IMAT 2025
PROGRAM

TEST DI MEDICINA 2021 EXAM

TRANSLATED BY :
LOCOMOTIVE Group

PREPARED FOR :
IMAT Candidates

WWW.THISISLOCOMOTIVE.COM

IMAT 2025 REVIEW COURSE

- **Multiple Choice Exams for Each Topic:** One exam per topic is required to test your understanding thoroughly.
- **8 Mock Tests** in **IMAT Style**: Full-length practice tests to simulate the actual exam experience.
- **Study Planner**: A detailed schedule to help you review and stay on track with your studies.
- **Mentor program**: Access to expert guidance and answers to your questions.
- **Review Classes**: Live or recorded classes to revisit and clarify challenging topics.

A PLAN FOR THE 17TH OF SEPTEMBER

@Thisislocomotive

@Thisislocomotive

www.thisislocomotive.com

TO ACCESS THE IMAT EXAMS, IMAT WORKED SOLUTIONS, AND TOLC-MED (ALPHA TESTS), WE RECOMMEND VISITING OUR WEBSITE

TABLE OF CONTENTS

The TOLC-MED test is administered twice a year by the Italian Ministry of Education. While these exams are generally easier than the IMAT tests, they share the same syllabus and number of questions. To prepare effectively for the IMAT exams, it is advisable for students to practice with the TOLC-MED tests. We recommend that students solve tests from at least the past five years.

01 LOGIC

5 Questions
All types of question

02 GK

4 Questions
All types of questions

03 BIOLOGY

23 Questions
All topics

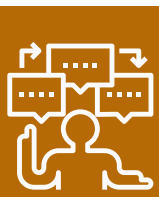
04 CHEMISTRY

15Questions
All topics

05 PHYSICS

7 Questions
All topics

06 MATH



6 Questions
All topics

1. Considering the statement:

“The recruits of the Pontifical Swiss Guard must necessarily be Swiss citizens from birth, Catholic, male, between the ages of 19 and 30, and must have undergone a period of training in the Swiss army”,

Which of the following statements is certainly FALSE regarding last June’s enlistments?

A) Enea, Swiss from birth, born in 1989, Catholic, with a period of training in the Swiss army, was enlisted.
B) Giorgio, Swiss from birth, born in 2000, Catholic, with a period of training in the Swiss army, was not enlisted.
C) Tommaso, Swiss from birth, born in 1992, Catholic, without a period of training in the Swiss army, was not enlisted.
D) Michele, Swiss from birth, born in 1998, Catholic, with a period of training in the Swiss army, was enlisted.
E) Nicolò, born in Paris in 1996, a Swiss citizen since 2008, Catholic, with a period of training in the Swiss army, was not enlisted.

2. Three sets A, B, and C each contain 4 elements; if A ∩ B ∩ C contains 1 element, 1 element belongs only to C, and the number of elements belonging only to A is 1 more than the number of elements belonging only to B, in how many ways can the three sets be represented using Venn diagrams?

A) 1
B) 2
C) 3
D) 4
E) 0

3. Which of the proposed terms correctly completes the following proportion?
hygrometer : humidity = X : wind

A) X = tachometer
B) X = oximeter
C) X = sphygmomanometer
D) X = anemometer
E) X = barometer

4. Alice opens the wardrobe and counts the boxes of her shoes.

- **If she divides the number of boxes by 2, the remainder is 1.**
- **If she divides it by 3, there is no remainder.**
- **If she divides it by 5, the remainder is 4.**

Knowing that the number of boxes is greater than 4 and less than 45, how many possible solutions are there to determine the number of Alice's shoe boxes?

A) 0
B) 4
C) 2
D) 1
E) 8

5. Nicolò has marbles of different diameters but all made of the same material. Nicolò places the marbles into three identical cube-shaped boxes in such a way that:

- **each box is filled with marbles of the same diameter,**
- **The boxes are completely full,**
- **In each box, each layer of marbles is composed of the same number of marbles (different for each box),**
- **In each layer, the marbles touch the sides of the box.**

If Nicolò fills box S_1 with 125 marbles, box S_2 with 27 marbles, and box S_3 with 64 marbles, which of the three boxes will have the greatest weight?

