IMAT Exam (01)

Exam Date: 22/02/2025

Full Name:	Code:
Total Questions: 60	Duration: 100 minutes

Subject	Question No.		No. of Questions
	From	To	
Reading Skills and General Knowledge	1	4	4
Logical reasoning and problem-solving	5	9	5
Biology	10	32	23
Chemistry	33	47	15
Physics and Mathematics	48	60	13

1.5 points are awarded for each correct answer, while 0.4 points are deducted for each wrong answer.

Winter 2025

01 **Question Booklet**

Academic Year 2025/2026

Reading skills and knowledge acquired during studies

1. **The Renaissance was a period of great cultural, artistic, and scientific advancements in Europe, roughly spanning the 14th to 17th centuries. It was characterized by renewed interest in classical antiquity, humanism, and innovations in art, literature, and science. Many prominent figures, such as Leonardo da Vinci and Michelangelo, made significant contributions during this era.**
   According to the text, which of the following is true?
   A) The Renaissance primarily focused on religious reforms.
   B) The Renaissance was limited to Italy and did not influence the rest of Europe.
   C) The Renaissance saw major developments in science, art, and literature.
   D) The Renaissance rejected classical ideas in favor of medieval traditions.
   E) The Renaissance started in the 18th century.

2. **Which of the following pairs of scientist/discovery is wrong?**
   A) Isaac Newton – Laws of Motion
   B) Albert Einstein – Theory of Relativity
   C) Charles Darwin – Evolution by Natural Selection
   D) Marie Curie – The discovery of Oxygen
   E) Nikola Tesla – Alternating Current

3. **The book 1984 by George Orwell is best described as:**
   A) A historical novel about World War II.
   B) A dystopian novel about a totalitarian regime.
   C) A scientific analysis of political structures.
   D) A romantic novel set in the future.
   E) A collection of philosophical essays.

4. **Which of the following statements about the United Nations (UN) is correct?**
   A) The UN was founded in 1991 after the Cold War ended.
   B) The UN's primary goal is to promote international peace and cooperation.
   C) The UN has its headquarters in Paris, France.
   D) The UN is a military organization responsible for global defense.
   E) The UN consists of only five permanent member states.

Logical reasoning and problem-solving

5. Sum of the ages of a group of students is 480 today. The average of their ages will be 28 after 4 years. Accordingly, how many students are there in the group?

A) 14 B) 15 C) 16 D) 17 E) 20

6. A boy took an examination that had +3 marks for a correct response and -1 for a wrong one. If there were a total of 60 questions and he attempted all of them to get a score of 100, how many questions did he get wrong?

A) 5 B) 10 C) 20 D) 40 E) 45

7. A shopkeeper sells balloons either in single pieces priced at 10 cents apiece or in boxes containing 25 each at $2 per box. What is the minimum amount that a customer must spend if he wants to purchase exactly 310 balloons?

A) 12 B) 20 C) 24 D) 25 E) 28

8. Everyone in Niko's class has a different birth date. If Niko is both the 8^{th} oldest and 12^{th} youngest person in his class, how many students are in Niko's class?

A) 18 B) 19 C) 20 D) 21 E) 22

9. At a resturant, each large order of fries has 350 more calories than one large soda. If 2 large orders of fries and 3 large sodas have a total of 1500 calories, how many calories, does one large order of fries have?

A) 350 B) 400 C) 435 D) 490 E) 510

Biology

10. Which statement is correct?

A) The Golgi apparatus is responsible for the digestion of lipids and produces novel lipids.
B) Ribosome is an organelle which is surrounded by one layer of membrane in eukaryotes but is without any membrane in prokaryotes.
C) The permeability of the cell wall is different from the permeability of cell surface membrane.
D) The cell wall of a plant cell determines which molecule to enter/exit the cell.
E) Centrioles are present in all eukaryotic cells except fungi.

11. Which statement is wrong?

A) Lipids are macromolecules.
B) Carbohydrates are made of only carbon and hydrogen molecules.
C) Multiple amino-acids joined together cannot be called “protein”.
D) Nucleic acids are polymer and macromolecules.
E) Sucrose is an example of a disaccharide.

12. Which of the statements are true about cholesterol in the cell membrane?

1) It has a hydrophobic and a hydrophilic part.
2) It is presented only in animal eukaryotic cells.
3) It is not presented in prokaryotic cells.
4) It has no effect on the permeability of the membrane, while has an effect on making the membrane more resistant to both hot and cold temperature.

