Student Number: ……

North Sydney Boys High School

Science Faculty

Year 10 Science 2023

Assessment Task 3

General Instructions:

- Reading time: 5 minutes
- Working time: 70 minutes
- This examination contains **Section A** and **Section B**.
- You will be provided with a answer sheet for **Section A** and a periodic table. Use the answer sheet to record your answer for **Section A**.
- Write your student number on the cover of the exam paper.
- Write using a black or blue pen.
- Draw diagrams and graphs using a pencil.
- NESA-approved calculators may be used.
- Attempt ALL questions.

Total Marks – 50

Section A: Multiple Choice

- Question 1 - 15
- 15 marks

Section B: Written Response

- Question 16 – 28
- 35 marks

Assessment Weighting:

10% Working Scientifically

25% Knowledge and Understanding

Section A:	**/15**
Section B:	**/35**
Total:	**/50**

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Section A (15 marks):

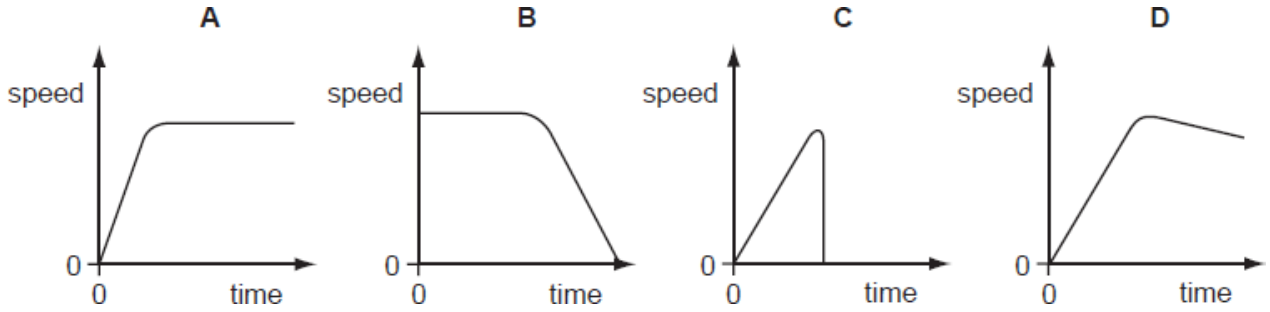
Attempt questions 1-15
Use the answer sheet provided to record your answer.

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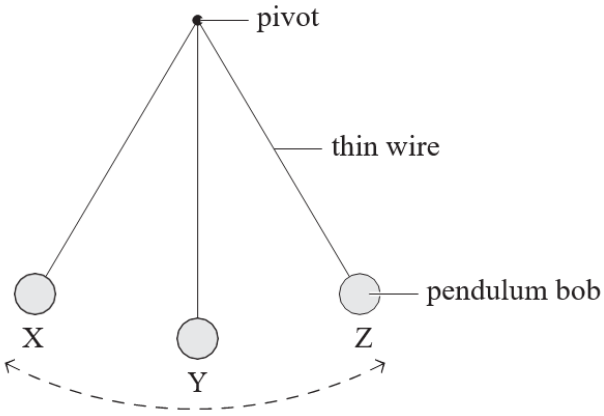
1. Speed is defined as: 1 mark (KU)

   A. the rate of change of velocity with time
   B. the rate of change of distance with time
   C. the rate of change of time with distance
   D. the distance from the origin divided by time on the clock

2. A golf ball starts to roll down a steep slope and then continues to roll along a rough, flat surface. Which graph best shows the speed of the ball? 1 mark (WS)



3. The following diagram shows a pendulum swinging backwards and forwards. 1 mark (WS)



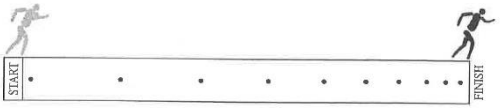
Which one of the following statements about the pendulum bob is correct?

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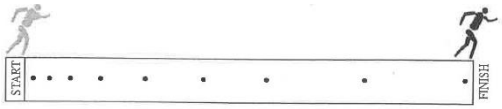
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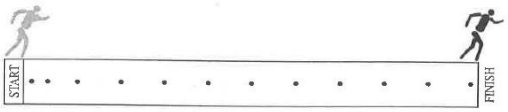
A.