A) S_1
B) S_2
C) S_3
D) None, all the boxes have the same weight
E) It is not possible to determine, since the specific weight of the marbles' material is unknown

6. Enea places three circles on a plane so that each of them is tangent to the other two, and their centers form the vertices of a right triangle. Knowing that the radii of the circles are expressed as integers, which of the following triples can represent the radii of the circles?

A) 2, 3, 10
B) 3, 4, 5
C) 5, 12, 13
D) 7, 24, 25
E) 8, 15, 17

7. In the last mathematics lesson, teacher Alice reminded her students that a function is differentiable only if it is continuous, and that if a function is continuous, then it is integrable.

Which of the following deductions made by Nicolò, a student of Alice, is correct?

A) Every integrable function is continuous
B) Every differentiable function is integrable
C) Every continuous function is differentiable
D) Every non-continuous function is not integrable
E) Every integrable function is differentiable

8. For dinner with friends, Enea bought from the butcher a total of 10 birds, among partridges, pigeons, and quails. Partridges are sold at €12 each, pigeons at €9 each, and quails at €6 each. If Enea bought at least two of each type of bird, how many partridges did he buy if the total expense for the birds was €81?

A) 4
B) 3
C) 2
D) 1
E) Cannot be calculated with the given data

9. The pastry shop Tommaso, which used to sell pastries in packs of 12 pieces at a price of €9 each, has now reduced the packs to 10 pieces, keeping the price at €9. By what percentage has the price of a single pastry increased?

A) 12%
B) 15%
C) 20%
D) 24%
E) 18%

10. Four natural numbers a, b, c, d are such that a < b < c < d. To which of the four numbers should Enea add 1 so that the product of the three unchanged numbers with the modified one is as small as possible?

A) a
B) d
C) It makes no difference; the same variation is always obtained
D) c
E) b

11. In which year were the racial laws promulgated in Italy?

A) 1938
B) 1940
C) 1922
D) 1925
E) 1933

12. In 1919, Gabriele D'Annunzio led the "March on Fiume" (Fiume Crisis). In which country is the city of Fiume located today?

A) Italy
B) Albania
C) Croatia
D) Montenegro
E) Slovenia

13. Which term can be associated with both of the following definitions?

"document issued with commercial references"
"act of witchcraft"

A) Note
B) Consignment note
C) Spell
D) Incantation
E) Invoice

14. In four of the following terms, the suffix "-teca" has the same meaning. Identify the odd one out.

A) Fonoteca
B) Emeroteca
C) Pinacoteca
D) Biblioteca
E) Zapoteca

15. Who is the author of the play Mistero Buffo?

A) Giorgio Strehler
B) Dario Fo
C) Giorgio Gaber
D) Bertolt Brecht
E) Eduardo De Filippo

16. On which day is the Day of Legality celebrated, an occasion to commemorate the massacres of Capaci and Via D'Amelio?

A) March 25
B) May 23
C) April 22
D) January 27
E) November 4

17. Which car manufacturer was the first to introduce the assembly line?

A) Ford
B) Aston Martin
C) Buick
D) Peugeot
E) Cadillac

18. Which English term refers to the narrative technique that consists of the free representation of a person's thoughts exactly as they appear in the mind?

A) Flashback
B) Stream of consciousness
C) Cinematic techniques
D) Flashforward
E) Serialism

19. What is meant by the term "legislature"?

A) The length of the term of the Prime Minister
B) The set of laws and regulations governing the functioning of the State
C) The length of the term of the President of the Italian Republic
D) The period during which a given legislative body is in office and carries out its electoral mandate
E) The set of rules governing commercial law and labor law

20. In which of these sentences is the verb in the passive form?

A) The deeds of Aeneas were sung by Virgil
B) In classical high school, the Greek theater is often spoken about
C) In De Bello Gallico, Caesar described in detail his military campaign concerning the conquest of Gaul
D) In one of his writings, Plato associates the solid forms with the four elements: water–air–fire–earth
E) Homer in the Iliad sings the deeds of Achilles

21. Which of the following statements is/are true?

A_1 Hydrogen is the only element to which different names are given for some of its isotopes.
A_2 In kilograms, the mass of an atom is between 10^{-31} and 10^{-29}.
A_3 Except for hydrogen, all atoms of other chemical elements have an equal number of electrons and neutrons.

