BIOLOGY

BOOKS - CENGAGE BIOLOGY

RESPIRATION IN PLANTS AND ANIMALS

Question

1. List three ways in which respiration is different from burning.

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2. Name an organism which can respire both aerobically and anaerobically.

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3. Name one inlet of oxygen for respiration in the plants.

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4. What is the use of the following in experiments on respiration ?

(a)Soda lime

(b)Lime water

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5. Why the glottis is guarded by epiglottis ?

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6. Breathing rate increases after a vigorous physical exercise. Why ?

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7. What happens when lactic acid accumulates in the muscle ?

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Mandatory Exercise Exercise Set I

1. Define respiration.

2. Differentiate between aerobic and anaerobic respiration.

3. Opening and closing of stomata is due to the

A. hormonal change in guard cells.

B. change in turgor pressure of guard cells.

C. gaseous exchange.

D. respiration

Answer: B

4. Assertion: Stomata open when guard cells have more K^+.

Reason: Increased K^+ concentration results endosmosis in guard cells.

A. if both Assertion and Reason are true, Reason is the correct explanation of Assertion.

B. if both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. if Assertion is true but Reason is false.

D. if both Assertion and Reason are false.

Answer: A

5. Mention the functions of stomata.

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6. Why is anaerobic respiration less efficient?

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7. Give reasons: Respiration is called a catabolic process.

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8. Give reasons: The amount of energy released during anaerobic respiration is less than the amount of energy released during aerobic respiration.

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9. Write the name of the process of the given equations:

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

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10. Write the name of the process of the given equations:

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 38\ \mathrm{ATP}$

_____

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11. Write the name of the process of the given equations:

$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 2ATP$ _____

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12. Define compensation point.

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13. The respiratory quotient is

A. $RQ = \frac{\text{Volume of } O_2 \text{evolved}}{\text{Volume of } CO_2 \text{consumed}}$

B. $RQ = \frac{\text{Volume of } O_2 \text{consumed}}{\text{Volume of } CO_2 \text{evolved}}$

C. $RQ = \frac{\text{Volume of } CO_2 \text{evolved}}{\text{Volume of } O_2 \text{consumed}}$

D. $RQ = \frac{\text{Volume of } CO_2 \text{consumed}}{\text{Volume of } O_2 \text{evolved}}$

Answer: C

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Mandatory Exercise Exercise Set Ii

1. S to Z are structures of the human respiratory system. Arrange them to show the order in which air from outside travels through the respiratory system to reach the gaseous exchange surface in the lungs.

S: Bronchioles

U: Nostrils

W: Epiglottis

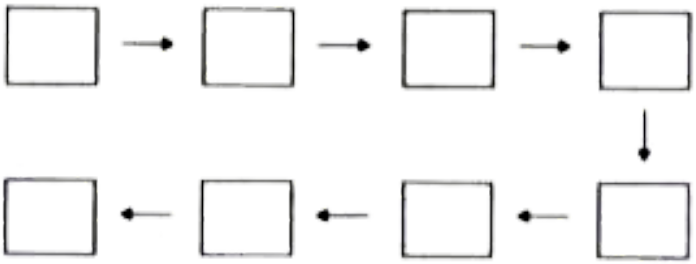
Y: Trachea

T: Bronchi

V: Pharynx

X: Larynx

Z: Alveoli



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2. Where in the cell does the glycolysis part of cellular respiration occur?

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3. How are dust particles that enter the respiratory system in the air expelled?

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4. Arrange these statements in the right order to describe inspiration.

(a) The air pressure in the air tight pleural cavities decreases.

(b) The muscles between the ribs contract to move the ribs cranially and laterally.

(c) Air is drawn down the trachea into the lungs.

(d) The diaphragm contracts and flattens.

(e) The lungs expand to fill the space created.

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5. Add the following labels to the diagram of a section cut across lung alveoli shown below :

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6. Which of the statements below gives the best definition of gas exchange?

A. Swapping oxygen for digested food in the gut capillaries.

B. Using energy to breathe.

C. Exchanging inhaled air for exhaled air in the lungs.

D. Exchanging oxygen for CO_2 in the lung alveoli.

Answer: D

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7. Assertion: Human lungs have enormous surface area for exchange of gases.

Reason: In humans, glottis is guarded by epiglottis.

