Primary 6 Integrated Science

Term 2

Theme: The Human Body

Topic 4/4 – Respiratory System

Learning outcomes: The learner;

- appreciates the importance of the respiratory system in the production of energy for life processes.
- acquires scientific knowledge and skills for maintaining the effi ciency of the respiratory system.

Respiration

- Respiration is the process by which living things **take in oxygen** and **release carbon dioxide**.
- It helps the body get **energy** from food.

Types of Respiration

- **Breathing (external respiration)** – taking in air (inhaling) and letting it out (exhaling).

- **Cellular respiration** – inside the body's cells, oxygen combines with food to release energy.

Importance of Respiration

- Provides **energy** for movement, growth, and repair.
- Removes **waste gases** like carbon dioxide.
- Keeps the body alive and active.

Key Points for Pupils

- Respiration = breathing + energy release.
- Oxygen is needed, carbon dioxide is removed.
- Without respiration, living things cannot survive.

Exercise 1

(i) What is external and cellular respiration
(ii) State any importance of respiration.

Gaseous exchange

Exchange of carbon dioxide and oxygen between the environment and the organism is termed gaseous exchanges, and the area where gaseous exchange actually takes place is called the **respiratory surface.**

Adaptations of a respiratory surface.

- It is **permeable to gases,** to allow exchange of gases between blood and air
- It is **thin,** to facilitate diffusion
- It has **a large surface area** to ease diffusion
- It is **moist to ease diffusion** of gases across the respiratory surface.

Exercise 2

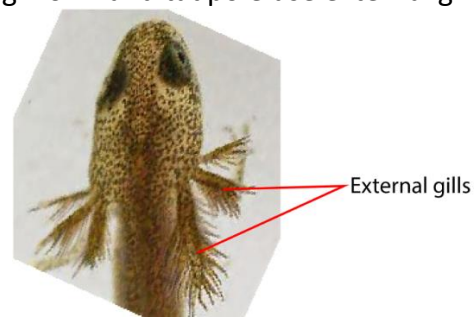
State any four adaptation of gaseous exchange surfaces

Specialized gaseous exchange surfaces

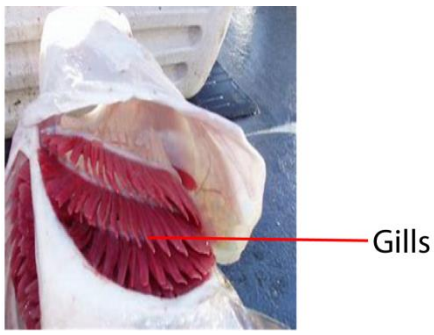
The specialized gaseous exchange surfaces provide large surface area to allow faster gaseous exchange. They include:

1. Gaseous exchange in small organism like protozoa, earthworm, and flatworms occur over the body surface/skin

2. Lung worm and tadpole use external gills for gaseous exchange



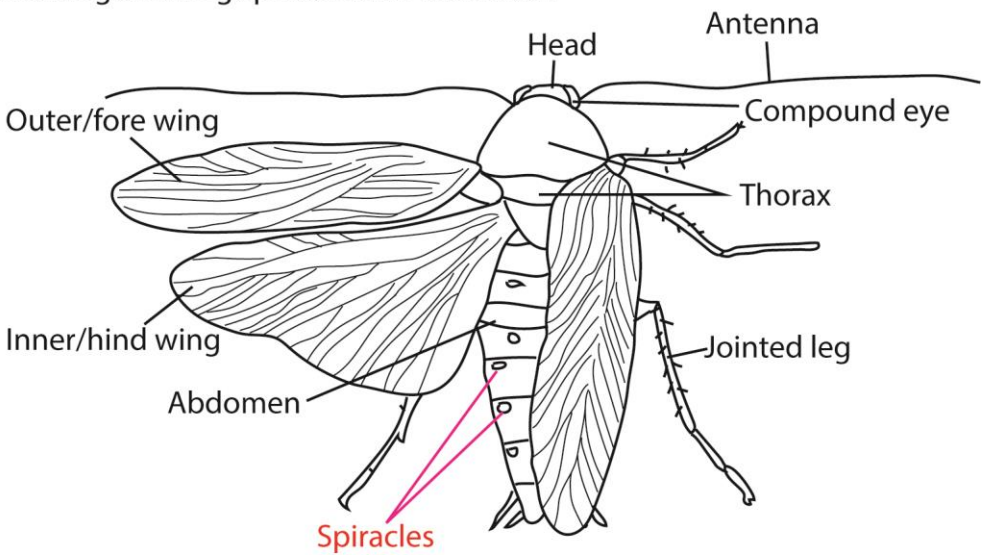
3. Fish use internal gill for gaseous exchange