A) 1 only
B) 2 and 3 only
C) 1, 3 and 4 only
D) 1 and 4 only
E) 1 and 3 only

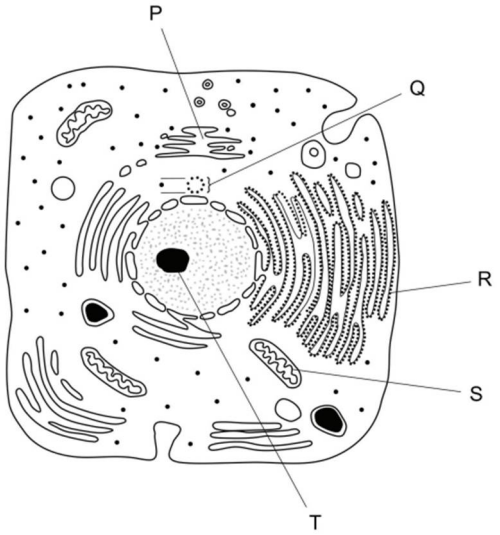
13. If three same fatty acids with a formula of $C_8H_{16}O_2$ and a glycerol molecule ($C_3H_8O_3$) condensate a triglyceride, which statement is correct?

A) The final molecule has 24 carbon atoms.
B) The final molecule has 9 oxygen atoms.
C) The final molecule has 53 hydrogen and 6 oxygen atoms.
D) The final formula contains 50 hydrogen atoms.
E) The final formula would contain 19 carbon atoms.

14. How many of the statements are correct in the front image?

1) P processes protein molecules came from the RER.
2) S is responsible for photosynthesis.
3) Q is one of the characteristics that shows this cell does not belong to a complex plant.
4) T is responsible for the production of dot-shape structures on R.

A) 1 and 2 only.
B) 1 and 3 only.
C) 2, 3 and 4 only.
D) 3 only.
E) 1,3 and 4 only.



15. Which sentence is correct about enzymes?

A) It is a peptidoglycan molecule.
B) It can be a globular molecule, but it is not a must.
C) It is a functional lipid.
D) Low pH destroys most of the structure of these molecules.
E) Low temperature denaturates its structure.

16. Which statement is the definition of facilitated diffusion?

A) It obeys the steepness of concentration gradient.
B) Polar molecules with a small size do not use this path.
C) Water uses this path because it cannot pass the membrane due to its polarity.
D) It consumes energy.
E) The protein involved in this path is called the “pump”.

17. Which organelles should be presented more than usual in muscle cells?

A) Mitochondria
B) Lysosome
C) SER
D) A and C
E) B and C

18. Which statement is not correct about the Golgi apparatus?

A) It is involved in production of Lysosome.
B) It is the place where carbohydrates are added to proteins to make glycoproteins.
C) It is the place where mucin is released from.
D) During plant cell division, novel cell membrane is produced by this organelle.
E) Even glycolipids are made inside this apparatus.

19. Which statement is correct?

A) Amylopectin is shorter than amylose molecules.
B) A starch molecule does not contain either amylopectin and amylose at the same time.
C) Glycogen is a similar molecule to amylose, but it is presented in animal cells.
D) The link between glucose molecules in starch is always 1-6, and always 1-4 in glycogen.
E) Starch molecules are the most abundant polysaccharides in nature.

20. Which statements are wrong about an amino acid molecule?

1) It should have a amino group which contains Nitrogen.
2) It contains a carboxylic acid group which is COOH.
3) It has a solid Hydrogen attached to the central carbon.
4) There is a R group which makes the difference between other amino-acids.

A) 1,2 and 4 only.
B) 1 and 4 only.
C) 2 and 4 only.
D) 2,3 and 4 only
E) All are correct.

21. Which statement is wrong about protein structures?

A) The primary structure is the same as the polypeptide chain.
B) The secondary structure is very weak and fragile.
C) The tertiary structure is not the final structure and those proteins in this stage should have the last stage (quaternary structure) to make the protein.
D) The quaternary structure is made by the same bonds in the tertiary structure.
E) Disulfide bond is not always presented and is just there when there is a sulfur atom (cysteine).

22. Which sentence is not the description of the Ribosome?

A) It is an organelle without any phospholipidic membrane.
B) It varies in size in eukaryotic cells (80S) and prokaryotic cells (70S).
C) It makes protein molecules.
D) It can be on RER and free in the cytoplasm.
E) It is made by the nucleolus.

