



EXAMINATIONS COUNCIL OF ESWATINI
Junior Certificate Examination

CANDIDATE
NAME

CENTRE
NUMBER

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NUMBER

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Science

414/02

Paper 2

October/November 2021

1 hour 45 Minutes

Additional Materials required: Calculators may be used.

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number, candidate number and name in the spaces provided.

Write in dark blue or black ink pen in the spaces provided on the Question Paper.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Do **not** use staples, paper clips, highlighters or correction fluid.

This paper consists of two sections (Section **A** and **B**).

Answer **all** questions in both sections **A** and **B**.

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

The total of the marks for this paper is 80.

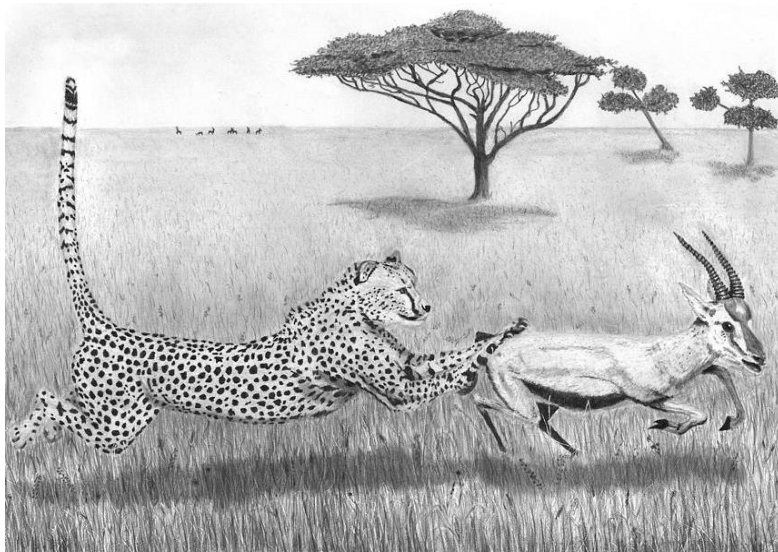
Question	Examiner's use
Section A	
1	
2	
3	
4	
5	
6	
7	
8	
9	
Section B	
10	
11	
12	
Total	

This documents consists of **14** printed pages and **2** blank pages.

SECTION A

Answer all questions

- 1 Fig. 1.1 shows a cheetah catching a buck for a meal.

**Fig. 1.1**

- (a) Describe **one** visible characteristic of the cheetah in Fig. 1.1 that shows it is a mammal.

.....[1]

- (b) Describe **two** characteristics of living things shown in Fig. 1.1, other than feeding.

1.....

2..... [2]

- (c) Draw a food chain using Fig. 1.1.

..... [2]

- (d) Name the organism that gets the least amount of energy in Fig. 1.1.

.....[1]

[Total: 6]

- 2 Fig. 2.1 shows a concrete block that has dimensions 0.5 m by 1.0 m by 2.0 m. The block has a mass of 2600 kg.

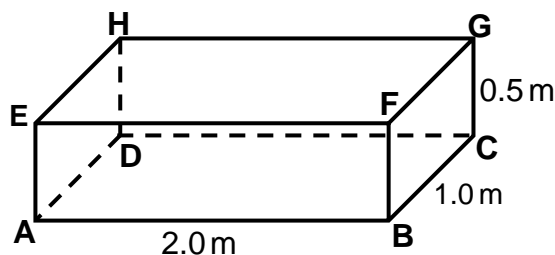


Fig. 2.1

- (a) Calculate the volume of the concrete block.

volume =[2]

- (b) The block has a weight of 26000N.

- (i) Define the term *weight*.

.....
..... [1]

- (ii) Name the instruments for measuring mass and weight.

mass.....
weight..... [2]

- (iii) The area of the base **ABCD** of the concrete block is 2 m².

Calculate the pressure exerted by the concrete block on the ground, in Fig. 2.1.

pressure =Pa [2]

(iv) The concrete block in Fig. 2.1 is lifted to stand on the ground with base **BCFG**.

