



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES**

**DEPARTMENT OF NATURAL AND APPLIED SCIENCES**

<b>QUALIFICATION: ALL PROGRAMMES</b>	
<b>QUALIFICATION CODE:</b>	<b>LEVEL: 4</b>
<b>COURSE CODE: BSC410S</b>	<b>COURSE NAME: BASIC SCIENCE</b>
<b>SESSION: JANUARY 2023</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 100</b>

<b>SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION PAPER (FM, PM AND DI)</b>	
<b>EXAMINER(S)</b>	DR. MUNYARADZI ZIVUKU, MR. PETRUS PAULUS AND MR. TUWILIKA TOBIAS
<b>MODERATOR:</b>	DR. EDOSA OMOREGIE

<b>INSTRUCTIONS</b>	
1.	Write all your answers in the answer booklet provided.
2.	Read the whole question before answering.
3.	Begin each question on a new page.
4.	The Periodic Table is attached at the back of this paper.

**PERMISSIBLE MATERIALS**

Non-programmable Scientific Calculator

**THIS EXAMINATION QUESTION PAPER CONSISTS OF 14 PAGES**

**(INCLUDING THIS FRONT PAGE)**



**QUESTION 1:****(20)**

**Question type:** Multiple choices. Read the questions carefully, choose and write the correct letter corresponding to the correct answer. Each question weighs 2 marks.

1.1 Which of the following options is the correct order for increasing complexity? (2)

- A. cells → tissues → organs → organ systems → organism
- B. organs → organism → tissues → cells → organ systems
- C. tissues → cells → organ systems → organs → organism
- D. cells → organs → tissues → organ systems → organism

1.2 Monoecious are; (2)

- A. plants that have separate male and female flowers on the same plant.
- B. plants that have the male flowers on one plant and female flowers on another plant.
- C. non-flowing plants
- D. naked seed producing plants

1.3 A non-living organism is one that \_\_\_\_\_ . (2)

- A. shows all the 7 characteristics of living organisms
- B. lacks all characteristics of living organisms
- C. has ceased to show the characteristics of living organisms
- D. responds to danger and grow

1.4 A starter culture in the food industry is \_\_\_\_\_ . (2)

- A. fungi that are used to make food rot so that we can eat the food
- B. bacteria that are used in the fermentation of food products
- C. a microorganism that is used to control the growth of other organisms
- D. a microorganism that can withstand high temperatures and can be used in fermentation industries



- 1.5 Unsaturated fats; (2)
- A. are more common in animals than in plants.
  - B. have fewer fatty acid molecules per fat molecule.
  - C. are associated with greater health risks than saturated fats.
  - D. have double bonds in their fatty acid chains.
- 1.6 Organisms within communities and ecosystems feed on one another to obtain energy and nutrients. What component does not cycle within an ecosystem? (2)
- A. soil nutrients
  - B. energy
  - C. plant nutrients
  - D. components of hard animal structures.
- 1.7 Which of the following options is the primary function of proteins? (2)
- A. growth of new cells
  - B. repair of damaged cells
  - C. manufacture of antibodies
  - D. all of the above.
- 1.8 Which of the following group of people has a high demand for calcium? (2)
- A. Growing children and elderly women
  - B. Growing children and young women
  - C. Growing children and expectant women/ breast feeding women
  - D. Elderly men and young men.
- 1.9 Which of the following is NOT a fat-soluble vitamin? (2)
- A. Vitamins A
  - B. Vitamins C
  - C. Vitamins D
  - D. Vitamins E



- 1.10 Abiotic factors are elements that compose a given environment such as; (2)
- A. light, temperature, minerals, water
  - B. gases, atmospheric pressure, rocks, fungi
  - C. water, sunlight, microorganisms, minerals
  - D. soil, gases, epiphytes, light

**QUESTION 2:** (15)

**Question type:** Structured questions.

- 2.1 Distinguish between unicellular and multicellular organisms. (2)
- 2.2 Briefly discuss why a scientific name of organisms is more important than its common name. (2)
- 2.3 The rhinoceros (rhino) is a protected animal in Namibia. It is an endangered or extinct animal, explain? (2)
- 2.4 Feeding on yogurt, especially children, it is said to boost the immune system and promote growth. Explain? (4)
- 2.5 Discuss the statement, "*You are what you eat*"? (2)
- 2.6 What is the relationship between **vitamin D** and **bone** development? (1)
- 2.6 Discuss the effects of omitting the addition of the starter culture during the production of yogurt? (2)





**QUESTION 3:****(20)**

**Question type:** Multiple choices. Read the questions carefully, choose and write the correct letter corresponding to the correct answer. Each question weighs 2 marks.

