Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

PHYSICAL SCIENCE HIGHER LEVEL 8322/3

PAPER 3 Practical Test 2 hours

Marks 40 **2020**

Additional Materials: As per instructions to subject teacher
Non-programmable calculator

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams, graphs or rough working.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The Periodic Table is printed on page 8.
- Chemistry practical notes are printed on page 9.

For Examiner`s Use	
1	
2	
Total	
Marker	
Checker	

This document consists of **9** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

1 In this experiment you will investigate the relationship between a load attached to a spring and the extension it causes.
The load (mass) will stretch the spring. At the same time an equal and opposite force is created in the spring. This force acts against the pull of the load.
This force will restore the spring to its original length after the load is removed, provided that the force due to the load was not too large.

Use g = 9.8 N/kg to calculate the values for force caused by the mass.

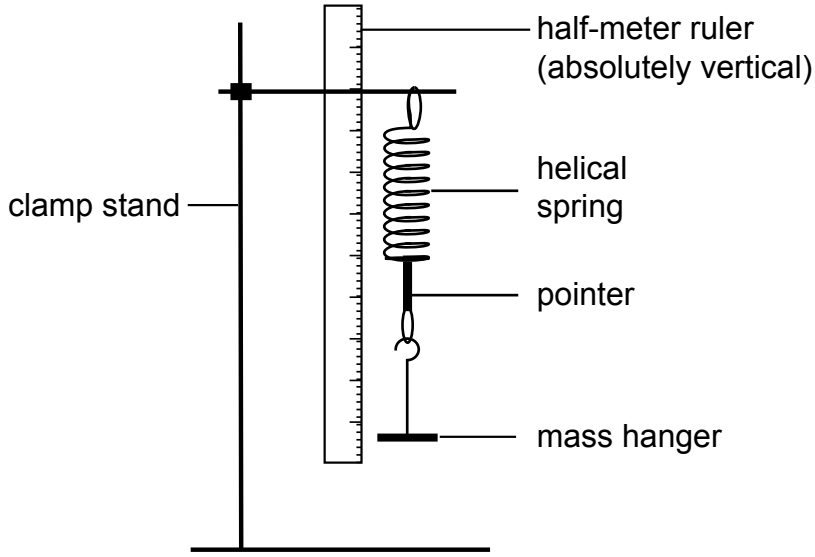


Fig. 1.1

(a) Use the equipment provided to set up the apparatus as shown in Fig. 1.1 above.

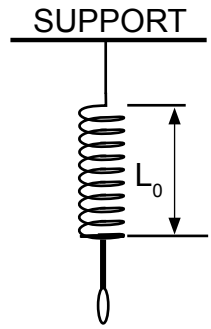


Fig. 1.2

(b) From your set-up measure the length, L_0, of the unextended spring when no load is attached as shown in Fig. 1.2.

the length of unextended spring, L_0 = ... [1]

(c) Table 1.1 is used to record the length of the extended spring, the extension, x, the mass of the load attached and the force caused by the attached mass. Label the columns of Table 1.1, include the correct SI units.

Table 1.1

[2]

(d) Expand Table 1.1 above to have six more rows. [1]

(e) Attach the mass hanger of 100 g. Convert the mass into kg before recording in Table 1.1. [1]

(f) Record the new value for the length of the extended spring in Table 1.1. [1]

(g) Calculate the value of the extension caused by the mass and record this in Table 1.1. [1]

(h) Now repeat the steps in **(e)** to **(f)** to find five more values for extension by increasing the mass.

(i) Record your measurements and complete the Table 1.1. [6]

(j) Remove all mass and measure the length of the unextended spring, L_n.

Length of unextended spring, L_n = ...

