



FACULTY	EDUCATION & HUMAN SCIENCES		
DEPARTMENT	INTERMEDIATE & VOCATIONAL EDUCATION		
SCHOOL	SCHOOL OF EDUCATION		
SUBJECT	INTEGRATED NATURAL SCIENCE & HEALTH EDUCATION 3		
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DURATION	3 HOURS	MARKS	100

FIRST OPPORTUNITY EXAMINATION

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This question paper consists of 8 pages including this cover page

INSTRUCTIONS

1. Answer all questions on this paper in the answer book provided.
2. Provide an example and/or sketch wherever applicable.
3. Write neatly and legibly.
4. Calculators may be used, but may not be shared amongst students

UNIVERSITY OF NAMIBIA EXAMINATIONS

SECTION A BIOLOGY /50/

Question 1

[11]

1.1 Fig. 4.1 shows the human digestive system and associated organs.

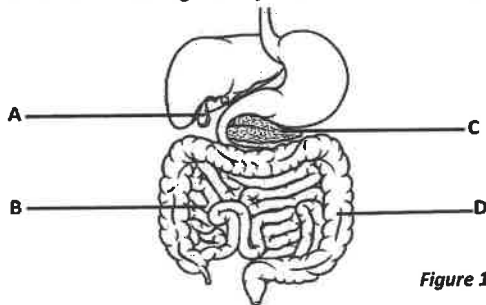


Figure 1.1

- (a) Name the parts labelled A and C. (2)
- (b) State two functions of part D. (2)

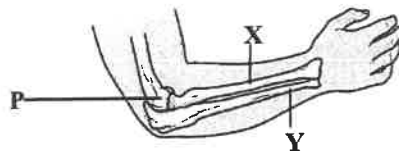
1.2 Part B contains villi. Draw a labelled diagram to show the structure of a villus. (4)

- 1.3 The circulatory system is integrally connected with the digestive system.
- (a) Where would one find the hepatic portal vein in the digestive system? (1)
 - (b) What is the role of the hepatic portal vein in the digestive system? (2)

Question 2

[7]

2. The diagram shows the bones and muscles used to raise and lower the forearm.

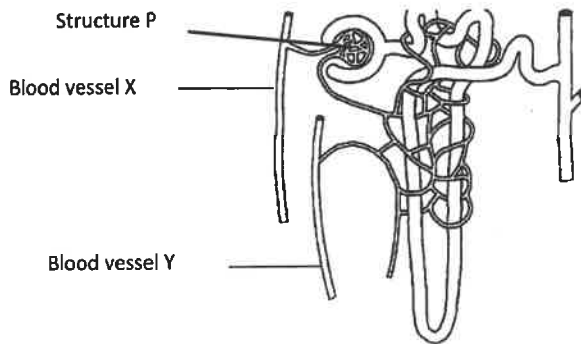


- 2.1 State the names of bones X and Y. (2)
- 2.2 Name the joint found at P and explain how this joint act to perform its function. (3)
- 2.3 Describe the difference between a tendon and a ligament. (2)

Question 3

[13]

3.1 The diagram shows the structure of a kidney nephron and its blood supply.

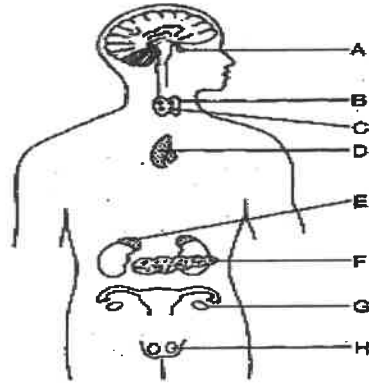


- (a) Identify structure P (1)
- (b) On a very hot day, the volume of the urine produced by the nephron is likely to decrease. Explain the role of ADH that brings about this change. (4)
- 3.2 People with chronic kidney disease often require a kidney transplant. Suggest why it is not always possible for all people with chronic kidney disease to have a kidney transplant. (2)
- 3.3 (a) Name blood vessels X and Y. (2)
- (b) Give one main structural difference between blood vessel X and Y AND explain the importance of this difference for each blood vessel. (4)

Question 4

[11]

4.1 The diagram below indicates the major endocrine glands found in the human body.



- (a) What is the name AND function of gland numbered D? (2)
- (b) Name ONE hormone secreted by each of glands numbered B and E. (2)
- 4.2 The responses brought about by hormones are different from the responses brought about by neurons. Describe two of these differences. (2)
- 4.3 While cooking, Selma accidentally touches a hot pan. Her hand automatically moves away from the pan.
 - (a) Describe the pathway taken by the nerve impulse to bring about this reflex action. (4)
 - (b) Explain why we have this reflex. (1)

Question 5

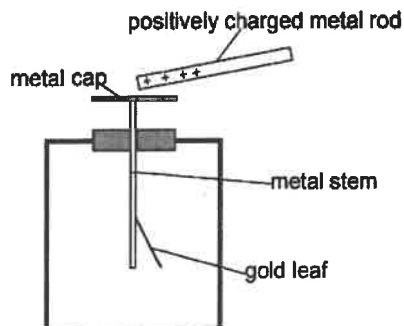
[8]