3.1 Which of the following is a qualitative measurement? (2)

- A. Height
- B. Weight
- C. Density
- D. Color

3.2 Which of these is not an SI unit? (2)

- A. Celsius
- B. Kelvin
- C. Kilogram
- D. Meter

3.3 The scientific notation form of 0.0000482 is \_\_\_\_\_? (2)

- A.  $4 \times 10^5$
- B.  $4 \times 10^{-5}$
- C.  $4.82 \times 10^{-5}$
- D.  $4.82 \times 10^5$

3.4 \_\_\_\_\_ is an example of chemical properties of matter. (2)

- A. Boiling point
- B. Decomposition
- C. Density
- D. Odor



3.5 Which of the following is an exothermic process? (2)

- A. Melting
- B. Freezing
- C. Evaporation
- D. Sublimation

3.6 Which equation represents the law of conservation of mass? (2)

- A.  $\text{Mass}_{\text{reactants}} = \text{Mass}_{\text{products}}$
- B.  $\text{Mass}_{\text{reactants}} \neq \text{Mass}_{\text{products}}$
- C.  $\text{Density}_{\text{reactants}} = \text{Density}_{\text{products}}$
- D.  $\text{Density}_{\text{reactants}} \neq \text{Density}_{\text{products}}$

3.7 \_\_\_\_ is a metalloid. (2)

- A. Carbon
- B. Magnesium
- C. Lead
- D. Polonium

3.8  $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$  is chemically known as? (2)

- A. Neutralization
- B. Ionization
- C. Dissociation
- D. Acidification

3.9 Which of the following is a soluble base? (2)

- A. Sodium hydroxide
- B. Copper (II) Oxide
- C. Iron (III) Oxide
- D. Lead (II) Oxide



- 3.10 Sodium Hydroxide is commonly known as \_\_\_\_\_? (2)
- A. Caustic soda
  - B. Bleaching soda
  - C. Washing soda
  - D. Baking soda

**QUESTION 4:** [15]

**Question type:** Structured questions.

4.1 Convert 500 Gigameters to meters. (2)

4.2 Use the appropriate significant figures rule to carry out the calculation below; (2)

4.3 Explain the physical properties of the three states of matter in terms of their shapes and volume. (3)

4.4 Differentiate between Compounds and Mixtures? (2)

4.5 Given the following measurements obtained by three students for the length of an object (in cm):

Student	Trial 1	Trial 2	Trial 3	Trial 4	Average
1	11.2	11.1	11.1	11.2	11.2
2	11.1	11.8	11.9	11.2	11.5
3	11.4	11.6	11.5	11.5	11.5

If the length of the object is known to be 11.54 cm; (3)

- (a) Which student is accurate and precise?
- (b) Which student is not accurate, but precise?
- (c) Which student is accurate, but not precise?

4.6 State any three physical properties of bases. (3)

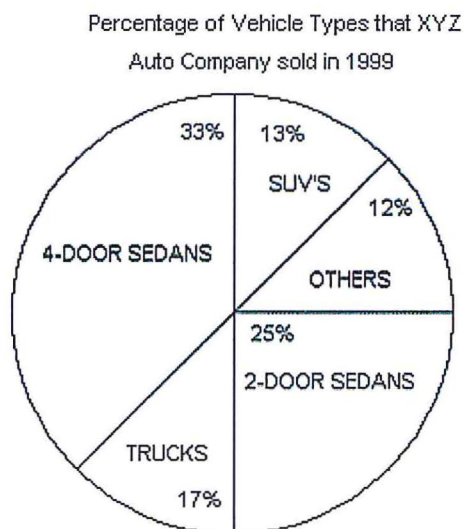


## QUESTION 5:

(20)

**Question type:** Multiple choices. Read the questions carefully, choose and write the correct letter corresponding to the correct answer. Each question weighs 2 marks.