A. if both Assertion and Reason are true: Reason is the correct explanation of Assertion.

B. if both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. if Assertion is true but Reason is false.

D. if both Assertion and Reason are false.

Answer: B

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8. Match the following :

Column A	Column B
(a) Trachea	(i) Alveolar air
(b) Yeast	(ii) ATP
(c) Insects	(iii) Cartilaginous rings
(d) Gill respiration	(iv) Tracheal respiration
(e) Biologically useful energy	(v) Larynx
(f) 100 mm. Hg	(vi) Ethanol
(g) Vocal cords	(vii) Fish

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9. The volume of air left in the lungs after a maximum expiration is called _____ while the volume of air breathed out during a normal useful respiration is called ____

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10. Leeches respire through.....while prawns respire through..... .

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11. Alveolar P_{o_2} is.....than the venous P_{o_2} while artierial P_{o_2} is .....than the alveolar P_{o_2}.

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12. Lung is enclosed by _____membrane.

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13. Total lung capacity is _____

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14. Difference between the inspiration and expiration

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15. Different between the external respiration and internal respiration

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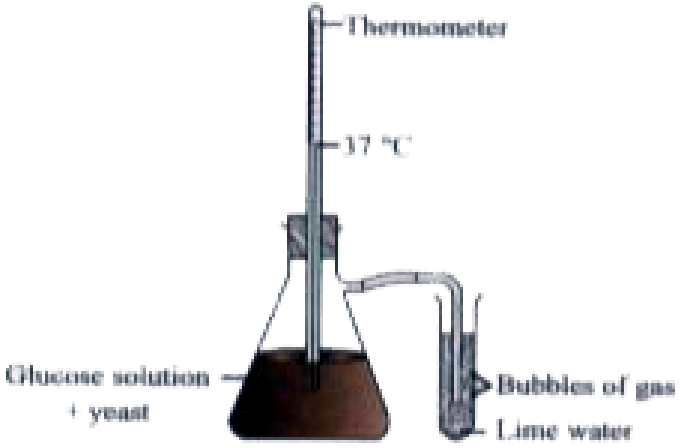
Consolidated Exercise

1. Study the following experimental setup. Answer the questions that follow.

The set up was left for 2 days. What do you notice in the test tube having lime water solution? Justify



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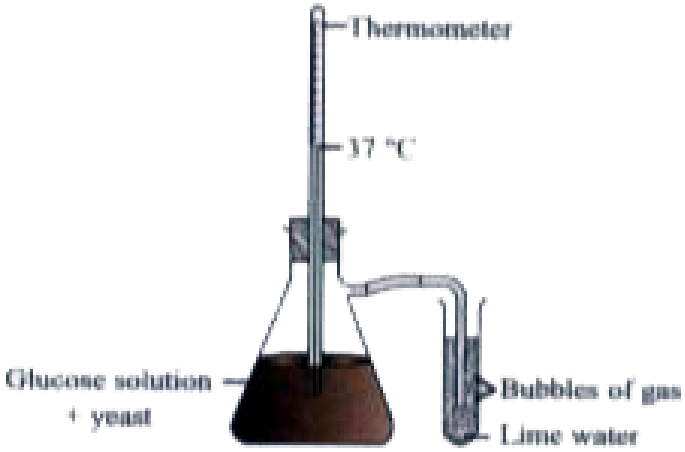
2. Study the following experimental setup. Answer the questions that follow.

What type of respiration was dominant?



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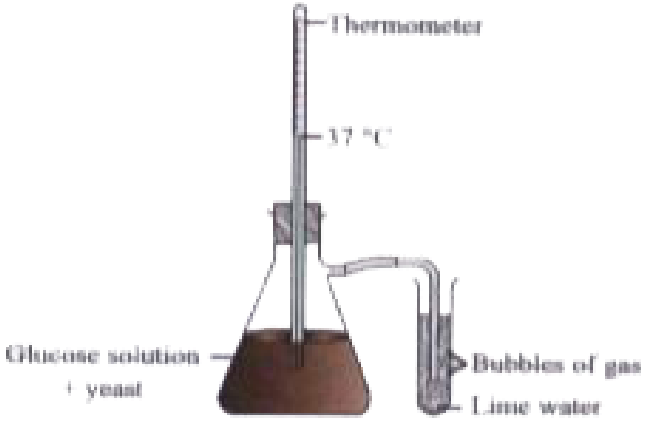
3. Study the following experimental setup. Answer the questions that follow.

