



DEPARTMENT OF  
**EDUCATION**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**



**PHYSICAL SCIENCES  
CONTROL TEST 1  
17 MARCH 2025**

**MARKS : 100**

**TIME : 2 HOURS**

**This question paper consists of 19 pages including data sheets.**

## INSTRUCTIONS AND INFORMATION

1. Write your name on the top of your ANSWER SCRIPT.
2. This question paper consists of 7 questions. Answer ALL the questions on your ANSWER SCRIPT.
3. You may use a non-programmable calculator.
4. You may use appropriate mathematical instruments.
5. Number the answers correctly according to the numbering system used in this QUESTION PAPER.
6. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.
7. Give brief motivations, discussions, et cetera where required.
8. Round off your final numerical answers to a minimum of TWO decimal places.



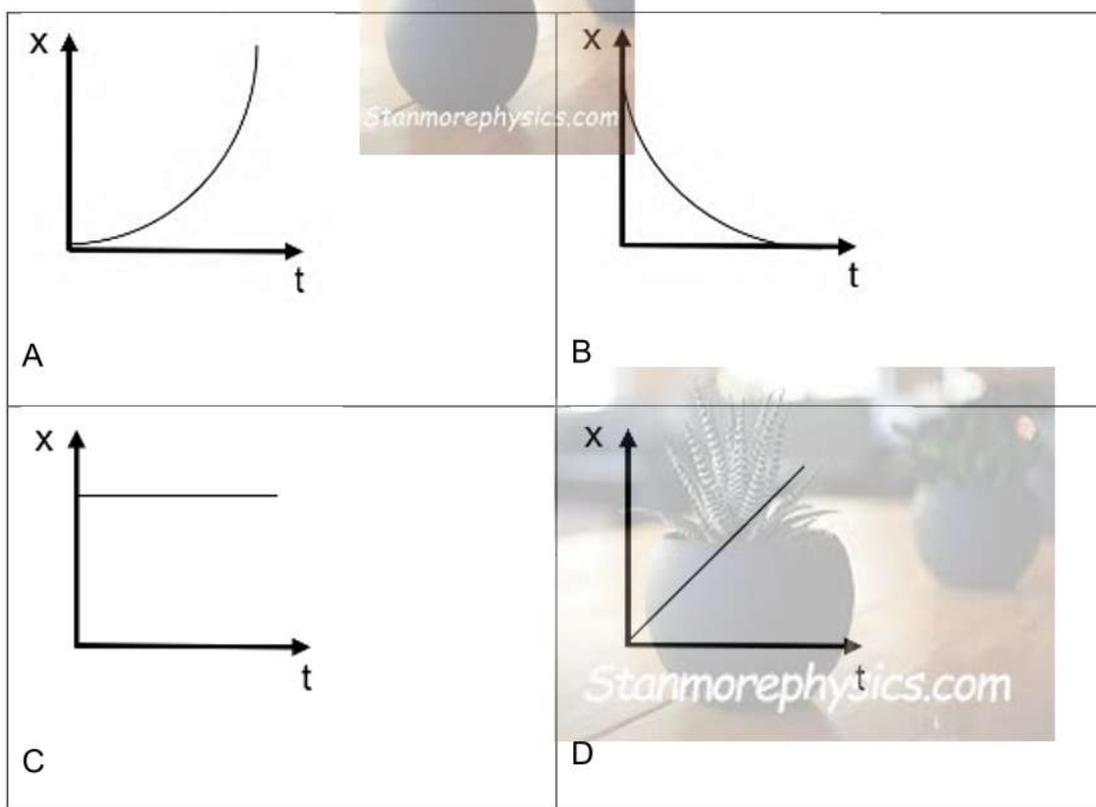
**QUESTION 1 MULTIPLE-CHOICE QUESTIONS**

Various options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A – D) next to the question numbers. (1.1 – 1.10) in the ANSWER BOOK, e.g. 1.11 D.

1.1 Which one of the following physical quantities is a vector?

- A Impulse
  - B Kinetic energy
  - C Time
  - D Mass
- (2)

1.2 Which of the following position-time graphs represent the motion of an object moving with constant, non-zero velocity?



1.3 A person stands on a bathroom scale in a stationary elevator. The reading on the scale is 490 N. When the elevator is in motion, the reading on the scale changes to 470 N.

Which ONE of the following combinations best describes the DIRECTION OF THE MOTION and the DIRECTION OF THE ACCELERATION of the elevator during the motion?

	Direction of motion	Direction of acceleration
A	Upwards	Upwards
B	Downwards	Downwards
C	Upwards	Downwards
D	Downwards	Upwards

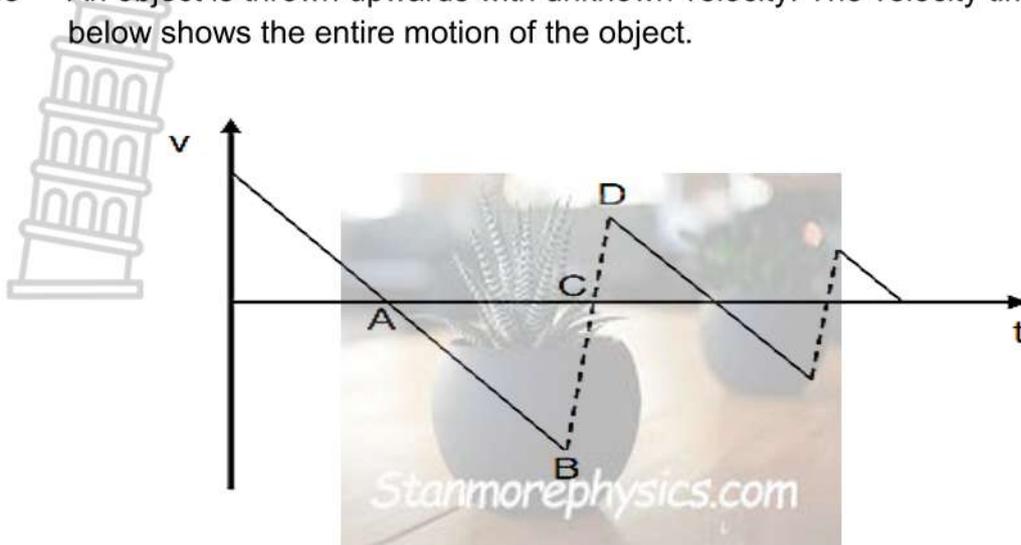
(2)

1.4 The gravitational acceleration,  $g$ , on or near the surface of the earth depends on the...

- A mass of the earth and the diameter of the earth
- B mass of the earth and the distance from its centre
- C mass of the earth only
- D distance from its centre

(2)

1.5 An object is thrown upwards with unknown velocity. The velocity time graph below shows the entire motion of the object.



At which point **A – D** will the object have the greatest momentum.

- A. A
- B. B
- C. C
- D. D



(2)

1.6 A ball is dropped downwards from the height, **h** and hits the ground with a speed **v**. The speed of the ball when it reaches half its initial height is...