5.1 The pie graph shows the Vehicle types that were sold at company XYZ in in Windhoek in 1999.



If XYZ company sold 23 000 vehicles in 1999, how many were SUVs? (2)

- A. 3030
- B. 1990
- C. 2990
- D. 3450

5.2 Newton's first law of motion can be best described as \_\_\_\_\_. (2)

- A. the force is equal to the product of mass and acceleration of the object
- B. the resultant of action – reaction
- C. an object at rest will stay at rest, and an objection in motion will contention to move at the same velocity and direction until acted upon by an external force
- D. None of the above.



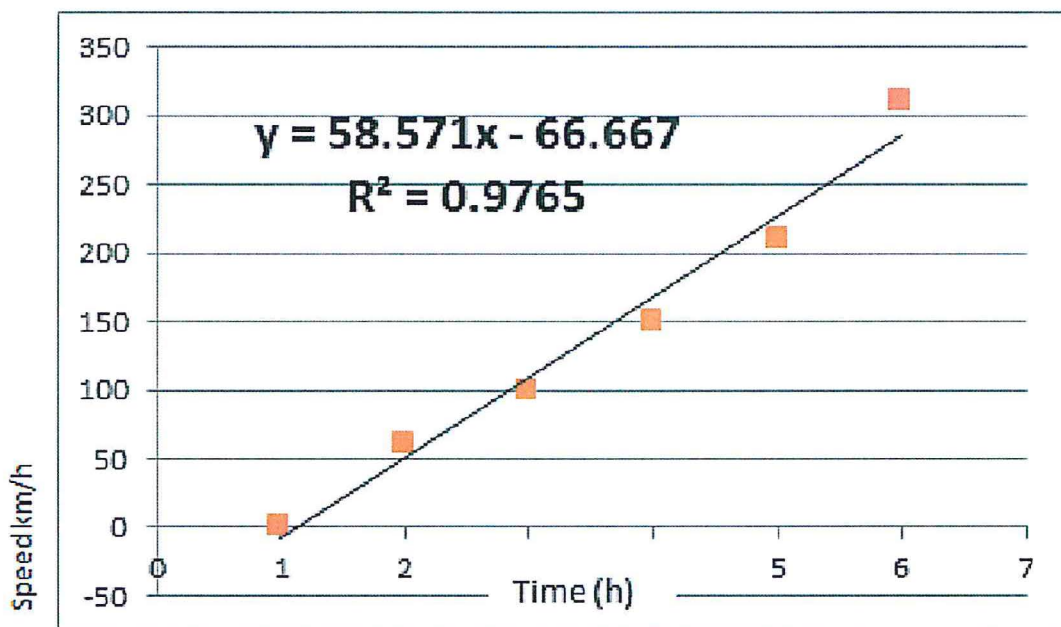


5.3 Which of the following is a renewable source of energy? (2)

- A. Nuclear energy
- B. Coal
- C. Crude oil
- D. Wind

5.4 A motorist on a long journey recorded the distances that he had travelled (km) every hour for a period of six hours, as shown in the graph below

USE THE GRAPH BELOW TO ANSWER QUESTION 4 and 5



What is the speed of the approximate journey in SI units? (2)

