

Biology, 2016 EC, natural science, entrance exam

Grade 12 · Biology · 2016 E.C.

MARKING KEY — CONFIDENTIAL**Time allowed:** 120 minutes**Questions:** 35**Total marks:** 35

1. Gene flow is the movement of genetic material (1)
- A. without altering the allele frequencies.
 - B. that drives a population towards perfection.
 - C. without affecting the balance of gene pool of a population.
 - D. ✓ **where organisms either join or leave a population.**

Answer: D

Gene flow is the transfer of alleles from one population to another. It happens when individuals move into a population (immigration) or out of it (emigration) and then breed. That is exactly what option D describes.

Options A and C fail because gene flow does change allele frequencies: the arriving alleles shift the balance of the gene pool. Option B fails because evolution has no goal, so no process drives a population towards perfection.

Textbook: Biology Grade 12, Unit 4 Evolution, section 4.1.8 Gene flow (immigration and emigration) (page 223).

2. Which one of the following options is a constituent of peripheral nervous system? (1)
- A. Afferent nerves, brain and automatic motor nerves
 - B. Somatic sensory nerves, spinal cord and efferent nerves
 - C. ✓ **Afferent nerves, efferent nerves and somatic motor nerves**
 - D. Spinal cord, afferent nerves and somatic sensory nerves

Answer: C

The nervous system has two divisions. The central nervous system is the brain and the spinal cord. The peripheral nervous system is every nerve outside them: afferent (sensory) nerves carrying signals to the brain and spinal cord, and efferent (motor) nerves, including somatic motor nerves, carrying commands out to muscles and glands.

Only option C lists nerves alone. The other options each include the brain or the spinal cord, which belong to the central nervous system.

Textbook: Biology Grade 12, Unit 5 Human body system, section 5.1.4 Types of the nervous system (page 254).

3. Which one of the following structures of neurons is correctly paired with its function? (1)
- A. Axon - receives signal from muscle
 - B. ✓ **Cell body - maintains structure and supply energy**
 - C. Dendrites - protects the neuron and insulate it
 - D. Myelin sheath - reduces nerve impulse transmission

Answer: B

The cell body holds the nucleus and most organelles, including the mitochondria. It keeps the neuron alive, maintains its structure, and supplies the energy the cell needs. So option B is the correct pair.

The others are mismatched: the axon carries impulses away from the cell body, dendrites receive signals from other neurons, and the myelin sheath insulates the axon and speeds up transmission rather than reducing it.

Textbook: Biology Grade 12, Unit 5 Human body system, section 5.1.1 Neurons and their functions (page 240).

4. Which one of the following statements explain how nerve impulse is occurred? It occurs as a result of (1)
- A. ✓ **charge difference across the membrane of axon.**
 - B. the movement of neurotransmitter molecules into myelin sheath.
 - C. balanced charge across the membrane of dendrites.
 - D. the movement of neurotransmitter molecules out of cell body.

Answer: A

A nerve impulse (action potential) is an electrical event. Sodium and potassium ions sit unevenly on the two sides of the axon membrane, so there is a charge difference across it. When a stimulus lets sodium ions rush in, that charge difference suddenly reverses, and the reversal sweeps along the axon as the impulse. So option A is correct.

Option C is wrong because a perfectly balanced charge means no impulse at all. Neurotransmitters (options B and D) act only at the synapse between neurons, not inside the axon.

Textbook: Biology Grade 12, Unit 5 Human body system, section 5.1.2 The nerve impulse and transmission (page 246).

5. Which one of the following statements is an acceptable justification of the importance of synapse? Synapse is (1)
- A. the mechanism of protecting the axon from external damage
 - B. ✓ **a connection between the appendages of consecutive neurons.**
 - C. a conductor of action potential towards the end of the dendrite.
 - D. the facilitator of the reverse flow of neurotransmitter chemical in neurons.

Answer: B

A synapse is the meeting point between two neurons: the axon ending of one neuron and the dendrite of the next. At this junction a chemical messenger (a neurotransmitter) carries the signal across a tiny gap, so messages can pass from neuron to neuron. That matches option B.