- 5.1 Primary Health Care became a core policy for the World Health Organization already in 1978. Name four (4) core activities that this service promotes. (4)
- 5.2 According to statistics, about 4% of children in Namibia under the age of 5-years, are overweight or obese.
 - (a) Define the term Obesity. (1)
 - (b) Name three (3) health problems related to obesity. (3)

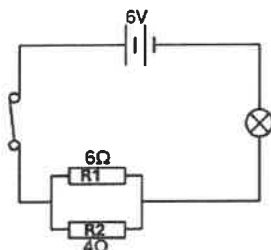
SECTION B PHYSICAL SCIENCE /50/

1. How many moles of Na are in 42 g of Na? (3)
2. Katarina is trying to impress a friend with her Chemistry knowledge.
She combusts 500g of methane [CH₄]. How many molecules of water did she produce? (3)
3. A compound is found to contain 40.0% carbon, 6.7% hydrogen and 53.3% oxygen by mass. The molar mass of the compound is 180g/mol. Calculate the *empirical formula* and *molecular formula* of the compound. (4)
4. Balance the following equations by providing the missing coefficients:
 - (a) $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$ (3)
 - (b) $\text{C}_2\text{H}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (3)
5. Write the chemical equation for the reaction below and balance it:
Zinc and Hydrochloric acid react to form zinc chloride and Hydrogen gas (2)
6. Magnesium and oxygen react to yield magnesium oxide as described by the following balanced chemical equation: $2\text{Mg} + 2\text{O}_2 \rightarrow 2\text{MgO}_2$.
If 1.3 g of Magnesium is used in the reaction. What is the theoretical yield of magnesium oxide in grams? (3)
7. Allesta and Suzan were working in the laboratory. They found that the mass of their product was 45g; however, using "stoichiometry" they thought it should be 123g. What was their % yield? (3)

8. The figure below shows the instrument used to detect electrostatic charges.



- (a) State the name of the instrument shown in the figure above. (1)
 - (b) The positively charged rod is brought close to the metal cap and removed. Copy the diagram and draw the distribution of charges on the metal stem and gold leaf. (1)
9. Two small, identical spheres A and B are placed 0.2 meters apart in air. Sphere A carries a charge of $+3.0 \times 10^{-6}$ C, and sphere B carries a charge of -2.0×10^{-6} C.
- (a) Calculate the magnitude of the electrostatic force between the two charges. (3)
 - (b) State whether the force is attractive or repulsive and explain why. (1)
10. Consider the circuit below



- (a) Calculate the total resistance of the circuit. (2)
- (b) Copy the diagram and add a voltmeter to measure the voltage supplied by the battery. Use the correct symbol and connect it appropriately. (1)
- (c) On your diagram from (b), add an ammeter to measure the current through the bulb. Use the correct symbol and connect it appropriately. (1)
- (d) Determine the voltage across R_1 and R_2 , respectively. (2)
- (e) Calculate the current through R_1 and R_2 , respectively. (4)

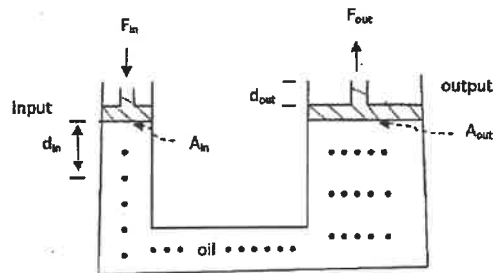
(f) Calculate the total current in the circuit.

(2)

(g) Calculate the power of the bulb.

(2)

11. Consider a hydraulic jack below:



Suppose that the diameter of the input piston is $2.0 \times 10^{-2}m$ and the diameter of the output piston is $9.0 \times 10^{-2}m$, what force could be generated on the output piston if the force of 350 N is applied to the input piston?

(3)

12. A diver is 10 meters underwater. If the density of water is $1000 kg/m^3$ and gravitational acceleration $g = 9.8 m/s^2$, calculate the pressure due to the water at that depth.

(3)

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DATA SHEET The Periodic Table of the Elements																																																																																														
Group																																																																																														
I	II	III										IV	V	VI	VII	0																																																																														
		1 H Hydrogen 1															4 He Helium 2																																																																													
7 Li Lithium 3	9 Be Beryllium 4	11 B Boron 5	12 C Carbon 6	13 Al Aluminum 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 K Potassium 19	20 Ca Calcium 20	21 Sc Scandium 21	22 Ti Titanium 22	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Zr Zirconium 40	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	55 Cs Caesium 55	56 Ba Barium 56	57 La Lanthanum 57	58 Ce Cerium 58	59 Pr Praseodymium 59	60 Nd Neodymium 60	61 Pm Promethium 61	62 Sm Samarium 62	63 Eu Europium 63	64 Gd Gadolinium 64	65 Tb Terbium 65	66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

Key
a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

*58 - 71 Lanthanoid series
*90 - 103 Actinoid series