- A  $v$
- B  $\frac{v}{\sqrt{2}}$
- C  $\frac{v}{2}$
- D  $\frac{v}{4}$

(2)

1.7 Consider the compound below:



The IUPAC name for the above compound is...

A 2,2,5-trimethylhex-3-yn

B 2,5,5-trimethylhex-3-yn

C 2,2-dimethyl hept-3-yn

D 2,5-dimethylhept-3-yn (2)

1.8 Which one of the following reactions will produce an alkene?

A Esterification reaction

B Substitution reaction

C Elimination reaction

D Addition reaction (2)

1.9 Which one of the following compounds has the lowest vapour pressure?

A Propane

B Propan-1-ol

C Propanoic acid

D Propanone (2)

- 1.10 List of reactants and reaction conditions are given below for a learner to use so that he/she can produce a primary alcohol from **3-ethyl-3-iodo-2-methylpentane**.

**Concentrated  $H_2SO_4$ , water, heat, concentrated KOH and dilute  $H_2SO_4$**

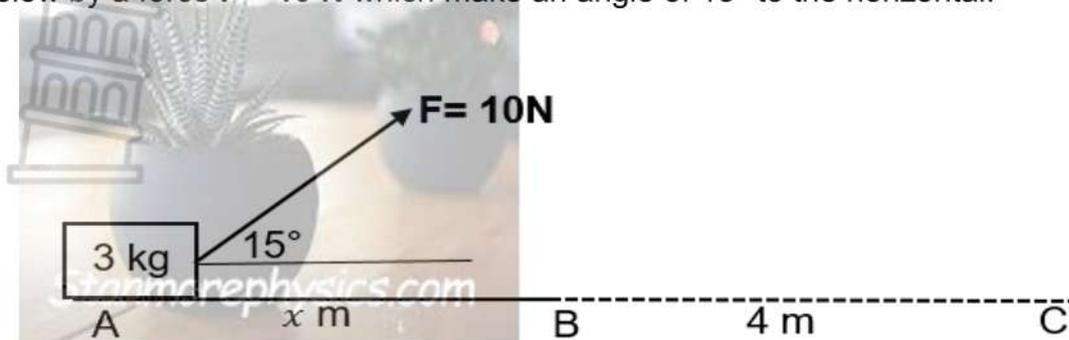
How will the learner use the above reactants and reaction condition to produce a primary alcohol in 4 steps?

	STEP 1	STEP 2	STEP 3	STEP 4
A	Heat and concentrated KOH	Water and dilute $H_2SO_4$	Heat and concentrated $H_2SO_4$	Water and dilute $H_2SO_4$
B	Heat and Concentrated $H_2SO_4$	Water and dilute $H_2SO_4$	Heat and concentrated KOH	Water and dilute $H_2SO_4$
C	Water and dilute $H_2SO_4$	Heat and concentrated KOH	Heat and concentrated $H_2SO_4$	Water and dilute $H_2SO_4$
D	Water and dilute $H_2SO_4$	Heat and concentrated KOH	Water and dilute $H_2SO_4$	Heat and concentrated $H_2SO_4$

(2)  
[20]

**QUESTION 2**

A block of mass 3 kg is pulled from rest on a straight horizontal surface as shown below by a force  $F = 10 \text{ N}$  which make an angle of  $15^\circ$  to the horizontal.

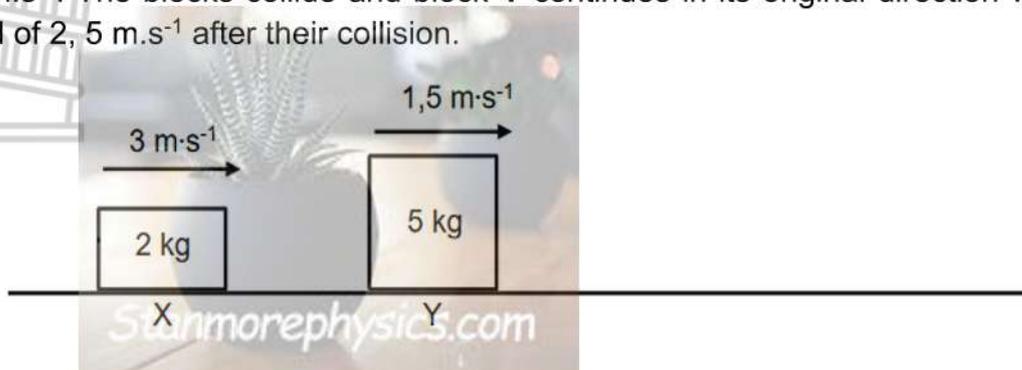


Path **AB** is  $x \text{ m}$  and is frictionless and path **BC** is  $4 \text{ m}$  and is rough. The coefficient of kinetic friction between the block and the surface **BC** is  $0,53$ . The block comes to rest at point **C**.

- 2.1 Draw a force diagram showing all the forces acting on the body as it slides on path **AB**. (3)
  - 2.2 Calculate the speed of the block at point **B**. (5)
  - 2.3 How will the speed calculated in 2.2 be affected if the angle between the surface and the force ( $F$ ) was reduced to  $10^\circ$ ?  
 Write INCREASE, DECREASE or REMAIN THE SAME. Give a reason for your answer. (2)
  - 2.4 Draw the graph of  $F_{\text{net}}$  vs **time** for the entire motion of the block.  
 No numerical values are required. (3)
- [13]**

### QUESTION 3

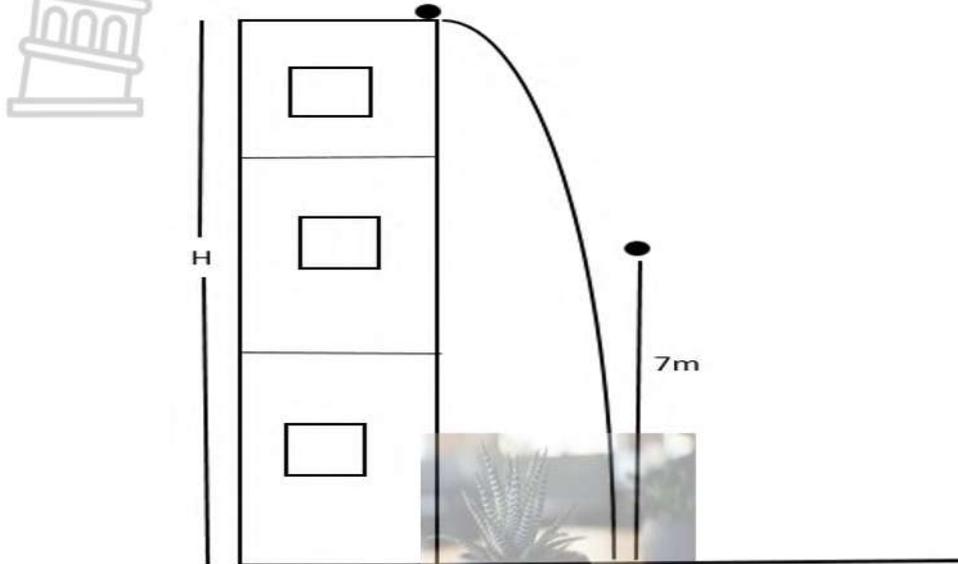
Two blocks are moving to the right along a frictionless surface. Block **X** has a mass of 2 kg and is moving at  $3 \text{ m}\cdot\text{s}^{-1}$ . Block **Y** has a mass of 5 kg and is travelling at  $1,5 \text{ m}\cdot\text{s}^{-1}$ . The blocks collide and block **Y** continues in its original direction with a speed of  $2,5 \text{ m}\cdot\text{s}^{-1}$  after their collision.