State and explain how changing the base of the block affects the pressure.

.....
.....
..... [2]

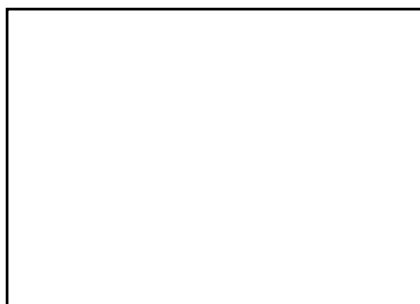
[Total: 9]

3 When solid iodine is heated it changes directly into gas.

(a) Name the process by which solid iodine changes directly to a gas.

..... [1]

(b) Draw a diagram to show the arrangement of particles in gaseous iodine.



[2]

(c) Explain why a liquid can flow but a solid cannot.

.....
.....
..... [2]

[Total: 5]

- 4 A student eats a slice of bread with peanut butter and then drinks milk. This meal provides carbohydrates, fats, proteins and calcium.

- (a) Complete Table 4.1 by stating the source of these nutrients from the student's meal and their functions in the body.

Table 4.1

nutrient	source in the meal	function in the body
fats		
proteins		
calcium		

[3]

- (b) Digestion of starch in the bread begins in the mouth

Describe the digestion of starch in the mouth.

.....

.....

..... [2]

- (c) Glucose, the end product of the digestion of starch, is absorbed in the alimentary canal.

Describe the absorption of glucose in the alimentary canal.

.....

.....

..... [2]

[Total: 7]

5 Water is a renewable source of energy.

(a) State **two** other renewable sources of energy.

- 1.....
2..... [2]

(b) Fig. 5.1 shows how electricity is generated at a power station in Eswatini.

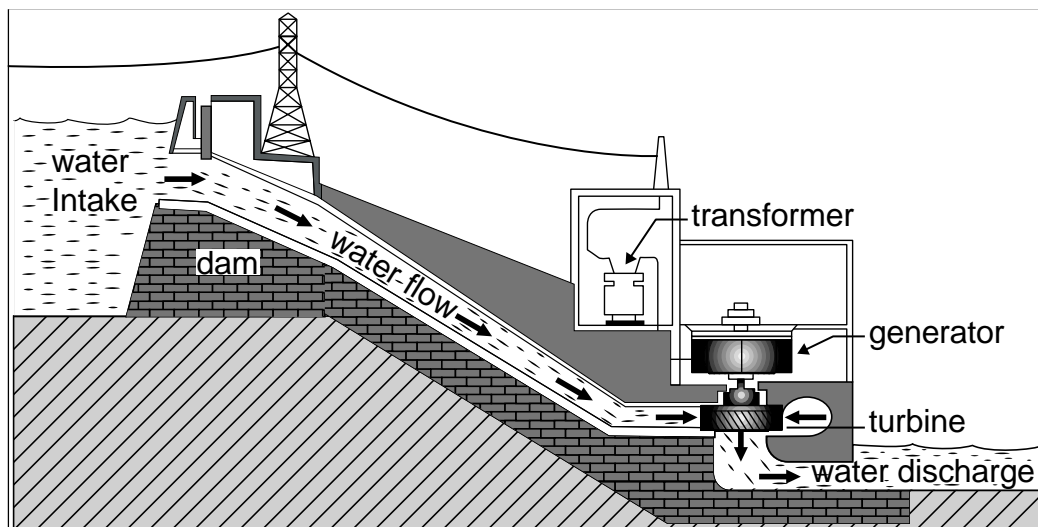


Fig. 5.1

(i) Name the type of power station shown in Fig. 5.1.

..... [1]

(ii) Describe the energy changes that take place in this power station.

.....
..... [2]

(iii) State the law of conservation of energy.

..... [1]

[Total: 6]

6 (a) Sodium chloride, NaCl, is a compound.