A) A_1 and A_2
B) A_2 and A_3
C) All
D) A_1 and A_3
E) None

22. Which of the following is a work by Niccolò Machiavelli?

A) The Prince
B) Of the Prince and Fine Letters
C) On Crimes and Punishments
D) On the Duties of Men
E) Dialogue on Nobility

23. In a DNA molecule consisting of 6000 nucleotides, of which 20% are guanine, what will be the number of adenine nucleotides?

A) 1500
B) 2400
C) 1200
D) 1800
E) 3600

24. Which of the following images represents prophase I of meiosis?

A) IMAGE 3
B) IMAGE 1
C) IMAGE 4
D) IMAGE 2
E) IMAGE 5

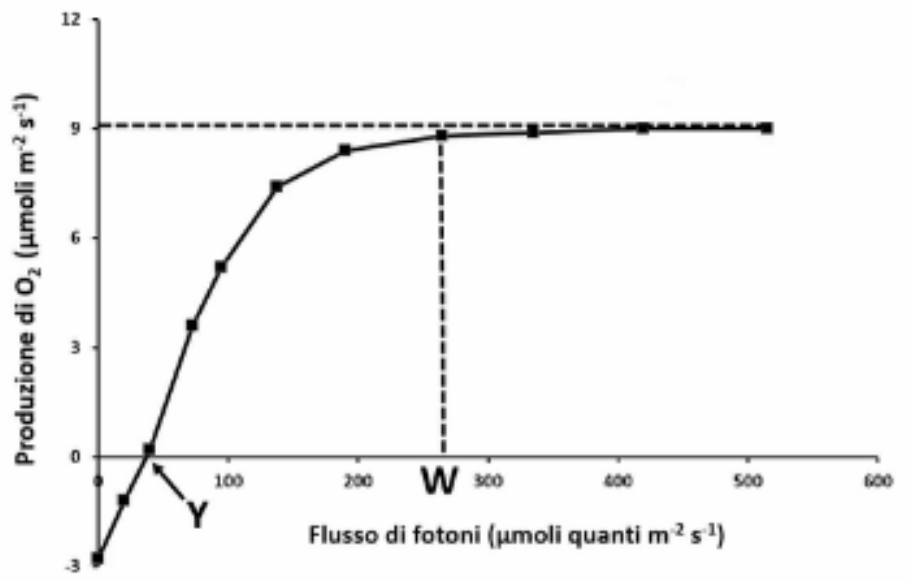
25. Which of the following events is not present in the division of a prokaryotic cell?

A) Cytokinesis
B) Growth of the cell
C) DNA duplication
D) Karyokinesis
E) Separation of the daughter DNA molecules

26. A diploid cell in the G2 phase of the cell cycle has:

A) An amount of DNA double that of a haploid cell
B) An amount of DNA four times that of a haploid cell
C) The same amount of DNA as it had in the G1 phase
D) An amount of DNA equal to half of what it had at the end of the S phase
E) Always the same amount of DNA in all phases of the cycle

27. The graph shows the photosynthetic activity of a plant as a function of photon flux. Which of the following statements is correct?



A) Photosynthesis is always limited by photon flux.
B) When the photon flux is between Y and W, photosynthesis does not occur.
C) At point Y, all the oxygen produced by photosynthesis is used for respiration.
D) If the photon flux is greater than W, photosynthesis stops.
E) Photosynthesis is limited by CO_2 when the photon flux is between Y and W.

28. Which of the listed processes does not lead to ATP synthesis?

A) Krebs cycle
B) Lactic fermentation of glucose
C) Calvin cycle
D) Glycolysis
E) Electron transport chain

29. Glycolipids are important components of cell membranes. Which of the following combinations of organelles is involved in their formation?

A) Smooth endoplasmic reticulum and lysosomes
B) Rough endoplasmic reticulum and smooth endoplasmic reticulum
C) Smooth endoplasmic reticulum and Golgi apparatus
D) Rough endoplasmic reticulum and Golgi apparatus
E) Smooth endoplasmic reticulum and peroxisomes

30. Recessive mutations in a gene located on the X chromosome cause color blindness. Francesca is not color-blind, but her father is. Francesca and Paolo, who is not color-blind, are expecting twins, a boy and a girl. What is the probability that the children will be color-blind?