- 3.1 State the principle or law which is applicable AT THE POINT OF COLLISION. (2)
  - 3.2 Give a reason why the speed of the 5 kg block increases after collision. (1)
  - 3.3 Calculate the impulse experienced by the 5 kg block. (3)
  - 3.4 Determine the magnitude of the velocity of block **X** after collision. (4)
- [10]**

### QUESTION 4

A ball of mass  $1.5 \text{ kg}$  is thrown down from the top of the building with a velocity of  $12 \text{ m}\cdot\text{s}^{-1}$ . The ball hit the ground and bounces off to the maximum height of  $7 \text{ m}$ . Ignore the effect of air resistance.



- 4.1 Define the term *free fall* in words. (2)
- 4.2 Calculate the velocity which the ball leaves (bounces) the ground with. (4)
- 4.3 When the ball was in contact with the ground,  $344,1 \text{ J}$  of its kinetic energy was converted into the other forms of energy.

Calculate the:

- 4.3.1 speed that the ball hit the ground with. HINT: Use ENERGY FORMULAE. (4)
- 4.3.2 time the ball will take to travel distance **H**. (3)

**[13]**



5.2 Write the IUPAC name of the following:

5.2.1 compound **A**. (2)

5.2.2 compound **E**. (3)

5.3 Draw the structural formula of functional group of compound **D**. (2)

5.4 Write the general formula of compound **C**. (1)

5.5 Consider compound **F**.

5.5.1 Write down the NAME of the catalyst used during preparation of compound **F**. (1)

5.5.2 Is the reaction for preparation of compound **F** ENDOTHERMIC or EXOTHERMIC? Stanmorephysics.com

(1)  
**[13]**

**QUESTION 6**

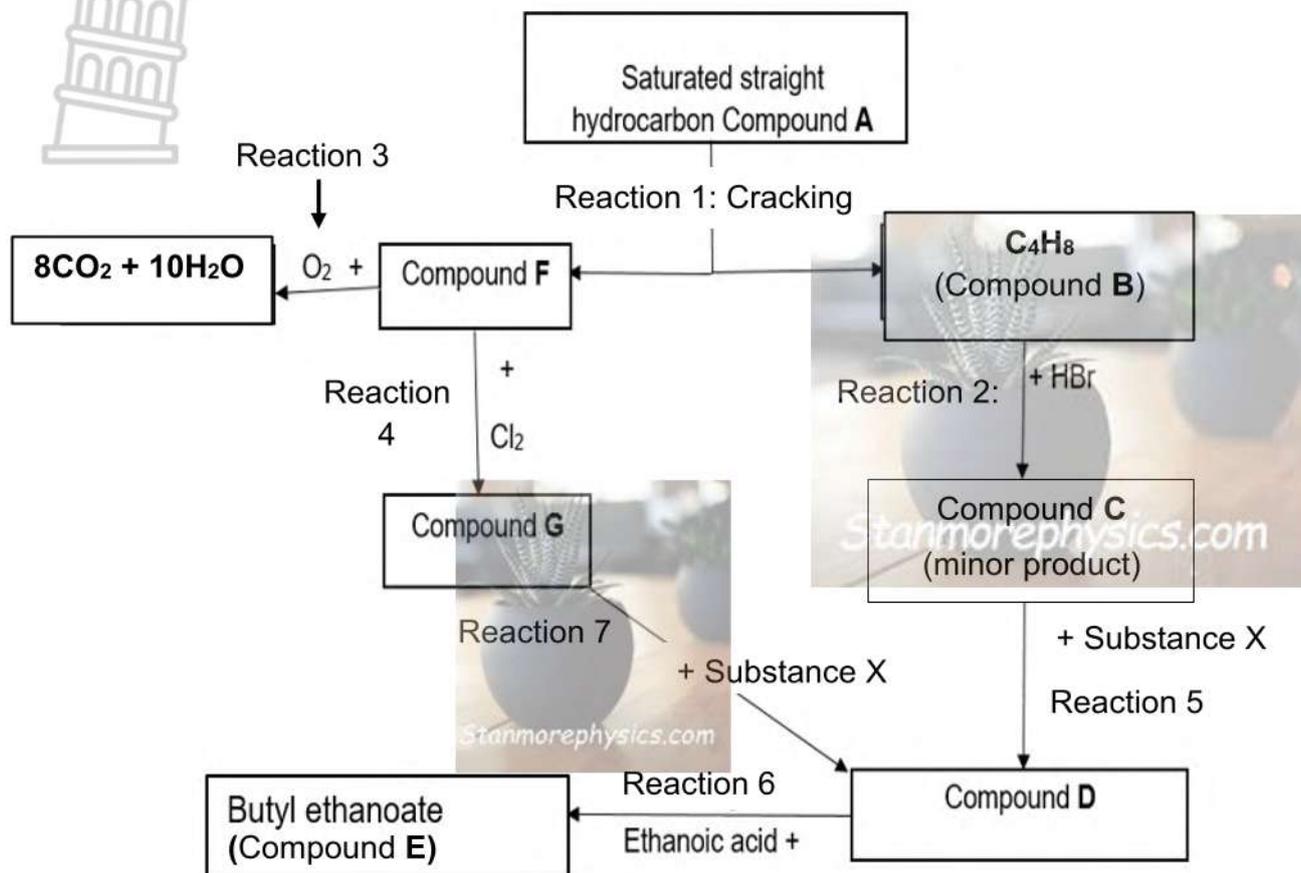
The relationship between strength of intermolecular forces and the boiling point is investigated using five organic compounds. The compounds and their boiling points are given in the table below.

