

PROVA DI AMMISSIONE AL CORSO DI LAUREA TRIENNALE IN NURSING

Anno Accademico 2024/2025

Per ogni domanda, la risposta esatta è quella evidenziata

Reading skills and knowledge acquired during studies Test

1. What literary movement, characterized by the application of experimental methods to literary creation, emerged in France during the second half of the 19th century and was influenced by Positivist thought?
A) Naturalism
B) Decadentism
C) Existentialism
D) Classicism
E) Abstractionism
2. Which of the following is NOT a work by Ugo Foscolo?
A) *Adelchi*
B) *I sepolcri*
C) *All'amica risanata*
D) *I sonetti (Poesie)*
E) *A Luigia Pallavicini caduta da cavallo*
3. Choose the alternative name by which Alexander the Great is known:
A) Alexander the Macedonian
B) Alexander the Persian
C) Alexander the Athenian
D) Alexander the Syrian
E) Alexander the Spartan
4. Read the text below and select the statement that can be deduced from it.
The power of hurricanes comes from the heat in tropical ocean waters. The surface temperature of the seas in the Atlantic region where hurricanes form and strengthen has increased over the last century, and the cause is at least partly due to the fact that the atmosphere contains more and more CO₂, a greenhouse gas that traps heat. Combining these factors, we might expect an increasing number of hurricanes with higher average strength than a few decades ago. But this is not necessarily true. The formation of hurricanes is a very complicated process; it requires warm oceans and favorable winds. If the wind blows between different layers of the atmosphere in different directions, or at greatly varying speeds, it is difficult for hurricanes to form even if the ocean is very warm.
Climate Central. *Le stranezze del clima*, Zanichelli, 2013
A) A warm ocean is a necessary condition for the formation of a hurricane.
B) Favorable winds are a sufficient condition for the formation of a hurricane.
C) A warm ocean is a necessary and sufficient condition for the formation of a hurricane.
D) Favorable winds are a necessary and sufficient condition for the formation of a hurricane.
E) A warm ocean is a sufficient condition for the formation of a hurricane.

Logical reasoning and problems Test

5. Stacie has entered a women's tennis tournament where 80% of the participants compete in the doubles tournament. The tournament is single elimination. If the winning doubles pair played 4 matches, what is the number of participants in the tournament?
- A) 40
B) 96
C) 64
D) 36
E) 32
6. Larry, Mark, and David decide to give Emily a €2100 e-bike for her birthday, splitting the cost equally. A week before the purchase, David informs his two friends that he can only provide 80% of the agreed amount. Larry and Mark take on the additional expense, dividing it in a 1:3 ratio. How much did Mark pay?
- A) €805
B) €700
C) €840
D) €665
E) €770
7. Some friends need to equally divide €216 earned from small jobs; if two fewer friends were there, each of them would receive €9 more. How many friends are there?
- A) 8
B) 27
C) 6
D) 36
E) Not determinable with the data provided
8. In her square garden, Krissy wants to pave a triangular area ABC. If Vertex A coincides with one of the vertices of the square, Vertex B is the midpoint of one of the sides of the square not adjacent to A, and Vertex C divides the other side of the square not adjacent to A into segments proportional to 1 and 3. What is the maximum area, in square meters, that the paved area can have if the side of the garden measures 20 m?
- A) 175
B) 275
C) 125
D) 225
E) 150

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9. Rachel, the director of an exhibition space, contacts Alex's catering company for a quote for refreshments for 50 people. The menu proposed by Alex is as follows:

| | |
|------------------------------------|-----------|
| Sandwiches (2 per person) | €2 each |
| open sandwiches (2 per person) | €1.5 each |
| finger food baskets (2 per person) | €2.5 each |
| mini pizzas (3 per person) | €1 each |
| mini focaccias (3 per person) | €0.5 each |
| 1 bottle of prosecco for 5 people | €11 each |
| 1 bottle of water for 5 people | €1.5 each |

If the number of people is greater than 40, a 20% discount is applied. The fixed cost to be added (not subject to the discount) is €50. What is the minimum expense that Rachel must incur for the refreshments?