Option A is the job of the myelin sheath, not the synapse. Option C is wrong because the action potential travels along the axon, and option D is wrong because a synapse passes the signal in one direction only.

Textbook: Biology Grade 12, Unit 5 Human body system, section 5.1.2 The nerve impulse and transmission (page 246).

6. Assume your friend has a blood type that has no antigen on his red blood cells but produces antibodies A and B, (1)
loses blood due to a car accident. If blood transfusion is necessary to save his life, your friend can receive blood from someone with
- A. blood type AB.
 - B. ✓ **blood type O.**
 - C. blood type B.
 - D. blood type A.

Answer: B

Red blood cells with no A or B antigen, together with both anti-A and anti-B antibodies in the plasma, describe blood type O. A person with type O can donate to anyone, but can receive red cells only from another type O donor.

If this friend received type A, B, or AB blood, his anti-A and anti-B antibodies would attack the donor cells and make them clump, which is dangerous. So option B is the only safe choice.

Textbook: Biology Grade 10, Unit 5 Human Biology (ABO blood groups and transfusion).

7. The binomial system of naming developed by Linnacus comprises two names. Which hierarchical groups are used? (1)
- A. Order and family
 - B. ✓ **Genus and species**
 - C. Kingdom and species
 - D. Kingdom and phylum

Answer: B

In the binomial system each organism gets a two-part scientific name. The first part is the genus and the second part is the species. For example, in *Homo sapiens*, *Homo* is the genus and *sapiens* is the species.

Kingdom, phylum, order and family are higher ranks in classification, but they do not appear in the two-part name itself.

Textbook: Biology Grade 9, Unit 2 Characteristics and classification of organisms (page 19).

8. Which one of the following is the feature of kingdom Monera? Its members are (1)
- A. ✓ **unicellular without separated nucleus.** B. multicellular with cell walls.
C. mainly autotrophic and saprophytic. D. reproduced by hypha formation.

Answer: A

Kingdom Monera contains the bacteria. They are unicellular prokaryotes: their genetic material lies free in the cytoplasm because there is no membrane around it, so the cell has no separate nucleus. That matches option A.

Option B fails because monerans are not multicellular. Option C describes fungi better, and option D is wrong because hyphae are fungal threads; bacteria mostly reproduce by binary fission.

Textbook: Biology Grade 9, Unit 2 Characteristics and classification of organisms (page 19).

9. Which alternative given below is comprised of harmful groups from the kingdom Monera, Protista and Fungi, respectively? (1)
- A. Trypanosoma. Plasmodium falciparum and Haemophilus ducreyi
B. Candida albicans, Mycobacterium tuberculosis and Trypanosoma
C. ✓ **Haemophilus ducreyi, Trypanosoma and Tinea pedis**
D. Trypanosoma, Plasmodium falciparum and Penicillium

Answer: C

The order asked for is Monera first, then Protista, then Fungi. Option C gives exactly that: *Haemophilus ducreyi* is a bacterium (Monera) that causes the disease chancroid, *Trypanosoma* is a protozoan (Protista) that causes sleeping sickness, and *Tinea pedis* is a fungal infection known as athlete's foot.

Option A starts with a protozoan, option B starts with a fungus (*Candida albicans*), and option D ends with *Penicillium*, a useful mould that gives us the antibiotic penicillin, so none of them fit the required order of harmful organisms.

Textbook: Biology Grade 9, Unit 2 Characteristics and classification of organisms (page 19).

10. Which one of the following is a feature of Octopi and squid in phylum mollusca? They have (1)
- A. segmented body with head and thorax. B. ✓ **well-developed brain.**
C. lung as a breathing structure. D. hard muscular foot with a hard body.

Answer: B

Octopuses and squids are cephalopods, the most advanced group in phylum Mollusca. They have the best developed brain of all invertebrates, which lets them learn, hunt and even change colour to hide. So option B is correct.

The other options fail: a body segmented into head and thorax describes arthropods, cephalopods breathe with gills rather than lungs, and octopuses and squids have soft bodies without the hard shell of other molluscs.