Experiment	Compound/Molecular Formulae		Boiling point (°C)
1	A	C <sub>5</sub> H <sub>12</sub>	36
	B	C <sub>5</sub> H <sub>12</sub>	28
	C	C <sub>5</sub> H <sub>12</sub>	10
2	D	C <sub>4</sub> H <sub>8</sub> O	54
	E	C <sub>4</sub> H <sub>8</sub> O	68

- 6.1 Define the term *boiling point*. (2)
- 6.2 Consider experiment 2.
- 6.2.1 To which homologous series does compound **D** and **E** belong? (1)
- 6.2.2 Name the type of intermolecular force found in compound **D** and **E**. (1)
- 6.2.3 Write down the IUPAC name of compound **D**. (2)
- 6.3 Fully explain the difference in boiling point between compound **A** and compound **B** in experiment 1. (3)
- 6.4 Draw the structural formula of compound **C**. (2)
- 6.5 From the table above, which compound is a gas at room temperature? Write only the letter (A – E). (1)
- [12]**

### QUESTION 7

The flow diagram below has reactions 1 – 7. Compounds **A – G** represent organic compounds. Study the flow diagram and answer the questions that follow.



7.1 Write down the **type** of:

7.1.1 reaction 3. (1)

7.1.2 reaction 4. (1)

7.2 Write down the **name/formula** of:

7.2.1 substance X. (1)

7.2.2 inorganic product of reaction 4. (1)

7.3 Compound C and compound G are structural isomers.

Is the above UNDERLINED statement TRUE or FALSE?

Write TRUE or FALSE and give a reason for your answer. (2)

7.4 Write down the IUPAC name of compound D. (2)

- 7.5 Using structural formula write down a balance chemical reaction for reaction 1. (5)
- 7.6 Write down the structural formula of the positional isomer of the organic PRODUCT of reaction 4. (2)
- 7.7 Compound **G** can be converted to compound **B**.  
Write down TWO reaction conditions required to convert compound **G** to compound **B**. (2)
- 7.8 Draw the structural formula of the functional isomer of compound **E**. (2)

[19]

**TOTAL: 100**



**DATA FOR PHYSICAL SCIENCES GRADE 12  
 PAPER 1 (PHYSICS)**

**TABLE 1: PHYSICAL CONSTANTS**

NAME	SYMBOL	VALUE
Acceleration due to gravity	$g$	$9,8 \text{ m}\cdot\text{s}^{-2}$
Universal gravitational constant	$G$	$6,67 \times 10^{-11} \text{ N}\cdot\text{m}^2\cdot\text{kg}^{-2}$
Speed of light in a vacuum	$c$	$3,0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Planck's constant	$h$	$6,63 \times 10^{-34} \text{ J}\cdot\text{s}$
Coulomb's constant	$k$	$9,0 \times 10^9 \text{ N}\cdot\text{m}^2\cdot\text{C}^{-2}$
Charge on electron	$e$	$1,6 \times 10^{-19} \text{ C}$
Electron mass	$m_e$	$9,11 \times 10^{-31} \text{ kg}$
Mass of the Earth	$M$	$5,98 \times 10^{24} \text{ kg}$
Radius of the Earth	$R_E$	$6,38 \times 10^6 \text{ m}$

**TABLE 2: FORMULAE**

**MOTION**

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ OR $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$ OR $v_f^2 = v_i^2 + 2a\Delta y$	$\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$ OR $\Delta y = \left(\frac{v_i + v_f}{2}\right)\Delta t$

**FORCE**

$F_{net} = ma$	$p = mv$
$f_s^{max} = \mu_s N$	$f_k = \mu_k N$
$F_{net}\Delta t = \Delta p$ $\Delta p = mv_f - mv_i$	$w = mg$
$F = \frac{Gm_1m_2}{d^2}$ OR $F = \frac{Gm_1m_2}{r^2}$	$g = \frac{GM}{d^2}$ OR $g = \frac{GM}{r^2}$

**WORK, ENERGY AND POWER / ARBEID, ENERGIE EN DRYWING**

$W = F\Delta x \cos \theta$	$U = mgh$ OR $E_p = mgh$
$K = \frac{1}{2}mv^2$ OR $E_k = \frac{1}{2}mv^2$	$W_{net} = \Delta K$ OR $W_{net} = \Delta E_k$ $\Delta K = K_f - K_i$ OR $\Delta E_k = E_{kf} - E_{ki}$
$W_{nc} = \Delta K + \Delta U$ OR $W_{nc} = \Delta E_k + \Delta E_p$	$P = \frac{W}{\Delta t}$
$P_{ave} = Fv_{ave}$	

**WAVES, SOUND AND LIGHT**

$v = f\lambda$	$T = \frac{1}{f}$
$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$	$E = hf$ OR $E = h\frac{c}{\lambda}$
$E = W_o + E_{k(max)}$ OR $E = W_o + K_{max}$ where	
$E = hf$ and $W_o = hf_o$ and $E_{k(max)} = \frac{1}{2}mv_{max}^2$ OR $K_{max} = \frac{1}{2}mv_{max}^2$	

**ELECTROSTATICS**

$F = \frac{kQ_1Q_2}{r^2}$	$E = \frac{kQ}{r^2}$
$V = \frac{W}{q}$	$E = \frac{F}{q}$
$n = \frac{Q}{e}$ OR $n = \frac{Q}{q_e}$	

**ELECTRIC CIRCUITS**

$R = \frac{V}{I}$	$\text{emf } (\epsilon) = I(R + r)$
$R_s = R_1 + R_2 + \dots$	$q = I \Delta t$
$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$	$P = \frac{W}{\Delta t}$
$W = Vq$	$P = VI$
$W = VI \Delta t$	$P = I^2R$
$W = I^2R \Delta t$	$P = \frac{V^2}{R}$
$W = \frac{V^2 \Delta t}{R}$	

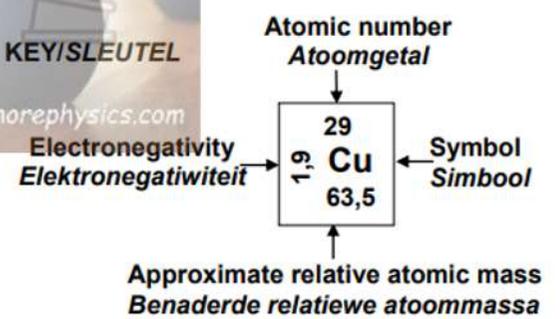
**ALTERNATING CURRENT**

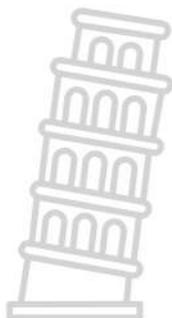
$I_{\text{rms}} = \frac{I_{\text{max}}}{\sqrt{2}}$	$P_{\text{ave}} = V_{\text{rms}} I_{\text{rms}}$
$V_{\text{rms}} = \frac{V_{\text{max}}}{\sqrt{2}}$	$P_{\text{ave}} = I_{\text{rms}}^2 R$
	$P_{\text{ave}} = \frac{V_{\text{rms}}^2}{R}$



