

- 1) **Reda is a traitor to his homeland.**
Traitors to the homeland work for the biology division at PrePost.
Some of those who worked in the logics division last year, are working in the biology division this year.
Pick the correct statement among the following:
- A) Reda is working in the biology department this year
 B) Reda is a traitor of his homeland that last year has worked in the logics division
 C) Some of those who have worked in the logics division last year are traitors
 D) Anybody working in the biology division is a traitor of the homeland
 E) There are no traitors of the homeland who are not working in the biology division this year
- 2) **“The of the world is a cycle of production and , so combined that the one for the good of the other. By their joint operation the is preserved. If either ceased, the world would dissolve. Therefore, if suffering were removed from the earth, its own existence would be endangered.”**
From “*Dialogue between Nature and an Icelander*” by G. Leopardi
- A) life – perpetual – destruction – works – universe
 B) reality – fleeting – demolition – provides – cosmos
 C) reason – inextinguishable – restoration – is useful – body
 D) duration – eternal – devastation – surrender – creation
 E) philosophy – perishable – disintegration – rules – mankind
- 3) **Which of the following statements is related to this syllogism?**
Enriquez, despite being a physician, is very timid, therefore, as soon as he gets into a female patient’s room, he faints because of emotion. Believe it or not, some very shy people end up specializing in gynaecology.
- A) Enriquez will be a gynaecologist and he will faint on every medical examination
 B) We can’t take for granted that Enriquez won’t be a gynaecologist
 C) Gabri has the nerve but she could still be a gynaecologist
 D) None of the gynaecologists is shy
 E) B + C
- 4) **Jack is a very unfair football player; he receives a yellow card every time he plays a match, but he never gets a red card or a double yellow card. Jack always plays as a starter and his championship is composed of 30 matches. Guidelines mandates a day off after 5 yellow cards, then another day off after 5 more yellow cards. After that, restrictions increase and a day off is mandated after 4 yellow cards, then after 3 and finally 2. How many yellow cards does Jack receive in a season?**
- A) 23
 B) 19
 C) 30
 D) 21
 E) 24
- 5) **Julie has got some pencils. They are half as many as Clara’s rubbers. Sandra’s pencils are half as many as her rubbers. Sandra’s rubbers are one third of Clara’s rubbers. The rubbers are 16 all together. How many pencils do Julie and Sandra have all together?**
- A) 2
 B) 6

- C) 8
- D) 10
- E) 15

6) Santa, Bosco and Pillo are suspected of having stolen the cash fund of Cusl. They respectively make the following statements:

S: "It wasn't me"

B: "I'm too handsome, it was Pillo"

P: "It was Santa"

Dave Calabretta knows for sure that two of them are lying, while one of them is saying the truth. Who is the culprit?

- A) We can only assume that Pillo is innocent
- B) Santa
- C) Bolco
- D) Pillo
- E) It is not possible to establish who is the thief

7) Choose the odd one out:

- A) Canine
- B) Tennis
- C) Weight
- D) Honesty
- E) Slim

8) Which of the following is an inductive reasoning?

- A) Physiotherapists are usually handsome and intelligent. Stecco is certainly handsome, but he is quite stupid. Therefore, he is not a physiotherapist
- B) Pillo and Mary Frangi love aperitivo. So does Simo Soz. Pillo, Mary Frangi and Simo Soz are freshmen. Freshmen love aperitivo.
- C) Bazz and Biro do not love motorbikes and they are in 6th year of Medical school. Cioppi and Eli do not love motorbikes and they are attending 6th year of Medical school. Not all 6-year-students love bicycles.
- D) All the inhabitants of Villasanta love playing in the band. Giordi is in the band, therefore he loves playing the clarinet.
- E) None of the above

9) Nine guys from Sacco decide to go all together on a trip to Sicily. The plan is to spend 10 nights in a hotel, for a total of 1440€. Lommi decides to join them last minute and to spend 5 nights with them. The guys find a way to keep the total amount of money unchanged and to divide it taking into account also Lommi. How much will Lommi owe to each of the guys so that everyone pays the same amount of money with respect to the number of days spent together?