Textbook: Biology Grade 11, Unit 2 Animals (page 26).

11. What mechanism was used by Gregor Mendel to protect the garden peas from self-pollination? He (1)
- A. ✓ **opened the flower bud before pollen matured.**
B. sterilized the male part of the flower using chemicals.
C. covered the flower and protects it from pollinating agents.
D. selected pure dominant traits for breeding.

Answer: A

Pea flowers normally fertilise themselves: the male anthers shed pollen onto the stigma of the same flower while the petals are still closed. To stop this self-pollination, Mendel opened each flower bud early, before its pollen was mature, and removed the anthers. A flower without its own pollen cannot pollinate itself, so Mendel could then brush on pollen from the parent he chose.

Option C is the tempting wrong answer. Covering a flower keeps out insects and wind-blown pollen, so it prevents cross-pollination from other plants, but the covered flower would still pollinate itself.

Textbook: Biology Grade 11, Unit 4 Genetics, section 4.5 Mendelian inheritance (page 137).

12. Gregor Mendel crossed two pure-breeding traits of pea plants in his experiment and found only one of the traits expressed in the first generation. This shows that the (1)
- A. expressed trait must be determined by the recessive allele.
 - B. Two traits in the F1 generation were equally expressed.
 - C. alleles masked in the F1 generation were lost due to mutation.
 - D. ✓ **expressed trait must be determined by the dominant allele.**

Answer: D

When Mendel crossed two pure-breeding parents with contrasting traits, every F1 plant showed only one of the two traits. The trait that appears in the F1 is controlled by the dominant allele; the other allele is still present but hidden. So option D is correct.

Option A has it backwards, since the hidden trait is the recessive one. Option B is wrong because only one trait appeared. Option C is wrong because the masked allele was not lost: it reappeared in the F2 generation, which proves it was only hidden.

Textbook: Biology Grade 11, Unit 4 Genetics, section 4.5 Mendelian inheritance (page 137).

13. Which one of the following statements correctly describes chromosome structure? (1)
- A. The pair of chromosomes is heterozygous in nature.
 - B. Chromosomes are similar to a gene in structure.
 - C. The DNA is wrapped with ribose sugar to form a chromosome.
 - D. ✓ **Chromosomes are made up of histone bounded DNA.**

Answer: D

A chromosome is a long DNA molecule wound around packaging proteins called histones. This DNA plus histone material (chromatin) coils up tightly so the DNA can fit inside the nucleus. Option D states this correctly.

Option A is wrong because a chromosome pair can be homozygous or heterozygous for any gene. Option B is wrong because a gene is only a short segment of a chromosome. Option C is wrong because DNA contains deoxyribose sugar; ribose belongs to RNA, and neither sugar wraps the DNA.

Textbook: Biology Grade 11, Unit 4 Genetics, section 4.1 The genetic materials (page 114).

14. The breeding mechanism that improves the performance of animals or plants using particular traits is (1)
- A. self-breeding.
 - B. test cross.
 - C. ✓ **selective breeding.**
 - D. combination of traits.

Answer: C

Choosing parent animals or plants that show a wanted trait, such as high milk yield or disease resistance, and breeding from them generation after generation is called selective breeding. Over time the offspring perform better and better in that trait, so option C is correct.

A test cross has a different purpose: it reveals whether an organism showing a dominant trait is homozygous or heterozygous, and it does not by itself improve performance.

Textbook: Biology Grade 11, Unit 4 Genetics, section 4.12 Breeding (page 167).

15. Which one of the following birth control methods is correctly matched with its function? (1)

- A. ✓ **Hormonal method - prevents follicle development and ovulation**
- B. Physical method - reduces the lining of the uterus
- C. Surgical method - avoids early embryo implantation
- D. Natural method - prevent the ovum from reaching to the uterus

Answer: A

Hormonal contraceptives such as pills, injections and implants supply hormones that stop the ovary from ripening a follicle, so no egg is released. Preventing follicle development and ovulation is exactly how they work, which makes option A the correct match.

The other pairs are wrong: physical methods like condoms simply block sperm and do not touch the uterine lining, surgical methods cut or tie the tubes so sperm and egg never meet, and natural methods only avoid intercourse on fertile days.