(i) Define the term *compound* with reference to NaCl.

.....
.....[2]

(ii) Describe how sodium chloride differs from a mixture.

.....
.....
.....[2]

(b) Table 6.1 shows some information about two particles found in an atom.
Complete Table 6.1 by filling in the missing information.

Table 6.1

name of particle	relative charge	position in atom
proton	nucleus
neutron	no charge

[2]

(c) Group I metals, like sodium, react very fast with water.
Sodium floats on the water since it has a lower density than water.

(i) State **one** other physical property of Group I metals.

.....
..... [1]

(ii) State **one** other observation that you make when sodium reacts with water.

.....
..... [1]

[Total: 8]

7 Fig. 7.1 is a diagram of the respiratory system.

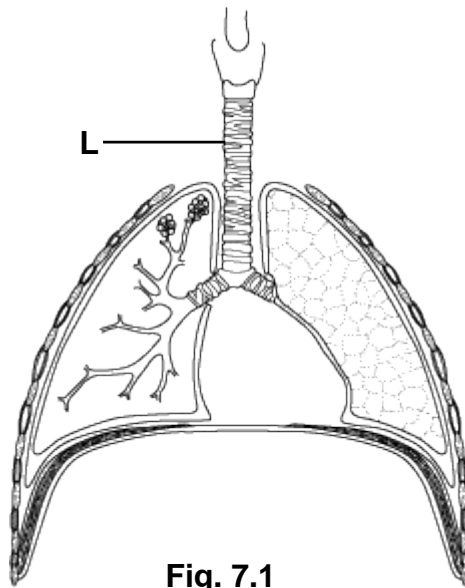


Fig. 7.1

(a) Name the part labelled **L** in Fig. 7.1.

..... [1]

(b) Fig. 7.2 shows an alveolus surrounded by a capillary.

Gaseous exchange takes place in the alveoli.

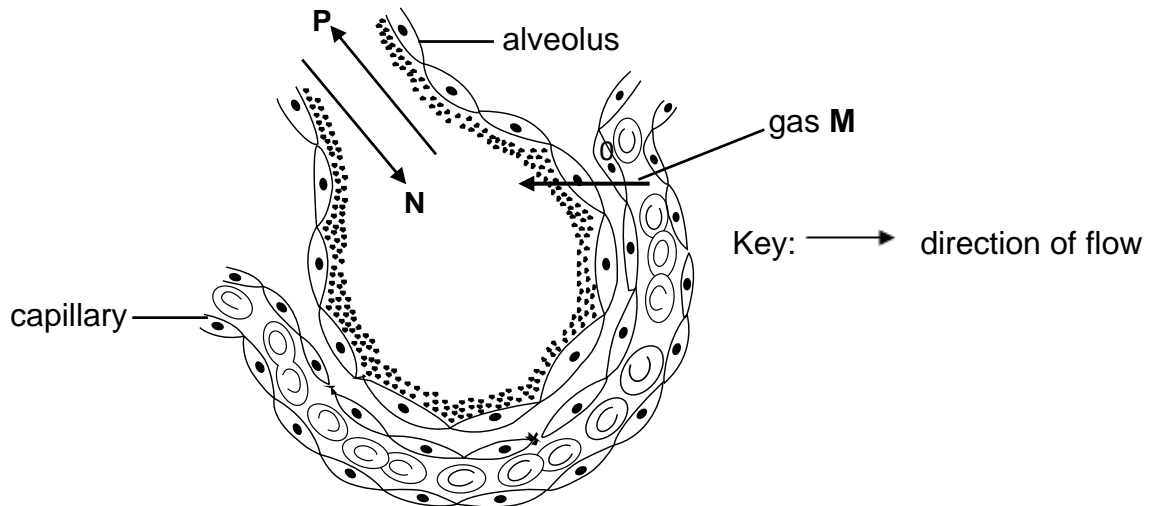


Fig. 7.2

(i) Name the gas labelled **M** in Fig. 7.2.