TABLE 3: THE PERIODIC TABLE OF ELEMENTS  
TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
1 2,1 <b>H</b> 1																	2 <b>He</b> 4
3 1,0 <b>Li</b> 7	4 1,5 <b>Be</b> 9											5 2,0 <b>B</b> 11	6 2,5 <b>C</b> 12	7 3,0 <b>N</b> 14	8 3,5 <b>O</b> 16	9 4,0 <b>F</b> 19	10 <b>Ne</b> 20
11 0,9 <b>Na</b> 23	12 1,2 <b>Mg</b> 24											13 1,5 <b>Al</b> 27	14 1,8 <b>Si</b> 28	15 2,1 <b>P</b> 31	16 2,5 <b>S</b> 32	17 3,0 <b>Cl</b> 35,5	18 <b>Ar</b> 40
19 0,8 <b>K</b> 39	20 1,0 <b>Ca</b> 40	21 1,3 <b>Sc</b> 45	22 1,5 <b>Ti</b> 48	23 1,6 <b>V</b> 51	24 1,6 <b>Cr</b> 52	25 1,5 <b>Mn</b> 55	26 1,8 <b>Fe</b> 56	27 1,8 <b>Co</b> 59	28 1,8 <b>Ni</b> 59	29 1,9 <b>Cu</b> 63,5	30 1,6 <b>Zn</b> 65	31 1,6 <b>Ga</b> 70	32 1,8 <b>Ge</b> 73	33 2,0 <b>As</b> 75	34 2,4 <b>Se</b> 79	35 2,8 <b>Br</b> 80	36 <b>Kr</b> 84
37 0,8 <b>Rb</b> 86	38 1,0 <b>Sr</b> 88	39 1,2 <b>Y</b> 89	40 1,4 <b>Zr</b> 91	41 <b>Nb</b> 92	42 1,8 <b>Mo</b> 96	43 1,9 <b>Tc</b> 98	44 2,2 <b>Ru</b> 101	45 2,2 <b>Rh</b> 103	46 2,2 <b>Pd</b> 106	47 1,9 <b>Ag</b> 108	48 1,7 <b>Cd</b> 112	49 1,7 <b>In</b> 115	50 1,8 <b>Sn</b> 119	51 1,9 <b>Sb</b> 122	52 2,1 <b>Te</b> 128	53 2,5 <b>I</b> 127	54 <b>Xe</b> 131
55 0,7 <b>Cs</b> 133	56 0,9 <b>Ba</b> 137	57 <b>La</b> 139	72 1,6 <b>Hf</b> 179	73 <b>Ta</b> 181	74 <b>W</b> 184	75 <b>Re</b> 186	76 <b>Os</b> 190	77 <b>Ir</b> 192	78 <b>Pt</b> 195	79 <b>Au</b> 197	80 <b>Hg</b> 201	81 1,8 <b>Tl</b> 204	82 1,8 <b>Pb</b> 207	83 1,9 <b>Bi</b> 209	84 2,0 <b>Po</b>	85 2,5 <b>At</b>	86 <b>Rn</b>
87 0,7 <b>Fr</b>	88 0,9 <b>Ra</b> 226	89 <b>Ac</b>															
			58 <b>Ce</b> 140	59 <b>Pr</b> 141	60 <b>Nd</b> 144	61 <b>Pm</b>	62 <b>Sm</b> 150	63 <b>Eu</b> 152	64 <b>Gd</b> 157	65 <b>Tb</b> 159	66 <b>Dy</b> 163	67 <b>Ho</b> 165	68 <b>Er</b> 167	69 <b>Tm</b> 169	70 <b>Yb</b> 173	71 <b>Lu</b> 175	
			90 <b>Th</b> 232	91 <b>Pa</b>	92 <b>U</b> 238	93 <b>Np</b>	94 <b>Pu</b>	95 <b>Am</b>	96 <b>Cm</b>	97 <b>Bk</b>	98 <b>Cf</b>	99 <b>Es</b>	100 <b>Fm</b>	101 <b>Md</b>	102 <b>No</b>	103 <b>Lr</b>	





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**ERRATA/AMENDED MG**

**PHYSICAL SCIENCES/FISIESE WETENSKAPPE**

**CONTROL TEST 1 MARKING GUIDELINE/KONTROLE TOETS 1  
NASIENRIGLYNE**

**17 March/Maart 2025**

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**MARKS/PUNTE : 100**

**This marking guideline consists of 12 pages/Hierdie nasienriglyne bestaan uit  
12 bladsye**

QUESTION/VRAAG 1

1.1 A ✓✓

1.2 D ✓✓

1.3 B or/of C ✓✓

1.4 B ✓✓

1.5 B ✓✓

1.6 B ✓✓

1.7 ~~A ✓✓~~ (remove)

1.8 C ✓✓

1.9 C ✓✓

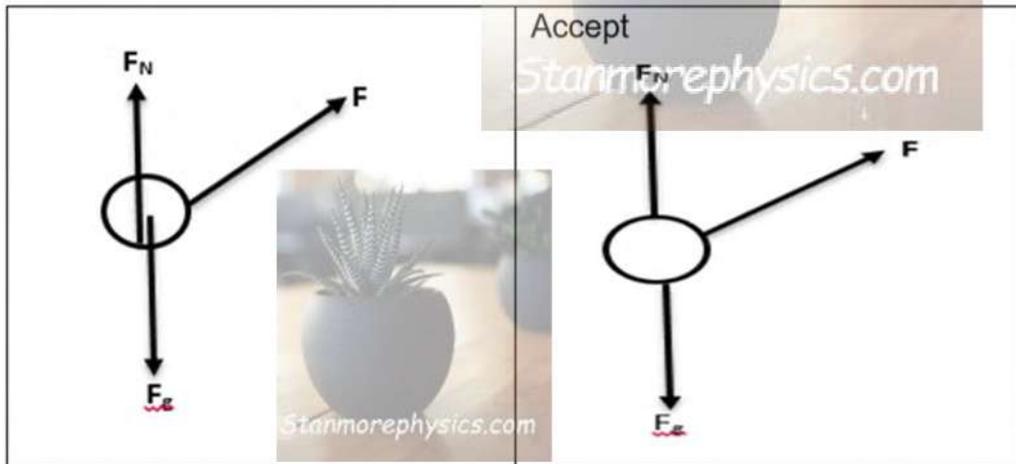
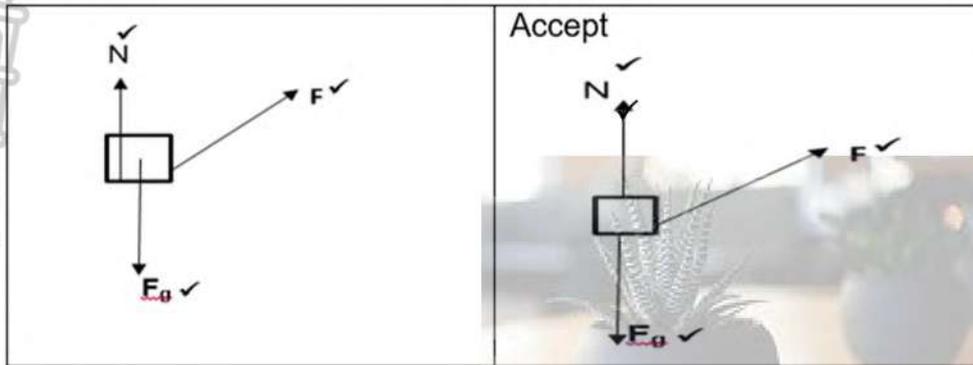
1.10 A ✓✓



