02 **Question Booklet**

**Academic Year 2025/2026**

**Reading skills and knowledge acquired during studies**

1. **Who is the author of Pride and Prejudice?**
   A) Charlotte Brontë
   B) Emily Brontë
   C) Jane Austen
   D) Louisa May Alcott
   E) Mary Shelley

2. **The Great Depression was a severe worldwide economic downturn that began in 1929 and lasted for about a decade. It was triggered by the stock market crash in the United States and had devastating effects on economies across the globe. High unemployment rates, widespread poverty, and financial instability characterized this period. Governments responded with various economic policies, including Franklin D. Roosevelt's New Deal, which aimed to provide relief and economic recovery.**

   **Which of the following CANNOT be inferred from the text?**
   A) The Great Depression affected multiple countries.
   B) The stock market crash played a key role in starting the crisis.
   C) Governments took no action to address the crisis.
   D) Economic instability and poverty were widespread.
   E) The New Deal was a response to the crisis.

3. **Which empire was ruled by Julius Caesar?**
   A) The Persian Empire
   B) The Byzantine Empire
   C) The Roman Empire
   D) The Ottoman Empire
   E) The Holy Roman Empire

4. **Which of the following sentences correctly uses a conditional clause?**
   A) If he will study harder, he passes the exam.
   B) She would go to the party if she had knew about it.
   C) If it rains tomorrow, we will cancel the picnic.
   D) They go to the gym if they had more time.
   E) If I was you, I take that opportunity.

## Logical reasoning and problem-solving

**5. David has a bottle full of water. He drinks $\frac{1}{5}$ of the water, then refills the bottle back to its original level. After that, he drinks $\frac{1}{4}$ of the total water and refills half of what he drank. Finally, he drinks $\frac{1}{3}$ of the remaining water, leaving 140 milliliters in the bottle. How much water was in the bottle at the beginning?**

A) 200 B) 240 C) 300 D) 360 E) 400

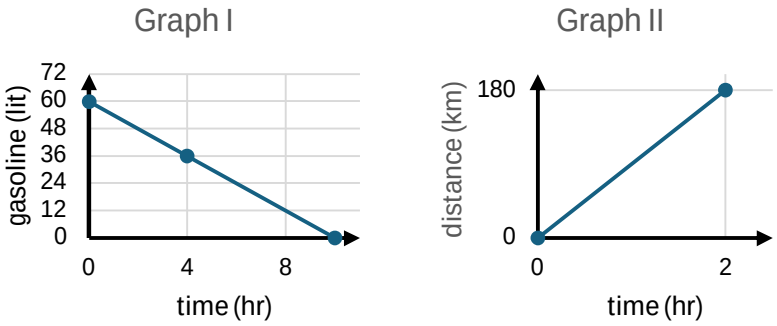
**6. A traveler exchanges $500 to euros (€) at an exchange rate of 1 USD = 0.85 EUR. He then spends €255 on his trip and exchanges the remaining euros back to dollars at 1 EUR = 1.10 USD. How much money does he get back in USD?**

A) 187 B) 208 C) 215 D) 220 E) 240

**7. A rectangular photo frame has a length-to-width ratio of 5:3. If the perimeter of the frame is 96 cm, what is the length of the frame?**

A) 20 B) 25 C) 30 D) 35 E) 40

**8.**




**Graph I. shows the amount of gasoline left in the tank according to the traveling time at a constant speed, the graph II. shows the traveling distance according to the traveling time for the same vehicle. How many kilometers does this vehicle travel with 36 liters of gasoline in its tank?**

A) 360 B) 400 C) 450 D) 450 E) 540

**9. A fruit salad contains apples, bananas, and grapes. The ratio of apples to bananas is 3:4, and the ratio of bananas to grapes is 6:5. If the total number of apples, bananas, and grapes is 186, how many grapes are there?**

A) 40 B) 50 C) 55 D) 60 E) 72

## Biology

**10. Which statement is correct?**

A) Viruses can be divided into 3 groups based on their genetic material.
B) HIV is a double-stranded DNA virus causing AIDS.
C) Bacteriophage is a type of virus which attacks a particular bacterium called E. coli.
D) Viruses replicate themselves by their own ribosomes and organelles of the host.
E) Viruses always have an envelope surrounding them.