A) Male 50% – Female 50%
B) Male 50% – Female 0%
C) Male 33% – Female 0%
D) Male 0% – Female 50%
E) Male 0% – Female 0%

31. The epidermis is made up of:

A) Stratified columnar epithelium
B) Simple squamous epithelium
C) Simple columnar epithelium
D) Stratified squamous epithelium
E) Ciliated cuboidal epithelium

32. The vertebral column has:

A) Six sacral vertebrae
B) Six lumbar vertebrae
C) Seven cervical vertebrae
D) One lordosis and two kyphoses
E) One kyphosis and two lordoses

33. One of the following statements about gastric glands is incorrect:

A) They produce an intrinsic factor for vitamin B12 absorption
B) They produce pepsinogen
C) They produce a proteolytic enzyme
D) They produce hydrochloric acid
E) They produce amylases

34. In the circulatory system:

A) The coronary arteries originate from the pulmonary artery
B) The pulmonary artery carries arterial blood
C) The pulmonary veins carry venous blood
D) The aorta carries arterial blood
E) The venae cavae originate from the right ventricle

35. Bone marrow:

A) Is made up of osteocytes
B) Is made up of osteons
C) Is a lymphoid organ
D) Is found only in long bones
E) Is found only in flat bones

36. It is correct to say that:

A) Cranial nerves are only sensory
B) Spinal nerves are only motor
C) Spinal nerves are sensory, while cranial nerves are motor
D) Spinal nerves originate from the meninges
E) Spinal nerves have both motor and sensory components

37. The endocrine pancreas produces:

A) Prolactin
B) Oxytocin
C) Glucagon
D) Amylase
E) Proteases

38. Cystic fibrosis is a genetic disease caused by an autosomal recessive allele. Two healthy parents have one child with cystic fibrosis and two healthy children. What is the probability that the next child will have the disease?

A) 1/2
B) 0
C) 1
D) 1/4
E) 2/3

39. In the PCR cycle, the use of high temperature (95°C) has the purpose of:

A) Inactivating the selected gene
B) Activating the enzyme Taq polymerase
C) Pairing the gene of interest with its corresponding primer
D) Denaturing the DNA molecule in the initial phase of the process
E) Allowing DNA polymerase to begin elongation

40. Which of the following are not cloning vectors?

A) Introns
B) Plasmids
C) Phages
D) Artificial chromosomes
E) Cosmids

41. A cylinder initially contains 100 mol of hydrogen gas at a pressure of 4×10^5 Pa. After use, the recorded pressure is 10^5 Pa. Indicate how many moles of hydrogen have been consumed:

A) 25 mol
B) 75 mol
C) 10 mol
D) 4 mol
E) 1 mol

42. Li (A=4, Z=1) is an unstable isotope of lithium that decays by emitting a proton. What will be its decay product?

A) $^{3}_{2}He$
B) $^{3}_{3}Li$
C) $^{3}_{1}H$
D) $^{4}_{2}He$
E) $^{2}_{1}H$

43. In which of the following pairs do both species have a trigonal planar structure according to VSEPR theory, and their central atoms have the same number of valence electrons?

A) $AlCl_3$, NH_3
B) BF_3, $AlCl_3$
C) NH_3, BH_3
D) NH_3, PH_3
E) None of the listed pairs

44. Which of the following is a decomposition reaction of ammonium nitrate?

A) $NH_4NO_2 \rightarrow N_2 + 2\ H_2O$
B) $12\ HNO_2 + 16\ NH_3 \rightarrow 24\ H_2O + 14\ N_2 + 6\ H_2$
C) $Am(NO_3)_3 \rightarrow Am^{3+} + 3\ NO_3^-$
D) $4\ NH_4NO_3 \rightarrow 2\ NH_3 + 3\ NO_2 + NO + N_2 + 5\ H_2O$
E) $[Ni(NH_3)_6]^{-2} \rightarrow Ni^{2+} + 6\ NH_3$

45. To an acidic aqueous solution of $KBrO_3$ (100 mL, 0.1 mol/L) are added 100 mL of an aqueous solution containing 0.006 mol of $K_2S_2O_3$ and 0.09 mol of KI. The following quantitative reactions occur:

$$9\,I^-(aq) + BrO_3^-(aq) + 6\,H^+(aq) \rightarrow 3\,I_3^-(aq) + Br^-(aq) + 3\,H_2O \quad (1)$$

$$I_3^-(aq) + 2\,S_2O_3^{2-}(aq) \rightarrow 3\,I^-(aq) + S_4O_6^{2-}(aq) \quad (2)$$

Reaction (2) is instantaneous, while reaction (1) is relatively slow. At the moment when all the $S_2O_3^{2-}$ present in the solution has reacted, how many moles of BrO_3^- will have been consumed?