- A. 58.57 km/h
- B. 58.57 m/s
- C. 16.27 m/s
- D. 162 km/h

5.5 What will the distance travelled metres between the time  $t = 1s$  and  $t = 6s$ ? (2)

- A. 900
- B. 900 000
- C. 90
- D. 0.9

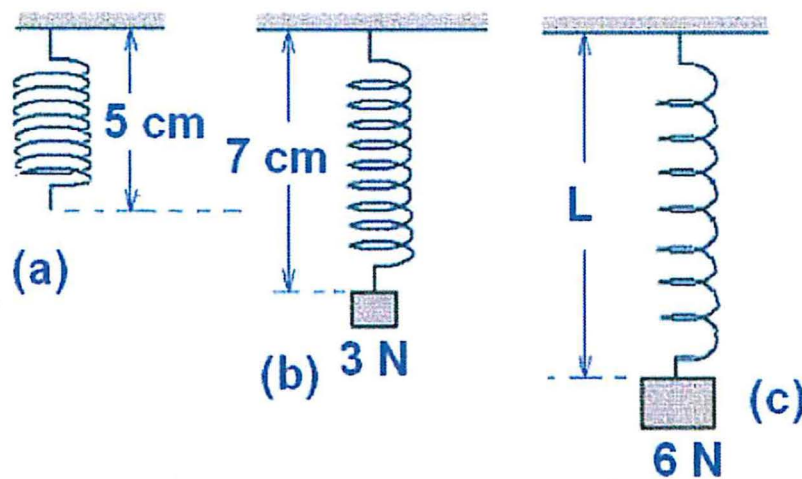


5.6 A scientist carried out an experiment and realize that the force being exerted by the apple to the earth was 3.92 N. Similarly the earth was also exerting a force of equal magnitude to the apple of 3.92 N. The scientist was so surprised that the earth has an equal force as the apple. Which of the following statement best describe this astonishing result? (2)

- A. The mass of apple is relatively big, while its acceleration is extremely high and similarly, the mass of the earth is very large and its acceleration so small.
- B. The mass of apple is relatively small, while its acceleration is extremely low and similarly, the mass of the earth is very large and its acceleration so small.
- C. The mass of apple is relatively small, while its acceleration is extremely high and similarly, the mass of the earth is very small and its acceleration so small.
- D. The mass of apple is relatively small, while its acceleration is extremely high and similarly, the mass of the earth is very large and its acceleration so small.

5.7 A student carried out the following experiment to determine the extension of the spring when a certain amount of force has been applied.

**Measuring spring extension**



The extension of the spring designated as letter L in mm is likely to be \_\_\_\_\_. (2)

- A. 9
- B. 10
- C. 90
- D. 11



5.8 The main purpose of the fuse on an electrical appliance is to; (2)

- A. ensure that current flows through it to the appliance.
- B. cut the flow of current when there is a short circuit.
- C. make the appliance more beautiful.
- D. no one knows its purpose.

5.9 What is the main difference in the generation of electricity with water and nuclear energy? (2)

- A. Nuclear energy is a dangerous source of energy and hydroelectric power is safe
- B. In nuclear energy fission of atoms heat water which turns the generator to produce electricity while in hydroelectric energy, potential energy of water turns the turbines which turns the electricity.
- C. Hydroelectric power is a renewable source of energy while nuclear energy is non-renewable source of energy.
- D. All of the above.

5.10 The main advantage of using nuclear energy compared to coal is \_\_\_\_\_. (2)

- A. Nuclear energy is a renewable source of energy while coal is a non-renewable source of energy.
- B. Nuclear energy is cheap to install as opposed to coal which needs a lot land for the construction of coal plant.
- C. Nuclear energy is green source of energy unlike coal which pollute the atmosphere.
- D. Nuclear is very dangerous and therefore can generate a lot of electricity more than coal.

