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Support Pack | Grade 12

CAPS

Life Sciences

Practice exercises: Life processes in plants and animals

This support pack for the **Life processes in plants and animals** strand in the **Life Sciences Grade 12 CAPS curriculum** provides practice exercises. All exercises have the answers provided. Learners can work through these individually at home or these could form the basis of a catch-up class or online lesson. You have permission to print or photocopy this document or distribute it electronically via email or WhatsApp.

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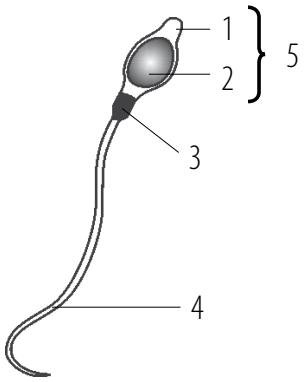
WORKSHEET 2: LIFE PROCESSES IN PLANTS AND ANIMALS

HUMAN REPRODUCTION

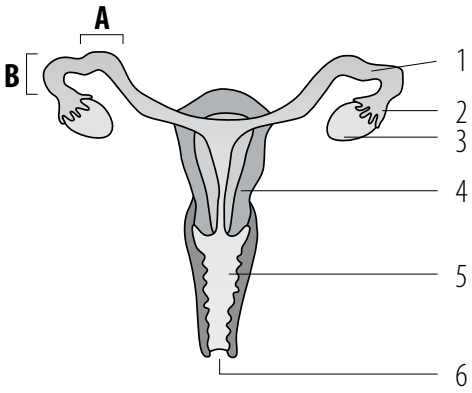
1. The diagram on the left shows a human reproductive cell.
   1.1 Identify the parts numbered 1 to 5.
   1.2 The part numbered 1 contains enzymes. What function is performed by these enzymes during fertilisation?
   1.3 The part labelled 3 is packed with mitochondria. Why is this?
   1.4 The ovum is much larger than the sperm. Why is this?
   1.5 Why is the egg of the pigeon much larger than that of the human?



STRAND 2: LIFE PROCESSES IN PLANTS AND ANIMALS

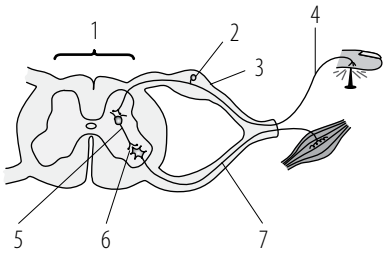
UNIT 2: HUMAN REPRODUCTION

2. The diagram above shows the female human reproductive system. Study it and answer the following questions.
   2.1 Identify the parts numbered 1 to 6.
   2.2 Fertilisation usually takes place at B. Why does a blockage at A:
      a) prevent fertilisation at B
      b) not necessarily lead to total infertility?
   2.3 Write down the number of the structure lined with:
      a) ciliated epithelium
      b) the endometrium.

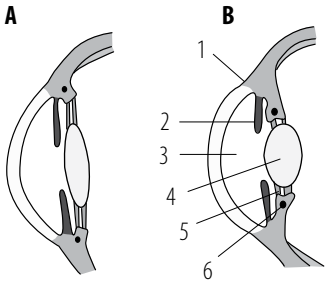


RESPONDING TO THE ENVIRONMENT: HUMANS

3. Study the diagram of a reflex arc on the left and answer the questions that follow.
   3.1 Distinguish between a reflex arc and a reflex action.
   3.2 Identify the parts numbered 1 to 5.
   3.3 What is the microscopic gap between two consecutive neurons called, as shown by 6?
   3.4 a) Name the type of neuron numbered 7.
      b) What part of the neuron is indicated by the number 7?
      c) State the function of the neuron numbered 7.
   3.5 Name five examples of a reflex arc in the human body.
   3.6 What will the consequences be for the body if the parts numbered a) 4 and b) 7 are damaged?
   3.7 Name, in the correct sequence, the neurons involved in transmitting an impulse during a reflex action.

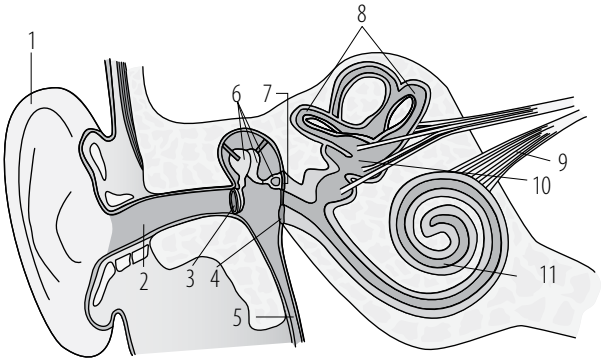


4. The diagrams on the left show two stages in the way that the lens changes when a human eye is focused on an object.



4.1 Which lens (A or B) is adapted to distant vision?
4.2 Which numbered part regulates the amount of light entering the eye?
4.3 State a reason for the change from A to B.
4.4 Explain how the change from A to B was brought about. Use numbers and names in your explanations.

