Test - 01

Ultimate KCET Crash Course 2026

BOTANY

Q1 In a grazing food chain: Grass Goat Man
If the grass captures 10,000 units of energy, approximately how much energy would be available to humans according to the ecological energy transfer principle?
(A) 1000 units (B) 100 units
(C) 10 units (D) 1 unit

Q2 During gene expression, only a specific portion of the hereditary molecule is copied into RNA. What primarily determines this selectivity?.
(A) Ribosomal binding sites
(B) Regulatory DNA sequences
(C) Amino acid availability
(D) Protein folding patterns

Q3 **The death rate of a fruitfly population where 4 out of 40 individuals die in a week is:**
(A) 0.01 (B) 0.04
(C) 0.1 (D) 10

Q4 The alignment of chromosome pairs independently during meiosis leads to
(A) Mutation
(B) Linkage
(C) Independent assortment
(D) Replication

Q5 The technique for identifying individuals using DNA relies primarily on
(A) Gene expression levels
(B) Protein sequences
(C) Repetitive DNA sequences
(D) Chromosome number

Q6 A soil sample contains a dark coloured amorphous substance formed during decomposition that resists microbial degradation and serves as a nutrient reservoir. This substance is:
(A) Detritus (B) Humus
(C) Lignin (D) Peat

Q7 Semiconservative replication implies that
(A) New DNA contains only new strands
(B) Parental DNA is destroyed
(C) Each daughter DNA has one old and one new strand
(D) DNA is replicated randomly

Q8 Match the following conservation strategies

Column I		Column II	
a.	Interaction where both species benefit	1.	Parasitism
b.	Interaction where one species benefits and other unaffected	2.	Mutualism
c.	Interaction where one species benefits and other harmed	3.	Commensalism
d.	Interaction where both species are harmed	4.	Competition

(A) a–2, b–3, c–1, d–4
(B) a–1, b–2, c–3, d–4
(C) a–2, b–1, c–3, d–4
(D) a–3, b–2, c–1, d–4

Q9 A DNA strand having sequence identical to RNA (except one base difference) is referred to as

(A) Template strand
(B) Coding strand
(C) Regulatory strand
(D) Structural strand

Q10 **Assertion (A):** The assignment of a scientific name to an organism is possible only after the organism has been correctly identified and described.

Reason (R): Scientific names are universally accepted only when they conform to the principles laid down in international codes of nomenclature.

(A) Both A and R are correct and R explains A
(B) Both A and R are correct but R does not explain A
(C) A is correct but R is incorrect
(D) A is incorrect but R is correct

Q11 Match the following

A.	Primary treatment	1.	Flocs
B.	Secondary treatment	2.	Sedimenta tion
C.	Activated sludge	3.	Anaerobic digestion
D.	Sludge digester	4.	Biological treatment

(A) A-2, B-4, C-1, D-3
(B) A-4, B-2, C-1, D-3
(C) A-2, B-1, C-3, D-4
(D) A-3, B-4, C-2, D-1

Q12 During microscopic observation of an angiosperm anther, a student notes four pollen sacs arranged at the corners of a tetragonal structure. Each pollen sac originates from a microsporangium containing sporogenous tissue that eventually produces pollen grains. If the sporogenous tissue failed to undergo meiosis but continued dividing mitotically, which of the following outcomes would most logically follow?

(A) Production of haploid microspores but with altered pollen wall formation
(B) Formation of diploid pollen grains incapable of normal gametophyte function
(C) Absence of pollen grains due to degeneration of tapetum
(D) Formation of tetrads identical to normal microspore tetrads

Q13 A researcher studying parasitic relationships notes that parasites evolve specialised adaptations enabling them to survive within hosts while exploiting host resources. Which ecological reasoning best explains such adaptations?

(A) Parasites evolve independently of host interactions
(B) Coevolution between host and parasite drives adaptive traits
(C) Hosts do not influence parasite evolution
(D) Parasites do not affect host survival

Q14 In a developing ovule, integuments surround the nucellus but leave a small opening at one end. Later, the pollen tube enters the ovule through this opening. What is the biological significance of this opening?

