Candidate Name ——— Centre Number Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

COMBINED SCIENCE 4003/3

PAPER 3 Practical Test

JUNE 2023 SESSION 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:
As listed in instructions to Supervisors
Calculator (optional)

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **both** questions.

Write your answers in the spaces provided on the question paper.

Use a sharp pencil for your drawings. Coloured pencils or crayons should **not** be used.

You should show the essential steps in any calculation and record all experimental results in the spaces provided in the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
1	
2	
TOTAL	

This question paper consists of 7 printed pages and 1 blank page.

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1 You are required to identify the nutritional value in a nutrient solution A.

You are provided with a test tube labelled T_1, a syringe, access to nutrient solution A, access to solution S, access to solution P, access to iodine solution, two droppers and white paper.

(a) (i) Carry out the tests which are described in **Table 1.1**.

Record the observations in **Table 1.1**.

Write conclusions in **Table 1.1**.

Table 1.1

test	observation(s)	conclusion(s)
1. Add, using a syringe, 2.0 cm^3 of the nutrient solution A into test tube T_1. Thoroughly rinse the syringe. Draw 2.0 cm^3 of solution S and add it to test tube T_1. Use a dropper to add one drop of solution P to the mixture in test tube T_1 and shake. Continue to add one drop of Solution P and shaking until a change is noticed. Throw away the contents of test tube T_1 and thoroughly rinse the test tube.		

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2. Add, using a syringe, 2.0 cm^3 of the nutrient solution A into test tube T_1. Thoroughly rinse the syringe. Then add about 1 cm^3 of iodine solution and shake.		
3. Use a dropper to add one drop of the nutrient solution A to a white sheet of paper. Gently wave the paper in the air.		

[11]

(ii) Identify solution S.

.....

[1]

(iii) Suggest the identity of solution P.

.....

[1]

(b) State, giving a reason, **one** precaution that should be taken during the experiment.

.....

.....

.....

[2]

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(c) (i) Explain any **one** nutritional deficiency of the nutrient solution A.

.....

.....

[2]

(ii) Explain any **one** nutritional advantage of the nutrient solution A.

.....

..... [2]

(iii) State a deficiency disease in children that may be controlled through drinking the nutrient solution A regularly.

.....

[1]

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2 You are required to determine the mechanical advantage (MA), velocity ratio (VR) and efficiency of a simple machine.

You are provided with a flat bar with marked positions of the pivot, A and B. You are also provided with masses and a pivot.

(a) (i) Set up the apparatus as shown in **Fig.2.1**.

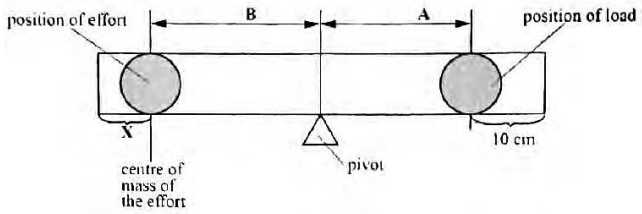


Fig.2.1

The centre of the load should be 10 cm from the end of the flat bar.

Measure and record the distances A and B from the pivot

[3]

(ii) Place a load of 100 g on the position marked A as shown in **Fig. 2.1**

Place masses (effort) at the position marked B (as shown in **Fig.2.1**) until the load is just lifted.

Record, in **Table 2.1**, the total mass that just lifted the load.

Repeat the experiment two more times, recording the masses in **Table 2.1**.

Complete **Table 2.1** by converting the load and effort to newtons.

Table 2.1

experiment	load/g	load/N	effort/g	effort/N
1				
2				
3				

[6]

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(iii) Calculate the average effort applied in newtons.

[2]

(b) (i) Calculate the mechanical advantage (MA) of the machine.

[2]

(ii) Calculate the velocity ratio (VR) of the machine.

[2]

(iii) Calculate the efficiency of the machine.

[2]

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(iv) Comment on the value of the efficiency obtained in **(b)(iii)**.

[2]

(v) State **one** way of increasing the efficiency of the machine.

[1]