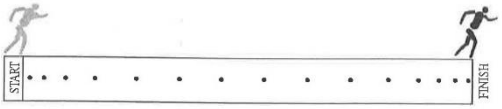
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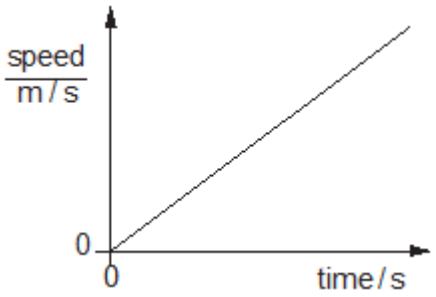
C.



D.

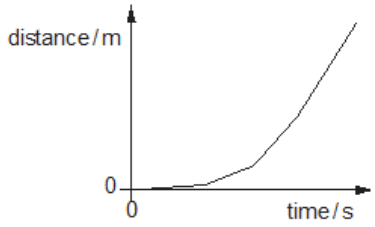


5. The speed-time graph represents a short journey. 1 mark (WS)

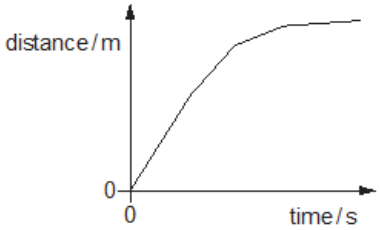


Which distance-time graph represents the same journey?

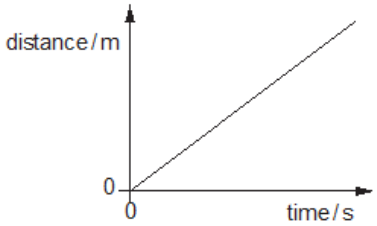
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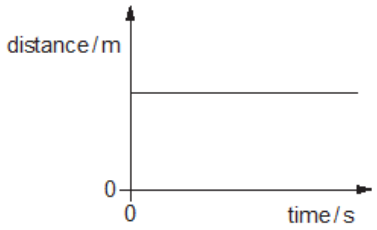
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D.



6. Which one of the following is an example of Newton's third law of motion? 1 mark (KU)

   A. You will weigh less on the Moon
   B. A pea will accelerate faster than an egg when thrown with the same force
   C. When you paddle water backwards, the boat will move forward
   D. When a car moving forward suddenly comes to a stop, passengers tend to keep moving forward

7. In the compound Na_2O, the cation and anion would be: 1 mark (KU)

   A. Na_2^+ and O^-
   B. Na^- and O^{2+}
   C. Na^+ and O^{2-}
   D. O^- and Na_2^+

8. A student wanted to investigate how the acceleration of a trolley was affected by the mass of the trolley. He set up the trolley on a bench and used masses hung over a pulley to provide a force on the trolley. Which variable should the student change during the experiment? 1 mark (KU)

   A. The masses hanging from the pulley
   B. The distance that the trolley travels along the bench
   C. The distance that the masses hung below the trolley
   D. The masses carried on the trolley

9. A physical quantity which has direction as well as magnitude is known as: 1 mark (KU)

   A. force
   B. vector
   C. scalar
   D. weight

10. What does it mean when an object has a negative displacement? 1 mark (KU)

    A. The object has moved clockwise with reference to the initial position
    B. The object has moved in a forward direction with reference to the initial position
    C. The object has moved anti-clockwise with reference to the initial position
    D. The object has moved in a backward direction with reference to the initial position

11. The correct chemical name for the compound SO_2 is: 1 mark (KU)

    A. sulfur dioxide
    B. sulfur oxide
    C. sulfur oxygen
    D. sulfur monoxide

12. What products are formed if potassium carbonate reacts with sulfuric acid? 1 mark (KU)

A. Potassium sulfate, carbon dioxide and water
B. Potassium sulfate and carbon dioxide
C. Potassium sulfate, hydrogen gas and water
D. Potassium oxide, carbon dioxide and water

13. The water making up the Earth's oceans contains sodium chloride. 1 mark (KU)

What type of substance is sodium chloride?

A. Element
B. Compound
C. Sub-atomic particle
D. Mixture

14. Some students were trying to identify a colourless solution. They performed a number of experiments and recorded their results. 1 mark (KU)

RESULTS

- It turned blue litmus paper red.
- It reacted with zinc to produce bubbles of gas. The gas caused a lighted wooden splint to go out with a loud 'pop'.

Which of the following could be the formula of the chemical which caused these results?

A. NaOH
B. Na_2CO_3
C. H_2O
D. H_2SO_4

15. It is important to use correct scientific procedures when testing an idea. The results of an experiment are more reliable if the same results are achieved every time the experiment is carried out. 1 mark (WS)

Which of the following procedures would help to make the results of an experiment more reliable?

