

Explanation for the 2nd IMAT Mock Examination

1. Correct answer: C

The passage states that many everyday actions—such as recognizing familiar faces or instinctively catching a falling object—are driven mainly by unconscious processes rather than conscious thought. This supports option C.

2. Correct answer: B

The Renaissance period moved away from the rigid framework of medieval scholasticism and embraced new modes of thinking and artistic expression.

3. Correct answer: C

The Last Supper is a mural painted by Leonardo da Vinci depicting Jesus and his disciples.

4. Correct answer: B

George Orwell is the author of *1984*, which explores themes of totalitarianism and a surveillance society.

5. Correct answer: B

The researchers' hypothesis was that sharing ideas makes teamwork more efficient in problem-solving. The experimental results showed that, on average, teams solved puzzles 40% faster than individuals, generally supporting the hypothesis that teams are more efficient. However, some individuals performed as well as or better than teams, indicating individual differences. Overall, teams are advantageous, but exceptional individuals do exist.

6. Correct answer: E

Solve using the following variables:

- c = number of cows
- h = number of chickens
- s = number of sheep

Given conditions:

1. Total number of animals:

$$c + h + s = 96 \quad (1)$$

2. Cows plus sheep equals twice the number of chickens:

$$c + s = 2h \quad (2)$$

3. Number of cows is three times the number of sheep:

$$c = 3s \quad (3)$$

Step 1: Substitute (3) into (2):

$$3s + s = 2h \Rightarrow 4s = 2h \Rightarrow h = 2s \quad (4)$$

Step 2: Substitute (3) and (4) into (1):

$$3s + 2s + s = 96 \Rightarrow 6s = 96 \Rightarrow s = 16$$

Step 3:

$$h = 2s = 32$$

Therefore, the answer is **32 (E)**.

7. Correct answer: B

Premise: Automation improves accuracy and efficiency, but raises concerns about job losses.

Experts argue that new jobs, such as those in AI and engineering, are created.

The strongest evidence supporting the claim that automation benefits the economy overall is research showing that automation has increased total employment in technology-dependent industries (B). This directly supports job creation through automation.

8. Correct answer: B

- A) AEIOU → starts with a vowel, no consonants → invalid
- B) ORB → starts with a vowel (O), followed by consonants R and B → valid
- C) SKY → starts with a consonant → invalid
- D) EUOUA → vowels only → invalid
- E) BIRD → starts with a consonant → invalid

Therefore, **B** is correct.

9. Correct answer: B

The distances form a geometric sequence: 100, 200, 400, 800, 1600.

Total distance:

$$100 + 200 + 400 + 800 + 1600 = 3100 \text{ km}$$

10. Correct answer: B

Microtubules, actin filaments (microfilaments), and intermediate filaments.

The cytoskeleton consists of actin filaments, intermediate filaments, and microtubules, and is responsible for maintaining cell structure, intracellular transport, and movement.

11. Correct answer: E

Human AB blood type.

Codominance is a phenomenon in which both alleles are fully expressed in a heterozygote. In AB blood type, both A and B antigens are present on the surface of red blood cells.

12. Correct answer: B

The sinoatrial (SA) node is the primary pacemaker that initiates electrical impulses. It generates the electrical signals that determine the heart's rhythm.

13. Correct answer: C

Most glucose is actively reabsorbed in the proximal tubule of the nephron.

14. Correct answer: A

X-linked genes are expressed at similar levels in males and females.

In mammalian females (XX), one X chromosome is randomly inactivated in each cell (Barr body), resulting in expression levels roughly equal to those in males (XY).

15. Correct answer: B

Membrane proteins and lipids can diffuse laterally within the bilayer.

According to the fluid mosaic model, lipids and proteins move freely within the membrane plane, maintaining membrane flexibility and function.

16. Correct answer: C

An increase in aldosterone secretion from the adrenal glands.

Aldosterone promotes sodium and water reabsorption, increasing blood volume and blood pressure.

17. Correct answer: C

To amplify specific DNA sequences.

PCR (polymerase chain reaction) rapidly amplifies target DNA sequences and is essential in genetic research and forensic science.

18. Correct answer: E

A decrease in oxygen supply to cells.

Oxygen is the final electron acceptor in oxidative phosphorylation; without it, ATP synthesis is severely inhibited.

19. Correct answer: C

The probability that a child inherits a dominant trait is 50%.

The probability that none of four children inherit it is:

$$(0.5)^4 = 6.25\%$$

Thus, the probability that at least one child inherits it is:

$$100\% - 6.25\% = 93.75\% \approx 94\%$$

20. Correct answer: C

During anaphase, sister chromatids separate and move to opposite poles of the cell.