Write the overall equation for this respiratory process.



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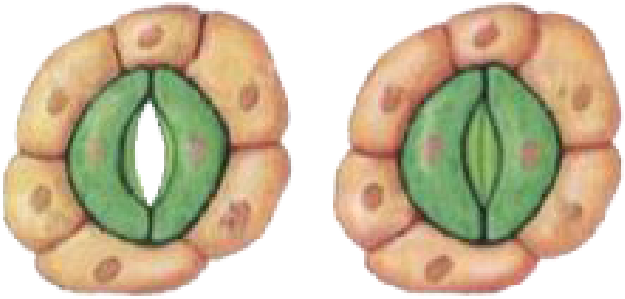
4. Label water (H_2O) and potassium ions $\left(K^+\right)$ appropriately in these diagrams. What is the role of K^+ in the opening of stomata ?



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5. Match the following

Column A	Column B
(a) Stomatal movement	(i) Pleurisy
(b) Cutaneous respiration	(ii) Earthworm
(c) C_2H_5OH and CO_2	(iii) Inspiration
(d) Diaphragm	(iv) High affinity for haemoglobin
(e) Carbon monoxide	(v) K + transport
(f) Disorders of respiratory system	(vi) Frog
	(vii) Alcoholic fermentation
	(viii) Turgor changes
	(ix) Emphysema
	(x) Constipation

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6. The table below shows the difference between inhaled air and exhaled air :

Components	% composition of air	
	Inhaled	Exhaled
Oxygen	20.7	14.0
Carbon dioxide	0.04	4.0
Water vapour	1.25	3.99
Nitrogen	78.0	78.0

Answer the following questions about exhaled air :

Why has the oxygen content decreased?

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7. The table below shows the difference between inhaled air and exhaled air :

Components	% composition of air	
	Inhaled	Exhaled
Oxygen	20.7	14.0
Carbon dioxide	0.04	4.0
Water vapour	1.25	3.99
Nitrogen	78.0	78.0

Answer the following questions about exhaled air :

From where has the extra carbon dioxide been produced?

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8. The table below shows the difference between inhaled air and exhaled air :

Components	% composition of air	
	Inhaled	Exhaled
Oxygen	20.7	14.0
Carbon dioxide	0.04	4.0
Water vapour	1.25	3.99
Nitrogen	78.0	78.0

Answer the following questions about exhaled air :

From where the extra water vapour comes from?

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9. The table below shows the difference between inhaled air and exhaled air :

Components	% composition of air	
	Inhaled	Exhaled
Oxygen	20.7	14.0
Carbon dioxide	0.04	4.0
Water vapour	1.25	3.99
Nitrogen	78.0	78.0

Answer the following questions about exhaled air :

Why there is no change in the percentage of nitrogen?

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10. The table below shows the difference between inhaled air and exhaled air :

Components	% composition of air	
	Inhaled	Exhaled
Oxygen	20.7	14.0
Carbon dioxide	0.04	4.0
Water vapour	1.25	3.99
Nitrogen	78.0	78.0

Answer the following questions about exhaled air :

What part does diaphragm play when breathing in?

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Consolidated Exercise Mcqs

1. Which of the following help the lungs to be such good organs for gaseous exchange?

A. They are close to the heart.

B. They have a small surface area.

C. The air in the alveoli and blood in the capillaries are separated by a very thin layers of cells.

D. The haemoglobin carries lots of oxygen.

Answer: B::C

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2. How is inhaled air modified before it reaches the lungs?

A. It must be humified.

B. It must be warmed.

C. It must be filtered.

D. All of the above

Answer: A::B::C

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3. Which of these is anatomically incorrect?

A. The nose has two nasal cavities.

B. The pharynx connects the nasal and oral cavities to the larynx.

C. The larynx contains the vocal cords.

D. The trachea enters the lungs

Answer: A::B::C

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4. Which of these is correct concerning inspiration?

A. Rib cage moves up and down.

B. Diaphragm expands and moves up.

C. Pressure in lungs decreases and air comes rushing in.

D. The lungs expand because air comes rushing in.

Answer: A::C::D

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5. Which one is not correct about Krebs cycle ?