A. More scientists should be involved in planning the method to use.
B. Any unusual observation should not be recorded.
C. The results should be written up in a scientific report.
D. A large sample size should be tested.

End of Section A

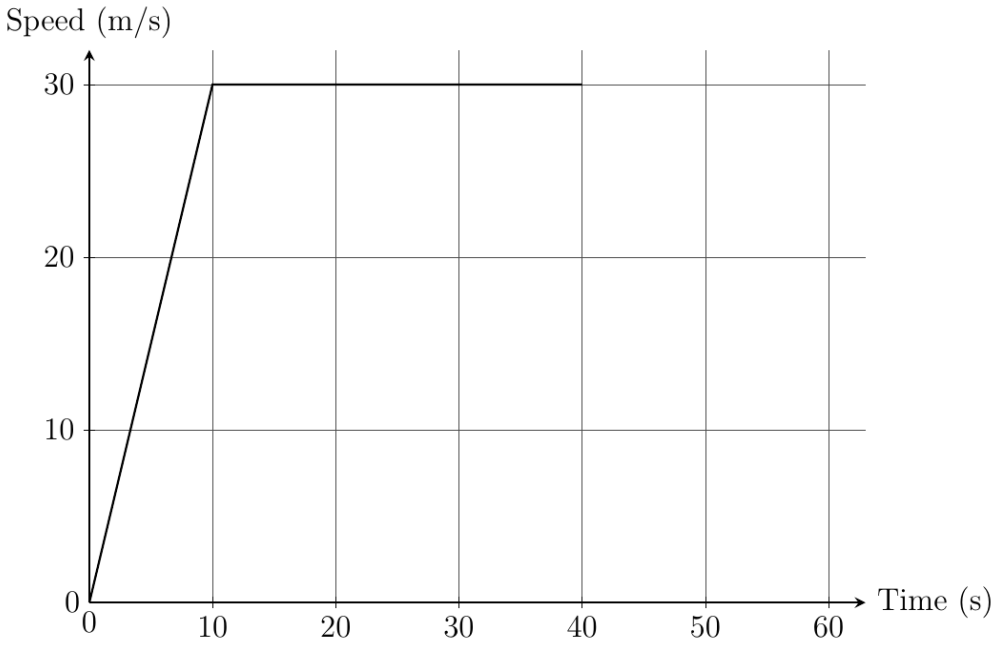
Section B (35 marks):

16. Complete the following conversion: 1 mark (WS)

70 km h^{-1} = _____ m s^{-1}

17. A car weighing 1500 kg is travelling along a straight road. The car starts from rest and its speed increases for the first 10 seconds of its journey at an acceleration of 3 m s^{-2}. The car then maintains a constant speed for the next 30 seconds, before decelerating to rest at 2.5 m s^{-2}.

The diagram below shows the partially complete speed-time graph for the car.



a) Calculate the total time required for the car to come to a complete stop at a deceleration of 2.5 m/s^2. Show full working. 2 marks (WS)

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b) Complete the graph above to fully represent the journey of the car. 1 mark (WS)

18. An object is experiencing a driving force of 20N to the left and the forces of friction of 10N and air resistance of 5N to the right. Calculate the net force. Show full working. 2 marks (WS)

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19. Define inertia and give an example of inertia in everyday life. 2 marks (KU)

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20. Explain the effect that each of the following changes would have on the acceleration of an object. 1 mark (KU)

a) The force acting on an object is tripled.

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b) The mass of an object is halved, while a constant force is applied. 1 mark (KU)

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21. Identify the element that is in group 6 and in period 4. 1 mark (KU)

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22. Complete this sentence: 1 mark (KU)

The metals in Group 1 of the Periodic Table behave in a similar way because they have the same number of …… ……. .

23. Explain the difference between energy transfer and energy transformation. 2 marks (KU)

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24. "The rate of a chemical reaction is how fast the reaction can be completed." 2 marks (KU)

a) State five factors that can affect the rate of chemical reactions.

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b) Choose one of the factors from Question 24 a) and describe how it would affect the rate of chemical reactions. 1 mark (KU)

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c) Provide the name that is given to a reaction that releases energy. Give an example. 2 marks (KU)

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25. Describe two similarities between combustion and respiration. 2 marks (KU)

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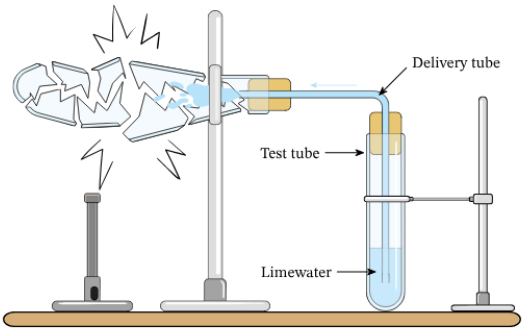
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26. Scientists use the solubility rules to predict if a precipitation reaction will occur when two ionic solutions are mixed. Using the solubility rules provided, write the formula for any precipitate formed by mixing the solutions in the following table. 4 marks (KU)