- A) €810
- B) €800
- C) €950
- D) €760
- E) €1000

Biology Test

10. While examining a histological specimen from a cat , a cell is observed to have 19 chromosomes, each consisting of a pair of sister chromatids. In which phase of the cell cycle is this cell likely to be?

- A) Metaphase II of meiosis
- B) Metaphase I of meiosis
- C) Metaphase of mitosis
- D) Interphase
- E) Prophase I of meiosis

11. Which molecules are produced during the light-dependent reactions of photosynthesis and subsequently used in the Calvin cycle?

- A) ATP and NADPH
- B) ADP and H₂O
- C) ADP and NADP⁺
- D) CO₂ and H₂O
- E) ATP and CO₂

12. Which of the following terms does NOT indicate a chromosomal anomaly?

- A) Scission
- B) Traslocation
- C) Duplication
- D) Inversion
- E) Deletion

13. In a plant, the dominant allele V of a gene determines the purple color of the seed, and the allele v determines the red color. The plant also has a second gene where the dominant phenotype I prevents seed pigmentation, while the recessive phenotype i allows pigment production. Knowing that both genes are independent and completely dominant, the phenotypic ratio of the F1 generation obtained from crossing two dihybrid plants will be:

- A) colorless seeds : purple seeds : red seeds = 12 : 3 : 1
- B) colorless seeds : purple seeds : red seeds = 9 : 3 : 1
- C) colorless seeds : purple seeds : red seeds = 9 : 6 : 1
- D) colorless seeds : purple seeds : red seeds = 10 : 3 : 3
- E) colorless seeds : purple seeds : red seeds = 4 : 3 : 1

14. Which of the following enzymes is NOT directly involved in the DNA replication process?

- A) Endonuclease
- B) Helicase
- C) DNA polymerase
- D) Primase
- E) Ligase

15. What is the outcome of alternative splicing?

- A) Different proteins can be produced from the same gene.
- B) The same protein can perform different functions in different cells.
- C) Different primary transcripts can be obtained from the same gene.
- D) Different proteins can be obtained from the same mature mRNA.
- E) A gene sequence can be transcribed in different ways.

16. Which of the following statements about PCR, a technique allowing in vitro amplification of DNA fragments, is correct?

- A) It does not require the presence of a primase.
- B) It occurs at a constant temperature of about 67°C.
- C) It does not use a polymerase enzyme.
- D) It does not require the presence of primers.
- E) It uses deoxyribonucleotide monophosphates.

17. Bowman's capsule:

- A) surrounds the renal glomerulus
- B) encircles the crystalline lens
- C) contains the spleen
- D) delimits the pulmonary alveoli
- E) protects the dental pulp

18. Which cells are responsible for the production of antibodies?

- A) Effector B cells
- B) Cytotoxic T lymphocytes
- C) Pathogenic bacteria
- D) Macrophages
- E) Helper T Lymphocytes

19. Which of the following hormones is a steroid?

- A) Estradiol
- B) Insulin
- C) Calcitonin
- D) Oxytocin
- E) Growth hormone

20. During organogenesis, which of the following body structures is derived from the endoderm?

- A) Pancreas
- B) Dermis
- C) Epidermis
- D) Tooth enamel
- E) Skeletal system

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21. Which of the following neurotransmitters does NOT derive from amino acids?

- A) Acetylcholine
- B) Adrenaline
- C) Noradrenaline
- D) Serotonin
- E) Dopamine

22. Which of the following structure-function pairings is correct?

- A) Medulla oblongata – control of the basic rhythm of respiration
- B) Limbic system – coordination of movement
- C) Hypothalamus – connection between the two cerebral hemispheres
- D) Cerebellum – control of essential physiological needs
- E) Corpus callosum – production of melatonin

23. A cyclist is forced to stop due to a cramp in their calf. Which muscle could be involved?

- A) Lateral gastrocnemius
- B) Triceps
- C) Extensor carpi ulnaris
- D) Deltoid
- E) Trapezius

24. Following a fracture of the talus bone, which body part should be immobilized?

- A) Foot
- B) Hand
- C) Shoulder
- D) Elbow
- E) knee

25. Which of the following is NOT a type of connective tissue?

- A) Glandular tissue
- B) Osseous tissue
- C) Cartilaginous tissue
- D) Adipose tissue
- E) Blood