..... [1]

(ii) Name the process by which gaseous exchange takes place in Fig. 7.2.

..... [1]

(iii) Label a red blood cell in Fig. 7.2 using the letter **Q** and a label line.

[1]

(iv) State the difference in the amount of oxygen content between air in **N** and **P** in Fig. 7.2.

.....
.....[1]

(c) Describe the changes that occur to the rib cage and diaphragm when inhaling.

.....
.....
.....[2]

[Total: 7]

8 Fig. 8.2 shows a simple circuit.

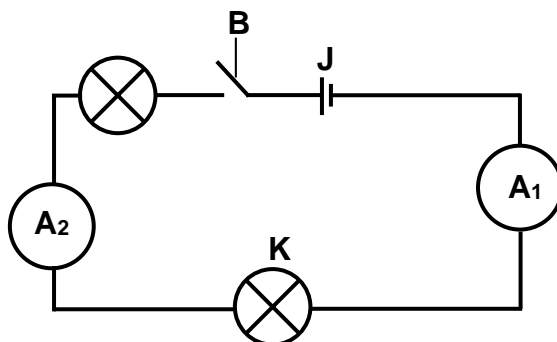


Fig. 8.2

(a) Name the components labelled **B** and **J** in Fig. 8.2.

B.....[1]

J.....[1]

(b) The current reading on ammeter **A₂** in Fig. 8.2 is 0.5 A when **B** is closed.

Predict the reading on ammeter **A₁**.

.....[1]

(c) Draw, in Fig. 8.2, a circuit symbol for a voltmeter to measure the voltage of bulb **K**.

[2]
[Total: 5]

9 The extraction of iron from iron(III) oxide is done inside a blast furnace.

The essential reaction inside the blast furnace is represented by the following equation.



(a) The iron(III) oxide is reduced to iron.

(i) Define the term *reduction*.

.....
..... [1]

(ii) Name the main ore of iron.

..... [1]

(b) Two alloys of iron are mild steel and stainless steel.

(i) Name **two** elements that are combined with iron to form stainless steel.

1

2 [2]

(ii) Describe how alloying helps to improve the properties of pure metals.

.....
..... [1]

(iii) Explain why it is not possible to extract aluminium from its ore in the same way iron is extracted.

.....
.....
..... [2]

[Total: 7]

SECTION B

Answer **all** questions.

10 Fig. 10.1 shows Miss Yende looking at her image formed by a plane mirror.

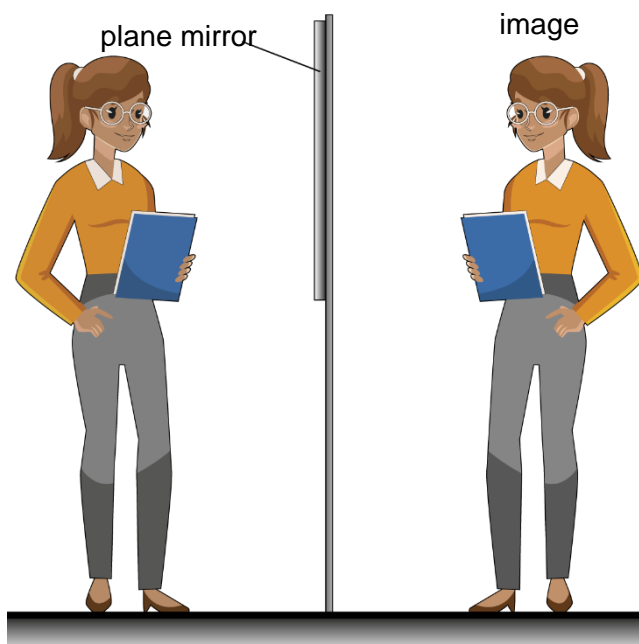


Fig. 10.1

(a) List **two** properties of her image shown in Fig. 10.1.

- 1.....
- 2..... [2]

(b) An image is formed through reflection of light rays.