**11. Which statement is wrong?**

A) Bacteria always have a cell wall.
B) It is not a must for bacteria to contain capsule.
C) Nitrogen-fixation is not possible for every bacterium.
D) Naked-DNA can be replicated independently from the main DNA.
E) Capsule of bacteria is used for the attachment of bacteria to the surrounding surfaces.

**12. Which of the statements are wrong about bacteria?**

1) Plasmid is connected to some protein molecules.
2) Plasmid is the DNA that contain the specific code for antibiotic resistance.
3) Plasmid is always presented in a bacterium, but the number of this molecule can vary in different bacteria.

A) 1 only.
B) 2 only.
C) 2 and 3 only.
D) 1 and 3 only.
E) All are wrong.

**13. Which sentence is correct about viruses?**

A) They always have a protein coat surrounding their genetic material.
B) They always have a protein around their envelope.
C) They are living organisms dependent on their hosts.
D) They must have a genetic material, an envelope and a capsid.
E) They replicate themselves independently to their host.

**14. How many of the statements are correct?**

1) Bacteria use a structure called “pili” for their sexual activities.
2) An example of a double-stranded RNA virus can be the cause of AIDS.
3) The envelope of a virus contains 4 layers of phospholipid molecules.
4) The flagella of a bacteria are used for cellular attachments.

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?**

A) A nucleotide is made of a base, hexose sugar and a phosphate group.
B) A nucleotide molecule is defined as a sugar-base plus one to three phosphate group(s).
C) C4 is the place where the phosphodiester bond is presented.
D) C1 is the place where defines the type of the sugar.
E) ATP is the part of a RNA molecule.

**16. Which statement is true about nitrogen-containing bases?**

A) They are 4 types used in nucleotides.
B) Adenine & Guanine are Purines and are 1 ringed.
C) Uracil comes instead of Adenine in RNAs.
D) Uracil is a 1 ringed base.
E) Thymine is replaced by Uracil in RNAs.

**17. Assume that there is a DNA molecule that 20 % of its bases are Cytosine; If the whole molecule contain 20 complete turns, how many of the bases would be Adenine?**

A) 60
B) 40
C) 120
D) 180
E) 80

**18. Which statement is not correct?**

A) Okazaki fragments are parts of the lagging strand.
B) DNA polymerase starts from the 5’end of the parent strand.
C) DNA polymerase is responsible for the complementary base pairing.
D) DNA Ligase synthesizes phosphodiester bonds between nucleotides .
E) Both leading & lagging strands were made from their 5’ end to their another end.

**19. Which statement is correct?**

A) Thymine is purine base.
B) Cytosine is connected to Guanine with 2 hydrogen bonds.
C) There are 2 one-ringed bases and 3 two-ringed bases in the nature.
D) Thymine is connected to Uracil in RNAs with 2 hydrogen bonds.
E) There should be always 3 rings in the distance between two opposite back bones.

**20. Which statements are wrong?**

1) DNA and RNA has no differences but in the presence of a “H” or “OH” on the second carbon of the pentose.
2) DNA has one more O atom in comparison with RNA.
3) Both RNA and DNA can be either single- or double- stranded in the nature.

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

**21. How many of the statements are wrong about nucleotide structures?**

1) C5 is the place to connect to the other nucleotide.
2) C3 is the place to connect to the other nucleotide.
3) C2 is the place where the main difference between RNA and DNA sugar is obvious.
4) C1 is in the apex.

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

**22. Which sentence is the description of a chromatin?**

A) The combination of polynucleotide chains and histone.
B) The combination of pentose sugar, base and phosphate group(s).
C) The combination of DNA and protein.
D) The half of a doubled chromosome, joined with an identical structure through centromere.
E) The genetic material of prokaryotes.

**23. Which of the statements is true about “Interphase”?**

A) It contains G1,M and G2 phase.
B) It always prepares the cell for division.
C) It is right after the nuclear division.
D) It is considered after the cell division and before the next probable division.
E) It contains 5 different parts.

**24. What is wrong about Interphase?**

1) S is the stage to replicate organelles.
2) G1 is the stage to produce DNA polymerase and Ligase.
3) G2 is the stage where cell decides whether to divide or not.
4) S is the stage in which mitosis happens.