- A) 8
- B) 72
- C) 144
- D) 9
- E) 4

- 10) Marghe, Marta, Anna, Cocca and Sara are going to the seaside. Since they have a small car, they choose to each bring, in addition to all the necessary things for the beach, one object that could make the day a good one. Eventually, the car contains a pink ball, a giant watermelon, a sun cream SPF80, the Lord of the Rings trilogy, and an inflatable crocodile.

Knowing that:

Cocca does not use sun cream - she's already so tanned!

Sara loves playing on the beach with the ball

Marghe, Cocca and Marta do not like watermelon

Marta and Anna are fans of the Lord of the Rings

Cocca and Marghe love bathing with the inflatable crocodile

Who brought the sun cream?

- A) Marghe
- B) Marta
- C) Anna
- D) Cocca
- E) Sara

- 11) Which of the following numbers completes the sequence 21; 15; 33; 11; 5; ?

- A) 7
- B) 6
- C) 3
- D) 18
- E) 24

- 12) Chiara loves running around Milan. Today she has decided to run south 7 km, east 4 km, north 1 km, west 1 km and then north 2 km more. Once she's done running, she walks 3 km to the west toward a bakery to treat herself with a donut. How far away is she from her home, the starting point, as the crow flies?

- A) 4 Km
- B) 5 Km
- C) 7 Km
- D) 0 Km
- E) 6 Km

- 13) On Christmas eve, Giuli is wrapping up many presents for her Dylan. Doing the job on her own, it would take her 1 hour and a half. If Marti was helping her, they would take just one hour. How long would it take Marti to wrap the presents on her own?

- A) 2.00 h
- B) 2.30 h
- C) 2.45 h
- D) 3.00 h
- E) 3.15 h

- 14) Knowing $\&=18$ and $\#=14$, solve the following equations to calculate the value of $@$ and $!$ respectively.

$$5@-1/3\& = \#$$

$$\#+16/!= \&$$

- A) 3
- B) 4
- C) 5
- D) 6
- E) 7

- 15) **The price of a coat in December is 140\$. In January, a 30% discount is applied and in February a further 20% is offered. Furthermore, in a special shop-wide sale, clients who buy merchandise costing at least 90\$ total will receive a further 5% discount. Lucia, taking advantage of the special sale, buys the coat and a 15\$ hat. How much has she saved compared to somebody buying the same coat and hat back in December?**

- A) 88,73 \$
- B) 78,4 \$
- C) 140 \$
- D) 70 \$
- E) 66,27 \$

- 16) **A female-only new year's eve party is taking place. 50 people showed up. Due to a mishap in the dress code description in the invitations, some invitees arrived in their pajamas, some formally dressed and others with costumes on.**

Three groups can be recognized also by classifying the hair color of the attendees: blondes, redheads and brunettes. A fifth of the attendees are wearing their pajama, while the number of masked women is larger by 5 units compared to the pajama group. Furthermore, 30 are brunettes and redheads are one fewer than half the number of blondes. There's an equal number of blondes wearing a pajama, blondes wearing a mask and redheads wearing a formal dress, which is twice the amount of redheads wearing a mask; there's also twice the amount of formally-dressed blonde women as there's brunettes wearing a pajama. How many brunettes are formally dressed?

- A) 12
- B) 13
- C) 14
- D) 11
- E) 10

- 17) **When we listen to music, electric waves in our brain tend to synchronize with the rhythm of the music. In a recent study from the university of Fossombrone, scientists recorded the electric waves in the brain of some musicians and some non-musicians while they were listening to music. Even though in both cases electric waves in the brain synchronized to different rhythms, electric waves in the brain of non-musicians did not synchronize to extremely slow music. Non-musicians reported that they couldn't keep the rhythm when they were listening to slow music. This proves that an innate ability of the brain to synchronize to the rhythm of all kinds of music, being it slow or fast, is necessary to become a musician. Which of the following options shows the mistake in the above reasoning?**

- A) The rhythm of a slow music may be more difficult to follow for a listener
- B) By studying music, a person may develop the ability to synchronize brain electric waves with the rhythm
- C) Some musician may decide to play music in the future
- D) Becoming a musician may depend on several different abilities
- E) Some researchers from Cislago university said that there are no electric waves in our brain

18) **Even if in the last decade the number deaths and severe injuries on the road among children has dropped by 52%, we should not presume that lessons on road safety for students are not essential anymore. A study of the government shows that in 2006, among pedestrians, nearly 1300 boys and 700 girls were killed or severely injured in traffic accidents and 500 young cyclists were killed or severely injured, more than 400 of which were boys.**

Taking 2006 as a representative year for traffic accidents involving children as pedestrian or cyclists, which of the following conclusions can be drawn from the above text?