26. What is phylogenesis?

- A) The evolutionary history of a species
- B) The contribution provided by an individual to the gene pool of a population
- C) The gene flow between two distinct populations
- D) The process by which two distinct species evolve from a common ancestor
- E) The set of stages of embryonic development of an organism

27. What is cellular differentiation?

- A) The process by which one cell type changes into a more specialized cell type in a multicellular organism
- B) The set of structural and functional differences between eukaryotic and prokaryotic cells
- C) The set of morphological characteristics that distinguish cells of organisms belonging to different domains
- D) The transformation of a healthy cell into a tumor cell
- E) The evolutionary stages leading to the transition from unicellular to multicellular organisms

28. What is the primary structure of proteins?

- A) The linear sequence of amino acids within a protein
- B) The regular folding of the molecule in certain regions of the protein
- C) The three-dimensional structure of proteins
- D) The primary interactions of proteins
- E) The spatial organization of the molecule into α -helix or β -sheet

29. What is the process called by which cells expel material through the fusion of vesicles with the plasma membrane?

- A) Exocytosis
- B) Diffusion
- C) Osmosis
- D) Endocytosis
- E) Signal transduction

30. Somatic cells from two distinct tissues have:

- A) different gene expression
- B) different DNA
- C) different genes
- D) different numbers of chromosomes
- E) different DNA duplications

31. The oxygen we inhale is used:

- A) by the electron transport system
- B) during transcription
- C) in fermentation
- D) by glycolysis
- E) in the Krebs cycle

32. In DNA, nitrogenous bases:

- A) are classified as purines or pyrimidines and are held together by hydrogen bonds in the double-helix structure
- B) are exclusively purines because pyrimidines are found in RNA
- C) are molecules bound together by peptide bonds
- D) are molecules that form trimers called nucleotides
- E) are aromatic molecules containing monosaccharides

Chemistry Test

33. The molar mass of a compound:

- A) is numerically equal to its molecular mass and is expressed in g/mol
- B) corresponds to the sum of the atomic masses of all the atoms that compose it and is expressed in atomic mass units (AMU)
- C) depends on the number of moles considered
- D) corresponds to the number of moles considered
- E) is obtained by multiplying the molecular mass by a constant

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34. Determine which reaction has an equilibrium constant expressed in terms of molar concentrations (K_c) that is numerically equal to that expressed in terms of partial pressures (K_p):

- A) $\text{H}_{2(g)} + \text{CO}_{2(g)} \leftrightarrow \text{H}_2\text{O}_{(g)} + \text{CO}_{(g)}$
- B) $2\text{NO}_{(g)} + \text{O}_{2(g)} \leftrightarrow 2\text{NO}_{2(g)}$
- C) $3\text{H}_{2(g)} + \text{N}_{2(g)} \leftrightarrow 2\text{NH}_{3(g)}$
- D) $\text{PCl}_{5(g)} \leftrightarrow \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$
- E) $2\text{NO}_{2(g)} \leftrightarrow \text{N}_2\text{O}_{4(g)}$

35. What is the electronic configuration of a ground-state atom of iron ($Z=26$)?

- A) $1s^2, 2s^2p^6, 3s^2p^6d^6, 4s^2$
- B) $1s^2, 2s^2p^6, 3s^2p^6d^7, 4s^1$
- C) $1s^2, 2s^2p^6, 3s^2p^5d^6, 4s^2$
- D) $1s^2, 2s^2p^6, 3s^2p^6, 4s^2p^6$
- E) $1s^2, 2s^2p^6, 3s^2p^6d^8$

36. Which of the following statements about p-type orbitals is NOT correct?

- A) They have larger dimensions when they are located in energy levels with lower energy.
- B) They are characterized by the angular quantum number $l=1$.
- C) The magnetic quantum number m can assume 3 values.
- D) They are oriented along three orthogonal directions.
- E) Each p orbital can contain a maximum of 2 electrons with opposite spins.