4. Mammals, amphibians, birds and reptiles use lungs for gaseous exchange

5. Trachea system in insects.

Drawing showing spiraacles on cochroach



In insects air enters and leaves through the spiracles into the trachea. The trachea divides into small tubes called tracheoles that deliver oxygen and remove carbon dioxide from individual cells.

6. Amphibians like toad and frog use buccal cavity (mouth) and skin in gaseous exchange

Exercise 3

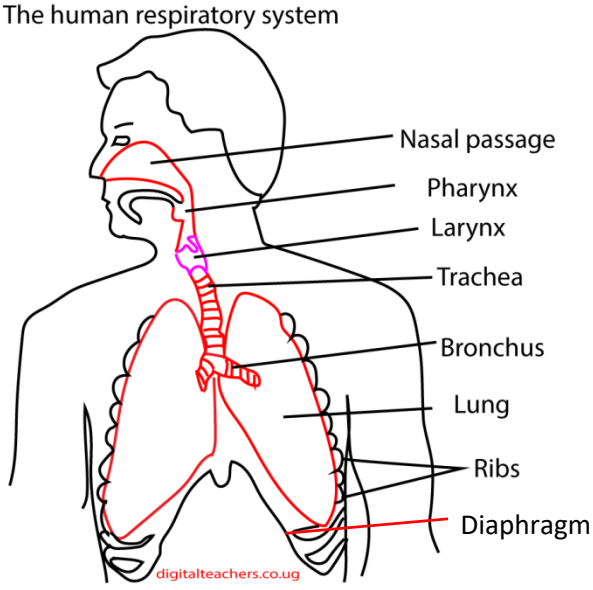
Name the gaseous exchange surfaces in the following organism

(i) Man
(ii) Fish
(iii) Tadpole
(iv) Earthworm

Gaseous exchange in man

The human lungs and associated structure are shown in figure below.

The human respiratory system



Organs Involved

(i) **Nose** – takes in air.
(ii) **Trachea (windpipe)** – carries air to the lungs. It made of cartilages that prevents from collapsing during exhalation
(iii) **Lungs** – exchange oxygen and carbon dioxide. The sites of gaseous exchange in the lungs are the air sacs
(iv) **Diaphragm** – helps in breathing in and out.

- It contracts during breathing in to expand the chest cavity and allow air in.
- It expand into the chest cavity and reduces its volume thereby pushing air out of the lungs

Exercise 4

(a) Give one function each of the following organs in respiration

(i) Nose
(ii) Trachea (wind pipe)
(iii) Lung

(b) Name the structure that keep the wind pipe open during exhalation

Inspiration.

Air is drawn into the lungs via the **trachea** and bronchi**.**

1. External intercostal muscles contract and rise the ribs upwards and outwards.
2. The radial and circular muscles of the diaphragm contract and diaphragm flattens.
3. There is an increase in volume of the thoracic cavity and a decrease in pressure in the lungs.
4. Air is drawn into the lungs to equalize the pressure to atmospheric pressure.

Expiration.