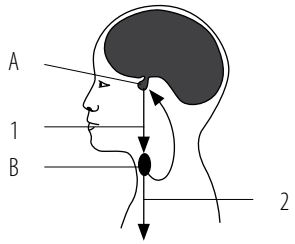
5. Study the diagram of the ear and answer the questions that follow.



5.1 What is the function of the structure numbered 1?
5.2 Identify the structures numbered 6 and state their function.
5.3 What gas fills the tube numbered 5? What is the function of this tube?
5.4 Write down the number and name of the structure concerned with maintaining balance.
5.5 Name the fluid found inside the structure numbered 10.
5.6 Write down the number and name of the structure in which sound waves are converted into nerve impulses.
5.7 Write down the number of the auditory nerve. What type of neuron is present in this nerve? To where does this nerve lead?
5.8 Identify the parts numbered:
a) 4
b) 7.
5.9 Where does the tube numbered 5 end?

HUMAN ENDOCRINE SYSTEMS

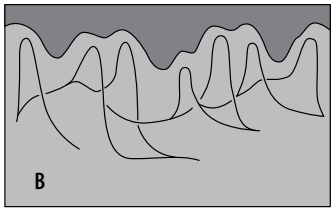
6. Study the diagram on the left, which shows the relationships between two endocrine glands, and answer the questions that follow.



6.1 a) What is meant by the term 'hormone'?
b) How are hormones transported in the human body?
6.2 Identify the endocrine glands labelled A and B.
6.3 Which interaction (mechanism) is shown by the diagram?
6.4 Identify the hormones numbered 1 and 2 that are involved in the interaction mentioned in question 6.3.
6.5 What effect does a) an over-secretion and b) an under-secretion of hormone 1 have on the production of hormone 2?

HOMEOSTASIS IN HUMANS

7. Study the diagrams on the left, which show the blood flow in the skin under different environmental temperatures and answer the questions that follow.

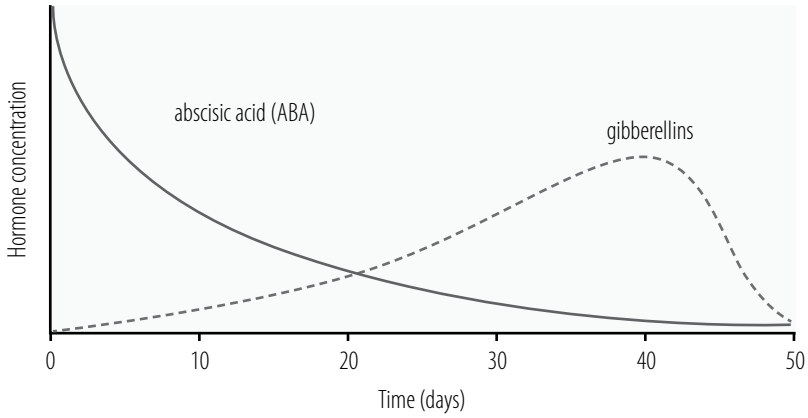


7.1 Which diagram (A or B) shows the blood flow under warmer environmental temperatures? Give a reason for your answer.
7.2 In which diagram (A or B) will the sweat glands be less active? Give a reason for your answer.
7.3 Name:
a) the part of the skin in which the blood vessels are found
b) the part of the brain containing the heat-regulatory centre.

7.4 What is the phenomenon called whereby organisms, for example, humans, maintain a constant body temperature?
7.5 What is meant by the term 'endothermic/homeothermic'?
7.6 State two reasons why endothermic animals have an advantage over ectothermic/poikilothermic animals.

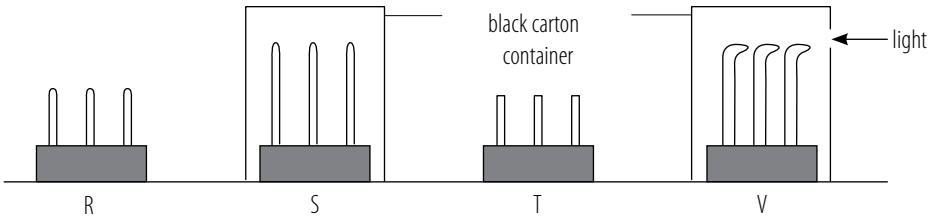
RESPONDING TO THE ENVIRONMENT

8. Many seeds store starch, which is converted to glucose by enzymes when germination starts. The production of these enzymes is triggered by gibberellins that are synthesised by the developing embryo. The presence of ABA in the seed inhibits the production of gibberellins. The graph below shows the relationship between ABA and gibberellins in germinating seeds, over a period of 50 days.



8.1 What are gibberellins?
8.2 What effect will decreasing levels of ABA have on the concentration of gibberellins up to day 45?
8.3 Why must starch be broken down into glucose?
8.4 Why does the level of gibberellins drop after 45 days?
8.5 State two reasons why water is necessary during the conversion of starch to glucose.

9. The following diagram shows four different groups of stem tips of young seedlings or shoots that were grown under different conditions.



9.1 Name the external condition that was different for group R and group S.
9.2 In what way did this influence the growth of the shoots?
9.3 What is the difference between the shoots in group R and group T?
9.4 What influence did this difference (stated in question 9.3) have on their growth?
9.5 Suggest one conclusion that can be made regarding the area of growth in shoots?
9.6 Give an explanation for the results observed in group V.