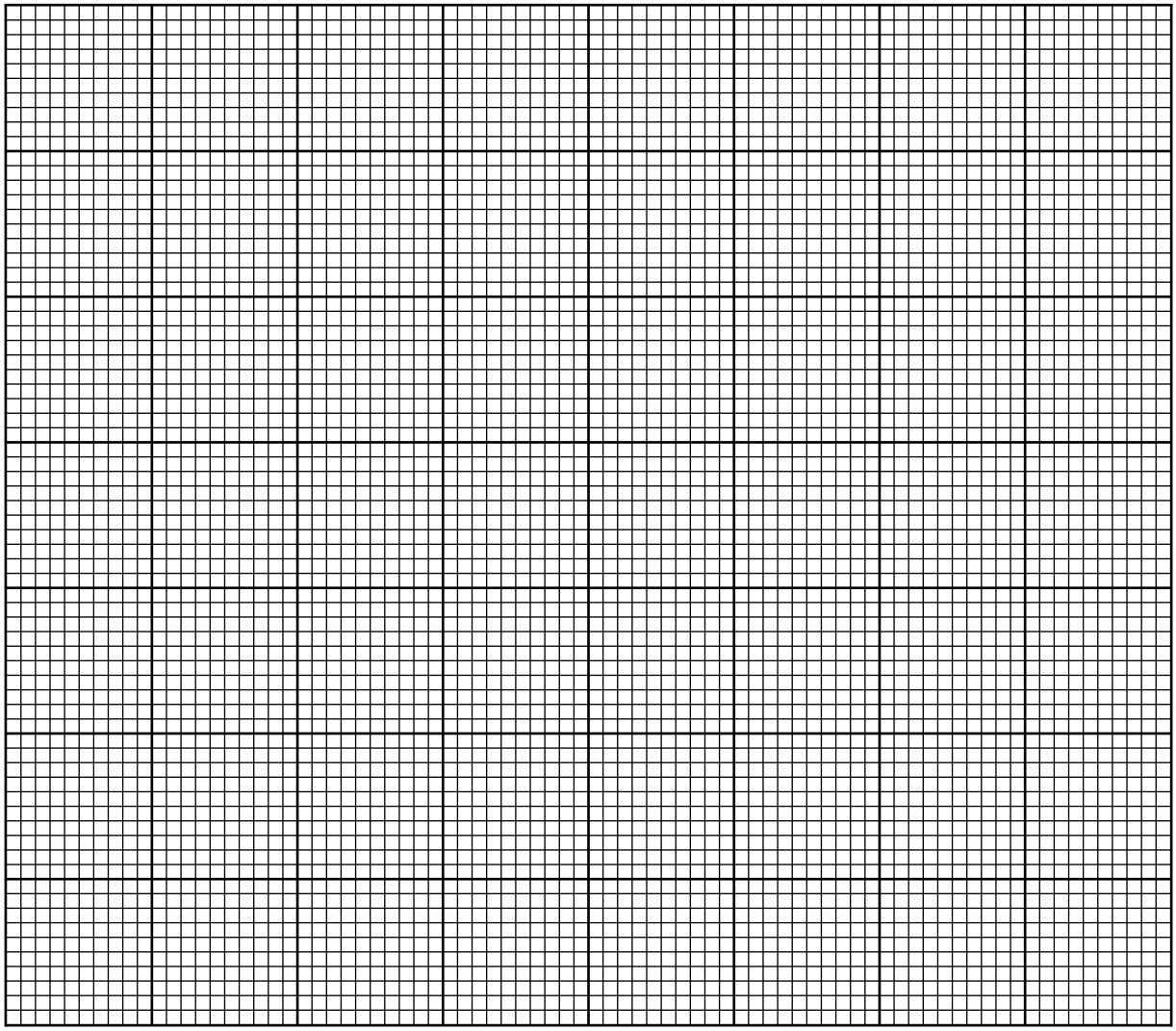
(k) Compare with reasons the values of L_0 and L_n.

.....

..... [2]

For Examiner's Use

(l) In the grid below draw a load (on x-axis) vs extension (on y-axis) graph, by choosing a suitable linear scale and plot the points based on your results in table 1.1.



[4]

(m) Use your graph to describe the relationship between the mass of the load and extension for this spring.

.....

..... [1]

[20]

For Examiner's Use

2 You are provided with three solids, in three bottles labelled **A**, **D** and **E**.
You will need to do some tests according to the Practical Notes contained in this question paper to determine the substances in each sample.

(a) Take three test tubes and label these **A**, **D**, and **E** using the marker pen provided.

(b) Transfer a small amount of solid **A** into the test tube labelled **A**, and record its colour. Repeat this process for solids **D** and **E** using the correct labelled test tubes.

	A	**D**	**E**
colour			

[3]

(c) Add a few drops of water but not more than 1 cm high into each test tube. Record your observations.

	A plus water	**D plus water**	**E plus water**
colour and any physical change			

[3]

(d) You are provided with one A4 sheet of coloured paper.
State the colour of this paper:

.....

(e) Cut along the short side of the coloured paper to form a strip of approximately 5 mm width and length longer than the test tubes. Insert this strip of paper into the test tubes containing the solutions. Keep these test tubes with their content for part **(f)**.

Record your observations:

	A plus water plus immersed colour paper	**D plus water plus immersed colour paper**	**E plus water plus immersed colour paper**
change			

[1]

(f) Use the test tubes and content of **(e)** but remove the papers. Put half of each solution into a separate clean test tube.
To one half of each solution, add a few drops of silver nitrate solution. Record your observations in the first row of the table.
To the other half add a few drops of aqueous ammonia, then add more drops of aqueous ammonia until it is in excess.
Record your observations in the second row of the table.

		A plus water	**D plus water**	**E plus water**
(i) 1st half of solution	Few drops of silver nitrate			
(ii) 2nd half of solution	Few drops of aqueous ammonia			
	Excess aqueous ammonia			

[4]

(g) Label **three** clean test tubes **A**, **D** and **E**.
Transfer a small amount of solid **A** into test tube labelled **A**. Repeat this process for solids **D** and **E** using the correct labelled test tubes.

Light your heat source. Put your goggles on and your dust cap over your nose. Put damp pieces of litmus paper of each colour over the top of each test tube. Hold them in place using cotton wool or a small piece of sellotape. Slowly heat the test tubes carefully for no more than a few minutes and record all your observations on the heated solid and the litmus papers in the table.

	A plus litmus paper	**D plus litmus paper**	**E plus litmus paper**
observations			

[3]

(h) Which of these three solutions **A**, **D** and **E**, contains a transition metal cation? Explain your answer.

Solution .....

Explanation ..... [2]

(i) In another investigation, sample **A** is found to give a white precipitate with aqueous barium nitrate. Use the practical notes to identify what compound is in sample **A**.

..... [1]

(j) Use your observations to identify the ions present in sample **D**.

D: ..... [1]

(k) Use your observation to identify the cation in sample **E** and the gas evolved from sample **E** during your experiments.

.....

.....

..... [2]

[20]

DATA SHEET
The Periodic Table of the Elements

Group I	Group II						Group III	Group IV	Group V	Group VI	Group VII	Group 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	14 N Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12						27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35,5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 ***I*** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

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

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

Key

a
X
b

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

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

CHEMISTRY PRACTICAL NOTES

Test for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous lead (II) nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil, warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Tests for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
aluminium (Al^{3+})	white ppt., soluble in excess, giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Test for gases

gas	*test and test result*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint

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