A. It is also called citric acid cycle.

B. The intermediate compound which links glycolysis with Krebs cycle is ethanol.

C. It occurs in mitochondria.

D. It starts with six carbon compound.

Answer: B

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6. Diffusion of gases along the respiratory surface occurs because

A. P_{CO_2} is more in alveoli than blood

B. P_{O_2} is more in alveoli than blood

C. P_{CO_2} is more in blood than in tissues

D. P_{O_2} is more in blood than in tissues

Answer: B

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7. The two organisms which breathe only through their moist skin are

A. Fish and frog

B. Frog and earthworm

C. Leech and earthworm

D. Fish and earthworm

Answer: C

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8. The breathing and respiration in woody stem of a plant takes place through:

A. Root hair

B. Lenticels

C. Closed stomata

D. Open stomata

Answer: B

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9. One of the following animals does not use tracheae as the respiratory organs. This animal is:

A. Grasshopper

B. Prawn

C. Mosquito

D. Cockroach

Answer: B

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10. Hamburger's phenomenon is also known as

A. HCO_3 - shift

B. Na^+ shift

C. H^+ shift

D. Chloride shift

Answer: D

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11. Despite lack in oxygen, which one of the following increases in a muscle cell?

A. CO_2

B. Lactose

C. Lactic acid

D. Uric acid

Answer: C

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12. When air is blown from mouth into a test - tube containing lime water, the lime water turned milky due to the presence of

A. oxygen

B. CO_2

C. N_2

D. Water vapour

Answer: B

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13. During anaerobic respiration in unicellular fungus, which one of the following is not produced

A. C_2H_5OH

B. H_2O

C. CO_2

D. ATP

Answer: B

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14. The organisms which can live without oxygen of air is

A. Amoeba

B. Yak

C. Yeast

D. Leech

Answer: C

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15. During respiration, the gaseous exchange takes place in

A. Bronchi

B. Alveoli

C. Bronchioles

D. Trachea

Answer: B

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16. The organisms in which the gaseous exchange during separation does not take place through cell membrane or skin is

A. Electric cell

B. Leech

C. Earthworm

D. Amoeba

Answer: A

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17. Which of the following is most likely to have a much higher breathing rate?

A. Man

B. Fish

C. Dog

D. Sparrow

Answer: B

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18. In cockroaches, air enters the body through:

A. Lungs

B. Gills

C. Spiracles

D. Skin

Answer: C

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19. Myoglobin is found in

A. Lungs

B. Blood

C. Muscles

D. RBC

Answer: C

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20. Air is breathed through

A. Trachea-Lungs-Larynx-Pharynx-Alveoli

B. Nose-Larynx-Pharynx-Bronchus -Alveoli-Bronchioles

C. Nostrils-Pharynx-Larynx- Trachea- Bronchi-Bronchioles-Alveoli

D. Nose-Mouth-Lungs

Answer: C

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21. The amount of CO_2 is expired in air about

A. $0.04\ \%$

B. $0.03\ \%$

C. $21\ \%$

D. $4.5\ \%$

Answer: D

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22. What percentages of CO_2 is transported by RBCs ?

A. $70\ \%$

B. $20 - 25\ \%$

C. $7\ \%$

D. $97\ \%$

Answer: B

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23. Dead space air in man is

A. 1.5 l

B. 500 ml

C. 250 ml

D. 150 ml

Answer: D

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24. When oxygen supply to tissues is inadequate, the condition

A. Dyspnea

B. Asphyxia

C. Hypoxia

D. Anaerobic

Answer: C

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25. Oxygen dissociation curve of haemoglobin is

A. Sigmoid

B. Hyperbolic

C. Linear

D. Circular

Answer: A

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26. Which one respires through gills?

A. Crocodile

B. Whale

C. Frog

D. Prawn

Answer: D

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27. During expiration, diaphragm becomes

A. Flattened

B. Dome-shaped

C. Oblique

D. Normal

Answer: B

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28. In Crustacea, respiration occurs through

A. Tracheae

B. Gills

C. Book lungs

D. Book gills

Answer: B

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29. What percentage of air is expired?