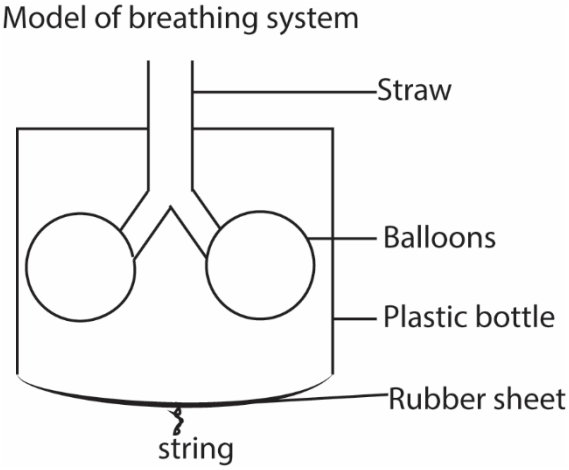
- This is a reverse of the inspiration process; air being expelled from lungs.

- It is mainly a passive process resulting from elastic recoil of the tissues that have been stretched during inspiration.
- However, in forced breathing or when breathing tubes are blocked, expiration is aided by contraction of the internal intercostal muscles and **abdominal muscles.**
- Contraction of the latter raises the pressure in the abdominal cavity, forcing the diaphragm upwards.

Class activity

- Ask pupils to **take a deep breath** and notice their chest rising and falling.
- Explain that this is how air moves in and out during respiration.

Model of breathing system



When the rubber sheet is pulled downwards by a string, the balloons get inflated

When the rubber sheet is pushed upwards, the balloons get deflated.

Thus, the model can be used to demonstrate breathing in (inhalation) and out (exhalation)

Parts	Comparison
Plastic bottle	Rib cage
Balloons	Lungs
Straw	Trachea
Rubber sheet	Diaphragm

Diseases of the respiratory system

- Bronchitis
- Whooping cough
- Pneumonia
- Tuberculosis
- Lung cancer
- asthma

Good habits of keeping lungs healthy

- stay in well ventilated place
- exercise regularly
- avoid smoking
- avoid people with infections
- regular treatment

Exercise 5

(a) Name any two diseases that attack the respiratory organs.
(b) Name any two good habits for keeping a healthy respiratory system

Revision exercise

2. Give any one way that can be used to prevent the spread of tuberculosis in a community.

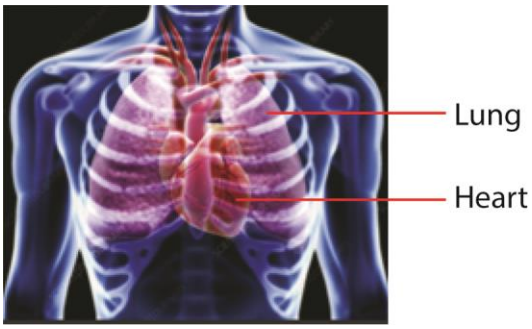
   (i) **Cover your mouth** when coughing or sneezing to stop germs from spreading.
   (ii) **Seek early treatment** if someone has a long cough, so they don't spread TB to others.
   (iii) **Finish all TB medicine** when prescribed, to fully cure the disease.
   (iv) **Keep rooms well ventilated** by opening windows, since TB spreads in crowded, stuffy places.
   (v) **Avoid overcrowding** in homes and classrooms.
   (vi) **Vaccinate children (BCG vaccine)** to protect them from severe TB.

3. State any one reason why it is not good to breathe through the mouth.

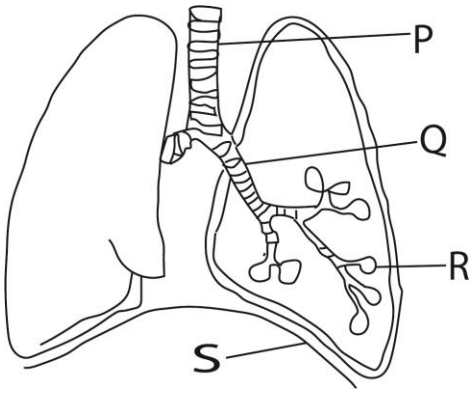
   (i) It allows dust and germs in,
   (ii) dries the throat,
   (iii) and reduces healthy oxygen intake.