Textbook: Biology Grade 11, Unit 5 The human body systems, section 5.2.4 Mechanism of action of contraceptives (page 204).

16. The ability of carnivores to survive in an ecosystem is dependent on the availability of prey. This can be considered as (1)

- A. abiotic factor.
- B. edaphe factor.
- C. catastrophic factor.
- D. ✓ **biotic factor.**

Answer: D

Prey animals are living organisms, and any influence that living things have on other living things is a biotic factor. A carnivore that depends on prey for food therefore depends on a biotic factor, so option D is correct.

Abiotic factors are non-living conditions such as temperature, water and light. Edaphic factors concern the soil, and catastrophic factors are sudden disasters like floods or fire.

Textbook: Biology Grade 9, Unit 6 Ecology (page 137).

17. The two reverse processes that play a significant role in absorbing and releasing carbon dioxide, respectively are (1)

- A. combustion and photosynthesis.
- B. decomposition and respiration.
- C. respiration and assimilation.
- D. ✓ **photosynthesis and respiration.**

Answer: D

The question asks for the process that absorbs carbon dioxide first and the one that releases it second. Photosynthesis takes carbon dioxide from the air to build glucose, and respiration breaks glucose down and returns carbon dioxide to the air. The two are chemically reverse processes, so option D fits in the right order.

Combustion, decomposition and respiration all release carbon dioxide, so options A, B and C do not give an absorbing process first.

Textbook: Biology Grade 10, Unit 6 Ecological Interactions, section 6.2.2 Carbon cycle.

18. Which one of the following adaptations is important for survival of polar bear in very cold environments? Having (1)

- A. smaller size
- B. fine silky fur
- C. ✓ **blubbers under the skin**
- D. thick wrinkled ears

Answer: C

Polar bears carry a thick layer of fat called blubber under the skin. Fat is a poor conductor of heat, so blubber insulates the body against the freezing air and icy water, and it also stores energy for times when food is scarce. Option C is correct.

The other options would work against survival in the cold: a small body loses heat faster than a large one, fine silky fur traps less air than dense thick fur, and large wrinkled ears would give extra surface for heat to escape.

Textbook: Biology Grade 9, Unit 6 Ecology (page 137).

19. A student concluded that the stage of meiosis on a prepared slide of plant tissue he observed was Anaphase II. (1)
What do you think was the reason to come to this conclusion? Observation of

- A. ✓ **divided centromere and separated sister chromatids**
- B. reformed nuclear envelope and reappearance of nucleolus
- C. one chromosome from each homologous pairs at the poles
- D. crossing over between non-sister chromatids of homologous pairs

Answer: A

In anaphase II each centromere finally divides, and the two sister chromatids of every chromosome are pulled apart to opposite poles. Seeing divided centromeres with separated sister chromatids is therefore the sign of anaphase II, so option A is correct.

Option C describes anaphase I, where whole homologous chromosomes separate while their centromeres stay intact. Option B describes telophase, and option D (crossing over) happens in prophase I.

Textbook: Biology Grade 10, Unit 4 Cell Division (page 81).

20. Which one of the following plant species is endemic to Ethiopia? (1)

- A. *Percica papaya*
- B. *Eucaliprus globulose*
- C. *Aurocaria baramuleta*
- D. ✓ ***Guizotia abyssinica***

Answer: D

Guizotia abyssinica is noug (niger seed), the oilseed crop that originated in the Ethiopian highlands. Ethiopia is its home and primary centre of diversity, so among the choices it is the Ethiopian species. Option D is correct.

The others come from elsewhere: papaya is from tropical America, *Eucalyptus* is from Australia, and *Araucaria* trees are from the southern Pacific region.

Textbook: Biology Grade 9, Unit 2 Characteristics and classification of organisms (page 19).

21. Which one of the following national parks of Ethiopia is declared as the world's heritage site and comprises endemic animals like *Walia ibex*? (1)

- A. Yangudi Rassa National Park
- B. ✓ **Simien Mountain National Park**
- C. Rift Valley National Park
- D. Bale Mountain National Park

Answer: B

Simien Mountains National Park in northern Ethiopia is registered by UNESCO as a World Heritage Site. It is the only home of the *Walia ibex*, and it also shelters the gelada and the Ethiopian wolf. So option B is correct.