A. $8\ \%$

B. $25\ \%$

C. $32\ \%$

D. $20\ \%$

Answer: C

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30. RQ for carbohydrate is

A. 1

B. 0.5

C. 2

D. 0.05

Answer: A

31. In anaerobic respiration of muscles, the pyruvic acid is changed to

A. Alcohol

B. Acetaldehyde

C. Acetyl CoA

D. Lactic acid

Answer: D

32. The net gain of energy from one gram mole of glucose during aerobic respiration is

A. 2 ATP

B. 4 ATP

C. 38 ATP

D. 40 ATP

Answer: C

33. Total gain of energy in anaerobic respiration is

A. 2ATP

B. 1ATP

C. 4ATP

D. 3ATP

Answer: A

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34. Final electron acceptor in respiration is

A. Hydrogen

B. Oxygen

C. Cytochromes

D. Dehydrogenesis

Answer: B

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35. Oxidative phosphorylation is found in

A. Chloroplast

B. Leucoplast

C. Peroxisome

D. Mitochondria

Answer: D

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36. Common immediate source of energy in celluar activity is

A. DNA

B. ATP

C. RNA

D. NAD

Answer: B

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37. The amount of energy given by one mole of ATP is

A. 2.3 kcal

B. 4.6 kcal

C. 7.3 kcal

D. 10 kcal

Answer: C

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38. Normal breathing in called

A. Aponea

B. Dyspnoea

C. Eupnoea

D. Hyperpnoea

Answer: C

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39. Glycolysis takes place in

A. Cytoplasm

B. Mitochondria

C. Chloroplast

D. All of the above

Answer: A

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40. Kreb's cycle takes place in

A. Cytoplasm

B. Chloroplast

C. Mitochondrial matrix

D. None

Answer: C

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41. IF ADH_2 form

A. 1 ATP

B. 3 ATP

C. 2 ATP

D. 8 ATP

Answer: C

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42. $INADH_2$ form

A. 3ATP

B. 6ATP

C. 12ATP

D. 7ATP

Answer: A

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43. Respiration is a _____ process.

A. Catabolic

B. Anabolic

C. Amphibolic

D. All of the above

Answer: A

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44. $C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{enzyme}} 6CO_2 + 6H_2O$ + 686 kcal represent

A. Aerobic respiration

B. Photosynthesis

C. Anaerobic respiration

D. Fermentation

Answer: A

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45. The energy which is consumed during breathing is

A. Mechanical

B. Chemical

C. Bioelectricity

D. Physical energy

Answer: B

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46. Pyruvic acid is formed at the end of

A. Calvin cycle

B. Glycolysis

C. Kreb's cycle

D. All of the above

Answer: B

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47. The last substrate which would be used in respiration is

A. Carbohydrate

B. Protein

C. Fat

D. Organic acid

Answer: B

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48. EMP pathway is also called

A. ETS

B. Kreb's cycle

C. Glycolysis

D. None

Answer: C

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49. Respiration is an

A. Endothermic process

B. Exothermic process

C. Either Endothermic process or Exothermic process

D. None of the above

Answer: B

50. Vocal cords occur in

A. Pharynx

B. Larynx

C. Glottish

D. Bronchial tube

Answer: B

51. An amphibolic pathway is

A. Kreb's cycle

B. Calvin cycle

C. ETC

D. None

Answer: A

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52. Carbon dioxide is liberated during

A. Photosynthesis

B. Respiration

C. Transpiration

D. Ascent of sap

Answer: B

53. Lungs are not affected by the disease

A. Pneumonia

B. Bronchitis

C. Polio

D. Asthma

Answer: C

54. Arytenoid cartilage occurs inÂ

A. Larynx

B. Nose

C. Hyoid

D. Larynx

Answer: A

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55. During expiration, diaphragm becomes

A. Flattened

B. Dome-shaped

C. Oblique

D. Normal

Answer: B

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56. Which one protects the lungs?