[20 - 2] = [18]

QUESTION/VRAAG 2

2.1



ACCEPTABLE LABELS/AANVAARDE BYSKRIFTE	NOTES/NOTAS
<p><math>F_N</math>: Normal force/Normaalkrag  <math>F_g</math>: w/weight/force due to gravity / gewig/krag agv gravitasie  <math>F_A</math>: 10 N/Applied force/Toegepaste krag</p>	<p>ONE mark for each force represented by an arrow with a correct label/<i>Een punt vir elke krag wat deur 'n pyl met 'n korrekte byskrif voorgestel word</i></p> <p><b>Penalise ONCE</b> for each of the following: /<b>Penaliseer EEN KEER</b> vir elk van die volgende:</p> <ul style="list-style-type: none"> <li>• No arrow/<i>geen pyl</i></li> <li>• Gap between the line and the block/<i>spasie tussen die lyne en die blok</i></li> <li>• Dotted line is used/<i>stippellyn word gebruik</i></li> <li>• Free body diagram drawn/<i>Vryeliggaan diagram geteken</i></li> <li>• Components are drawn/<i>Komponente geteken</i></li> </ul>

2.2 **OPTION 1/OPSIE 1**

$$F_{net} = ma$$

$$F_x - f_k = ma$$

$$10 \cos 15^\circ - 0,53((3 \times 9,8) - 10 \sin 15^\circ) \checkmark = 3a \checkmark$$

$$a = -1,51712 \text{ m} \cdot \text{s}^{-2}$$

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

$$0 = v_i^2 + 2(-1,51712)4 \checkmark$$

$$v = 3,48 \text{ m} \cdot \text{s}^{-1} \checkmark (\text{right/regs})$$

**Marking criteria for choosing right as positive/Nasien kriteria as regs as positief gekies word**

- **1 mark for/punt vir :**

$$0,53(3(9,8) - 10 \sin 15)$$

- **1 mark for/punt vir:**

$$10 \cos 15 \text{ and/en } 3a$$

- **1 mark for/punt vir:**

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

- **1 mark for/punt vir:**

$$0 = v_i^2 + 2(-1,51712)4$$

- **1 mark for/punt vir:**

$$v = 3,48 \text{ m} \cdot \text{s}^{-1} (\text{right/regs})$$

(5)

**OPTION 2/OPSIE 2**

$$W_{net} = \Delta E_k$$

$$F_x \Delta x \cos \theta + f_k \Delta x \cos \theta = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \checkmark$$

$$10 \cos 15 (10) \cos 0 \checkmark + (14,210)(10) \cos 180 \checkmark = \frac{1}{2} (1,5)(0)^2 - \frac{1}{2} (1,5) v_i^2 \checkmark$$

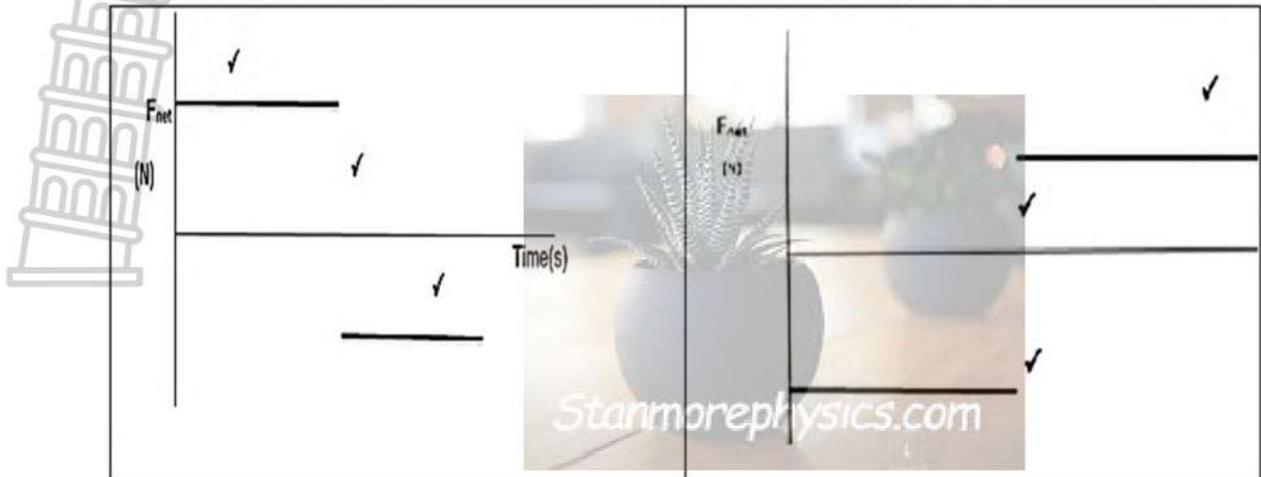
$$v_1 = 3,48 \text{ m} \cdot \text{s}^{-1} \checkmark$$

2.3 Increase ✓/Toeneem

The resultant force will increase/acceleration will increase causing the velocity to also increase. ✓ / Die resulterende krag sal toeneem/versnelling sal toeneem, wat veroorsaak dat die snelheid ook toeneem. (2)

2.4 **OPTION 1**

**OPTION 2**



Marking criteria for choosing right as positive/ <i>Nasien kriteria as regs as positief gekies word</i>
<ul style="list-style-type: none"> <li>1 mark for the line parallel to the x- axis and intersecting with the y axis in the first quadrant/<i>1 punt vir die lyn parallel aan die x-as en sny met die y-as in die eerste kwadrant</i></li> </ul>
<ul style="list-style-type: none"> <li>1 mark for the line parallel to the x axis in the fourth quadrant/<i>1 punt vir die lyn parallel aan die x-as in die vierde kwadrant</i></li> </ul>
<ul style="list-style-type: none"> <li>1 mark for the time of change in direction of the net force/<i>1 punt vir die tyd van verandering in rigting van die netto krag.</i></li> </ul>
<p>Note: Two parallel lines in the fourth and the first quadrant both intersecting with the y axis (2/3)/ <i>Let wel: Twee parallelle lyne in die vierde en die eerste kwadrant wat albei met die y-as sny (2/3)</i></p> <p><b>Do not penalize if there is a line joining both graphs/<i>moenie penaliseer as daar 'n lyn is wat die twee grafieke verbind nie</i></b></p>

(3)  
[13]

**QUESTION/VRAAG 3**

3.1 When object A exerts a force on object B, object B simultaneously exerts an oppositely directed force of equal magnitude on object A ✓✓ / Wanneer voorwerp A 'n krag op voorwerp B uitoefen, oefen voorwerp B gelyktydig 'n teenoorgestelde gerigte krag van gelyke grootte op voorwerp A uit

**OR/OF**

In an isolated system the total linear momentum is conserved / In 'n geïsoleerde stelsel word die totale lineêre momentum bewaar

**OR/OF**

The net (or resultant) force acting on an object is equal to the rate of change of momentum of the object in the direction of the net force. / Die netto (of resulterende) krag wat op 'n voorwerp inwerk is gelyk aan die tempo van verandering van momentum van die voorwerp in die rigting van die netto krag.