(A) Allows nutrient supply to embryo sac
(B) Serves as entry point for pollen tube
(C) Enables attachment of ovule to placenta
(D) Facilitates release of embryo after fertilisation

Q15 A horticulturist produces seedless fruits by spraying auxins on flowers without fertilisation. Which biological process is being artificially induced?
(A) Apomixis (B) Parthenocarpy
(C) Polyembryony (D) Autogamy

Q16 Biofertilisers primarily help in
(A) Killing pests
(B) Fixing nitrogen
(C) Increasing soil salinity
(D) Reducing oxygen

Q17 A botanist observes that after fertilisation the ovary wall thickens and forms the fruit wall. The structure enclosing the seeds consists of three distinct layers. What is this structure called?
(A) Testa (B) Perisperm
(C) Pericarp (D) Endosperm

Q18 In birds, sex determination involves
(A) XY system
(B) XO system
(C) ZW system
(D) Haploid system

Q19 Which observation provided the first indirect evidence for transfer of hereditary material?
(A) Heat-killed virulent strain alone is lethal
(B) Non-virulent strain alone causes disease
(C) Mixture of dead virulent and live non-virulent strains causes death
(D) Live virulent strain fails to infect

Q20 During early molecular investigations, chromosomes were identified as carriers of heredity. Which factor delayed the identification of the exact genetic molecule?
(A) Lack of microscopic techniques
(B) Ambiguity between protein and nucleic acids
(C) Absence of mutation studies
(D) Inability to culture organisms

Q21 A disorder shows higher incidence in males, transmitted through unaffected Identify the inheritance pattern
(A) Autosomal dominant
(B) Autosomal recessive
(C) Sex linked recessive
(D) Mitochondrial inheritance

Q22 Which disorder results from a single base substitution leading to structural alteration of a protein molecule?
(A) Thalassemia
(B) Sickle cell anaemia
(C) Down syndrome
(D) Turner syndrome

Q23 A population with a pyramid showing a broad base and narrow top represents
(A) A declining population
(B) A stable population
(C) A growing population
(D) A population without age structure

Q24 A genetic condition is absent in parents but appears in offspring, especially when both parents are unaffected carriers. Identify the pattern.
(A) Autosomal dominant
(B) Autosomal recessive
(C) Sex linked dominant
(D) Y-linked inheritance

Q25 Statement I: Heterozygous individuals produce only one type of gamete.
Statement II: Gametes receive only one allele of a pair
(A) Both correct
(B) I incorrect, II correct
(C) I correct, II incorrect
(D) Both incorrect

Q26 Consider the hierarchical classification of organisms and match the examples in Column I with their corresponding taxonomic ranks in Column II

Column I	Column II
a. Panthera	1. Family
b. Felidae	2. Genus
c. Carnivora	3. Order
d. Mammalia	4. Class

(A) a–2, b–3, c–1, d–4
(B) a–1, b–2, c–3, d–4
(C) a–2, b–1, c–3, d–4
(D) a–3, b–1, c–2, d–4

Q27 Consider the following statements about biodiversity importance:

1. Biodiversity contributes to ecosystem
2. It enhances ecosystem
3. Biodiversity has no role in nutrient
4. Greater species diversity improves resilience to

Which option represents the most accurate assessment?
(A) 1, 2 and 4 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2, 3 and 4

Q28 In an angiosperm species, pollen grains are shed when they contain three cells rather than two. Which sequence of events must have occurred before pollen release?
(A) Generative cell underwent mitosis inside pollen grain
(B) Vegetative cell divided to form two male gametes
(C) Pollen mother cell divided twice mitotically
(D) Tapetal cells produced two male gametes

Q29 A plant species shows pollen transfer from one flower to another flower of the same plant through an insect.
From a genetic perspective, which statement best describes this process?
(A) Equivalent to xenogamy due to pollinator involvement
(B) Equivalent to autogamy due to same plant origin
(C) Completely distinct from both autogamy and xenogamy
(D) Always results in genetic recombination between plants

Q30 Match the following conservation strategies

Column I		Column II	
a.	Protection of species in natural habitat	1.	In situ conservation
b.	Conservation outside natural habitat	2.	Ex situ conservation
c.	Botanical gardens and zoos	3.	Species preservation centres
d.	Biosphere reserves	4.	Large protected landscapes

(A) a–1, b–2, c–3, d–4
(B) a–2, b–1, c–4, d–3
(C) a–3, b–2, c–1, d–4
(D) a–1, b–3, c–2, d–4

Answer Key

Q1	B
Q2	B
Q3	C
Q4	C
Q5	C
Q6	B
Q7	C
Q8	A
Q9	B
Q10	B
Q11	A
Q12	B
Q13	B
Q14	B
Q15	B
Q16	B
Q17	C
Q18	C
Q19	C
Q20	B
Q21	C
Q22	B
Q23	C
Q24	B
Q25	B
Q26	C
Q27	A
Q28	A
Q29	B
Q30	A

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Key Concept: Ten percent

Explanation:

1. Energy transfer between trophic levels follows the 10% law.
2. Only about 10% of energy passes to the next trophic level.
3. From producers to herbivores only 1000 units would transfer.
4. From herbivores to secondary consumers only 100 units remain.
5. Remaining energy is lost as heat during metabolic processes.

Video Solution:

Q2 Text Solution:

Key Concept: Regulatory regions

Explanation:

1. Only defined segments undergo transcription.
2. Specific sequences mark start and end.
3. These regions guide enzyme binding.
4. Prevent unnecessary transcription.
5. Ensure controlled gene expression.

