KZN CLUSTERED DISTRICTS

GRADE 11

LIFE SCIENCES

TERM 3: PRACTICAL TASK-5

GASEOUS EXCHANGE: BREATHING SYSTEM MODEL

MARKS: 30

DURATION: 2 HOURS

N.B. This question paper consists of 6 pages including this page.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Number the answers correctly according to the numbering system used in this question paper.
3. Make ALL drawings in pencil and label them in blue or black ink.
4. Draw diagrams, tables or flow charts only when asked to do so.
5. You must use a non-programmable calculator, protractor and a compass, where necessary.
6. Write neatly and legibly.

Part A: 60 minutes

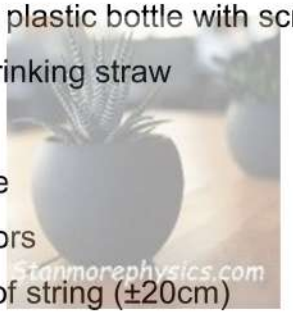
Instructions to the teacher:

- Give learners a list of materials to be used a week before
- **Part 1** must be done on day **1** (**individual work**).
- Take pictures of learner models and file them as evidence.
- Pictures must be attached onto the script of each learner.
- The respiratory model must be completed in class.
- **Part 2** must be done on day **2** (**individual work**).

Aim: Construction of a model to show how the human breathing system works

Materials needed as shown in diagram A.

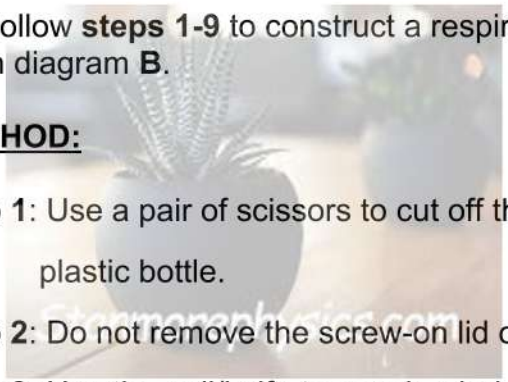
1. Empty 2 litre plastic bottle with screw-on lid
2. 2 x Plastic drinking straw
3. 3 x balloons
4. Masking tape
5. Pair of scissors
6. Short piece of string (±20cm)
7. Sharp nail



QUESTION 1

Instructions to learners:

- Each learner must bring all the materials a week before to the teacher as per the list
- Follow **steps 1-9** to construct a respiratory model as shown in the set-up in diagram **B**.



METHOD:

Step 1: Use a pair of scissors to cut off the bottom/base of the empty 2-litre plastic bottle.

Step 2: Do not remove the screw-on lid of the 2-litre plastic bottle.

Step 3: Use the nail/knife to punch a hole at the centre of the screw-on lid.

Step 4: Cut one straw into 2 equal halves.

Step 5: Open a small slit to fit the straw on the centre of the longer straw

Step 6: Take one half straw, insert it to the slit to form the Y-shaped tube and

use masking tape join them (must be airtight)

Step7: Attach each balloon to the tip of the Y-shaped tube. Balloons should not have holes and the connection should be airtight

Step 8: Insert the Y-shaped tube with balloons through the base of the plastic bottle and push the stem of tube into the hole of the screw-on-lid

Step 9: Cut off the mouth of balloon 3 to fit the bottom/base of the empty 2-litre bottle and tie it with the string/attach it with masking tape

A

B

(5)

Part B: 60 minutes

QUESTION 2

2.

2.1 State ONE precaution when constructing the model. (1)

2.2 Describe what happens to the balloons when you:

(a) Pull down the string on the bottom of your model. (1)

(b) Push up the bottom of your model. (1)

2.3 Name the parts of the respiratory system that are represented by the following parts of the model:

(a) Single straw fitted in the hole of the screw-on lid (1)

(b) Y-shaped straw (1)

(c) Balloons (1)

(d) Plastic bottle (1)

(e) Balloon at the bottom/base of the plastic bottle (1)

2.4 Explain:

(a) TWO ways in which this model is a poor representation of the structure of the human respiratory system. (4)

(b) How the structure of the bottom sheath/balloon of the plastic bottle allows more air to enter inside the balloons. (2)

(c) The results in QUESTION 2.2(a) as they occur in a human respiratory system. (4)

(18)

QUESTION 3

3. The table below compares the composition of different gases in percentage between the inhaled and exhaled air.

Gases	Inhaled air (%)	Exhaled air (%)
Nitrogen	78	78
Oxygen	21	16,6
Carbon dioxide	0,04	4
Other gases	1	1,4