MEMORANDUM FOR WORKSHEET 2

1.1 1: acrosome; 2: nucleus; 3: neck; 4: tail; 5: head

1.2 The enzymes in the acrosome digest the plasmalemma of the ovum so that the nucleus of the sperm can penetrate it, to fuse with the nucleus of the ovum during fertilisation.

1.3 The sperm have to swim from the vagina through the uterus and the Fallopian tube, and this requires a lot of energy, which is supplied by ATP, which is produced in the mitochondria.

1.4 The egg cell contains a small amount of yolk for the early development of the zygote and the embryo until it becomes implanted in the uterus wall. Also, egg cells do not need to move actively, but sperm need to be small and mobile.

1.5 Pigeons are oviparous and the eggs hatch outside the body of the mother and are covered with a shell. The embryo has to be supplied with food in the form of large amounts of yolk and albumen inside the shell of the egg.

2.1 1: Fallopian tube (oviduct); 2: funnel with fimbriae; 3: ovary; 4: uterus; 5: vagina; 6: opening of vagina (vulva)

2.2 a) The sperm cannot reach the ovum.

b) The egg produced in the other ovary can still be fertilised.

2.3 a) 1

b) 4

3.1 • A reflex arc is the functional unit of the nervous system; it is the path along which impulses are transmitted from receptor to effector to bring about responses to stimuli.

• A reflex action is a rapid, automatic response to a stimulus; it is a protective and instinctive reaction and does not need the brain for its initiation.

3.2 1: spinal cord; 2: cell body; 3: ganglion; 4: dendrite of sensory neuron; 5: interneuron

3.3 A synapse

3.4 a) Motor neuron

b) Axon

c) Transmits impulses from the spinal cord to the effector organs.

3.5 Any five: blinking the eyes; yawning; sneezing; coughing; heartbeat; peristalsis

3.6 a) Anaesthesia/insensibility or no reflex action

b) Paralysis or no motor function

3.7 Sensory neuron → interneuron → motor neuron

4.1 A

4.2 2

4.3 Accommodation has taken place because the eye is viewing an object that is within 6 m of it.

4.4 The ciliary muscle (6) contracts and moves nearer to the lens (4). The tension on the suspensory ligament (5) decreases and the tension on the lens (4) is released. The elastic lens now bulges and becomes more convex.

5.1 The pinna directs sound waves in the air and concentrates these on the external auditory opening.

5.2 The auditory ossicles – these play a role in the transfer and amplification of the vibrations caused by sound waves hitting the tympanic membrane.

5.3 Air – maintains the air pressure on either side of the eardrum.

5.4 8: the semi-circular canals

5.5 Perilymph

5.6 11: the cochlea

5.7 9; sensory; temporal lobe of the cerebellum

5.8 a) Round window

b) Oval window

5.9 In the pharynx

6.1 a) A hormone is a complex chemical, mainly a protein, that is secreted in small quantities by the endocrine glands into the bloodstream, which transports the hormone to target organs where its effects are felt.

b) They are transported in the blood.

6.2 A: Pituitary; B: thyroid gland

6.3 A negative feedback mechanism

6.4 1: TSH; 2: thyroxin

6.5 a) The thyroid gland is stimulated to produce more thyroxin.

b) Less thyroxin will be produced by the thyroid.

7.1 A: blood vessels are dilated

7.2 B: environmental temperature is low/blood vessels are constricted

7.3 a) dermis

b) hypothalamus

7.4 Thermoregulation

7.5 Organisms that maintain a constant body temperature, irrespective of changes in the external environmental temperature.

7.6 Animals can have a high metabolic rate/being constantly active at any environmental temperature. These organisms can live in varied environments/deserts or the poles/can withstand any environmental temperatures.

8.1 Gibberellins are plant growth substances that promote the elongation of stems so that the plant grows tall. They also stimulate the germination of seeds.

8.2 The decreasing level of ABA promotes an increase in the level of gibberellins.

8.3 Glucose is the fuel that is used during cellular respiration.
Energy is released during this process. This energy is used to promote cell division and therefore the germination of seeds.

8.4 Possibly, because the starch stored in the seed has been used up already and the seed has become a seedling (germinated plant).

8.5 Water is necessary to hydrolyse starch into glucose, and is also necessary to dissolve the glucose so that it can diffuse into the mitochondria of cells for cellular respiration to take place.

9.1 Sunlight – group R received full sunlight, while group S was excluded from sunlight by being covered with a black carton container.

9.2 Group R has grown taller; group S has not grown that much.

9.3 Group R still has growth tips; the growth tips in group T have been removed.

9.4 Group R grew taller; group T did not grow further.

9.5 Growth occurs in the growth tips.

9.6 Auxins are produced in the tips of shoots. Auxins are light- sensitive and diffuse away from light. Due to the illumination from one side (unilateral light) of the shoots, there is a higher concentration of auxins on the shaded side. Cell elongation is stimulated on the shaded side of the shoots, which results in the shoots curving and growing towards the light source.