	KBr	Na_2CO_3
$AgNO_3$		
$CuSO_4$		

Solubility Rules	
Ions	Solubility
Nitrates ($NO3^-$)	All soluble
Chlorides (Cl^-)	All soluble except for AgCl, $PbCl_2$ and $HgCl_2$
Bromides (Br^-)	All soluble except for AgBr, $PbBr_2$ and $HgBr_2$
Sulfates (SO_4^{2-})	All soluble except for PbSO4, CaSO4 and BaSO4
Carbonates (CO_3^{2-})	All insoluble except for group 1 carbonates (e.g. Na_2CO_3, K_2CO_3) and $(NH_4)_2CO_3$
Hydroxides (OH^-)	All insoluble except for group 1 hydroxides (e.g. NaOH, KOH), $Ca(OH)_2$, $Ba(OH)_2$ and NH_4OH

27. Students are performing the thermal decomposition of copper carbonate. They used a delivery tube to test the gas produced.



a) Write a balanced chemical equation of the thermal decomposition of copper carbonate. 2 marks (KU)

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b) Instructions were given to the students to remove the delivery tube before turning off the Bunsen burner. Bob forgot to follow the instruction, and he turned the Bunsen burner off without taking the delivery tube out. A few seconds later, the test tube cracked. Explain what caused the test tube to crack (the lime water remained at the room temperature). 2 marks (WS)

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28. Read the following hypothesis:

'Magnesium reacts faster with hydrochloric acid than Aluminium does.'

a) Outline a method for an experiment to test this hypothesis. 4 marks (KU)

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b) Identify one hazard and the corresponding safety procedure that should be taken while performing this experiment. 2 marks (WS)

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End of the Examination

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Student Number: ……

Answer Sheet for Section A

Select the alternative A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

	A	B	C	D
1				
2				
3				
4				
5				
6				
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8				
9				
10				
11				
12				
13				
14				
15				

PERIODIC TABLE OF THE ELEMENTS

KEY

Atomic Number	79
Symbol	Au
Standard Atomic Weight	197.0
Name	Gold

1 H 1.008 Hydrogen																	2 He 4.003 Helium
3 Li 6.941 Lithium	4 Be 9.012 Beryllium											5 B 10.81 Boron	6 C 12.01 Carbon	7 N 14.01 Nitrogen	8 O 16.00 Oxygen	9 F 19.00 Fluorine	10 Ne 20.18 Neon
11 Na 22.99 Sodium	12 Mg 24.31 Magnesium											13 Al 26.98 Aluminium	14 Si 28.09 Silicon	15 P 30.97 Phosphorus	16 S 32.07 Sulfur	17 Cl 35.45 Chlorine	18 Ar 39.95 Argon
19 K 39.10 Potassium	20 Ca 40.08 Calcium	21 Sc 44.96 Scandium	22 Ti 47.87 Titanium	23 V 50.94 Vanadium	24 Cr 52.00 Chromium	25 Mn 54.94 Manganese	26 Fe 55.85 Iron	27 Co 58.93 Cobalt	28 Ni 58.69 Nickel	29 Cu 63.55 Copper	30 Zn 65.38 Zinc	31 Ga 69.72 Gallium	32 Ge 72.64 Germanium	33 As 74.92 Arsenic	34 Se 78.96 Selenium	35 Br 79.90 Bromine	36 Kr 83.80 Krypton
37 Rb 85.47 Rubidium	38 Sr 87.61 Strontium	39 Y 88.91 Yttrium	40 Zr 91.22 Zirconium	41 Nb 92.91 Niobium	42 Mo 95.96 Molybdenum	43 Tc Technetium	44 Ru 101.1 Ruthenium	45 Rh 102.9 Rhodium	46 Pd 106.4 Palladium	47 Ag 107.9 Silver	48 Cd 112.4 Cadmium	49 In 114.8 Indium	50 Sn 118.7 Tin	51 Sb 121.8 Antimony	52 Te 127.6 Tellurium	53 I 126.9 Iodine	54 Xe 131.3 Xenon
55 Cs 132.9 Caesium	56 Ba 137.3 Barium	57–71 Lanthanoids	72 Hf 178.5 Hafnium	73 Ta 180.9 Tantalum	74 W 183.9 Tungsten	75 Re 186.2 Rhenium	76 Os 190.2 Osmium	77 Ir 192.2 Iridium	78 Pt 195.1 Platinum	79 Au 197.0 Gold	80 Hg 200.6 Mercury	81 Tl 204.4 Thallium	82 Pb 207.2 Lead	83 Bi 209.0 Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89–103 Actinoids	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