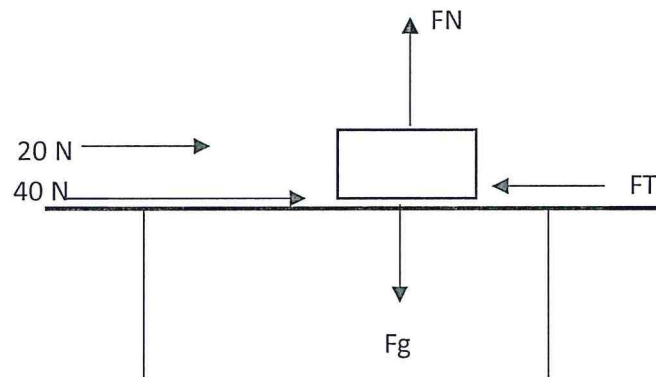


**QUESTION 6:**

**(10)**

**Question type:** Structured questions.

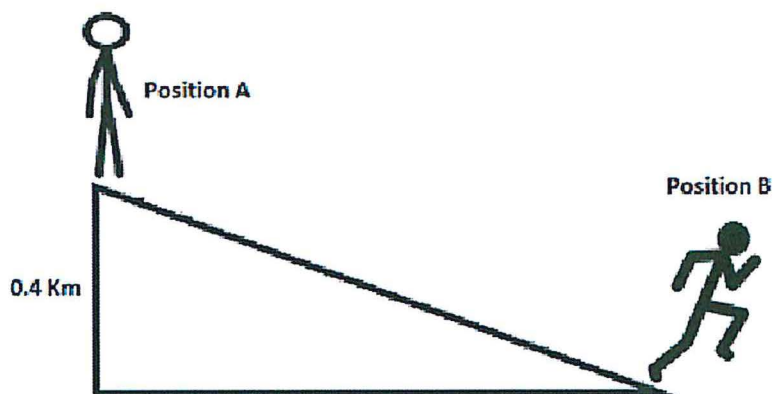
6.1 Peter and Susan are pushing a wooden object across a big table. Peter applied a force of 40 N and Susan applied a force of 20 N. The object is experiencing a force of friction (FT) of 10 N as shown in the free body diagram.



Given that the wooden object is having a force of gravity ( $F_g$ ) of 20 N and acceleration due to gravity of  $10 \text{ ms}^{-2}$ .

- (a) Determine the normal force of the wooden object. (1)
- (b) Calculate the mass (kg) the object, given that the normal force is 20 N. (2)

6.2 A student with a mass of 820 g stands at the top of a hill of height 0.4 km (Position A), as shown in the diagram below. *Note: Answers should be in SI units*



6.2.1 What is the student's gravitational potential energy at the top of the hill? (2)

*Note: Gravitational acceleration ( $g$ ) =  $9.8 \text{ m.s}^{-2}$*





6.2.2 Assuming that energy is conserved and there is no friction, what will the student's velocity be at the bottom of the hill (position B)? (2)

6.3 Construct a circuit diagram containing 3 resistors a, b, c in parallel, resistors d and e in series, with an ammeter and 2 cells in series with a conventional current and an open circuit. (3)