- A) More boys own a bike than girls
- B) Girls are more controlled by their parents as they walk in the streets
- C) Males may be more risk-takers as they cycle.
- D) Males risk to be killed or to be severely injured as cyclists or pedestrians is almost double compared to females
- E) Lessons on road safety for male students may decrease deaths in traffic accidents among kids.

19) **Bolivian government is planning an economic growth of 2% per year. If the purpose was achieved, energy consumption would be doubled by 2050. The government is also planning a massive reduction of carbon dioxide emissions by 2050. If the energy consumption is doubled, it would require a huge increase on the use of energies alternative to fossil fuels, such as nuclear energy or renewable energies like wind, water and solar energy. In the present level of development, these sources of renewable energy would not be able to provide for the total need of energy. Thus, even if nuclear energy is considered problematic because it produces toxic wastes, it will be used in 2050 in Bolivia.**

Which of the following statements weakens the above line of reasoning?

1. The government plan on economic growth may not be achieved
2. By 2050, we may discover how to dispose of nuclear wastes
3. It may be possible to speed up the development of renewable energy

- A) 1
- B) 2
- C) 3
- D) 1 and 2
- E) 1 and 3

20) **People keep wondering if one day machines may have a conscience, of course it's obvious that one day they will. After all, if conscience is the result of the work of the brain, and if the brain is only a very complex machine, what would prevent machines from becoming complex enough to have a conscience? Machines become more and more complex every year. It's just a matter of time before machines gain this ability.**

Which of the following statement shows the mistake in the above line of reasoning?

- A) It's impossible for a machine to

- B) The text does not explain the implications of the expression: “It’s just a matter of time”
- C) It’s necessary to attend *PrePost* to understand that the brain is not only a really complex machine
- D) The text mistakes sci-fi for the real technological progress
- E) The text is based on a wrong statement regarding the difference between brain and mind

21) Complete the following proportion

Laura : x = y : Leopardi

- A) x = Boccaccio; Y = Silvia
- B) x = Petrarca; Y = Aspasia
- C) x = Nek; Y = Beatrice
- D) x = Dante; Y = Beatrice
- E) x = Petrarca; Y = Silvia

22) Which of these matchings is the correct one?

- A) Matisse - Romanticism
- B) Turner - Neoclassicism
- C) Cezanne - Pointillism
- D) Segantini - Divisionism
- E) Kirchner – Impressionism

23) Given a DNA 3’-5’ strand, how would be a complementary strand synthesized by a DNA polymerase?

- A) Identical to the 3’-5’ strand
- B) Discontinuous
- C) Continuous
- D) Discontinuous, because DNA polymerase synthesizes only in 5’-3’ direction
- E) Continuous, if only DNA polymerase synthesizes in 3’-5’ direction

24) Ellen is bearing her third child and she is concerned about him, given that her second child had complications during delivery because of Rh incompatibility. Given that Ellen is homozygous for allele A and her husband Hugo is homozygous for allele B, what is the probability for the third Ellen’s child to be AB negative?

- A) $\frac{1}{2}$
- B) $\frac{1}{4}$
- C) 1
- D) Impossible to know
- E) Impossible

25) What is the percentage of cytosine in a cellular DNA if adenine is the 15%?

- A) 35%
- B) 15%
- C) 70%
- D) 25%
- E) 30%

26) What does “epistasis” mean?

- A) A particular interaction among two or more genes that influence the same character in which the expression of one overcomes the expression of the others
- B) The lack of dominance of two alleles with the consequent expression of an intermediate phenotype

- C) The condition underlying Marfan syndrome
- D) A phase of cell cycle
- E) An exception to the first Mendel law

27) Which of them are parts of a nephron?