Lanthanoids

57 La 138.9 Lanthanum	58 Ce 140.1 Cerium	59 Pr 140.9 Praseodymium	60 Nd 144.2 Neodymium	61 Pm Promethium	62 Sm 150.4 Samarium	63 Eu 152.0 Europium	64 Gd 157.3 Gadolinium	65 Tb 158.9 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.9 Holmium	68 Er 167.3 Erbium	69 Tm 168.9 Thulium	70 Yb 173.1 Ytterbium	71 Lu 175.0 Lutetium

Actinoids

89 Ac Actinium	90 Th 232.0 Thorium	91 Pa 231.0 Protactinium	92 U 238.0 Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Standard atomic weights are abridged to four significant figures.

Elements with no reported values in the table have no stable nuclides.

Information on elements with atomic numbers 113 and above is sourced from the International Union of Pure and Applied Chemistry Periodic Table of the Elements (November 2016 version).

The International Union of Pure and Applied Chemistry Periodic Table of the Elements (February 2010 version) is the principal source of all other data. Some data may have been modified.

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MARKING CRITERIA

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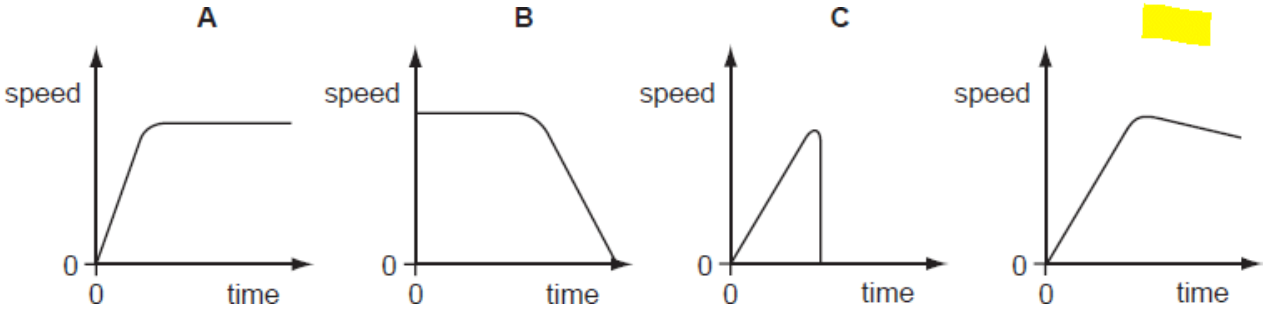
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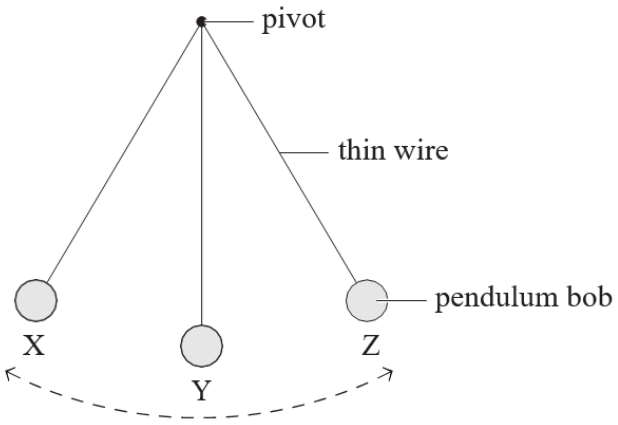
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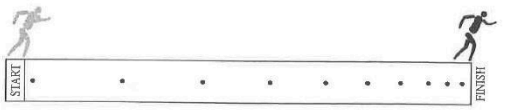
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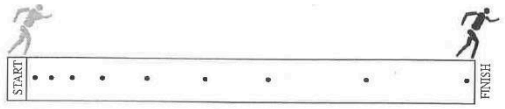