23. What is true about the largest organelle with an envelope?

1) It contains most of the genetic material of the cell.
2) Ribosomes can be seen inside this organelle.
3) It could not be seen before the invention of electronic microscopes.

A) 1 only.
B) 3 only.
C) 2 and 3 only.
D) 1 and 2 only.
E) 1, 2 and 3.

24. What is wrong about the organelle with a membrane called Tonoplast?

1) There is a permanent kind presented in plant cells.
2) There would be some temporary kind in animal cells which have different duty from the central one in plant cells.
3) Tonoplast is a specific name for the envelope of this organelle.
4) It can act as lysosomes inside the plant cell, because lysosome cannot be presented in plant cells.

A) 1 and 3 only.
B) 3 and 4 only.
C) 1 and 2 only.
D) 1, 2 and 4 only.
E) 1, 2 and 3 only.

25. Which sentence is correct about microscopes?

A) The actual size divided by the observed size of the image is called “magnification”.
B) Resolution and magnification are the same, but one is defined in light and the other is defined in electronic microscopes.
C) TEM gives us a better resolution than SEM.
D) SEM is used to watch the inside part of a cell.
E) Magnification is the ability to distinguish between 2 separate points.

26. Which organelle must be presented more than others in both liver and muscle cells?

A) Ribosome
B) RER
C) Golgi apparatus
D) Mitochondria
E) SER

27. Which statements are false about inhibition in enzymes?

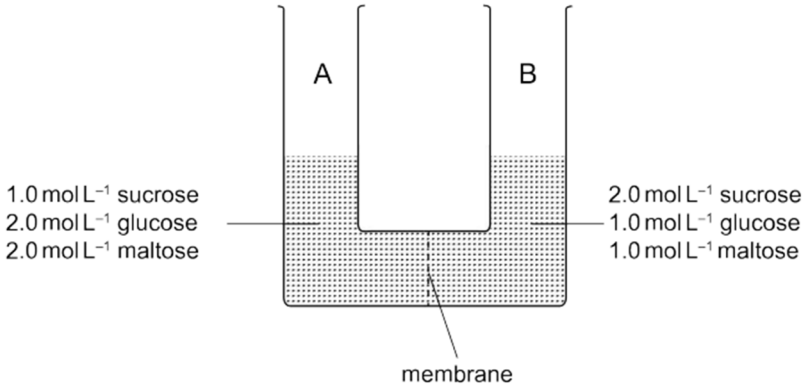
1) A competitive inhibition is when a substance similar to the substrate gets inside the active site.
2) A non-competitive inhibition is when a substance similar to the substrate gets inside the active site.
3) A non-competitive inhibition means that there is no way back to the reaction, ever.
4) An end-product inhibition example is in fake-drinking-alcohol toxicity.

A) 1 and 2 only.
B) 1 and 4 only.
C) 2 and 4 only.
D) 2, 3 and 4 only.
E) 1, 2 and 4 only.

28. Which sentence is not correct about enzymes?

A) pH and temperature have effects on their function.
B) The speediest enzyme has the most affinity.
C) Substrate concentration affects the initial rate of enzyme activity.
D) Some enzymes can work more properly in lower pH.
E) They are biological catalysts.

29. The following diagram shows a U-tube at the start of an experiment. It contains two solutions, separated by a membrane. Both solutions contain sucrose, glucose and maltose in water. (You can assume all the concentration equal)
The membrane acts like the living organism cell membrane. Which option correctly



identifies what happens within the first few seconds?

A) No net movement happens.
B) Glucose moves from A to B.
C) Sucrose moves from A to B.
D) Water moves from B to A.
E) Glucose moves from B to A.

30. Which statement is true about Lysozyme?

A) It is an enzyme used in immune actions.
B) It acts against viruses.
C) It is a digestive organelle.
D) Vacuole can act as it in plant cells.
E) It cannot be seen in plant cells.

31. Which of the followings contain ciliated epithelium?

A) Endocardial tissue (inside of the heart).
B) The rectal lumen.
C) Oviduct.
D) Inside the vessel lumen.
E) Oral cavity. (inside the mouth)

32. Which one of the following is found below the diaphragm in a human?

A) Liver
B) Heart
C) Esophagus (most parts)
D) Lungs
E) Ascending aorta

Chemistry

33. A given mass of ideal gas occupies a volume V and exerts a pressure p at $27^{\circ}C$. At which temperature will the same mass of the ideal gas occupy the same volume V and exert a pressure of 2p?