4. State **one** function of diaphragm during the process of breathing.
   It contract and increase the volume of the chest cavity during breathing in and relaxes to reduce the volume of chest cavity during exhalation.

5. Which excretory organ removes water and carbon dioxide from the body?
   Lungs
6. State one way in which a mask is important in maintaining the proper functioning of the respiratory system
   It **filters dust, germs, and harmful particles from the air** before they enter the nose and lungs.
7. How does smoking affect human lungs?
   (i) Cause disease to respiratory system
   (ii) Damages air sacs in the lungs
8. Name any human body organ protected by the rib cage
   Heart, lungs



9. Excretory product removed by the lungs
   Carbon dioxide
10. The diagram below is of a human respiratory system. Study the diagram and use it to answer the questions that follow



(a) Name the part marked Q
    Bronchus
(b) Which substance is part P made of?
    Cartilages
(c) Give the function of the part marked R.
    It where gaseous exchange takes place
(d) What happens to Part S during the process of breathing in
    It contracts

11. Name human respiratory disease whose signs are loss weight, chronic cough and blood stained sputum
    Tuberculosis

12. (a) Name the component of air used for;
    (i) Respiration: oxygen
    (ii) Putting out fire: carbon dioxide

    (b) State any two dangers of wind to people.

    (i) **Strong winds can destroy houses** and other property.
    (ii) **Cause accidents** by blowing dust, trees, or objects onto roads.
    (iii) **Spread diseases** by carrying dust and germs in the air.
    (iv) **Make movement difficult** and can injure people by blowing objects against them.

13. Why do lungs expand during breathing in?
    To increase volume and allow air to enter
14. What is the importance of the rings of cartilages of the trachea in the respiratory system?
    Maintain the wind pipe open during exhalation
15. Which property of air makes the lungs to expand during breathing in?
    Air occupies space
16. How do plants make use of the gas given out by animals during respiration?
    Plant use carbon dioxide for photosynthesis.
17. Which organs are used by both fish and tadpole for breathing?
    Gills

18. How does a tadpole differ from adult frog in the way it takes in oxygen?
    Tadpole breathes through external gills whereas a frog breathes through the skin, lungs and buccal cavity.
19. State one reason why burning and breathing are similar.
    They need oxygen.
20. Which structure of an insect has the same function as gills in fish?
    Spiracles
21. Suggest one reason why blood goes to the lungs before it circulates to all parts of the body.
    To get oxygenated
22. Give any one reason why it is not advisable to breathe through the mouth.
    You may take in germs and dust because the air is not filtered by hair and mucus in the nose
23. If a person enters a room and begin smoking, how does that habit affect the health of the people in the room?

They become passive smoker and can suffer from lung disease like cancer

24. What structure in an insect work like lungs in a mammal?

Spiracles

25. How does the breathing of an adult frog differ from of a tadpole?

Adult frog breathe by lungs, skin, and buccal cavity whereas tadpole use gills

26. Give any one way in which the breathing of a housefly is different from that of a rat.

Insects breathes through spiracles whereas rat breathe through lungs.

27. Give any one reason why human beings breathe in.

To get oxygen for the cellular rspiration

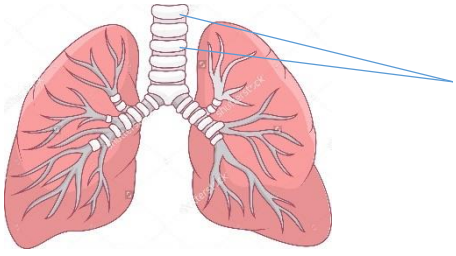
28.

29. In which human body organ does gases exchange take place?

In the lungs

30. Which structures enable the trachea to remain open all the time?

Cartilaginous rings

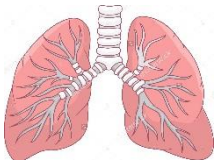


31. Which organ are used by both fish and tadpoles for breathing?

Gills

32. Name the human body organ where blood gets oxygen while carbon dioxide is removed.

Lungs



33. What is the importance of the rings of cartilages of the trachea in the respiratory system?

Help to keep the trachea open all the time

34. Which property of air makes the lungs expand when we breathe in?

It occupies space

35. (a) Apart from the skin, give any one example of a respiratory organ.