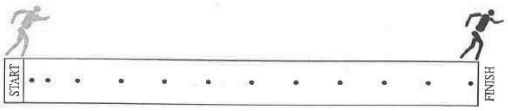
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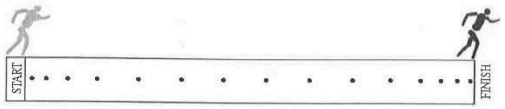
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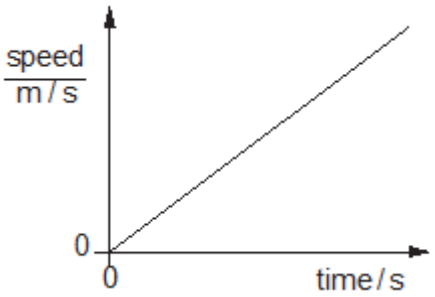
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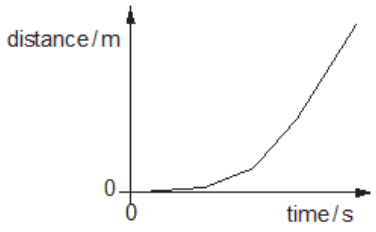
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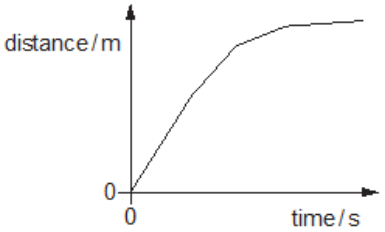
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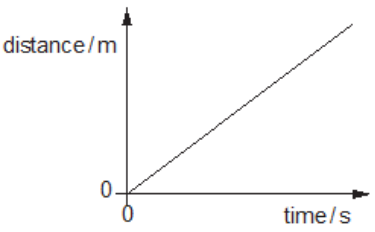
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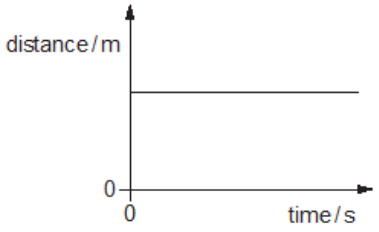


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B. 

C. 

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   D. weight

1 mark (KU)

10. What does it mean when an object has a negative displacement?

   A. The object has moved clockwise with reference to the initial position
   B. The object has moved in a forward direction with reference to the initial position
   C. The object has moved anti-clockwise with reference to the initial position
   D. The object has moved in a backward direction with reference to the initial position

1 mark (KU)

11. The correct chemical name for the compound SO_2 is:

   A. sulfur dioxide
   B. sulfur oxide

C. sulfur oxygen

D. sulfur monoxide

1 mark (KU)

12. What products are formed if potassium carbonate reacts with sulfuric acid?

A. Potassium sulfate, carbon dioxide and water

B. Potassium sulfate and carbon dioxide

C. Potassium sulfate, hydrogen gas and water

D. Potassium oxide, carbon dioxide and water

1 mark (KU)

13. The water making up the Earth's oceans contains sodium chloride.

What type of substance is sodium chloride?

A. Element

B. Compound

C. Sub-atomic particle

D. Mixture

1 mark (KU)

14. Some students were trying to identify a colourless solution. They performed a number of experiments and recorded their results.

RESULTS

- It turned blue litmus paper red.
- It reacted with zinc to produce bubbles of gas. The gas caused a lighted wooden splint to go out with a loud 'pop'.

Which of the following could be the formula of the chemical which caused these results?

A. NaOH

B. Na_2CO_3

C. H_2O

D. H_2SO_4

1 mark (WS)

15. It is important to use correct scientific procedures when testing an idea. The results of an experiment are more reliable if the same results are achieved every time the experiment is carried out.

Which of the following procedures would help to make the results of an experiment more reliable?

A. More scientists should be involved in planning the method to use.

B. Any unusual observation should not be recorded.

C. The results should be written up in a scientific report.

D. A large sample size should be tested.

End of Section A

Section B (35 marks):