21. Correct answer: E

tRNA carries amino acids to the ribosome and matches them to mRNA codons via its anticodon. This ensures the correct sequence of amino acids during protein synthesis.

22. Correct answer: C

Homologous chromosomes pair and undergo crossing over during meiosis, but not during mitosis.

Crossing over occurs only in meiosis I and increases genetic diversity.

23. Correct answer: C

Translation stops prematurely, producing a short, nonfunctional protein.

UAA is a stop codon; if it appears within a coding sequence, translation terminates early and a complete protein is not synthesized.

24. Correct answer: A



During transcription, complementary base pairing is applied (T→A, A→U, C→G, G→C), yielding this mRNA sequence.

25. Correct answer: B

ATP and NADPH are produced.

In the light reactions of photosynthesis, ATP and NADPH are generated as long as light and water are available, even without CO₂.

26. Correct answer: D

The rate of photosynthesis decreases.

Chlorophyll mainly absorbs red and blue light and reflects green light; therefore, photosynthesis is less efficient under green light alone.

27. Correct answer: C

Red blood cells have a short lifespan because they cannot synthesize proteins for repair.

Since RBCs lack nuclei, they cannot produce new proteins, resulting in an average lifespan of about 120 days.

28. Correct answer: A

Sodium ions (Na⁺) flow into the cell, making the interior more positively charged.

During depolarization, voltage-gated Na⁺ channels open, allowing a large influx of Na⁺.

29. Correct answer: C

The cerebellum regulates movement and balance (equilibrium).

30. Correct answer: B

Enveloped viruses are more likely to enter host cells via membrane fusion.

Viruses with a lipid bilayer envelope commonly invade host cells through fusion with the cell membrane.

31. Correct answer: B

Variation in traits within a population.

Natural selection requires genetic variation to distinguish advantageous from disadvantageous traits.

32. Correct answer: D

The enzyme's three-dimensional structure changes, reducing its affinity for starch.

Allosteric inhibitors bind outside the active site, altering enzyme structure and decreasing substrate affinity.

33. Correct answer: E

Polyvinyl chloride (PVC) is produced by polymerizing vinyl chloride (CH₂=CHCl), not ethylene (CH₂=CH₂).

Options A–D describe correct general features of ethylene addition polymerization, but E is incorrect.

34. Correct answer: C

Secondary alcohols (e.g., isopropanol) are oxidized to ketones (acetone).

Primary alcohols (methanol, ethanol, 1-propanol, 1-butanol) are oxidized to carboxylic acids via aldehydes.

35. Correct answer: D

Benzene is highly stable due to aromaticity (π -electron delocalization) and does not readily undergo addition reactions under normal conditions.

36. Correct answer: B

For silver chloride (AgCl):

$$K_{sp} = [\text{Ag}^+][\text{Cl}^-] = 1.8 \times 10^{-10}$$

In pure water, $[\text{Ag}^+] = [\text{Cl}^-] = X$:

$$X^2 = 1.8 \times 10^{-10} \Rightarrow X \approx 1.34 \times 10^{-5}$$

37. Correct answer: D

Copper has a lower ionization tendency than hydrogen and cannot displace hydrogen from dilute acids. Metals such as Mg, Zn, Fe, and Al react with dilute sulfuric acid to produce hydrogen gas.

38. Correct answer: B

This reaction is exothermic, so heat is treated as part of the products. Increasing temperature shifts the equilibrium toward the endothermic direction (reactants).

39. Correct answer: D

- Mass loss (water): $2.50 - 1.60 = 0.90 \text{ g}$
- Moles of anhydrous CuSO_4 :

$$\frac{1.60}{160} = 0.010 \text{ mol}$$

- Moles of water:

$$\frac{0.90}{18} = 0.050 \text{ mol}$$

Ratio:

$$\frac{0.050}{0.010} = 5$$

Thus, the compound is a pentahydrate.

40. Correct answer: E

Every pure substance has a triple point, where solid, liquid, and gas phases coexist in equilibrium.

Options A–D correctly describe properties of water's triple point, so E ("All pure substances have a triple point") is correct.

41. Correct answer: C

A), B), D), and E) are redox reactions involving electron transfer.

In contrast, (C) is an acid–base neutralization reaction with no change in oxidation states.

41. Correct answer: C

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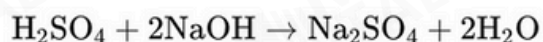
In contrast, (C) is an acid–base neutralization reaction with no change in oxidation states.