Lungs, kidney

(b) List any two diseases which affect the respiratory organ in humans

(i) **Lung cancer**

(ii) **Pneumonia**

(iii) Cough

(c) Give any one practice by humans which may lead to a respiratory disease.

Smoking

36. (a) What is the use of the hairs found in the nose of a human being?

Trap dust from air breathed in so that it does not enter the lungs

(b) Name any one disease that attacks the respiratory system.

Pneumonia

Cough

Lung cancer

Bronchitis

Tuberculosis

(c) What happens to the diaphragm when we breathe?

(i) in? **contract and flattens**

(ii) out? **Relaxes ad become dome shaped**

37. (a) Name the process that takes place in the air sacs of a human lung.

Gaseous exchange

(b) What prevents the trachea (wind pipe) from closing during breathing?

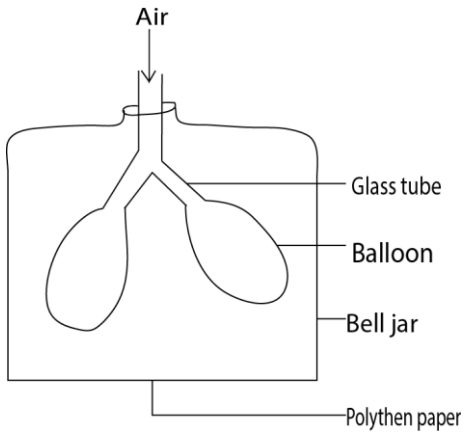
It is made of cartilage rings that do not collapse under low pressure

(c) Give two products found in the air we breathe out.

(i) Carbon dioxide

(ii) water

38. The diagram below shows the way in which one of the systems of the human body works. Use it to answer the question that follow



(a) Name the system.

Respiratory system

(b) What does a balloon represent?

Lungs

(c) (c) What does the polythene paper represent?

Diaphragm

(d) What would happen to the polythene paper if air filled the balloon?

Would burst/ expand outside

39. The table below shows a group of animals in A with their respiratory organ in B.

A	B
Tilapia	Moist skin
Mosquito	Lungs
Frog	Gills
Dog	spiracles

Write against each animal below, its respiratory organ from B.

(i) Tilapia: *Gills*

(ii) Mosquito: *spiracle*

(iii) Frog: *moist skin*

(iv) Dog: *lungs*

40. Why is smoking of tobacco harmful to the body?

Causes lung cancer

Causes pneumonia

41. Why is it more difficult to breath in a room full of smoke than in open compound?

Smoke suffocates

42. State one disease that both a passive and active smoker may suffer from.

Lung cancer

Pneumonia

43. Give any one special characteristics of the air we breathe out.

Contains high percentage of carbon dioxide

It is warm

Contain high percentage of moisture

44. (a) Name the respiratory organ which are protected by the rib cage.

Lungs

(b) What happen to the rib cage during the following process?

(i) Breathing in? : ***move up and outwards***

(ii) Breathing out? ***Move down and inwards***

(c) Give the use of oxygen we breath in

For respiration or burning food to obtain energy

45. Give the function of the epiglottis in the respiratory system.

It opens to allow air into the trachea and closes during swallowing to prevent food entering the trachea.

46. How is the function of stomata in a leaf similar to that of gills in a fish?

Both are used for gaseous exchange

47. The table below shows a group of animals in A with their respiratory organ in B.

A	B
Tilapia	Moist skin
Mosquito	Lungs
Frog	Gills
Dog	spiracles

Write against each animal below, its respiratory organ from B.

(i) Tilapia: gills

(ii) Mosquito: spiracle

(iii) Frog: *moist skin*

(iv) Dog: lungs

Thank You

Dr. Bbosa Science