Bale Mountains National Park is the tempting wrong answer: it is rich in endemic animals such as the mountain nyala, but the *Walia ibex* lives only in the Simien Mountains.

Textbook: Biology Grade 11, Unit 6 Population and natural resources, section 6.3 Conservation of natural resources in Ethiopia (page 256).

22. A mother milks her cow every morning and the milk usually forms curd after three days. What is the first step to investigate why this change happens? (1)

- A. Take action to prevent the milk from curdling
- B. Read scientific articles about the reason for curdling of milk
- C. Formulate hypothesis about the reason for milk curdling
- D. ✓ **Ask a question why the milk forms curd**

Answer: D

The scientific method begins with an observation and the question it raises. The mother has already observed the curdling, so the first step of the investigation is to ask why the milk forms curd. Option D is correct.

Reading articles and forming a hypothesis come after the question has been asked, and taking action to prevent curdling is not an investigation at all.

Textbook: Biology Grade 9, Unit 1 Introduction to Biology, section 1.3 The scientific method (page 1).

- 23.** A drug efficacy test was conducted under similar set up on two groups of infected mice (A and B), groups A were the control whereas group B were experimental group. A student gave a placebo to the control group and the drug to the experimental group. At the end, the experimental group got better. Which one of the following is true about the result? (1)
- A. Conclusion cannot be reached. B. Placebo has better effect.
C. ✓ The drug has an effect. D. The experiment was wrong.

Answer: C

This was a controlled experiment. Both groups of mice were kept under the same conditions, and the only difference between them was the drug: the control group got a placebo and the experimental group got the real drug. Since only the drug-treated group got better, the improvement can be credited to the drug. Option C is correct.

Option A is wrong because a fair comparison with a control group is exactly what allows a conclusion to be drawn.

Textbook: Biology Grade 9, Unit 1 Introduction to Biology, section 1.3 The scientific method (page 1).

- 24.** Suppose you did an experiment in a biology laboratory and need to report your work to your biology teacher. Which one of the following steps is correct to report the finding? (1)
- A.** Title → Procedure → Result → Hypothesis → Prediction → Evaluation
- B.** Title → Hypothesis → Procedure → Prediction → Conclusion → Result
- C. ✓ Title → Hypothesis → Prediction → Procedure → Result → Conclusion**
- D.** Title → Prediction → Procedure → Hypothesis → Result → Conclusion

Answer: C

A laboratory report follows the order of the scientific method itself. First the title names the work. Then comes the hypothesis (the proposed explanation), then the prediction (what should happen if the hypothesis is true), then the procedure (what was actually done), then the results (what was observed), and finally the conclusion, which says whether the results support the hypothesis. Option C gives this exact order.

The other options break the logic, for example by placing the result before the conclusion is drawn from it or the hypothesis after the procedure.

Textbook: Biology Grade 9, Unit 1 Introduction to Biology, section 1.3 The scientific method (page 1).

25. Which one the following statements explains how the allosteric inhibitors affect enzymes activities? By binding to the
- (1)
- A. substrate and preventing it from binding to the active site
 - B. ✓ **site other than the active site and altering the shape of the active site**
 - C. active site of an enzyme and blocking the substrate
 - D. active site and altering the shape of the enzyme

Answer: B

An allosteric inhibitor does not touch the active site. It binds to a different spot on the enzyme, the allosteric site, and this binding bends the whole enzyme so that the active site changes shape. The substrate then no longer fits, and the reaction slows down. Option B describes this correctly.

Options C and D describe a competitive inhibitor, which blocks the active site itself, and option A is wrong because inhibitors bind to the enzyme, not to the substrate.

Textbook: Biology Grade 11, Unit 3 Enzymes, section 3.5 Enzyme regulation (page 94).