(2 or 0)

3.2 Because the direction of resultant force/acceleration is the same as the direction of motion. ✓ / Omdat die rigting van resulterende krag/versnelling dieselfde is as die rigting van beweging.

(1)

3.3  $F_{net} \Delta t = mv_f - mv_i$  ✓  
 $F_{net} \Delta t = \Delta p$  }

$F_{net} \Delta t = 5(2,5) - 5(1,5)$  ✓

$F_{net} \Delta t = 5 \text{ N} \cdot \text{s right/regs}$  ✓

(3)

3.4  $\sum p_i = \sum p_f$  ✓  
 $mv_{ix} + mv_{iy} = mv_{fx} + mv_{fy}$  }

$2(3) + 5(1,5) \checkmark = 2v_{fx} + 5(2,5) \checkmark$

$v_{fx} = 0,5 \text{ m} \cdot \text{s}^{-1}$  ✓ (direction not considered)

**OPTION 2**

For 2kg

$\Delta p = m(v_f - v_i)$  ✓

$-5 \checkmark = 2(v_f - 3) \checkmark$

$v_f = 0,5 \text{ m} \cdot \text{s}^{-1} \checkmark$

(4)  
**[10]**

**QUESTION/VRAAG 4**

4.1 The motion during which the only force acting on an object is the gravitational force. ✓✓ / Die beweging waartydens die enigste krag wat op 'n voorwerp inwerk, die gravitasiekrag is (2 or 0)

4.2 **OPTION 1**

$$v_f^2 = v_i^2 + 2a\Delta x \text{ or/of } v_f^2 = v_i^2 + 2a\Delta y \checkmark$$

$$0 \checkmark = v_i^2 + 2(-9,8)(7) \checkmark$$

$$v_i = 11,71 \text{ m} \cdot \text{s}^{-1} \checkmark \text{ (upwards/up) / (boontoe/op)}$$

**OPTION 2**

$$v_f^2 = v_i^2 + 2a\Delta x \text{ or } v_f^2 = v_i^2 + 2a\Delta y \checkmark$$

$$0 \checkmark = v_i^2 + 2(9,8)(-7) \checkmark$$

$$v_i = 11,71 \text{ m} \cdot \text{s}^{-1} \text{ (upwards/up)} \checkmark$$

**OPTION 3**

$$v_f^2 = v_i^2 + 2a\Delta x \text{ or } v_f^2 = v_i^2 + 2a\Delta y \checkmark$$

$$v_f^2 = 0 \checkmark + 2(9,8)(7) \checkmark$$

$$v_i = v_f = 11,71 \text{ m} \cdot \text{s}^{-1} \text{ (upwards/up)} \checkmark \quad (4)$$

4.3.1 **Positive marking from 4.2/Positiewe nasien vanaf 4.2**

**OPTION 1/OPSIE 1**

$$E_{k(\text{hit the ground})} = E_{k(\text{that it bounce})} + E_{k(\text{converted to other energies})}$$

$$\frac{1}{2}mv_{(\text{hit})}^2 \checkmark = \frac{1}{2}mv_{(\text{bounce})}^2 + \frac{1}{2}mv_{(\text{convert})}^2$$

$$\frac{1}{2}(1,5)v_{(\text{hit})}^2 = \frac{1}{2}(1,5)(11,71)^2 \checkmark + 344,1 \checkmark$$

$$v_{(\text{hit})} = 24,41 \text{ m} \cdot \text{s}^{-1} \checkmark \text{ (downwards) / (afwaarts)}$$

**OPTION 2/OPSIE 2**

$$\Delta E_K = E_{kf} - E_{ki} \checkmark$$

$$-344,1 \checkmark = \frac{1}{2}(1,5)(11,71)^2 \checkmark - \frac{1}{2}(1,5)v^2$$

$$v = 24,41 \text{ m} \cdot \text{s}^{-1} \checkmark \text{ (downward)} \quad (4)$$

4.3.2 **Positive marking from 4.3.1/Positiewe nasien vanaf 4.3.1**

$$v_f = v_i + at \checkmark$$

$$24,41 = 11,71 + (9,8)t \checkmark$$

$$t = 1,27 \text{ s} \checkmark \quad (3)$$

**[13]**

QUESTION/VRAAG 5

5.1.1 A ✓ and/en B ✓ (2)

5.1.2 C ✓ (1)

5.2.1 3-chloro ✓ hexane ✓ /3-chloroheksaan

**Marking criteria/Nasien kriteria**

- 1 mark for 3-chloro / 1 punt vir 3-chloro
- 1 mark for hexane / 1 punt vir heksaan

(2)

5.2.2 4-methyl ✓ pentan-2-one ✓ ✓ /4-metiel pentaan-2-oon

OR/OF

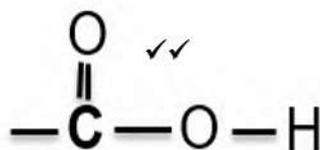
4-methyl ✓ -2- pentanone ✓ ✓ /4-metiel-2-pentanoon

**Marking criteria/Nasien kriteria**

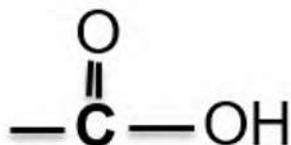
- 1 mark for 4-methyl / 1 punt vir 4-metiel
- 1 mark for pentanone / 1 punt vir pentaanoon
- 1 mark for whole name correct / 1 punt vir die hele naam korrek

(3)

5.3



ACCEPT/AANVAAR



(2)

5.4  $C_nH_{2n}$  ✓ (1)

5.5.1 Sulphuric acid ✓ (No mark for  $H_2SO_4$ ) / Swaelsuur (geen punt vir  $H_2SO_4$  nie) (concentrated removed/gekonsentreerd uitgelaat) (1)

5.5.2 Exothermic ✓ / Eksotermies (1)  
[13]

## QUESTION/VRAAG 6

6.1 The temperature at which the vapour pressure of the substance is equal to the atmospheric pressure. ✓✓ / Die temperatuur waarby die dampdruk van die stof gelyk is aan die atmosferiese druk. (2 or 0)

6.2.1 D and E are Aldehydes ✓ / D en E is Aldehiede

**OR/OF**

D is an Aldehyde and E a Ketone / of D is 'n Aldehyd en E 'n Ketoon (1)