A) 54°C B) 54K C) 600°C D) 600K E) 620K

34. Hydrogen and chlorine react at high temperatures to form HCl. Assuming that the relative atomic mass of hydrogen is 1amu and chlorine is 35.5amu, and the yield of the reaction is 80%, What happens when an 8g of hydrogen reacts with 71g of chlorine?

A) 58.4g of HCl are produced
B) 73g of HCl are produced
C) 7g of hydrogen remain
D) all hydrogen used.
E) 3.5mol of hydrogen remain.

35. How many molecules are present in $1cm^3$ of oxygen gas under room conditions?

A) $\frac{(1\times 24000)}{6.02\times 10^{23}}$

B) $\frac{(1\times 6.02\times 10^{23})}{24000}$

C) $1\times 6.02\times 10^{23}\times 32$

D) $\frac{(24000\times 6.02\times 10^{23})}{1\times 1000}$

E) 6.02×10^{23}

36. A mixture of 0.3 mol of N_2, 0.5 mol of CO_2, and 0.4 mol of O_2 exerts a pressure of 2.4atm on the walls of the vessel that contains it. What is the pressure exerted by nitrogen?

A)0.6atm B)0.8atm C)0.5atm D)0.3atm E)0.75atm

37. Given that the relative atomic mass of nitrogen is 14u, how many nitrogen atoms are present in 2.7g of N_2O_5?

A) 3.01×10^{22} B) 6.02×10^{22} C) 3.01×10^{23}

D) 1.51×10^{22} E) 2.01×10^{23}

38. A gas, confined in a rigid cylinder and maintained at temperature of $-3^{\circ}C$exerts a pressure of 9 atm. What pressure would the same gas exert if it were heated to $27^{\circ}C$?

A) 10atm B) 81atm C) 8.1atm D) 9.6atm E) 12.5atm

39. What value does c need to be so that the following equation can be balanced?

$4KMnO_4 + \mathbf{a}H_2SO_4 + 5C_2H_5OH \rightarrow 4MnSO_4 + \mathbf{b}K_2SO_4 + 5CH_3CO_2H + \mathbf{c}H_2O$

A)21 B)11 C)16 D)17 E)26

40.Varius units of measurement can be used to express the value of pressure. Which of the fallowing values of the pressure does <u>not</u> correspond to 1atm?

A)1013.25kPa B)101325Pa C)1013mbar

D)760mmHg E)760torr

41. How many oxygen atoms are there in 0.420 g of sodiumcarbonate?

A)$0.011N_A$ B)$0.1N_A$ C)$0.3N_A$ D)$0.03N_A$ E) $0.33N_A$

42. A sample of n moles of an ideal gas is contained in a closed system of fixed volume V m^3 at pressure P Pa and temperature $27^\circ C$.If the gas is heated to $327^\circ C$,What will be the pressure in Pa at this new temperature?

A) 2P B) $\frac{P}{2}$ C) P D) $\frac{327}{27}P$ E) $\frac{27}{327}P$

43. Nitrogen gas is made by breakdown of $C_3H_5N_3O_9$.(other species present in the reaction are oxygen and carbon dioxide and water.) 227g of nitroglycerine is used and the reaction percentage yield is 80%. How many moles of nitrogen gas produced?

A)134.4 B)4.8 C)6 D)168 E)1.2

44. How many atoms of hydrogen are there in 3.0kg of ethane?

A) 3.6×10^{26} B) 3.9×10^{26} C) 6×10^{25}

D) 3.6×10^{23} E) 6×10^{22}

45. Which one of the following samples of gases contains the most particles?
All gases are at 0 °C and 1 atm pressure, when 1 mole of gas has a volume of 22.4 L

A)33.6L of chlorine gas B)66.0g of carbon dioxide gas

C)22.4L of hydrogen gas D)10.0g of helium gas

E)64g of oxygen gas

46. Ethyne, C_2H_2, reacts with oxygen. What volume of oxygen (in dm^3) reacts with 40 dm^3 of C_2H_2?

A)0.4 B)0.8 C)1.0 D) 10 E) 100

47. A sample of 10 dm^3 of polluted air is passed through lime water $Ca(OH)_2$ so that all the carbon dioxide present is precipitated as calcium carbonate. The mass of calcium carbonate formed is 0.05g. What is the percentage, by volume, of carbon dioxide in air sample? (1mol of gas under experimental conditions has a volume of 24 dm^3)

A)0.03% B)0.05% C)0.12% D)0.3% E)0.5%

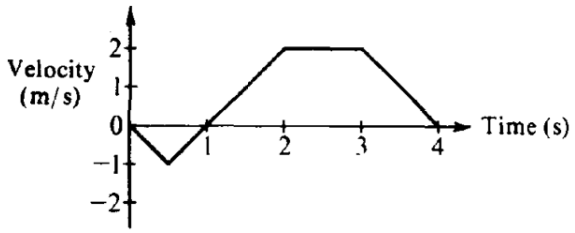
Physics and Mathematics

48. Three spherical particles have the following diameters: 1650 pm, 1.5 nm and 0.0036 µm. What is the correct order of these diameters from smallest to largest?