26. Why are enzymes considered special molecules in metabolism? Because

(1)

- A. metabolic processes can produce special products in the presence of enzymes.
- B. ✓ **enzymes facilitate metabolic reactions under controlled physiological conditions.**
- C. enzymes are protein molecules that act as a source of energy.
- D. reactions can't totally take place in the absence of enzymes.

Answer: B

Enzymes are biological catalysts. They lower the activation energy of reactions, so the chemistry of life can run fast enough at normal body temperature and pH. Because they make metabolism possible under these mild, controlled conditions, and are not used up in the process, option B is the best answer.

Option C is wrong because enzymes are catalysts, not fuel. Option D goes too far: most reactions can still happen without enzymes, only far too slowly for life.

Textbook: Biology Grade 11, Unit 3 Enzymes, section 3.2 Properties and functions of enzymes (page 82).

27. Which of the following is the most advanced and recent event in the history of cell biology?

(1)

- A. Discovery of the double-helix structure of DNA
- B. Enovation of the first scanning electron microscopd
- C. Deserption of the Golgi apparatus
- D. ✓ **Sequencing of the human genome**

Answer: D

Put the events in time order. The Golgi apparatus was described in 1898. The first electron microscopes were built in the 1930s. The double-helix structure of DNA was worked out in 1953. The human genome was fully sequenced in 2003, making it the most recent and most advanced milestone on the list. Option D is correct.

Textbook: Biology Grade 10, Unit 1 Sub-fields of Biology, section 1.3 Major discoveries in Biology (page 1).

28. A student focused a slide of an onion epidermal cell on pre-estimated width of 2 millimeter field of view under a microscope. What will be the width of each individual cell if you count cells that fit to the field of view during your observation?

(1)

- A. 16 millimeter
- B. ✓ **0.25 millimeter**
- C. 0.40 millimeter
- D. 4 millimeter

Answer: B

The width of one cell is found by dividing the width of the field of view by the number of cells that fit across it in a straight line. Here the field of view is 2 millimeters.

The original paper gave the number of cells counted across the field as 8. Then each cell is 2 divided by 8, which equals 0.25 millimeter, so option B is correct.

As printed here the cell count is missing, so remember the method: cell width equals field of view width divided by the number of cells.

Textbook: Biology Grade 9, Unit 1 Introduction to Biology, section 1.5 Handling and using of light Microscope (page 1).

29. Which one of the following statements is correct about the differences between eukaryotic and prokaryotic cells? Prokaryotic cells have (1)
- A. membrane bound organelles whereas eukaryotic cells don't have it.
 - B. ✓ **small ribosomes whereas eukaryotic cells have large ribosomes.**
 - C. cell wall whereas eukaryotic cells don't have cell wall.
 - D. division of labor whereas eukaryotic cells don't have it.

Answer: B

Prokaryotic cells carry small ribosomes (the 70S type), while eukaryotic cells carry larger 80S ribosomes. Option B states this difference correctly.

Option A is reversed: it is eukaryotic cells that have membrane-bound organelles. Option C fails because plant and fungal cells, which are eukaryotic, also have cell walls. Option D fails because division of labour among organelles is a eukaryotic feature.

Textbook: Biology Grade 9, Unit 3 Cells (page 44).

30. Which biological tool is correctly matched with its function? (1)
- A. ✓ **Petri dishes - to culture microorganisms**
 - B. Burette - to measure mass of a substance
 - C. Centrifuges - to collect insects
 - D. Theodolite - to measure the rate of water flow

Answer: A

A Petri dish is a shallow covered dish filled with a nutrient medium on which bacteria and fungi are grown, so option A is the correct match.

The other pairs are wrong: a burette measures the volume of a liquid, not mass; a centrifuge spins mixtures to separate their parts by density; and a theodolite is a surveying instrument for measuring angles.

Textbook: Biology Grade 9, Unit 1 Introduction to Biology, section 1.4 Tools of a Biologist (page 1).

31. This item is based on the following pyramid of biomass. (1)

Which alternative contains organisms that can occupy the above pyramid of biomass from the bottom to the top?