A. Ribs

B. Vertebral column

C. Sternum

D. All of the above

Answer: D

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57. Hemoglobin has maximum affinity for

A. CO

B. CO_2

C. O_2

D. NH_3

Answer: B

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58. Adam's Apple represents

A. Arytenoids cartilage of larynx

B. Cricoid cartilage of larynx

C. Thyroid cartilage of larynx

D. All of the above

Answer: C

59. The food does not enter the wind pipe due to

A. Glottis

B. Epiglottis

C. Pharynx

D. Larynx

Answer: B

60. Book lungs are respiratory structures of

A. Arthropoda

B. Mollusca

C. Mammals

D. Earthworm

Answer: A

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Olympiad And Ntse Level Exercises

1. Which is the most correct statement with reference to man?

A. Arteries always carry oxygenated blood while veins always carry deoxygenated blood.

B. Arteries are provided with valves while veins are devoid of valves.

C. Arteries always carry blood away from the heart, while veins always carry blood towards the heart.

D. Venous blood is returned to left auricle.

Answer: C

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2. During inspiration in man,

A. the internal intercostal muscles relax

B. due to contraction of external intercostal muscles and flattening of diaphragm, the volume of thoracic cavity increases

C. due to contraction of external intercostal muscles and flattening of diaphragm, the volume of thoracic cavity decreases

D. the abdominal muscles contract

Answer: B

3. Temporary cessation of breathing after forced deep breathing for a few minutes by a person sitting at rest is due to

A. too much oxygen in blood

B. too much carbon dioxide in blood

C. very little carbon dioxide in blood

D. both, too much oxygen and very little carbon dioxide in blood

Answer: D

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4. If a man inhales carbon monoxide along with oxygen, he suffers from suffocation. It is because carbon monoxide

A. affects the muscles involved in breathing

B. affects nerves controlling breathing

C. forms a stable compound with oxygen

D. forms a stable compound with haemoglobin

Answer: D

5. What is the normal haemoglobin content of an adult man?

A. 85 g/100 mL of blood

B. 105 g/100 mL of blood

C. 145 g/100 mL of blood

D. 185 g/100 mL of blood

Answer: C

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6. (i) If both Assertion and Reason are true: Reason is the correct explanation of Assertion.

(ii)If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(iii) If Assertion is true but Reason is false.

(iv) If Assertion is false but Reason is true.

Assertion (A): Human lungs have enormous surface area for exchange of gases.

Reason (R): In humans, glottis is guarded by epiglottis.

A. (i)

B. (ii)

C. (iii)

D. both (i) and (ii)

Answer: B

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7. Blood analysis of a patient reveals an unusually high quantity of carboxyhaemoglobin content. Which of the following conclusions is most likely to be correct? The patient has been inhaling polluted air containing high content of

A. carbon dioxide

B. carbon monoxide

C. carbon disulphide

D. chloroform

Answer: B

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8. Read the statements and select the option which best describes the process that occurs during systemic circulation.

(i) The left atrium receives the oxygenated blood through the pulmonary veins. The left ventricle pumps the blood through the aorta to various parts and the deoxygenated blood reaches right atrium.

(ii) The left atrium receives the oxygenated blood

through pulmonary veins and pumps the blood through the aorta to various parts and the deoxygenated blood reaches the right atrium.

(iii) The left atrium receives deoxygenated blood and pumps into left ventricles which in turn pumps into pulmonary artery for oxygenation.

(iv) The right atrium receives the deoxygenated blood and pumps into pulmonary artery for oxygenation.

A. (i) and (iii) are correct

B. (ii) is correct

C. (iii) and (iv) are correct

D. (iv) is correct

Answer: D

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9. A beaker is filled with water and twigs of Hydrilla are inserted in the funnel so that the cut ends are in the tube of the funnel and the funnel is put in the water. Then a test tube full of water is inverted over the inverted funnel. Air bubbles from the plant collect at the tip of the tube. This experiment demonstrates that oxygen is evolved

during photosynthesis. But if boiled water is used instead of pond water in which Hydrilla grows, then

A. air bubbles are not produced

B. air bubbles are produced in large numbers

C. only a few air bubbles are produced

D. only one air bubble is produced

Answer: C

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10. A person will breathe deeply and rapidly for some time after a period of strenuous exercise. The longer and more intense the exercise, the longer and deeper the breathing will be and this will continue after the exercise stops. Using your understanding of cellular respiration, why strenuous exercise stimulates deep breathing?

A. More rapid heartbeat

B. More consumption of oxygen by cells

C. More release of CO_2 by cells

D. Both (A) and (B)

Answer: D

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Challenging Exercise

1. Krebs cycle

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