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

**25. Which sentence is correct about Prophase?**

A) Nuclear envelope cannot be seen in this stage.
B) In late phase of this stage, Nucleolus starts to fade.
C) This is a part of cell division.
D) It is the second part of mitotic stages.
E) Equator alignment happens in this stage.

**26. Which one is the stage of mitosis that chromosome numbers are doubled and nucleous cannot be seen?**

A) Interphase
B) Metaphase
C) Prophase
D) Anaphase
E) Telophase

**27. Which statement is false about Mitotic cell cycle?**

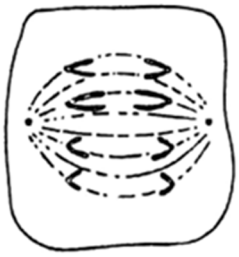
A) Centrosomes are replicated in the S phase of animal cells.
B) In Metaphase sister chromatids are not visible, yet.
C) In Prophase chromosomes can be seen but it may be more condensed later.
D) In late Telophase, Nucleolus can be seen again.
E) In Anaphase centrioles are in poles of the animal cell.

**28. Which sentence is correct about Mitotic cell cycle in every eukaryotic cells?**

A) Centriole is always needed in this process.
B) Just after Telophase is the turn of cell surface membrane to appear.
C) In Anaphase, there would not be any sign of nuclear envelope.
D) In Anaphase, homologous chromosomes would be separated.
E) In Interphase, cell's nucleus divides.

**29. The following picture shows one of the stages of Mitosis. Which choice is the name of the stage, and how is the original cell identified?**

A) Anaphase, n=8
B) Anaphase, 2n=8
C) Telophase, n=8
D) Anaphase, 2n=4
E) Telophase, 2n=4.



**30. Which of the followings is correct in all cells?**

A) Flagella is an extra-cellular structure.
B) Pili is used for antibiotic resistance.
C) Ribosome is the only organelle surrounded by membrane, in all types of cells.
D) Mitochondria have similar ribosomes with E.coli.
E) Cell wall main ingredient is Murin.

**31. Consider this sequence "ACGGCAAACGGCA" in one of the strands of HIV genetic material, what would be the complementary strand?**

A) TGCCGTTTGCCGT
B) UGCCGUUUGCCGA
C) UGCCGUUUGCCGU
D) TGCCGTTTGCCGA
E) No such strand is possible, because HIV has one strand of genetic material.

**32. Consider this sequence in one strand of DNA of a sand fly "ACGTGCATGCTAACTG"; If the whole genome has the same percentage of bases shown above, how many Hydrogen bonds would be presented if the whole genome is made of 300 bases?**

A) 300
B) 350
C) 375
D) 450
E) 400

## Chemistry

**33. A simple ion of element A can be represented:** ${}^{2x+2}_{x}A^{2+}$

**How many electrons are present in this ion?**

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

**34. An atom has a mass number of 18 and contains 10 neutrons. A common ion of this atom has a charge of -2. What is the electron configuration of this ion in its lowest energy?**

A) $1s^2 2s^2 2p^6$ B) $1s^2 2s^2 2p^4$ C) $1s^2 2s^2 2p^2$
D) $1s^2 2s^2 2p^6 3s^2$ E) $1s^2 2s^2 2p^6 3s^2 3p^4$

**35. Which of these elements has the highest first ionization energy?**

A) Neon(Z=10) B) Lithium(Z=3) C) Sodium(Z=11)
D) Argon(Z=18) E) Potassium(Z=19)

**36. Which of the following particles has the same number of neutrons as the** ${}^{79}_{35}Br^{-}$ **?**

A) ${}^{78}_{34}Se$ B) ${}^{81}_{35}Br^{2+}$ C) ${}^{81}_{35}Br^{-}$ D) ${}^{82}_{34}Kr$ E) ${}^{101}_{44}Ru^{+}$