Question Diagram

- A. Grass, Cricket, Chicken and Lizard,
- B. ✓ **Grass, Cricket, Lizard and Chicken**
- C. Grass, Chicken, Cricket and Lizard
- D. Grass, Lizard, Cricket and Chicken

Answer: B

In a pyramid of biomass the producers form the wide base and each level above holds the consumers that eat the level below. Grass is the producer at the bottom. Crickets eat grass, lizards eat crickets, and a chicken can catch and eat small lizards, so the order from bottom to top is grass, cricket, lizard, chicken. Option B is correct.

Option A fails at the top because lizards do not prey on chickens, and options C and D put a consumer directly on a food source it does not eat.

Textbook: Biology Grade 10, Unit 6 Ecological Interactions (page 153).

32. A student made an experiment to observe the effect of temperature on catalase of mashed potato. After three parallel trials, he obtained the following results. (1)

At which temperature was the reaction fastest?

 Question Diagram

- A. 10° C
B. ✓ 30° C
C. 50° C
D. 55° C

Answer: B

The faster the reaction, the shorter the time needed to collect the 33 cm³ of oxygen. The mean times in the table are 48 s at 10 degrees, 14 s at 20 degrees, 5 s at 30 degrees, 12 s at 45 degrees, 67 s at 50 degrees and 120 s at 55 degrees. The shortest time, 5 seconds, is at 30 degrees Celsius, giving the highest rate of 6.6 cm³ per second. Option B is correct.

This is the classic enzyme pattern: the rate rises with temperature up to an optimum near 30 degrees, then falls as heat starts to denature the catalase.

Textbook: Biology Grade 11, Unit 3 Enzymes, section 3.7 Factors affecting enzyme action (page 100).

33. A student conducted a food test on three unknown food samples and obtained results as presented in the table below. (1)

What do you conclude from the result of the above experiment?

 Question Diagram

- A. Lipids and reducing sugars are absent from all the three food samples tested.
B. Proteins and reducing sugars are found in all the food samples at equal concentrations.
C. Non-reducing sugars are present in all the food samples at different concentrations.
D. ✓ **Reducing sugars are found in two of the samples and proteins are found in all the samples.**

Answer: D

Read each test in the table. Benedict's test: sample 1 stayed blue (no reducing sugar), while sample 2 turned red and sample 3 turned yellow, so reducing sugar is present in two samples. Biuret test: all three samples turned mauve, so protein is present in all of them. That is exactly option D.

The other options contradict the table: the ethanol test stayed colourless (no lipids anywhere), the iodine test stayed brown (no starch), and the different Benedict's colours show the sugar amounts are not equal.

Textbook: Biology Grade 10, Unit 3 Biochemical Molecules (page 50).

34. This item is based on the following diagram about eye structure. (1)

The part of the eye represented by letter "Y" is

 Question Diagram

- A. ciliary muscle.
B. optic nerve.
C. ✓ **iris.**
D. pupil.

Answer: C

In the diagram the label Y points to the coloured ring at the front of the eye, just in front of the lens. This is the iris. Its muscles widen or narrow the pupil, the opening at its centre, and in that way control how much light enters the eye.

The label X at the back of the eye marks the optic nerve. The pupil itself is only a hole, and the ciliary muscles sit at the edges of the lens, where they change its shape for focusing.

Textbook: Biology Grade 12, Unit 5 Human body system, section 5.2.4 The Eye (page 281).

35. This item is based on the following table about the function of cellular.

(1)

=> Which numbers in the above table show the correct function of the given organelles?

 Question Diagram

A. 2 and 4

B. ✓ 2 and 3

C. 1 and 4

D. 1 and 3

Answer: B

Check each row of the table. Row 2 is right: only the Golgi body modifies and distributes molecules. Row 3 is also right: only the mitochondria are the site of aerobic respiration. So rows 2 and 3 are the correct ones, which is option B.

Row 1 is spoiled because it marks the Golgi body as a site of protein synthesis, a job that belongs to ribosomes alone.

Row 4 is spoiled because it marks ribosomes as digesting foreign cells, which is the work of lysosomes.

Textbook: Biology Grade 9, Unit 3 Cells (page 44).

— END OF MARKING KEY —

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