42. Correct answer: C

Moles of sulfuric acid:

$$0.0500\text{L} \times 0.100\text{mol/L} = 0.0050\text{mol}$$

Neutralization reaction:



Required NaOH:

$$0.0050 \times 2 = 0.0100 \text{ mol}$$

Volume of 0.200 mol/L NaOH:

$$\frac{0.0100}{0.200} = 0.050 \text{ L} = 50.0 \text{ mL}$$

43. Correct answer: E

At 90 °C, CuSO₄ solubility is 203 g per 100 g of water.

In 40 g of water:

$$\frac{203}{100} \times 40 = 81.2 \text{ g}$$

To dissolve 81.2 g at 20 °C:

$$\frac{81.2}{0.22} \approx 369.1 \text{ g water}$$

Additional water needed:

$$369.1 - 40 \approx 330 \text{ g}$$

44. Correct answer: D

Chlorine (Z = 17) belongs to Group 17 (halogens) and has seven valence electrons.

45. Correct answer: A

Sodium chloride (NaCl) forms an ionic bond between Na⁺ and Cl⁻.

H₂O, SiO₂, diamond, and CO₂ all involve covalent bonding.

46. Correct answer: C

Density = 1.2 g/mL \rightarrow 1 L of solution has a mass of 1200 g.

36.5% by mass \rightarrow HCl = $1200 \times 0.365 = 438$ g.

Molar mass of HCl = 36.5 g/mol.

$$438 \div 36.5 = 12.0 \text{ mol}$$

Therefore, the molarity is 12.0 mol/L.

47. Correct answer: C

Among the options, sulfuric acid (H_2SO_4) is generally the strongest acid in aqueous solution.

Although HCl is a strong monoprotic acid, H_2SO_4 has a very strong first dissociation and dissociates in two steps.

48. Correct answer: C

$$(64^2)^{1/6} = (4^6)^{1/6} = 4$$

49. Correct answer: B

Let $\log_2(x) = A$, then $x = 2^A$.

Substituting into the given equation yields $x = 3$.

50. Correct answer: A

The problem concerns the probability of choosing cashew nuts or peanuts three times consecutively:

$$\frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} = \frac{12}{65}$$

51. Correct answer: D

The surface area of a cylinder is:

$$S = 2\pi r^2 + 2\pi rh$$

52. Correct answer: C

Each side of the square is $\sin(a) \times c$, and the base of the triangle is $\cos(a) \times c$.

The perimeter of the trapezoid is the sum of the hypotenuse c , the triangle base $\cos(a)c$, and three sides of the square $3\sin(a)c$:

$$c + \cos(a)c + 3\sin(a)c$$

53. Correct answer: all answer is correct

The numerator $(x - 5)^2$ is always positive except at $x = 5$.

Thus, the sign of the expression depends on the denominator, and division by zero occurs when the denominator equals zero.

The solution set is $x < \frac{8}{7}$ and $x = 5$.

Since no option matches, all answers are accepted as correct.

54. Correct answer: D

Average power is $P_{av} = W/t$.

The change in potential energy is:

$$0.01 \times 1.5 \times 10$$

Dividing by time (0.4 s):

$$0.375$$

55. Correct answer: A

Power dissipated by a resistor is $P = I^2 R$.

Original conductor:

$$P_1 = 15^2 \times 16$$

New conductor:

$$P_2 = 15^2 \times 8$$

Difference:

$$15^2 \times 8 \approx 1800 \text{ W}$$

56. Correct answer: A

For an ideal gas: $PV = nRT$.

Temperature is measured in kelvin.

If T becomes 1.5 times larger and V is halved, pressure becomes:

$$1.5 \times \frac{1}{0.5} = 3$$

Thus, pressure triples.

57. Correct answer: E

Distance in the first 4 seconds under constant acceleration:

$$\frac{1}{2}at^2 = \frac{1}{2} \times 4 \times 4^2 = 32 \text{ m}$$

Velocity after 4 seconds:

$$v = at = 16 \text{ m/s}$$

Distance in the next 6 seconds:

$$16 \times 6 = 96 \text{ m}$$

Total distance:

$$32 + 96 = 128 \text{ m}$$

58. Correct answer: A

According to Coulomb's law

$$F = k \frac{q_1 q_2}{r^2}$$

the electrostatic force acts with a constant magnitude.

59. Correct answer: E

A pendulum's speed is greatest at its lowest point and zero at its highest point.

60. Correct answer: B

Newton's second law: $F = ma$.

First, calculate acceleration:

$$a = \frac{0 - 20}{4} = -5 \text{ m/s}^2$$

$$F = 1200 \text{ kg} \times (-5 \text{ m/s}^2) = -6000 \text{ N}$$