A) 0.002 mol
B) 0.003 mol
C) 0.004 mol
D) 0.001 mol
E) 0.036 mol

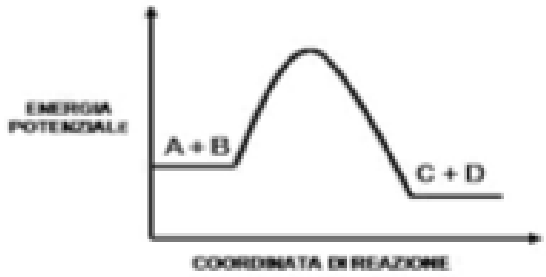
46. An osmotic membrane separates two solutions A and B of the same salt. If solution A is hypertonic compared to solution B, it can be stated that, after a certain time, a state of equilibrium will be reached in which:

A) The semipermeable membrane will allow the passage of the same number of molecules in both directions
B) The concentration of solution A has increased
C) The concentration of solution B has decreased
D) The passage of molecules through the membrane stops
E) There is a one-way flow through the osmotic membrane

47. Copper(I) chloride (CuCl) has a solubility in water of about 4.4×10^{-4} mol/L. What will happen to the concentration of Cu^+ if 0.1 mol of $CaCl_2$ is added to 1 L of a saturated solution of CuCl?

A) The concentration of Cu^+ increases due to the common ion effect
B) The concentration of Cu^+ decreases due to the common ion effect
C) The concentration of Cu^+ remains unchanged
D) The concentration of Cu^+ increases because pH decreases
E) The concentration of Cu^+ decreases because it is oxidized to Cu^{2+}

48. The diagram in the figure represents the change in potential energy in a generic reaction A + B ⇌ C + D. Based on it, indicate the correct statement.



A) The diagram represents a reaction whose mechanism involves a single stage in both directions
B) The activation energy is the same for both the forward and reverse reactions
C) The transition state coincides with the stabilization of the activated complex
D) The forward reaction is catalyzed, while the reverse reaction is not
E) The potential energy of reactants and products is the same

49. The superoxide ion is decomposed in vivo by enzymes that transform it according to the following reaction:

$$2 \cdot O_2^- + 2H^+ \leftrightarrows O_2 + H_2O_2$$

What are the oxidation numbers of oxygen atoms in the three species: superoxide ion, molecular oxygen, and hydrogen peroxide?

A) 0; +1; −1
B) −1; 0; −1
C) −0.5; 0; +1
D) −1; 0; +1
E) −0.5; 0; −1

50. Which of the following statements regarding a buffer solution is correct?

A) An increase of 10% of the total volume causes a decrease in the buffer capacity, and the pH remains unchanged
B) An increase of 10% of the total volume causes a decrease in the buffer capacity, and the pH decreases
C) A decrease of 10% of the total volume causes an increase in the buffer capacity, and the pH increases
D) A decrease of 10% of the total volume leaves both the buffer capacity and the pH unchanged
E) An increase of 10% of the total volume leaves both the buffer capacity and the pH unchanged

51. Which of the following pairs of molecules are structural isomers of each other?

A) Butane and cyclobutane
B) Acetone and propionaldehyde
C) 2-chlorophenol and o-chlorophenol
D) Benzene and cyclohexane
E) Propane and propyne

52. After examining the following electron configurations:

1.	↑↓ 1s	↑↓ 2s	↑↓ ↑ 2p	
2.	↑↓ 1s	↑↓ 2s	↑ ↑ ↑ 2p	
3.	↑↓ 1s	↑↓ 2s	↑↓ ↑↓ 2p	
4.	↑↓ 1s	↑ 2s	↓ ↑ ↑ 2p	
5.	↑↓ 1s	↑↓ 2s	↑↓ ↑↓ ↑↓ 2p	↑ 3s

Which of the following statements is always true?