3.1 Name:

(a) The gas whose composition in the air remains unchanged between inhaled and exhaled air. (1)

(b) The gas whose composition increases in exhaled air as compared to inhaled air. (1)

3.2 State TWO ways in which the gas mentioned in QUESTION 3.1(b) is transported in the blood. (2)

3.3 Calculate the percentage difference in the composition of oxygen between inhaled and exhaled air. (2)

3.4 State ONE way in which we can keep our respiratory system healthy. (1)

(7)

GRAND TOTAL: 30

KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

KZN CLUSTERED DISTRICTS

GRADE 11

LIFE SCIENCES

TERM 3: PRACTICAL TASK- 5

GASEOUS EXCHANGE: BREATHING SYSTEM MODEL

MARKING GUIDELINE

MARKS: 30

DURATION: 2 HOURS

N.B. This question paper consists of 5 pages including this page.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES PRACTICAL

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the righthand margin.

2. **If whole process is given when only a part of it is required** Read all and credit the relevant part.

3. **If comparisons are asked for, but descriptions are given** Accept if the differences/similarities are clear.

4. **If diagrams are given with annotations when descriptions are required** Candidates will lose marks.

5. **If flow charts are given instead of descriptions** Candidates will lose marks.

6. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.

7. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.

8. **Wrong numbering**
   If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.

9. **If language used changes the intended meaning** Do not accept.

10. **Spelling errors**
    If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

11. **If only the letter is asked for, but only the name is given (and vice versa)** Do not credit.

12. **If units are not given in measurements**

Candidates will lose marks. Memorandum will allocate marks for units separately.

13. **Be sensitive to the sense of an answer, which may be stated in a different way.**

14. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.

PART A:
QUESTION 1

1.

Criteria for marking the model:

Criteria	Mark Allocation
Model accurately represents the structure and its function **(A)**	1
All the different parts of the model are correctly placed **(P)**	1
Model is well built and neat **(B)**	1
Instructions to create the model were followed correctly, including all specifics **(I)**	1
Model is fully functional and demonstrate the understanding of the breathing process (Inhalation and exhalation) **(M)**	1

[5]

PART B:
QUESTION 2

	2.1	- Y-shaped tube must be airtight.✓ - The balloons should not have holes.✓ - The connection of the balloons to the tube must be airtight.✓ Any **(Mark the first ONE only)**			(1)
	2.2	(a)	Inflate✓ / take in more air/ get bigger		(1)
		(b)	deflate✓ / take out the air/ get smaller		(1)
	2.3	(a)	trachea ✓		(1)
		(b)	bronchi ✓		(1)
		(c)	lungs ✓		(1)
		(d)	rib cage ✓		(1)
		(e)	diaphragm ✓		(1)
	2.4	(a)	- The plastic bottle is rigid ✓structure, which is unable to move✓/ does not show the intercostal muscles in the same way as the ribcage and thoracic cavity/not flexible and inelastic - The rubber sheet needs to be pulled down✓ to cause balloons to inflate whereas the diaphragm only flattens✓ to cause air to enter the lungs - The model demonstrates air moving in and out✓ and not the process of gaseous exchange within the alveoli✓		

			- The plastic bottle is filled with air✓, whereas the chest cavity is filled with pleural fluid. ✓ - The model uses balloons as lungs✓, that do not show the increased internal surface area provided by alveoli - Balloons cannot withstand repeated use / handling✓ and cannot accurately represent the colour and texture of the lungs✓ Any (2 x 2) **(Mark the first TWO only)**		(4)
		(b)	- The bottom sheath/balloon is be pulled downward✓ - Pressure inside the plastic bottle decreases✓ allowing more air to be drawn into the balloons		(2)
		(c)	- During inhalation✓, - the diaphragm contracts✓and moves downward - Intercostal muscles/rib muscles contract✓to pull the rib cage - The chest cavity expands, causing air to fill in the lungs.✓ - The air will flow from the higher-pressure environment to lower- pressure lungs ✓ Any		(4)
					(18)

QUESTION 3					
	3.1	(a)	Nitrogen✓		(1)
		(b)	Carbon dioxide✓		(1)
	3.2		- Blood plasma✓ - Bicarbonate ions✓ - Carbaminohaemoglobin✓ **(Mark the first TWO only)**		(2)
	3.3		21% - 16.6✓% = 4,4✓%		(2)
	3.4		- Exercise ✓ - Eat well ✓ - Do not smoke ✓ **(Mark the first ONE only)** Any		(1)
					(7)

GRAND TOTAL: 30