37. Compared to the atom ^{16}O , the isotope ^{18}O has:

- A) a different atomic mass
- B) two more protons
- C) one more proton and one more electron
- D) a different electric charge
- E) a different atomic number

38. When the bond between two atoms occurs through lateral overlap of two p-type orbitals, it results in:

- A) a π bond
- B) a σ bond
- C) an sp orbital
- D) an sp^2 orbital
- E) an sp^3 orbital

39. Which of the following is the formula of an oxyacid?

- A) H_4SiO_4
- B) P_2O_5
- C) $\text{Pb}(\text{OH})_2$
- D) NH_4NO_3
- E) H_2O_2

40. Determine the stoichiometric coefficients values required to balance the reaction $a\text{Na}_2\text{S}_2\text{O}_3 + b\text{Cl}_2 + c\text{H}_2\text{O} \rightarrow d\text{NaHSO}_4 + e\text{HCl}$.

- A) $a=1 \quad b=4 \quad c=5 \quad d=2 \quad e=8$
- B) $a=2 \quad b=3 \quad c=5 \quad d=4 \quad e=8$
- C) $a=1 \quad b=2 \quad c=3 \quad d=3 \quad e=4$
- D) $a=2 \quad b=4 \quad c=3 \quad d=2 \quad e=9$
- E) $a=1 \quad b=3 \quad c=5 \quad d=2 \quad e=6$

41. At a temperature of 30°C, a solution of glucose and a solution of completely dissociated sulfuric acid (H_2SO_4) 0.2M exert the same osmotic pressure. What is the concentration of the glucose solution?

- A) 0.6M
- B) 0.3M
- C) 0.2M
- D) 0.1M
- E) 0.4M

42. Considering a yield of 100%, determine the correct statement regarding the chemical reaction $6\text{ClO}_2 + 3\text{H}_2\text{O} \rightarrow 5\text{HClO}_3 + \text{HCl}$ (Molar masses: H=1g/mol, O=16g/mol, Cl=35.5g/mol):

- A) 3 moles of ClO_2 and 2 moles of H_2O produce 0.5 moles of HCl
- B) 2 moles of ClO_2 and 1 mole of H_2O produce 1.8 moles of HClO_3
- C) 18g of H_2O react completely with 36g of ClO_2
- D) 6 moles of H_2O and 3 moles of ClO_2 produce 5 moles of HClO_3
- E) the mass of HCl produced is 1/6 of the mass of ClO_2 that has reacted

43. Which of the following definitions is NOT correct?

- A) Molality (m) = number of moles of solute present in 1kg of solution
- B) Molarity (M) = number of moles of solute present in 1L of solution
- C) Normality (N) = number of equivalents of solute present in 1L of solution
- D) Mole fraction (X) = ratio of the moles of a component of the solution to the total moles of all components of the solution
- E) Parts per million (ppm) = number of parts of solute present in a million parts of the solution

44. How many mL of a 1.5M H_2SO_4 solution are required to neutralize a 200mL of a 0.45M NaOH solution?

- A) 30mL
- B) 60mL
- C) 50mL
- D) 66mL
- E) 15mL

45. What is the rate of a chemical reaction?

- A) The change in the concentration of a reactant per unit time
- B) The ratio $\Delta t/\Delta c$
- C) The time required for a reactant to undergo transformation
- D) The ratio between the number of moles produced and the number of moles of reactants
- E) The time required to complete the reaction

46. How many electrons are exchanged in the redox reaction $3\text{Ca} + 2\text{H}_3\text{PO}_4 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 3\text{H}_2$?

- A) 6
- B) 4
- C) 3
- D) 2
- E) 8

47. What is the oxidation number of carbon in the compound CH_3CH_3 ?

- A) -3
- B) +4
- C) +2
- D) -4
- E) +3

Physics and Mathematics Test

48. An object of mass $m = 2$ kg is subject to a force, measured in newtons, varying in time according to the law $F = 9 - 2t$.

Measured in seconds, what is the change in the object's velocity in the time interval [1,2]?

- A) 3 m/s
- B) 2 m/s
- C) 4 m/s
- D) the provided data are insufficient to answer the question
- E) 6 m/s

49. In an isothermal expansion, two moles of a diatomic gas perform 10 J of work. Consider as positive the work done by the gas and the heat received by the gas. What is the heat absorbed by the gas during the expansion?