A) 0.0036 µm, 1.5 nm, 1650 pm
B) 1.5 nm, 0.0036 µm, 1650 pm
C) 1650 pm, 1.5 nm, 0.0036 µm
D) 0.0036 µm, 1650 pm, 1.5 nm
E) 1.5 nm, 1650 pm, 0.0036 µm

49. The graph shows the velocity versus time for an object moving in a straight line. At what time after t = 0 does the object again pass through its initial position?

A) 1 s
B) Between 1 and 2 s
C) 2 s
D) Between 2 and 3 s
E) 3 s



50. Two trains move towards each other on parallel tracks. Train A moves at 40 m/s, and Train B moves at 30 m/s. What is the velocity of Train A relative to Train B?

A) 10 m/s B) 30 m/s C) 50 m/s D) 60 m/s E) 70 m/s

51. At time t = 0, car X traveling with speed v0 passes car Y which is just starting to move. Both cars then travel on two parallel lanes of the same straight road. The graphs of speed v versus time t for both cars are shown. Which of the following is true at time t = 20 seconds?

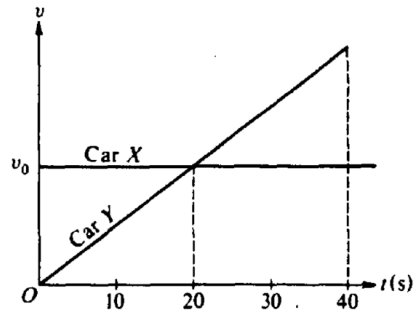
A) Car Y is behind car X.

B) Car Y is passing car X.

C) Car Y is in front of car X.

D) Car X is accelerating faster than car Y.

E) At t = 20 s, both cars have traveled the same distance.



52. A velocity-time graph has a straight diagonal line with positive slope. What does this indicate?

A) Constant velocity B) Zero acceleration C) Constant acceleration
D) Increasing acceleration E) Decreasing acceleration

53. A car accelerates from 10 m/s to 30 m/s over 5 seconds. What is the total displacement?

A) 75 m B) 80 m C) 90 m D) 100 m E) 110 m

54. A runner jogs 5 km north, then 12 km west, and finally 5 km south in 40 minutes. What is the magnitude of the average velocity in km/h?

A) 18 B) 10 C) 8 D) 12 E) 6

55. $\frac{1}{2} - 3a = \frac{1}{8} + 3b \Rightarrow a + b = ?$

A) $\frac{3}{4}$ B) $\frac{5}{6}$ C) $\frac{1}{8}$ D) $\frac{5}{8}$ E) $\frac{4}{9}$

56. $\frac{2x+1}{3} - \frac{x-5}{2} = 4 \Rightarrow x = ?$

A) 2 B) 3 C) 7 D) 9 E) 10

57. $a > b > 2$, $x = \frac{a}{b}$, $y = \frac{a}{2}$ ve $z = \frac{2}{b}$ $\Rightarrow ? < ? < ?$

A) $x > y > z$ B) $y > z > x$ C) $z > x > y$
D) $z > y > x$ E) $y > x > z$

58. Which of the following equations represents a line that passes through (−5,8) and is parallel to the y-axis?

A) y=−5 B) x=−5 C) x=8 D) y=8 E) x+y=3

59.

$$\begin{cases} y > mx + 2 \\ y < nx - 3 \end{cases}$$

In the xy-plane, if (2,1) is a solution to the system of inequalities above, which of the following must be true?

I. $m < -\frac{1}{2}$ II. $n > 2$ III. $m + n > 0$

A) I only B) I and II only C) I and III only
D) II and III only E) I, II, and III

60.

$$\begin{cases} y \geq 8x + 500 \\ y \geq -4x + 200 \end{cases}$$

In the xy-plane, if (x, y) lies in the solution set of the system of inequalities above, what is the minimum possible value of y?

A) 200 B) 250 C) 300 D) 350 E) 400