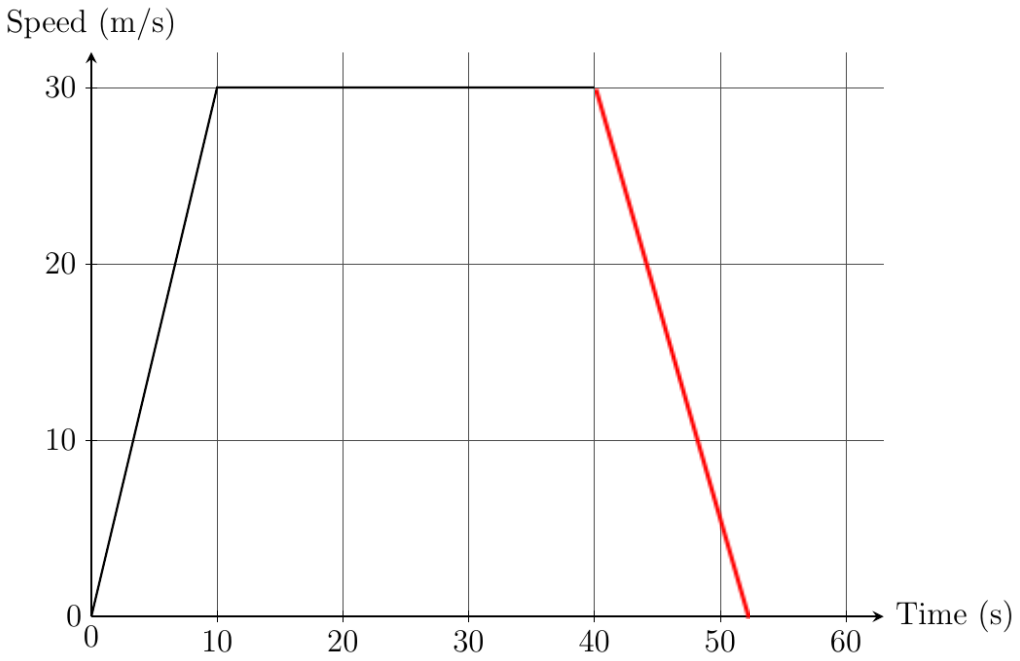
16. Complete the following conversion: 1 mark (WS)

70 km h^{-1} = ____19.4_____ m s^{-1}

The answer can be up to 2 decimal places (fraction form not accepted).

17. A car weighing 1500 kg is travelling along a straight road. The car starts from rest and its speed increases for the first 10 seconds of its journey at an acceleration of 3 m s^{-2}. The car then maintains a constant speed for the next 30 seconds, before decelerating to rest at 2.5 m s^{-2}.

The diagram below shows the partially complete speed-time graph for the car.



a) Calculate the total time required for the car to come to a complete stop at a deceleration of 2.5 m/s^2. Show full working. 2marks (WS)

Marker's comment:

- 1 mark for the correct answer with unit
- 1 mark for showing full working (sign convention must be correct)

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

$-2.5 = \frac{0-30}{t}$

$t = 12s$

b) Complete the graph above to fully represent the journey of the car. 1 mark

(WS)

18. An object is experiencing a driving force of 20N to the left and the forces of friction of 10N and air resistance of 5N to the right. Calculate the net force. Show full working.

2 marks (WS)

Marker's comment:

- 1 mark for the correct answer with units
- 1 mark for showing full working

$F(net) = -20N + 10N + 5N$ (assume right is positive, left is negative)
$F(net) = -5N$ (*or* $5N$ *to the left*)

19. Define inertia and give an example of inertia in everyday life.

2 marks (KU)

Inertia is the resistance an object has to a change in its state of motion (needed to state both either at rest or moving to get a mark for this one).

When the bus stops suddenly, people will continue to move and fall forward.

20. Explain the effect that each of the following changes would have on the acceleration of an object.

1 mark (KU)

a) The force acting on an object is tripled.

The acceleration is tripled.

b) The mass of an object is halved, while a constant force is applied.

1 mark (KU)

The acceleration is doubled.

21. Identify the element that is in group 6 and in period 4.

1 mark (KU)

Chromium and selenium

22. Complete this sentence:

1 mark (KU)

The metals in Group 1 of the Periodic Table behave in a similar way because they have the same

number of valence electrons (outer electrons was accepted)

23. Explain the difference between energy transfer and energy transformation.

2 marks (KU)

Energy transfer is the **movement** of energy from one location to another.
Energy transformation is when energy changes from one **type** to another.

24. "The rate of a chemical reaction is how fast the reaction can be completed."

2 marks (KU)

a) State five factors that can affect the rate of chemical reactions.

Surface area, concentration of the reactants (amount of solute was accepted), temperature, agitation, catalyst

1 mark (KU)

b) Choose one of the factors from Question 24 a) and describe how it would affect the rate of chemical reactions.

Answer can be different from each student.

2 marks (KU)

c) Provide the name that is given to a reaction that releases energy. Give an example.

Exothermic reaction.
Provided an example.

2 marks (KU)

25. Describe two similarities between combustion and respiration.

Both respiration and combustion use oxygen. Both respiration and combustion produce energy. Both respiration and combustion give out carbon dioxide as the end product.

4 marks (KU)

26. Scientists use the solubility rules to predict if a precipitation reaction will occur when two ionic solutions are mixed. Using the solubility rules provided, write the formula for any precipitate formed by mixing the solutions in the following table.

