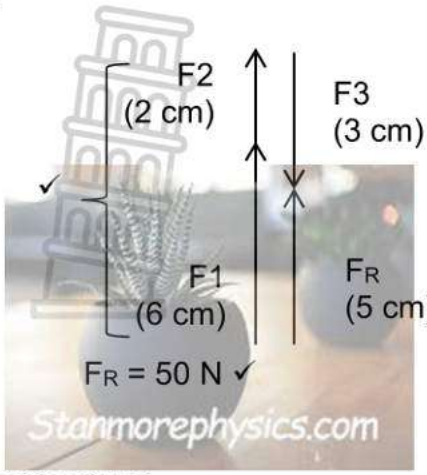
2.1.2 The total distance travelled per total time ✓✓ (2)

2.1.3 $\text{speed} = \frac{\text{distance}}{\text{time}}$ ✓

$= \frac{20+70}{12}$ ✓✓

$= 7{,}5\ \text{m·s}^{-1}$ ✓ (4)

2.2



✓ ✓ ✓

CRITERIA
1 mark – F1 and F2 drawn head-to-tail with correct scale and direction
1 mark – F3 drawn downwards from F2 with the correct scale.
1 mark – F_R drawn with correct direction and scale.
1 mark – Final answer (50 N)

(4)
[13]

QUESTION 3

3.1

3.1.1 The velocity uniformly decreased from 30 m·s^{-1} east ✓ to 0 m·s^{-1} / stop/ rest in 6 seconds ✓ (2)

3.1.2 $a = \frac{\Delta v}{\Delta t}$ OR $a = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{0 - 30}{21 - 15}$ ✓✓

= - 5 m·s^{-2}

= 5 m·s^{-2} West ✓ (3)

3.1.3 OPTION 1

415 ✓ $= \underline{10x + \frac{1}{2} \times 10 \times (30 - x)}$ ✓ $+ \underline{5 \times 30 + \frac{1}{2} \times 6 \times 30}$ ✓

X = 5 m·s^{-1} ✓

OPTION 2

415 ✓ $= \underline{\frac{1}{2} \times 10 \times (x + 30)}$ ✓ $+ \underline{5 \times 30 + \frac{1}{2} \times 6 \times 30}$ ✓

X = 5 m·s^{-1} ✓

OPTION 3

Δx (10 – 21 seconds) = $5 \times 30 + \frac{1}{2} \times 6 \times 30$ ✓

= 240 m

Δx (0 – 10 seconds) = 415 - 240

= 175 m

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

175 ✓ $= \frac{30 + X}{2} \times 10$ ✓

X = 5 m·s^{-1} ✓ (4)

3.2

3.2.1 The rate of change in position. ✓✓ (2)

3.2.2 $v = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{36 - 0}{6 - 3}$ ✓

= 12 m·s^{-1} North ✓ (3)

3.2.3 POSITIVE MARKING FROM 3.2.2

OPTION 1

$a = \frac{\Delta v}{\Delta t}$ ✓

$= \frac{12 - 0}{6}$ ✓

= 2 m·s^{-2} ✓

OPTION 2

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

$36 = 0(6) + \frac{1}{2} a(6)^2$ ✓

a = 2 m·s^{-2} ✓

OPTION 3

$v_f^2 = v_i^2 + 2a\Delta x$ ✓

$(12)^2 = 0^2 + 2a(36)$ ✓

a = 2 m·s^{-2} ✓

(3)

[17]

QUESTION 4

4.1 120 ÷ 3,6 ✓ = 33,33 m·s^{-1} ✓ (2)

4.2 $\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ OR $\Delta x = v_i \Delta t$

$= 45(0,5) + \frac{1}{2}(0)\Delta t^2$ ✓ $= 45(0,5)$ ✓

Δx = 22,5 m Δx = 22,5 m

Distance to speed trap = 100 – 22,5 ✓

= 77,5 m

$v_f^2 = v_i^2 + 2a\Delta x$ ✓

$= (45)^2 + 2(-6)(77,5)$ ✓

= 33,09 m·s^{-1} ✓

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The vehicle will not exceed the speed limit. ✓ (6)

4.3 POSITIVE MARKING FROM 4.2

OPTION 1

$v_f = v_i + a\Delta t$ ✓

33,09 ✓= 45 + (-6)Δt ✓

Δt = 1,99 s ✓

OPTION 2

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

77,5 ✓= $\frac{33,09 + 45}{2}\Delta t$✓

Δt = 1,98 s ✓

OPTION 3

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

77,5 ✓ = 45$\Delta t + \frac{1}{2}(-6)\Delta t^2$✓

Δt = 1,98 s ✓ (4)