**37. Which of the following equations is associated with the first electron affinity of chlorine?**

A) $Cl_{(g)} + e^{-} \rightarrow Cl^{-}_{(g)}$ B) $Cl_{(g)} \rightarrow Cl^{-}_{(g)} + e^{-}$
C) $Cl_{2(g)} + 2e^{-} \rightarrow 2Cl^{-}_{(g)}$ D) $2Cl^{-}_{(g)} - 2e^{-} \rightarrow Cl_{2(g)}$
E) $Cl^{-}_{(g)} + e^{-} \rightarrow Cl_{(g)}$

**38. Which of the following ions contains five un-paired d-electrons?**

A) $Cr^{3+}$ B) $Fe^{3+}$ C) $Mn^{3+}$ D) $Ni^{2+}$ E) $Sc^{3+}$

**39. Which of the following elements has the largest second ionization energy?**

A) O B) F C) Ne D) Na E) Cl

**40. Which of the following lists the given elements in order of DECREASING first ionisation energies? [Na=11 – Be=4 – Li=3]**

A) Be,Li,Na B) Li,Be,Na C) Li,Na,Be D) Be,Na,Li E) Na,Be,Li

**41. Why is the first ionization energy of Ne higher than that of F? (the best answer )**

A) Fluorine is more electronegative than neon.

B) Neon has a complete octet, but fluorine does not.

C) The atomic radius of fluorine is less than that of neon.

D) The nuclear charge in neon is greater than that in fluorine.

E) It is related to its EA, EN.

**42. Which property is the same for the two nuclides Ar and K?**

A) electrons B) neutrons C) nucleons D) protons E) ionization energy

**43. Which of the fallowing electron configurations represent an element that forms a simple ion with a charge of -3?**

A) $1s^2\,2s^2\,2p^6\,3s^2\,3p^1$ B) $1s^2\,2s^2\,2p^6\,3s^2\,3p^3$

C) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^1\,4s^2$ D) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^3\,4s^2$

E) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^5\,4s^1$

**44.Which of the fallowing elements would be expected to form the largest ion with a noble gas electron configuration?**

A) Al B) Cl C) P D) K E) S

**45. The species Ar , K* and Cal* are isoelectronic (have the same number of electrons).**

**In what order do their radii increase? smallest to largest.**

A) $Ar - Ca^{2+} - K^+$ B) $Ar - K^+ - Ca^{2+}$ C) $Ca^{2+} - Ar - K^+$

D) $Ca^{2+} - K^+ - Ar$ E) $K^+ - Ar - Ca^{2+}$

**46.An atom has atomic number x and a mass number of 2x+6. How many neutrons are in the nucleus of this atom?**

A) x+6 B) x-6 C) x+3 D) x-3 E) 6

**47. Which property of the first six elements of Period 3 (sodium to sulfur) continuously increases? mp: melting point bp: boiling point**

A) atomic radii
B) first ionization energy
C) maximum oxidation number in oxides
D) mp
E) bp

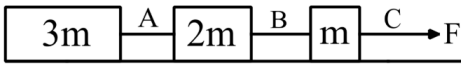
## Physics and Mathematics

**48. A child pushes horizontally on a box of mass m which moves with constant speed v across a horizontal floor. The coefficient of friction between the box and the floor is $\mu$. At what rate does the child do work on the box?**

A) $\mu mgv$ B) $mgv$ C) $\frac{\mu mg}{v}$ D) $\frac{mg}{v}$ E) $\frac{\mu}{mgv}$

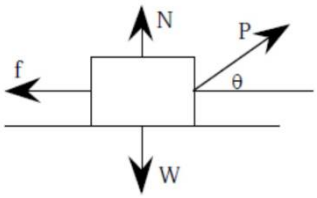
**49. Three blocks of masses 3m, 2m, and m are connected to strings A, B, and C as shown. The blocks are pulled along a rough surface by a force of magnitude F exerted by string C. The coefficient of friction between each block and the surface is the same. Which string must be the strongest in order not to break?**

A) A
B) B
C) C
D) They must all be the same strength.
E) The strength required depends on the value of F



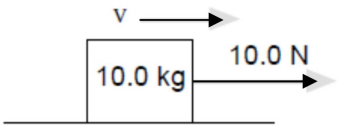

**50. A student pulls a wooden box along a rough horizontal floor at constant speed by means of a force P as shown to the right. Which of the following must be true?**

A) P > f and N < W
B) P > f and N > W
C) P < f and N < W
D) P < f and N > W
E) P = f and N = W