Video Solution:

Q3 Text Solution:

Key answers: C

- Death rate = deaths / initial
- 4 deaths out of 40 4/40.
- 4/40 = 1 individuals per fruitfly per week.
- Rates are always expressed per capita in

Video Solution:

Q4 Text Solution:

Key Concept: Chromosomal alignment

Explanation:

- Homologous pairs align randomly.
- Orientation is independent.
- Leads to varied combinations.
- Produces genetic diversity.
- Basis of assortment principle.

Video Solution:

Q5 Text Solution:

Key Concept: Satellite DNA

Explanation:

1. Repetitive sequences vary among individuals.
2. Known as satellite DNA.
3. Show high polymorphism.
4. Provide unique patterns.
5. Basis of identification.

Video Solution:

Q6 Text Solution:

Key Concept: Humus formation

Explanation:

1. Humification leads to formation of humus in soil.
2. Humus is dark coloured and amorphous.
3. It is highly resistant to microbial decomposition.
4. Being colloidal in nature it retains nutrients efficiently.
5. It acts as a long-term reservoir of soil nutrients.

Video Solution:

Q7 Text Solution:

Key Concept: Semiconservative

Explanation:

1. Strands separate during replication.
2. Each acts as template.
3. New complementary strand forms.
4. Results in hybrid molecules.
5. Maintains continuity.

Video Solution:

Q8 Text Solution:

Key Concept: Species interactions

Explanation:

1. Mutualism benefits both interacting species.
2. Commensalism benefits one species without affecting the other.
3. Parasitism benefits one species while harming the host.
4. Competition negatively affects both species due to resource overlap.
5. These interactions structure ecological communities.

Video Solution:

Q9 Text Solution:

Key Concept: Coding strand

Explanation:

1. Sequence resembles RNA.
2. Difference lies in one base.
3. Not used as template.
4. Used for reference mapping.
5. Helps define transcription unit.

Video Solution:

Q10 Text Solution:

Key Concept: Scientific Nomenclature

Explanation:

1. Nomenclature refers to assigning a scientific name to an organism, but this is possible only after correct **description and identification** of that organism.
2. Identification ensures that the organism being named is clearly recognised and distinguished from others.
3. International codes such as **ICBN for plants** and **ICZN for animals** provide principles and criteria for assigning names.
4. These codes ensure that each organism has a **unique and universally accepted name**.
5. Although both statements are correct, the reason states the regulatory framework of naming rather than explaining why identification precedes nomenclature.

Video Solution:

Q11 Text Solution:

Key Concept: Sewage treatment

Explanation:

- Primary sedimentation .
- Secondary = biological process.
- Activated sludge = flocs.
- Digester = anaerobic process.
- Logical mapping matches option 1.

Video Solution:

Q12 Text Solution:

Key Concept: Microsporogenesis

Explanation:

1. Sporogenous tissue normally forms **pollen mother cells (PMC)** that undergo **meiosis**.
2. Meiosis produces **haploid microspores arranged in tetrads**.
3. If meiosis is replaced by mitosis, **ploidy reduction does not occur**.
4. Microspores would remain **diploid**, affecting gametophyte
5. Since pollen grains represent the **male gametophyte**, abnormal ploidy disrupts fertilisation.

Video Solution:

Q13 Text Solution:

Key Concept: Host coevolution

Explanation:

1. Parasites depend on hosts for nutrition and survival.
2. Hosts develop defence mechanisms against parasites.
3. Parasites evolve counter-adaptations to overcome host defences.
4. This reciprocal evolutionary process is known as coevolution.
5. It leads to specialised adaptations in parasitic organisms.

Video Solution:

Q14 Text Solution:

Key Concept: Micropyle Entry

Explanation:

1. The **micropyle** is a small opening in
2. It occurs at the **micropylar end of the ovule**.
3. During fertilisation, the **pollen tube enters through the micropyle**.
4. It then reaches the **embryo sac via a synergid**.
5. This pathway enables **delivery of male gametes**

Video Solution:

Q15 **Text Solution:**
Key Concept: Parthenocarpy
Explanation:

1. Parthenocarpy is **fruit development without fertilisation**.
2. Seeds are **absent in such fruits**.
3. It can occur **naturally or be induced artificially**.
4. Plant hormones like **auxins or gibberellins** trigger ovary development.
5. Banana and seedless grapes are common examples

Video Solution:

Q16 **Text Solution:**
Key Concept: Nitrogen fixation
Explanation:

- Convert atmospheric nitrogen to usable form.
- Improve soil fertility.
- Reduce chemical fertilizer use.
- Enhance crop productivity.
- Sustainable practice practice

Video Solution:

Q17 **Text Solution:**
Key Concept: Pericarp Layers
Explanation:

1. Ovary develops into **fruit after fertilisation**.
2. Ovary wall differentiates into **fruit wall called pericarp**.
3. Pericarp may have **three layers: epicarp, mesocarp and endocarp**.
4. These layers protect the developing seeds.
5. Thus the fruit wall is termed **pericarp**.