[12]

QUESTION 5

5.1 The mass of one mole of substance. ✓✓ (2)

5.2

5.2.1 $n(Fe_2O_3) = \frac{m}{M}$ ✓

$n(Fe_2O_3) = \frac{1200}{160}$ ✓

= 7,5 mol ✓ (3)

5.2.2 POSITIVE MARKING FROM 5.2.1

$Fe_2O_3 : Fe_3O_4$

3 : 2 ✓

$n(Fe_3O_4)$ = 5 mol

$n(Fe_3O_4) = \frac{N}{N_A}$ ✓

$5 = \frac{N}{6,02 \times 10^{23}}$ ✓

N (Fe_3O_4) = 3,01 x 10^{24} Fe_3O_4 formula units ✓ (4)

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5.2.3 POSITIVE MARKING FROM 5.2.1

Fe_2O_3 : CO

3 : 1 ✓

n(CO) = 2,5 mol

$n(CO) = \frac{V}{V_m}$ ✓

$2.5 = \frac{V}{22.4}$ ✓

V(CO) = 56 dm^3 ✓ (4)

[13]

QUESTION 6

6.1.1 The simplest whole-number ratio✓ of atoms in a compound ✓ (2)

6.1.2

Consider 100g

Element	mass (g)	$n = \frac{m}{M}$		Simplest Ratio		Simplest Ratio (Modified)	
C	48,65	$\frac{48,65}{12} = 4,05$	✓	$\frac{4,05}{2,7} = 1,5$	✓ (all simplest ratios)	1,5 x 2 = 3	✓ (all modified simplest ratios)
H	8,11	$\frac{8,11}{1} = 8.11$	✓	$\frac{8,11}{2,7} = 3$		3 x 2 = 6	
O	43,24	$\frac{43,24}{16} = 2,7$	✓	$\frac{2,7}{2.7} = 1$		1x 2 = 2	

Empirical Formula: $C_3H_6O_2$ ✓ (6)

6.2

$C(H_2SO_4) = \frac{n}{V}$ ✓

$0,75 = \frac{n}{0,4}$ ✓

$n(H_2SO_4)$ = 0,3 mol

Y : H_2SO_4

2 : 1 ✓

n(Y) = 0,6 mol

$n(Y) = \frac{m}{M}$

$0,6 ✓ = \frac{13,8 ✓}{M}$

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

Y is Sodium ✓ (6)

[14]

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QUESTION 7

7.1

7.1.1

<u>OPTION 1</u>

$C_3H_8 : CO_2$

1 : 3 ✓

$V(CO_2) = 15\ dm^3$

$C_3H_8 : H_2O$

1 : 4 ✓

$V(H_2O) = 20\ dm^3$

V (end) = 15 + 20 ✓

= 35 dm^3 ✓

<u>OPTION 2</u>

$n(C_3H_8) = \frac{V}{V_m}$

$n(C_3H_8) = \frac{5}{22,4}$

= 0,22 mol

$C_3H_8 : CO_2$

1 : 3 ✓

$n(CO_2) = 0,66$ mol

$C_3H_8 : H_2O$

1 : 4 ✓

$n(H_2O) = 0,88$ mol

$n(end) = \frac{V}{V_m}$

$(0,66 + 0,88) = \frac{V}{22,4}$ ✓

$V(end) = 34,5\ dm^3$ ✓ (4)

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7.1.2 $V(CO_2) = 12\ dm^3$ ✓

$C_3H_8 : CO_2$

1 : 3 ✓

$V(C_3H_8) = 4\ dm^3$

$n(C_3H_8) = \frac{V}{V_m}$

$= \frac{4}{22,4}$ ✓

$= 0,18\ mol$

$n(C_3H_8) = \frac{m}{M}$

$0,18 = \frac{m}{44}$ ✓

$m(C_3H_8) = 7,92\ g$ ✓ (5)

7.2

$n(Mg) = \frac{m}{M}$ ✓

$= \frac{18}{24}$ ✓

$= 0,75\ mol$

$Mg : H_2$

1 : 1 ✓

$n(H_2) = 0,75\ mol$

$n(H_2) = \frac{m}{M}$

$0,75 = \frac{m}{2}$ ✓

$m(H_2)_{theoretical} = 1,5\ g$

$m(H_2)_{actual} = m(H_2)_{theoretical}$ x percentage yield

$m(H_2)_{actual} = 1,5 \times \frac{80}{100}$ ✓

$m(H_2)_{actual} = 1,2\ g$ ✓ (6)

[15]

TOTAL: 100

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