6.2.2 London force/ induced dipole force/dipole-dipole ✓ / London krag/geïnduseerde dipool krag/dipool-dipool (1)

6.2.3 **Negative marking from 6.2.1/negatiewe nasien vanaf 6.2.1**

methylpropanal ✓✓ / metielpropanaal

**ACCEPT/AANVAAR**

2-methylpropanal/2-metielpropanaal

**OR/OF**

Butanal/Butanaal

(2)

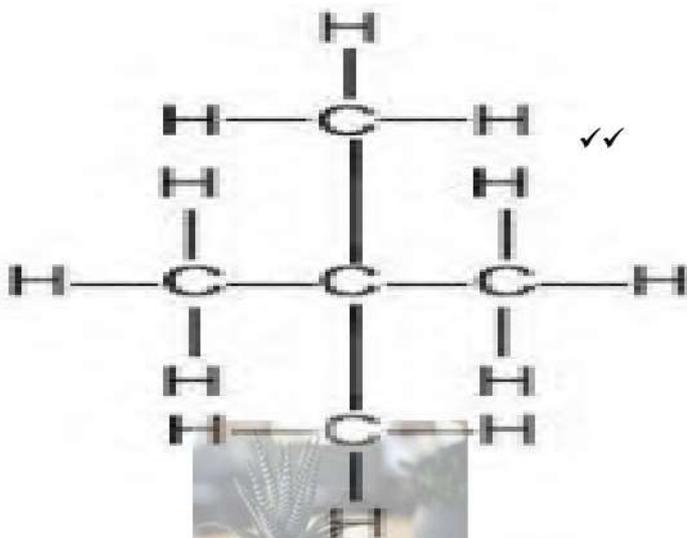
- 6.3
- Compound A has a larger surface area/longer chain length than compound B. ✓ / Verbinding A het 'n groter oppervlakte/langer kettinglengte as verbinding B
  - Compound A has stronger intermolecular force/London force than compound B. ✓ / Verbinding A het sterker intermolekulêre krag/Londen-krag as verbinding B
  - More energy is required to overcome the stronger intermolecular force in compound A than compound B ✓ / Meer energie word benodig om die sterker intermolekulêre krag in verbinding A as verbinding B te oorkom

**Or/Of**

- Compound B has a smaller surface area/smaller chain length/**is more branched** than compound A. ✓ / Verbinding B het 'n kleiner oppervlakte/kleiner kettinglengte/**is meer vertak** as verbinding A.
- Compound B has weaker intermolecular force/London force than compound A. ✓ / Verbinding B het swakker intermolekulêre krag/Londen-krag as verbinding A



- Less energy is required to overcome the weaker intermolecular force/London force in compound B than in compound A ✓/  
Minder energie word benodig om die swakker intermolekulêre krag/Londen krag in verbinding B te oorkom as in verbinding A (3)



(2)

6.5 C ✓



(1)  
[12]

QUESTION/VRAAG 7

7.1.1 Combustion/oxidation ✓/Verbranding/oksidasie (1)

7.1.2 Substitution ✓ **ACCEPT: halogenation/chlorination/**  
**Substitusie AANVAAR: halogenasie/chlorinasie** (1)

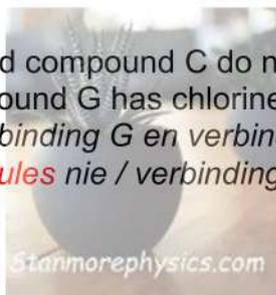
7.2.1 NaOH / KOH / H<sub>2</sub>O / Sodium hydroxide / potassium hydroxide / water  
 ✓/ Natriumhidroksied / kaliumhidroksied / water (1)

7.2.2 HCl/ hydrogen chloride ✓/ waterstofchloried  
 (NO MARK FOR HYDROCHLORIC ACID/GEEN PUNT VIR  
 SOUTSUUR NIE) (1)

7.3 False ✓/Fals

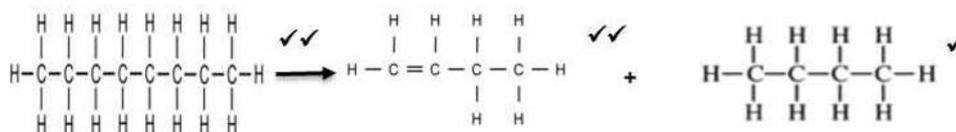


Compound G and compound C do not have the same molecular  
**formulae** / compound G has chlorine while compound C has  
 bromine. ✓/ *Verbinding G en verbinding C het nie dieselfde*  
*molekulêre formules nie / verbinding G het chloor terwyl verbinding*  
*C broom het*



7.4 Butan-1-ol ✓✓ **ACCEPT 1-butanol / butaan-1-ol AANVAAR 1-butaanol** (2)

7.5



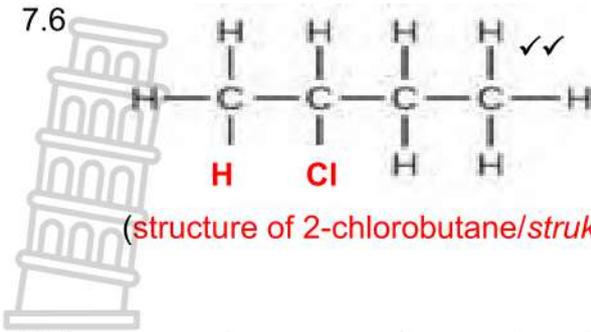
Marking criteria/Nasien kriteria

- 2 mark for 8 carbons/2 punte vir 8 koolstowwe
- 1 mark for double bonds/1 punt vir dubbelbindings  
 1 mark for whole structure correct/1 punt vir hele struktuur korrek  
**If But-2-ene is drawn deduct 1 mark/as But-2-een geteken trek 1 punt af**
- 1 mark for butane/1 punt vir butaan

**If molecular formula given/indien molekulêre formule gegee is:**  
**C<sub>8</sub>H<sub>18</sub> ✓✓ → C<sub>4</sub>H<sub>8</sub> + C<sub>4</sub>H<sub>10</sub> ✓** **Max/maks 3/5**

(5)

7.6



(structure of 2-chlorobutane/struktuur van 2-chlorobutaan)

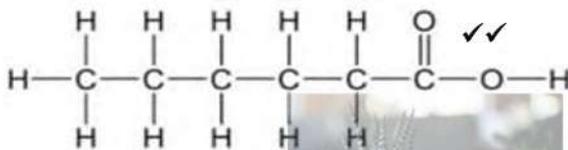
(2 or 0)

7.7

- Concentrated strong base/ concentrated NaOH/KOH ✓  
/gekonsentreerde sterk basis/gekonsentreerde NaOH/KOH
- Heat ✓ /Hitte

(2)

7.8



- 1 mark for functional group/1 punt vir funksionele groep
- 1 mark for whole structure correct/1 punt vir hele struktuur korrek

(2)  
[19]

TOTAL/TOTAAL: 100 – 2  
[98]

Rework total of 98 back to 100