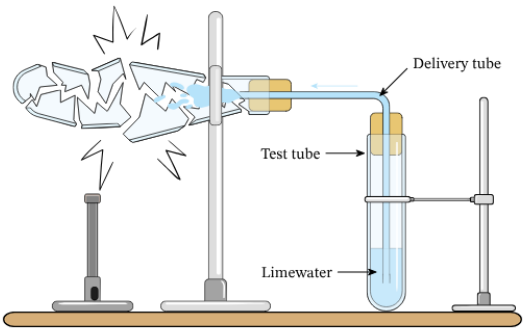
	KBr	Na_2CO_3
$AgNO_3$	AgBr	Ag_2CO_3
$CuSO_4$		$CuCO_3$

Solubility Rules

Ions	Solubility
Nitrates ($NO3^-$)	All soluble
Chlorides (Cl^-)	All soluble except for AgCl, $PbCl_2$ and $HgCl_2$
Bromides (Br^-)	All soluble except for AgBr, $PbBr_2$ and $HgBr_2$
Sulfates (SO_4^{2-})	All soluble except for PbSO4, CaSO4 and BaSO4
Carbonates (CO_3^{2-})	All insoluble except for group 1 carbonates (e.g. Na_2CO_3, K_2CO_3) and $(NH_4)_2CO_3$
Hydroxides (OH^-)	All insoluble except for group 1 hydroxides (e.g. NaOH, KOH), $Ca(OH)_2$, $Ba(OH)_2$ and NH_4OH

27. Students are performing the thermal decomposition of copper carbonate. They used a delivery tube to test the gas produced.

2 marks (KU)



2 marks (WS)

a) Write a balanced chemical equation of the thermal decomposition of copper carbonate.

$CuCO3(s) \longrightarrow \Delta CuO(s) + CO2(g)$

b) Instructions were given to the students to remove the delivery tube before turning off the Bunsen burner. Bob forgot to follow the instruction, and he turned the Bunsen burner off without taking the delivery tube out. A few seconds later, the test tube cracked. Explain what caused the test tube to crack (the lime water remained at the room temperature).

Marks	Criteria
2	• Refers explicitly to the effect of 'suckback' • Discussed the temperature change resulting in test tube cracking
1	Mentioned one of the points. or Some relevant information given

While you are heating the test-tube - the air inside would have expanded. Once you turn off the bunsen burner, the temperature within the test-tube will start to cool and a direct result of that would be the air inside the test-tube will also start to reduce its volume which then leads to a pressure difference between the inside of the test-tube to the air pressure outside. This is because a mini-vacuum is created in the system causing cold water from the trough or limewater from the test tube to be sucked up into the delivery tube until it eventually reaches the hot reaction tube. The effects of suck-back can be dangerous; the cracking or shattering of the reaction vessel can send pieces of glass flying, spilling hot chemicals.

4 marks (KU)

28. Read the following hypothesis:

'Magnesium reacts faster with hydrochloric acid than Aluminium does.'

a) Outline a method for an experiment to test this hypothesis.

Marks	Criteria

4	- 1 mark for following all the scientific conventions. (M, mL, weight of strips or strip dimensions, marks awards even if they wrote the method as a paragraph) - 1 mark for using the correct equipment. (didn't have to state the size of the equipment both test tubes and beakers were accepted) - 1 mark for successfully comparing the reactivity. (either mention:measure time taken for bubbles to stop forming or time taken for metals to completely dissolve or gas collected in an inverted container to collect gas) - 1 mark for being succinct and using scientific terminology
3	Mentioned three of the points
2	Mentioned two of the points
1	Mentioned one of the points

2 marks (WS)

1. Fill both test tubes with 5mL of 1M of hydrochloric acid and label them Test Tube A and Test Tube B.
2. Get 5 cm of magnesium strip and 5 cm of aluminium strip. Make sure the size of both metal strips is the same.
3. Use the sandpaper to clean the magnesium strip and aluminium strip.
4. Place magnesium strip into Test Tube A and Aluminium strip into Test Tube B at the same time.
5. Observe how fast the bubbles are produced for each test tube. Record your observation.

b) Identify one hazard and the corresponding safety procedure that should be taken while performing this experiment.

Marker's comment:
- 1 mark for providing a hazard and the corresponding safety procedure

Hydrochloric acid is corrosive. Avoid contact with the skin. Wear gloves and safety goggles when handling the acid.

End of the Examination

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Student Number: ……

Student Number: ……

Answer Sheet for Section A

Select the alternative A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

	A	B	C	D
1				
2				
3				
4				
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Student Number: ……