Fig. 10.2 shows a reflected light ray.

Draw and label, in Fig. 10.2, the normal and the incident light ray.

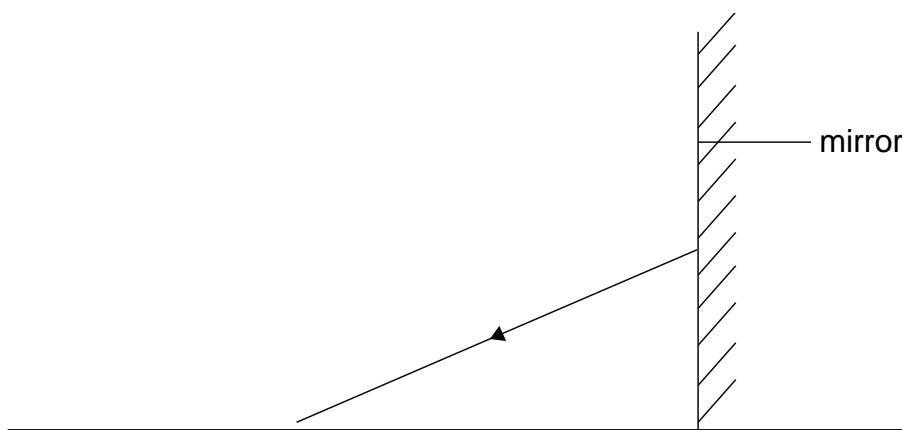


Fig. 10.2

[4]

[Total: 6]

11 A student investigates the effect of osmosis on an uncooked potato strip and a cooked potato strip.

- She measures the lengths of the potato strips.
- She places each potato strip in a separate beaker containing distilled water.
- The potato strips are left in the distilled water for 4 hours.
- She measures the lengths of the potato strips again.
- Table 11.1 shows her results.

Table 11.1

	length before placing in distilled water	length after placing in distilled water
uncooked potato strip	5 cm	7 cm
cooked potato strip	5 cm	5 cm

(a) State and explain the results for,

(i) uncooked potato strip

state [1]

explain

..... [1]

(ii) cooked potato strip

state [1]

explain

..... [2]

(b) Describe **two** factors that should be kept constant during this investigation.

1

2 [2]

[Total: 7]

12 A student prepares the soluble salt, zinc chloride.

She adds small amounts of zinc metal powder into a test-tube containing 10 cm³ of a dilute acid until there is no further reaction taking place.

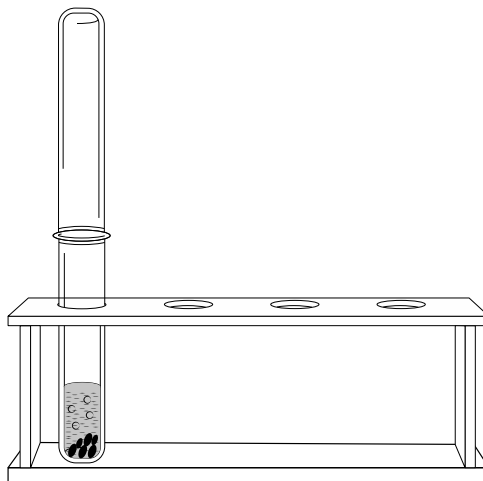
The reaction taking place is represented by the following equation:



(a) Name the acid the student uses.

..... [1]

(b) She holds another clean dry test-tube upside down at the mouth of the test-tube with the zinc and acid to collect the gas given off as shown in Fig. 12.1.



She then carries out a test for the hydrogen gas collected.

(i) Explain why she holds the test-tube for gas collection upside down.

.....
..... [2]

(ii) Describe how the student carries out the test for the hydrogen gas.
test.....

result..... [2]

(c) Sodium hydroxide reacts with dilute acid to form salt and water.

Describe how the student can use a named indicator to show that the pH of the end product of the reaction is 7.

name of indicator

how indicator is used

..... [2]

[Total: 7]

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