A) Only configuration 5 respects Hund's rule
B) Only configuration 1 respects Hund's rule
C) Configurations 3 and 4 respect Hund's rule
D) Configurations 2 and 5 respect Hund's rule
E) Configurations 1 and 3 respect Hund's rule

53. What is the set of solutions of the inequality $3e^{x} - 5e^{-x} - 2 > 0$?

A) $\left\{x \in \Re : x < -1, x > \frac{5}{3}\right\}$

B) $\left\{x \in \Re : x > ln\left(\frac{5}{3}\right)\right\}$

C) $\left\{x \in \Re : -1 < x \leq ln\left(\frac{5}{3}\right)\right\}$

D) All real x
E) No real x

54. What is the value of the sum

$$log_{10}\frac{1}{2} + log_{10}\frac{2}{3} + log_{10}\frac{3}{4} + \ldots\ldots + log_{10}\frac{9}{10}$$

A) -1
B) $log_{10}\frac{5}{6}$
C) 0
D) $log_{10}\frac{6}{5}$
E) 1

55. For which values of the real parameter k, does the equation $x^2 + y^2 - 4x + 2y + k = 0$ represent the equation of a real, non-degenerate circle?

A) k < 20
B) k < 5
C) k ≤ 5
D) k ≤ 20
E) For every real value of k

56. If $x \in [0, \pi]$,what is the solution of the inequality

$$\frac{\cos x}{2} + 2\sin x + \frac{1}{2} > 0 \quad ?$$

A) $0 \leq x \leq \frac{\pi}{6}$
B) $\frac{\pi}{4} \leq x \leq \frac{\pi}{3}$
C) $\frac{\pi}{2} \leq x \leq \pi$

D) The inequality has no solution
E) The inequality is satisfied for every x belonging to the given interval

57. Neglecting air resistance, let v be the escape velocity from a planet Y of mass M and radius R for an empty spacecraft of mass m. What would be the escape velocity from the planet Y for a loaded satellite with a total mass of 1.44 m compared to the empty one?

A) 1.2 v
B) v
C) 1.44 v
D) v / 1.2
E) v / 1.44

58. Inside a conducting sphere of radius r uniformly charged (positively), a negative charge q is placed at a distance r/2 from the center. How does it move, if it moves at all?

A) Remains stationary
B) Moves along the diameter toward the surface of the sphere, away from the center
C) Moves along the diameter toward the surface of the sphere, passing through the center
D) Moves along the diameter toward the center of the sphere
E) It is not possible to answer since the intensity of the sphere's charge is not known

59. A conducting rod of mass m carries a current i and is in a magnetic field B. In which case is the magnitude of the force vector to which the rod is subjected maximum?

A) When the magnetic field B is parallel to the current
B) When the magnetic field B is perpendicular to the current
C) When the magnetic field B forms an angle of 30 ° with the current
D) When the magnetic field B forms an angle of 45 ° with the current
E) None of the other answers is correct

60. A boy's weight is 600 N. If, when he steps on a scale inside an elevator, it reads 630 N, is the elevator moving? If yes, how is it moving?

A) Moving downward with acceleration
B) Moving upward with acceleration
C) Moving upward at constant velocity
D) Moving downward at constant velocity
E) Not moving, stationary

• Answer

Total Points: ...../90

Correct answer:...../60
Wrong answer:...../60
Unanswered:...../60

Correct answer: +1.5 points
Wrong answer: -0.4
Unanswered: 0 points

1. A	26. B	51. B
2. B	27. A	52. D
3. D	28. C	53. B
4. C	29. C	54. A
5. D	30. B	55. B
6. A	31. D	56. E
7. B	32. C	57. B
8. C	33. E	58. A
9. C	34. D	59. B
10. B	35. C	60. B
11. A	36. E	
12. C	37. C	
13. E	38. D	
14. E	39. D	
15. B	40. A	
16. B	41. B	
17. A	42. A	
18. B	43. B	
19. D	44. D	
20. A	45. D	
21. A	46. A	
22. A	47. B	
23. B	48. A	
24. A	49. E	
25. D	50. A	