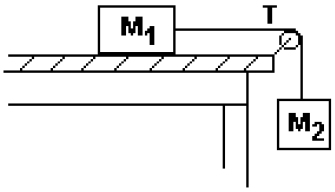
**51. The 10.0 kg box shown in the figure to the right is sliding to the right along the floor. A horizontal force of 10.0 N is being applied to the right. The coefficient of kinetic friction between the box and the floor is 0.20. The box is moving with:**

A) Acceleration to the left.
B) Acceleration to the right.
C) Constant speed and constant velocity.
D) Constant speed but not constant velocity.
E) Such a motion cannot occur.




**52. Two masses, $m_1$ and $m_2$, are connected by a cord and arranged as shown in the diagram with m1 sliding along on a frictionless surface and $m_2$ hanging from a light frictionless pulley. What would be the mass of the fallingmass, $m_2$, if both the sliding mass, $m_1$, and the tension, T, in the cord were known?**

A) $\frac{m_1 g - T}{g}$
B) $\frac{1}{2}Tg$
C) $\frac{m_1(T-g)}{(gm_1 - T)}$
D) $\frac{Tm_1}{(gm_1 - T)}$
E) $\frac{m_1 Tg}{(gm_1 - T)}$

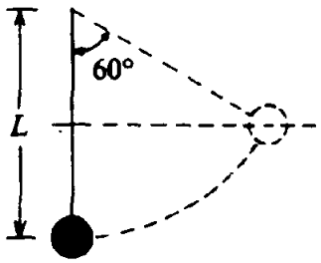



**53. A ball is thrown vertically upwards with a velocity v and an initial kinetic energy $E_k$. When half way to the top of its flight, its velocity and kinetic energy, respectively, are:**

A) $\frac{v}{2}, \frac{E_k}{2}$
B) $\frac{v}{\sqrt{2}}, \frac{E_k}{2}$
C) $\frac{v}{4}, \frac{E_k}{2}$
D) $\frac{v}{2}, \frac{E_k}{\sqrt{2}}$
E) $\frac{v}{\sqrt{2}}, \frac{E_k}{\sqrt{2}}$

**54. A pendulum consists of a ball of mass m suspended at the end of a massless cord of length L as shown. The pendulum is drawn aside through an angle of 60° with the vertical and released. At the low point of its swing, the speed of the pendulum ball is:**

A) $\sqrt{gL}$
B) $\sqrt{2gL}$
C) $\frac{1}{2}gL$
D) $gL$
E) $\sqrt{2}gL$



**55. Which of the following square roots has the same value as the expression**

$\sqrt{50} - \sqrt{18} + \sqrt{2} = ?$

A) $\sqrt{8}$ B) $\sqrt{10}$ C) $\sqrt{12}$ D) $\sqrt{32}$ E) $\sqrt{18}$

**56. What is the set of real solutions for the inequality:**

$$\left(\frac{1}{3}\right)^{x-2} < \frac{1}{9}$$

A) The set of real numbers such that $x > -1$.
B) The set of real numbers such that $x < 1$.
C) The set of real numbers such that $x > 1$.
D) The set of real numbers such that $x > 4$.
E) The set of real numbers such that $x < 4$.

**57. What are the real solutions of the equation: $3^{2x} + 5 \cdot 3^{x} + 4 = 0$**

A) $x = -1$
B) $x = -1$ or $x = 2$
C) $x = 1$ or $x = -2$
D) All real numbers
E) The equation has no real solutions

**58. What are the real solutions of the inequality?**
$|x + 2| > |x - 1|$

A) $x < -\frac{1}{2}$ B) $x > -\frac{1}{2}$ C) $x < 0$ D) $x \neq 0$ E) $x < -1$ or $x > 2$

**59. $f(x) = 5^x \Rightarrow f(x+1) - f(x) = ?$**

A) $4 \cdot 5^x$ B) $5^x$ C) $5 \cdot 5^x$ D) $5$ E) $1$

**60.** $\left(\left(\sqrt{2}\right)^{\sqrt{2}}\right)^{\sqrt{2}} = ?$

A) $1$ B) $2$ C) $\sqrt{2}$ D) $\sqrt[4]{2}$ E) $4$