**END**



# PERIODIC TABLE OF THE ELEMENTS

1											18						
<b>1</b> <b>H</b> 1.00794											<b>2</b> <b>He</b> 4.00260						
2											13	14	15	16	17		
<b>3</b> <b>Li</b> 6.941	<b>4</b> <b>Be</b> 9.01218											<b>5</b> <b>B</b> 10.81	<b>6</b> <b>C</b> 12.011	<b>7</b> <b>N</b> 14.0067	<b>8</b> <b>O</b> 15.9994	<b>9</b> <b>F</b> 18.9984	<b>10</b> <b>Ne</b> 20.179
<b>11</b> <b>Na</b> 22.9898	<b>12</b> <b>Mg</b> 24.305	3	4	5	6	7	8	9	10	11	12	<b>13</b> <b>Al</b> 26.9815	<b>14</b> <b>Si</b> 28.0855	<b>15</b> <b>P</b> 30.9738	<b>16</b> <b>S</b> 32.06	<b>17</b> <b>Cl</b> 35.453	<b>18</b> <b>Ar</b> 39.948
<b>19</b> <b>K</b> 39.0983	<b>20</b> <b>Ca</b> 40.08	<b>21</b> <b>Sc</b> 44.9559	<b>22</b> <b>Ti</b> 47.88	<b>23</b> <b>V</b> 50.9415	<b>24</b> <b>Cr</b> 51.996	<b>25</b> <b>Mn</b> 54.9380	<b>26</b> <b>Fe</b> 55.847	<b>27</b> <b>Co</b> 58.9332	<b>28</b> <b>Ni</b> 58.69	<b>29</b> <b>Cu</b> 63.546	<b>30</b> <b>Zn</b> 65.38	<b>31</b> <b>Ga</b> 69.72	<b>32</b> <b>Ge</b> 72.59	<b>33</b> <b>As</b> 74.9216	<b>34</b> <b>Se</b> 78.96	<b>35</b> <b>Br</b> 79.904	<b>36</b> <b>Kr</b> 83.8
<b>37</b> <b>Rb</b> 85.4678	<b>38</b> <b>Sr</b> 87.62	<b>39</b> <b>Y</b> 88.9059	<b>40</b> <b>Zr</b> 91.22	<b>41</b> <b>Nb</b> 92.9064	<b>42</b> <b>Mo</b> 95.94	<b>43</b> <b>Tc</b> (98)	<b>44</b> <b>Ru</b> 101.07	<b>45</b> <b>Rh</b> 102.906	<b>46</b> <b>Pd</b> 106.42	<b>47</b> <b>Ag</b> 107.868	<b>48</b> <b>Cd</b> 112.41	<b>49</b> <b>In</b> 114.82	<b>50</b> <b>Sn</b> 118.69	<b>51</b> <b>Sb</b> 121.75	<b>52</b> <b>Te</b> 127.6	<b>53</b> <b>I</b> 126.9	<b>54</b> <b>Xe</b> 131.29
<b>55</b> <b>Cs</b> 132.905	<b>56</b> <b>Ba</b> 137.33	<b>71</b> <b>Lu</b> 174.967	<b>72</b> <b>Hf</b> 178.49	<b>73</b> <b>Ta</b> 180.948	<b>74</b> <b>W</b> 183.85	<b>75</b> <b>Re</b> 186.207	<b>76</b> <b>Os</b> 190.2	<b>77</b> <b>Ir</b> 192.22	<b>78</b> <b>Pt</b> 195.08	<b>79</b> <b>Au</b> 196.967	<b>80</b> <b>Hg</b> 200.59	<b>81</b> <b>Tl</b> 204.383	<b>82</b> <b>Pb</b> 207.2	<b>83</b> <b>Bi</b> 208.908	<b>84</b> <b>Po</b> (209)	<b>85</b> <b>At</b> (210)	<b>86</b> <b>Rn</b> (222)
<b>87</b> <b>Fr</b> (223)	<b>88</b> <b>Ra</b> 226.025	<b>103</b> <b>Lr</b> (260)	<b>104</b> <b>Rf</b> (261)	<b>105</b> <b>Db</b> (262)	<b>106</b> <b>Sg</b> (263)	<b>107</b> <b>Bh</b> (264)	<b>108</b> <b>Hs</b> (265)	<b>109</b> <b>Mt</b> (268)	<b>110</b> Uun (269)	<b>111</b> Uuu (272)	<b>112</b> Uub (269)		<b>114</b> Uuq		<b>116</b> Uuh		<b>118</b> Uuo

<b>Lanthanides:</b>	<b>57</b> <b>La</b> 138.906	<b>58</b> <b>Ce</b> 140.12	<b>59</b> <b>Pr</b> 140.908	<b>60</b> <b>Nd</b> 144.24	<b>61</b> <b>Pm</b> (145)	<b>62</b> <b>Sm</b> 150.36	<b>63</b> <b>Eu</b> 151.96	<b>64</b> <b>Gd</b> 157.25	<b>65</b> <b>Tb</b> 158.925	<b>66</b> <b>Dy</b> 162.50	<b>67</b> <b>Ho</b> 161.930	<b>68</b> <b>Er</b> 167.26	<b>69</b> <b>Tm</b> 166.934	<b>70</b> <b>Yb</b> 173.04
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<b>Actinides:</b>	<b>89</b> <b>Ac</b> 227.028	<b>90</b> <b>Th</b> 232.038	<b>91</b> <b>Pa</b> 231.036	<b>92</b> <b>U</b> 238.029	<b>93</b> <b>Np</b> 237.048	<b>94</b> <b>Pu</b> (244)	<b>95</b> <b>Am</b> (243)	<b>96</b> <b>Cm</b> (247)	<b>97</b> <b>Bk</b> (247)	<b>98</b> <b>Cf</b> (251)	<b>99</b> <b>Es</b> (252)	<b>100</b> <b>Fm</b> (257)	<b>101</b> <b>Md</b> (258)	<b>102</b> <b>No</b> (259)
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