Video Solution:

Q18 **Text Solution:**
Key Concept: Female heterogamety
Explanation:

- Females produce two types of gametes.
- Z and W chromosomes present.
- Males have ZZ combination.
- Opposite of human system.
- Known as female heterogamety heterogamety

Video Solution:

Q19 Text Solution:

Key Concept: Transformation evidence

Explanation:

1. Dead virulent cells alone are harmless.
2. Live non-virulent cells are harmless.
3. Combined mixture leads to infection.
4. Indicates transfer of traits.
5. Suggests existence of transforming factor.

Video Solution:

Q20 Text Solution:

Key Concept: Molecular ambiguity

Explanation:

1. Both proteins and nucleic acids were present in chromosomes.
2. Proteins showed structural diversity, making them strong candidates.
3. Nucleic acids appeared too simple initially.
4. Experimental evidence was insufficient.
5. This caused delay in identifying the true genetic material.

Video Solution:

Q21 Text Solution:

Key Concept: Sex-linked recessive

Explanation:

1. Males express trait with a single defective allele
2. Females act as carriers without showing symptoms.
3. Transmission typically occurs from mother to son.
4. Trait rarely appears in females due to double X requirement.

Video Solution:

Q22 Text Solution:

Key Concept: Point mutation

Explanation:

1. A single nucleotide change alters amino acid sequence.
2. Leads to abnormal protein structure.
3. Affects oxygen-carrying molecule in blood.
4. Causes distortion in cell morphology under stress.
5. Inherited in a recessive manner.

Video Solution:

Q23 Text Solution:

- Broad base = many young individuals.
- Indicates high future reproductive output.
- Age pyramids show age distribution of males and females.
- Shape reflects whether population is growing, stable, or declining.

Video Solution:

Q24 Text Solution:

Key Concept: Recessive trait

Explanation:

1. Recessive traits require two copies of the defective allele
2. Carriers possess one normal and one mutated allele
3. Phenotype appears only in homozygous condition.
4. Trait may skip generations.
5. Equal chance of occurrence in both sexes

Video Solution:

Q25 Text Solution:

Key Concept: Gamete formation

Explanation:

- Heterozygotes produce two types of gametes.
- Each gamete carries one allele.
- Separation occurs during division.
- Ensures genetic variation.
- Hence only second statement is valid.

Video Solution:

Q26 **Text Solution:**
Key Concept: Taxonomic Categories
Explanation:

1. **Panthera** is a **genus** including species such as lion (*Panthera leo*), tiger (*Panthera tigris*) and leopard.
2. **Felidae** represents the **family** that includes genera such as *Panthera* and *Felis*.
3. The family Felidae is included in the **order Carnivora**, characterised by carnivorous
4. Orders like Carnivora and Primata are grouped under the **class Mammalia**, which includes animals possessing mammary glands and hair.
5. This arrangement illustrates the hierarchical organisation where **similarities decrease as we move from species to higher categories** like class and kingdom.

Video Solution:

Q27 **Text Solution:**
Key Concept: Ecosystem functions
Explanation:

1. Biodiversity improves ecosystem productivity through complementary resource use.
2. Diverse ecosystems are more stable and resilent.
3. Many species contribute to nutrient cycling and energy flow.
4. Loss of species can disrupt ecosystem processes.
5. Therefore biodiversity plays a crucial ecological role.

Video Solution:

Q28 **Text Solution:**
Key Concept: Pollen Maturation
Explanation:

1. Mature pollen grains usually contain **vegetative cell and generative cell**.
2. In many species, pollen is released at **two-celled stage**.
3. In some species, **generative cell divides mitotically before shedding**.
4. This forms **two male gametes inside pollen grain**.
5. Hence pollen grains are released at **three-celled stage**

Video Solution:

Q29 **Text Solution:**
Key Concept: Geitonogamy
Explanation:

1. **Geitonogamy** involves transfer between flowers of the **same plant**.
2. Although a pollinator may be involved, pollen source remains
3. Genetically it resembles **self-pollination**.
4. Therefore it behaves like **autogamy genetically**.
5. Genetic variation is **not increased significantly**.

Video Solution:

Q30 **Text Solution:**
Key Concept: Conservation methods
Explanation:

1. In situ conservation protects species within their natural habitats.
2. Biosphere reserves represent large protected landscapes.
3. Ex situ conservation preserves species outside natural habitats.
4. Zoos and botanical gardens are examples of ex situ methods.
5. These strategies complement each other in biodiversit protection.

Video Solution: