

Admission test -Degree Course in Pharmacy, University of Rome 'Tor Vergata', Academic Year 2017/2018

- 1** When the anion MnO_4^- is transformed into cation Mn^{2+} , manganese:
- A Goes from oxidation number +7 to +2 and is reduced
B Goes from oxidation number +7 to +2 and is oxidized
C Goes from oxidation number -1 to +2 and is reduced
D Goes from oxidation number -2 to +2 and is reduced
E None of the above
- 2** Indicate which is the sulfite ion:
- A SO_4^{2-}
B SO_3^{2-}
C S^{2+}
D $\text{S}_2\text{O}_3^{2-}$
E S^{2-}
- 3** Given that the atomic mass of carbon is 12, how many atoms are present in 0,36g of carbon?
- A 50
B 0,03
C $6,022 \times 10^{23}$
D $1,8066 \times 10^{22}$
E 12
- 4** If in a water solution the concentration of H_3O^+ ions is 0,001M, what is the pH?
- A 1
B 0,001
C 3
D 30
E 7
- 5** How many grams of ethyl alcohol ($\text{C}_2\text{H}_5\text{OH}$, MW 46,1) are present in 500mL of a solution 0,2M?
- A 4,61g
B $6,022 \times 10^{23}$ g
C $1,0 \times 10^{23}$ g
D 0,461g
E None of the above
- 6** Methanol is:
- A An organic compound containing a hydroxy group
B An aromatic organic compound
C A halogenated organic compound
D An organic compound containing an amino group
E None of the above
- 7** An atom that contains 19 protons, 20 neutrons and 19 electrons has the following mass number:
- A 19
B 20
C 39
D 58
E 19,5
- 8** Which of the following solutions has $\text{pH} > 7$?
- A 50mL of a 0,1M solution of NaCl
B 50mL of a 0,1M solution of HCl
C 250mL of a 0,1M solution of HCl
D 50mL of a 0,1M solution of NaOH
E 50mL of a 0,1M solution of NH_4Cl
- 9** A 0,5 M solution of KCl contains:
- A 1mol of solute per liter of solution
B 0,5g of solute per liter of solution
C 0,5g of solute per Kg of solution
D 1mole of solute per Kg of solution
E 0,5moles of solute per liter of solution
- 10** Which of the following couples of atoms can form a covalent bonding?
- A H; Na
B H; Br
C Na; Br
D Ca; Cl
E Ca; O

- 11 A gas sample at $T=0^{\circ}\text{C}$ and $P= 1 \text{ atm}$ has volume $V= 44,8 \text{ L}$, contains:**
- A About 1 mole
 - B About 1gram
 - C About 2 moles
 - D About 2grams
 - E About 2 molecules
- 12 Ice and water constitute a system:**
- A Chemically heterogeneous and physically heterogeneous
 - B Chemically homogeneous and physically heterogeneous
 - C Chemically homogeneous and physically homogeneous
 - D Chemically heterogeneous and physically homogeneous
 - E None of the above
- 13 Which species can be formed upon combustion of methane (CH_4)?**
- A Hydrogen and oxygen
 - B Carbon and hydrogen
 - C Propane
 - D Methane gas
 - E Carbon dioxide and water
- 14 In order to neutralize 100mL of a 0,01M solution of KOH it is necessary to add:**
- A 0,1mL of H_2O
 - B 0,1mL of a 1 M solution of NaOH
 - C 1mL of a 10^{-2} M solution of HNO_3
 - D 100mL of a 10^{-2} M solution of HNO_3
 - E 100mL of a 10^{-2} M solution of NaOH
- 15 In order to neutralize 100ml of a 10^{-3}M solution of HCl it is necessary to add:**
- A 1000ml of H_2O
 - B 10ml of a 0.01 M solution of NaOH
 - C 10ml of a 0.01 M solution of KCl
 - D 1ml of a 10^{-2} M solution of HNO_3
 - E 1ml of a 10^{-2} M solution of NaOH
- 16 In eukaryotic cells, DNA occurs only in:**
- A Cell nuclei, mitochondria, Golgi apparatus
 - B Mitochondria, Golgi apparatus, chloroplasts
 - C Cell nuclei, lysosomes, chloroplasts
 - D Cell nuclei, mitochondria, chloroplasts
 - E Mitochondria, chloroplasts, lysosomes
- 17 Two parents who do not exhibit phenylketonuria (PKU) have a son with PKU. Which of the following conclusions can be drawn from this situation?**
- A The allele for PKU is located on the Y chromosome
 - B PKU is a dominant trait
 - C PKU is a recessive trait
 - D A mutation occurred in the sperm of the father
 - E None of the above
- 18 Which of the following cellular processes normally produces ATP from glucose in the absence of oxygen?**
- A Krebs cycle
 - B Glycolysis
 - C Chemiosmosis
 - D Calvin cycle
 - E None of the above
- 19 Which of the following best describes the pathway of a protein from its manufacture to its secretion from the cell?**
- A Endoplasmic reticulum \rightarrow Golgi complex \rightarrow secretory vesicle
 - B Secretory vesicle \rightarrow endoplasmic reticulum \rightarrow Golgi complex
 - C Secretory vesicle \rightarrow Golgi complex \rightarrow endoplasmic reticulum
 - D Golgi complex \rightarrow endoplasmic reticulum \rightarrow secretory vesicle
 - E None of the above
- 20 A person touches a hot object and immediately moves her finger away from it. Which of the following structures is the first to receive an impulse triggered by the stimulus?**
- A Synapse
 - B Ventral root ganglion
 - C Motor neuron
 - D Sensory neuron
 - E None of the above

- 21 The sympathetic nervous system**
 A Increases heart rate
 B Is voluntary
 C Is activated mainly in sleep
 D Activates digestion
 E None of the above
- 22 A health disorder that results from a deficiency of thyroid hormone production in adults and is characterized by a low metabolic rate, increase in body weight and tiredness is:**
 A Hyperthyroidism
 B Goiter
 C Cretinism
 D Hypothyroidism
 E None of the above
- 23 In eukaryotic cells, protein synthesis takes place at the:**
 A Nucleus
 B Mitochondria
 C Chloroplasts
 D Ribosomes
 E Lysosome
- 24 The four bases which form the code words for DNA are:**
 A UTAC
 B ACTU
 C AGCU
 D ATCG
 E None of the above
- 25 Prokaryotic cells are different from eukaryotic cells because prokaryotic cells:**
 A Are much bigger
 B Have no cell nuclei
 C Have cell nuclei
 D Have no cell wall
 E Have mitochondria and chloroplasts
- 26 The DNA double helix is stabilized by hydrogen bonds between:**
 A Purine bases and complementary pyrimidine bases
 B Pyrimidine bases only
 C Purine bases only
 D Molecules of deoxyribose and phosphate groups
 E Nitrogenous bases and phosphate groups
- 27 During which of the following stages of cell cycle DNA replication occurs?**
 A Early prophase
 B G1 phase
 C G2 phase
 D G0 phase
 E S phase
- 28 Which of the following statements best describes mitosis?**
 A It occurs only in the reproductive structure of organism
 B During this stage DNA is synthesized
 C It is one of the interphase stages
 D It is the division of mother cell into two daughter cells, genetically identical to each other and to their parent cell
 E It is the division of mother cell into two daughter cells, genetically different from each other and from their parent cell
- 29 Gene expression may be regulated:**
 A Only during translation
 B Only during transcription
 C During transcription and translation
 D Only during replication
 E During replication and transcription
- 30 One of a series of different versions of gene is called:**
 A Genome
 B Haploid
 C Diploid
 D Allele
 E Allosome

- 31 Which of the following processes can decrease the genetic variation in natural populations?**
 A Recombination
 B Immigration
 C Mutagenesis
 D Inbreeding
 E Hybridization
- 32 Eutrophication is the process of:**
 A Vegetation succession in lakes
 B Nutrient depletion of lakes
 C Increase inflow of minerals in lakes
 D Primary succession in lakes
 E Biological renewal of aquatic ecosystems
- 33 Which of the following types of plants tissue transport water and minerals?**
 A Phloem
 B Xylem
 C Meristem
 D Vascular cambium
 E Epidermis
- 34 Which of the following require a host cell because they are notable to make proteins on their own?**
 A Paramecium caudatum
 B Escherichia coli
 C Influenza virus
 D Saccharomyces cerevisiae
 E Euglena viridis
- 35 Which of the following is found in an unusual high proportion in cells of cardiac muscle?**
 A Lysosomes
 B Mitochondria
 C mRNA
 D Golgi apparatus
 E Cell nucleus
- 36 Which of the following organisms conduct ethanol fermentation?**
 A Yeasts
 B Bears
 C Spiders
 D Barley
 E Mushrooms
- 37 Which of the following is the right order of the four stages of food processing?**
 A Digestion, ingestion, absorption, elimination
 B Ingestion, digestion, elimination, absorption
 C Ingestion, digestion, absorption, elimination
 D Digestion, ingestion, absorption, elimination
 E Absorption, elimination, digestion, ingestion
- 38 Which hormone is produced by the placenta?**
 A Progesterone
 B Insulin
 C Thyroxin
 D Melatonin
 E None of the above
- 39 Which of the following is not characteristic for mammals?**
 A Mammary glands
 B Hair
 C Cold-blooded
 D Three middle ears bones
 E Sweat glands
- 40 All of the members of a particular species that live in one area are called a(an):**
 A Biotope
 B Community
 C Ecosystem
 D Biosphere
 E Population

- 41 Consider the following inequalities:**
- A $(2/3) > (3/4)$
 B $(2/3) < (2/5)$
 C $z^{-1} > z^{-2}$ when z is real and $z > 1$
 D $2 + \frac{1}{10} > 1 + \frac{11}{10}$
 E None of the above
- 42 What is the solution of the linear system $x+y=5$; $2x+3y=4$?**
- A $x=1, y=1$
 B $x=11, y=-6$
 C The linear system has infinite solutions
 D $x=-11, y=6$
 E The linear system has no solution
- 43 What is/are the correct value(s) of $(a + b)^2$ (a, b real numbers)?**
- A $a^2 + ab + b^2$
 B $a^2 + b^2$
 C $a^2 - b^2$
 D $a^2 + 2ab + b^2$
 E $a^2 + 2ab + b^2$
- 44 Consider the equation $4 - \sqrt{7 + \sqrt{9 + \sqrt{4 + x}}} = 0$. Mark the correct value of x**
- A 3660
 B 46
 C 567
 D 68
 E 5180
- 45 What is/are the correct value(s) of x for the equation $\log_x(16) = \frac{4}{3}$?**
- A $x = \sqrt[3]{65536}$
 B $x = 64$
 C $x = 2$
 D $x = 8$
 E $x = 1$
- 46 Calculates the mass of the motorcycle with speeds of 10 m / s and kinetic energy of 10000 J**
- A 100 kg
 B 300 kg
 C 200 kg
 D 400 kg
 E 500 kg
- 47 Which physical quantity can be measured in Newton meter (N m)?**
- A Force
 B Momentum
 C Kinetic energy
 D Power
 E Work
- 48 Which physical quantity can be measured in Newton second (N s)?**
- A Force
 B Momentum
 C Kinetic energy
 D Power
 E Work
- 49 When do you have a uniform circular motion?**
- A When there is a variable centripetal force
 B When there is a constant centripetal force
 C When there is a constant centrifugal force
 D When there is a variable centrifugal force
 E When there is a constant velocity
- 50 A net force F_A acts on object A, and a net force F_B acts on object B. The mass of object B is twice the mass of object A, and the acceleration of object B is twice that of object A. Which of the following relations between F_A and F_B is true?**
- A $F_B = \frac{1}{4} F_A$
 B $F_B = \frac{1}{2} F_A$
 C $F_B = F_A$
 D $F_B = 2 F_A$
 E $F_B = 4 F_A$

- 51** In which year the Wright brothers achieved the first powered, sustained and controlled airplane flight?
A 1908
B 1918
C 1880
D 1903
E None of the above
- 52** The Machu Picchu is an archeological site located in?
A Perù
B Iran
C Mexico
D Colombia
E None of the above
- 53** Which is the Capital of Romania?
A Budapest
B Bucarest
C Belgrad
D Novi Sad
E None of the above
- 54** Which architect designed the Sagrada Familia in Barcellona?
A Le Corbusier
B Carlos Gardel
C Antoni' Gaudi'
D Oscar Niemeyer
E None of the above
- 55** Who first discovered the oral polio vaccine?
A Fleming
B Sabin
C Dulbecco
D Pasteur
E None of the above
- 56** In which year Christopher Columbus discovered America?
A 1592
B 1472
C 1492
E 1542
- 57** Who designed the cupola of Santa Maria del Fiore in Florence?
A Michelangelo
B Raffaello
C Maderno
D Brunelleschi
E None of the above
- 58** Which of the following movies was not directed by Stanley Kubrick?
A 2001: A Space Odyssey
B Lawrence of Arabia
C Shining
D A clockwork Orange
E None of the above
- 59** Which of the following Nations is not a Republic?
A Portugal
B Austria
C Greece
D Sweden
E None of the above
- 60** Roger Federer is:
A Football player
B Basketball player
C Volleyball player
D Tennis player
E None of the above

Admission test -Degree Course in Pharmacy, University of Rome "Tor Vergata", Academic Year 2018/2019

Please mark with an "X" the letter corresponding to the right answer

- 1 Cardiac muscles consume more energy than any other cell type. Which organelle would you expect to be most abundant in cardiac muscle cells?**
- A Golgi apparatus
 - B Mitochondria
 - C Vacuole
 - D Lysosome
 - E Ribosome
- 2 Genetic information usually flows in one specific direction. Which of the following best represents this flow?**
- A DNA vs Protein vs RNA
 - B Protein vs RNA vs DNA
 - C RNA vs Protein vs DNA
 - D DNA vs RNA vs Protein
 - E None of the above
- 3 The maximum fixation of solar energy is made by:**
- A Green plants
 - B Fungi
 - C Protozoa
 - D Bacteria
 - E Alghe
- 4 Outside the nucleus DNA is found in:**
- A Mitochondria
 - B Peroxisomes
 - C Golgi apparatus
 - D Endoplasmic reticulum
 - E Lysosomes
- 5 The sleeping sickness is caused by:**
- A Escherichia coli
 - B Neisseria
 - C Entamoeba
 - D Trypanosoma
 - E None of the above
- 6 The male sex hormone is:**
- A Insulin
 - B Testosterone
 - C Progesterone
 - D Estrogen
 - E Aldosterone
- 7 The branch of Zoology that deals with the study of animal behaviour is:**
- A Ecology
 - B Physiology
 - C Ethology
 - D Anatomy
 - E Ornithology
- 8 The total interacting animals and plants in a well-defined area is known as:**
- A Population
 - B Biome
 - C Community
 - D Species
 - E Group
- 9 Which blood group is called the "universal donor"?**
- A A
 - B B
 - C O
 - D AB
 - E BO
- 10 Process of cell division can take place by:**
- A Heterosis
 - B Fusion
 - C Mitosis
 - D Apoptosis
 - E None of the above

- 11 In normal sexual reproduction, two mature germ cells fuse to form a:**
 A Gonad
 B Ovary
 C Embryo
 D Zygote
 E None of the above
- 12 What word corresponds to the following definition: "All the chemical reactions that take place within the cell":**
 A Photosynthesis
 B Respiration
 C Mitosis
 D Decomposition
 E Metabolism
- 13 An organic compound is one that:**
 A Contains carbon
 B Is slightly acidic
 C Forms long chains
 D Is soluble in water
 E Is hydrophobic
- 14 A person who receives an extra chromosome, could have:**
 A Heightened intelligence
 B Down Syndrome
 C Red eyes
 D Polygenic traits
 E None of the above
- 15 If a person receives an X and a Y chromosome, that person is:**
 A Female
 B Male
 C Red hair
 D Mentally challenged
 E Mutated
- 16 The process by which DNA makes a copy of itself is called:**
 A Synthesis
 B Replication
 C Transcription
 D Translation
 E None of the above
- 17 A gene is:**
 A A segment of DNA that codes for a protein
 B A set of homologous chromosomes
 C A molecule within DNA
 D A type of pants
 E None of the above
- 18 What is the pulse rate of an average healthy human being?**
 A 65 beats per minute
 B Beats per minute
 C 100 beats per minute
 D 72 beats per minute
 E None of the above
- 19 How is the age of a tree determined?**
 A By measuring its height
 B By measuring its girth
 C By counting the annual rings in a cut trunk
 D By counting the number of its branches
 E None of the above
- 20 Which of the following are known as "pisces"?**
 A Reptiles
 B Fish
 C Birds
 D Mammals
 E None of the above
- 21 What is the distance covered after 4 seconds by a vertically fallen object?**
 A 7.48 m
 B 39.2 m
 C 78.4 m
 D 19.6 m
 E 196 m

- 22** What is the final velocity, after 4 seconds, of a vertically fallen object?
 A 7.48 m/s
 B 3.92 m/s
 C 78.4 m/s
 D 19.6 m/s
 E 39.2 m/s
- 23** Which physical quantity can be measured in meter per second per second (m/s^2) ?
 A Force
 B Acceleration
 C Kinetic energy
 D Velocity
 E Work
- 24** If a stone is projected vertically upwards with a speed of 5 m / s, what is the speed of the stone at the highest point?
 A 5 m / s
 B -5 m / s
 C 10 m / s
 D -10 m / s
 E zero m / s
- 25** An ambulance travels for 50 Km in 1 hour, what is its average speed?
 A 50 m / s
 B 0.8 m / s
 C 8 m/s
 D 5 m/s
 E 13.9 m/s
- 26** Mark the correct value of $(a^2)^5$
 A a^9
 B a^7
 C $a^{\frac{5}{2}}$
 D a^{2^5}
 E None of the above
- 27** Which is the correct result of $\sqrt{x^2}$?
 A $|x|$
 B x
 C $2x$
 D $x^{2/3}$
 E none of the above
- 28** The value 1.012E-02 appeared on my calculator' screen means:
 A 0,1012
 B Error in the representation
 C 0,01012
 D 0,001012
 E None of the above
- 29** Consider the value of $y = \frac{1}{5} + \frac{1}{4}$. Mark the correct expression:
 A $y < 0$
 B $\frac{1}{4} < y < \frac{1}{5}$
 C $\frac{2}{5} < y < \frac{1}{2}$
 D None of the above
 E All of the above
- 30** Mark the equivalent expression for $a^2 - b^2$:
 A $(a - b)^2$
 B $(a - b)(a + b)$
 C $a^2 - b^2 - 2ab$
 D $b^2 - a^2$
 E None of the above
- 31** When the anion CrO_4^{2-} is transformed into cation Cr^{3+} , Chromium:
 A Goes from oxidation number +6 to +3 and is oxidized
 B Goes from oxidation number +6 to +3 and is reduced
 C Goes from oxidation number -2 to +3 and is reduced
 D Goes from oxidation number -2 to +3 and is reduced
 E None of the above
- 32** Indicate which is the sulfide ion:
 A SO_4^{2-}
 B SO_3^{2-}
 C S^{2-}
 D S^{2+}

- E $\text{S}_2\text{O}_3^{2-}$
- 33 Which of the following elements is found in nature not combined?**
- A Na
B Cu
C Al
D He
E Ca
- 34 What of the following ratios defines density?**
- A Weight/Mass
B Mass/Volume
C Weight/Length
D Energy/Volume
E Mass/Length
- 35 Given that the atomic mass of carbon is 12, how many atoms are present in 0,24g of carbon?**
- A 50
B 0,02
C $1,2044 \times 10^{22}$
D 12
E $6,022 \times 10^{23}$
- 36 If in a water solution the concentration of H_3O^+ ions is 0,01M , what is the pH?**
- A 1
B 0,01
C 2
D 20
E 7
- 37 How many grams of acetone ($\text{C}_3\text{H}_6\text{O}$, MW 58,08) are present in 500mL of a solution 0,2 M?**
- A 5,808 g
B $6,022 \times 10^{23}$ g
C $1,0 \times 10^{23}$ g
D 58,08 g
E None of the above
- 38 Benzene is:**
- A An organic compound containing a hydroxy group
B An aromatic organic compound
C A halogenated organic compound
D An organic compound containing an amino group
E None of the above
- 39 Which of the following solutions has pH $\text{pH} < 7$?**
- A 50 mL of a 0.1 M solution of NaCl
B 250 mL of a 0.1 M solution of NaOH
C 50 mL of a 0.1 M solution of NaOH
D 50 mL of a 0.1 M solution of $\text{CH}_3\text{CO}_2\text{Na}$
E 50 mL of a 0.1 M solution of HCl
- 40 A 0.5 M solution of NH_4Cl contains:**
- A 1 mol of solute per liter of solution
B 0.5 moles of solute per liter of solution
C 0.5 g of solute per liter of solution
D 0.5 g of solute per Kg of solution
E 1 mole of solute per Kg of solution
- 41 A gas sample at $T=0^\circ\text{C}$ and $P= 1 \text{ atm}$ has volume $V= 67,2 \text{ L}$, contains:**
- A About 3 Moles
B About 3 Grams
C About 3 Molecules
D About 1 Mole
E About 1 Gram
- 42 In order to neutralize 100 mL of a 0,001M solution of KOH it is necessary to add:**
- A 0.01 mL of H_2O
B 0.01 mL of a 1 M solution of NaOH
C 0,01 mL of a 10^{-2} M solution of HNO_3
D 10 mL of a 10^{-2} M solution of HNO_3
E 10 mL of a 10^{-2} M solution of NaOH
- 43 What is the reaction occurring during metal corrosion?**
- A Hydrolysis
B Precipitation
C Combustion
D Neutralization
E Redox

- 44** If 1 g of ammonium chloride is dissolved into water, and the solution is diluted to 10mL with water, the concentration of the solution is:
- A 1000 g/L
 - B 100 g/L
 - C 10 g/L
 - D 1 g/L
 - E 0.1 g/L
- 45** If the pH of a solution varies from 7 to 9, the concentration of H_3O^+ ions:
- A Becomes The Half
 - B Becomes The Double
 - C Increases Of 100 Times
 - D Decreases Of 100 Times
 - E Increases Of 2 Units
- 46** What is the International Air Transport Association airport code for Heathrow Airport?
- A HRW
 - B HTR
 - C LHR
 - D LHW
 - E LHT
- 47** Who plays Lara Croft in the Tomb Raider series of films?
- A Angelina Jolie
 - B Minnie Driver
 - C Nell McAndrew
 - D Jennifer Aniston
 - E Pamela Anderson
- 48** Which volcano is best known for its eruption in AD 79 that led to the destruction of the Roman cities of Pompeii and Herculaneum?
- A Mount Etna
 - B Mount Stromboli
 - C Mount Vesuvius
 - D Mount Vulture
 - E Mount Sinai
- 49** Eritrea, which became the 182nd member of the UN in 1993, is in the continent of
- A Asia
 - B Africa
 - C Europe
 - D Australia
 - E America
- 50** For which of the following disciplines is Nobel Prize awarded?
- A Physics and Chemistry
 - B Physiology or Medicine
 - C Literature, Peace and Economics
 - D All of the above
 - E None of the above
- 51** "Run Lola Run" (1998) is a...
- A French movie
 - B German movie
 - C Swedish movie
 - D Italian movie
 - E None of the above
- 52** The Capital of Poland is...
- A Cracow
 - B Paris
 - C Glasgow
 - D Warsaw
 - E Madrid
- 53** What is the Highest Mountain in Western Europe?
- A Ben Nevis - Scotland
 - B Snowden - Wales
 - C Mont Blanc - France/Italy
 - D Gerlach – Slovakia
 - E Sierra Nevada – Spain
- 54** When was European Economic Community formed?
- A 25 March 1957
 - B 10 May 1945
 - C 23 August 1949
 - D 30 December 1955
 - E None of the above

- 55** **When did Bulgaria and Romania join European Union?**
A 2001
B 2007
C 1993
D 1996
E None of the above
- 56** **When did euro coins and notes come into circulation?**
A 1 January 2002
B 1 June 1998
C 1 July 2003
D 7 December 1999
E 1 January 2000
- 57** **When was Abraham Lincoln first sworn in as President of USA?**
A January 1869
B 4 March 1861
C January 1873
D 4 March 1849
E January 1900
- 58** **Which river flows through the city of Amsterdam?**
A The Tiber
B The Tagus
C The Amstel
D The Thames
E None of the above
- 59** **What is the largest denomination of Euro bank note?**
A €100
B €500
C €200
D €1000
E None of the above
- 60** **The reactor at the site of the Chernobyl nuclear disaster is now in which country?**
A Poland
B Ukraine
C Slovakia
D Hungary
E Russia