- A) 10 J
- B) -20 J
- C) 5 J
- D) -10 J
- E) 20 J

50. A square loop ABCD, carrying a current i in a clockwise direction, is immersed in a magnetic field B perpendicular to the plane of the loop. Which of the following statements is true?

- A) The loop does not rotate.
- B) The loop rotates uniformly, clockwise, around the axis of side AB.
- C) The loop rotates uniformly, counterclockwise, around the axis of side BC.
- D) The loop rotates uniformly, clockwise, around the axis of side AD.
- E) The loop rotates uniformly, counterclockwise, around the axis of side CD.

51. Among the following equivalences concerning the measurement of mass, which one is NOT correct?

- A) $5 \text{ mg} = 5 \times 10^{-5} \text{ kg}$
- B) $2 \text{ dag} = 2 \times 10^2 \text{ dg}$
- C) $1 \text{ Mg} = 1 \times 10^4 \text{ hg}$
- D) $4 \text{ }\mu\text{g} = 4 \times 10^{-6} \text{ g}$
- E) $3 \text{ cg} = 3 \times 10^{-3} \text{ dag}$

52. A capacitor with a capacitance of 2 mF is connected to a battery with a potential difference of 4.5 V and charges completely. The battery is disconnected and the space between the plates is filled with a dielectric with a dielectric constant of 3. What is the potential difference between the plates after the dielectric is inserted?

- A) 1.5 V
- B) 18 mV
- C) 13.5 V
- D) 9 mV
- E) 4.5 V

53. Which of the following statements is/are false?

A1 In the Carnot cycle, the work done by the gas along the two adiabatic processes is opposite in sign.

A2 In an isolated system, the internal energy remains constant.

A3 In a cyclic process, the work done by the gas is equal to the heat exchanged.

A) None of them is false.

B) A1 and A3 are false.

C) All of them are false.

D) A2 and A3 are false.

E) Only A1 is false.

54. What is the value of the following expression: $1 + 2\binom{n}{1} + 2^2\binom{n}{2} + 2^3\binom{n}{3} + \dots + 2^n\binom{n}{n}$

A) 3^n

B) 2^{n^2}

C) 4^n

D) $n2^n$

E) $n^2 2^n$

55. What are the coordinates of the incenter of a triangle with vertices $A(0, -\sqrt{3})$ $B(0, \sqrt{3})$ $C(3, 0)$

A) (1, 0)

B) $(\sqrt{3}, 0)$

C) (2, 0)

D) $(2\sqrt{3}, 0)$

E) (0, 0)

56. Consider this equation: $x^2 - (2k + 3)x + k^2 - k - 2 = 0$

For which values of the positive real value parameter k does the equation have two positive real roots?

A) $k > 2$

B) $k > 1$

C) $0 < k < 2$

D) $0 < k < 1$

E) For no value of the positive real parameter k

57. What is the solution to the equation $\ln(1 + e^x) = x + 1$?

A) $x = -\ln(e - 1)$

B) every real x with $x \neq \ln \frac{1}{e-1}$

C) every positive real x

D) every real x

E) every non-negative real x

58. Which of the following functions $f(x) = \sqrt{x^2}$; $g(x) = \sqrt[3]{x}$; $h(x) = \sqrt[3]{x^3}$; $k(x) = \sqrt{x}$; has/have a graph coinciding with the equation line $y = x$?

- A) Only $h(x)$
- B) Both $f(x)$ and $h(x)$
- C) None
- D) All four
- E) Only $f(x)$

59. Let E and F be two points on the opposite sides AB and CD of a rectangle ABCD such that the quadrilateral EBFD is a rhombus. If $AB = 8$ and $BC = 4$, what is the area of the rhombus EBFD?

- A) 20
- B) 12
- C) 32
- D) 8
- E) 26

60. For which values of the real parameter k does the equation $x^2 - 3kx + x + 3 - k = 0$ have reciprocal real roots?

- A) $k = 2$
- B) $k = 1/3$
- C) No value of k
- D) $k = -1/3$
- E) $k = 3$

***** FINE DELLE DOMANDE *****