- 1. The proximal convoluted tubule**
- 2. The arcuate arteries**
- 3. The alveolus**
- 4. The Bowmann's capsule**

- A) Only n. 1
- B) Only n. 2
- C) Only n. 3
- D) N. 1, 2 and 3
- E) N. 1 and 4

28) Where is the electron transport chain localized?

- A) Golgi's apparatus
- B) Mitochondrial matrix
- C) Trans-Golgi
- D) Internal mitochondrial membrane
- E) Lysosomes

29) Choose the right statement about microtubules:

- A) they are made up of Alpha and Delta tubulin
- B) they are part of flagella and microvilli
- C) they are involved in intracellular transport
- D) both answer A and C
- E) none of the previous

30) The Redateo is strange animal whose genotype is AA Bb Cc dd eE FF Gg Hh. If his genes distribution is independent, how many gametes are possible (do not consider crossing-over)?

- A) It is impossible to predict
- B) 28
- C) 22
- D) 2
- E) 25

31) Choose the right statement about the skin dermis:

- A) it does not contain blood vessels
- B) it is mostly made up of dense connective tissue
- C) it is mostly made up of adipose tissue
- D) it is thicker at the lips, eyelid and auricula level
- E) the apical part sweat glandes open to this level

32) Which of the following statements about ribosomes is FALSE?

- A) They are made up of RNA and proteins
- B) The minor subunit translates the mRNA codons
- C) Other cellular organelles can contain them
- D) They are responsible for proteins production
- E) In the eukaryotes they have a sedimentation coefficient of 60S

- 33) Which organ produces FSH?**
A) Thyroid
B) Kidney
C) Ovary
D) Spleen
E) Pituitary gland
- 34) In which phase of the cellular cycle the crossing-over occurs?**
A) Mitotic metaphase
B) Mitotic prophase
C) Leptotene of the meiotic prophase I
D) Pachytene of the meiotic prophase I
E) Leptotene of the mitotic prophase I
- 35) We know that vitamin-D dependent rickets is an hereditary disease which has a dominant X-linked inheritance, it is possible to say that:**
A) if a male is affected, his sons and daughters will be affected too
B) an affected male is a recessive hemizygote
C) an affected female is necessarily recessive homozygote
D) the disease gene transmission is from father to son
E) the disease gene stands on an autosome
- 36) Uniporters are involved in:**
A) primary active transport
B) facilitated diffusion
C) passive diffusion
D) secondary active transport
E) symport
- 37) Which of the following pairs is correct?**
A) Glyceraldehyde3phosphate - glycolysis
B) Succinate - Calvin Cycle
C) Lactic acid - aerobic respiration
D) A and C are both correct
E) None of the answers
- 38) Which of the following structures is not involved in regulating the function of the mitotic spindle?**
A) Centromere
B) Centrosome
C) Microtubules
D) Melanosome
E) Centriole
- 39) Which of the following cells don't have the nucleus?**
A) Red blood cell
B) Neutrophil
C) Hepatocyte
D) Platelet
E) Cardiomyocyte

- 40) **Ceciana is always late, so, in the morning, she usually doesn't have breakfast. However, she can't give up her big macchiato cup with a brown sugar pocket. Moreover, she often forgets her pocket lunch at home, so she eats taralli instead, and, as a result, she is often hungry and tired in the afternoon. Her friend, Cate, has find out on Facebook that eating an apple is everything you need to stay awake and be active, so she suggests Ceciana eating an apple picked from the orchard behind university, together with taralli at lunch. What will Ceciana's glycemic curve be like, after Cate's advice?**
- A) Extremely regular
 B) Initially high, very high, relatively high, very high
 C) Initially high, gradually reduced, high, regular
 D) Initially reduced, gradually high, very small, extremely reduced
 E) No effect is observed
- 41) **Which of the following transformations involves a change in the chemical composition?**
- A) Separation of the salt by evaporation of sea water.
 B) Drying of the glue.
 C) Melting of the ice.
 D) Transformation of wine into vinegar.
 E) Distillation of schnapps to wine.
- 42) **The third period of the periodic table is composed by the following elements: Na, Mg, Al, Si, P, S, Cl, Ar. Choose the answer in which the elements are listed in order of increasing ionisation energy.**
- A) Na, Mg, Al, Si, P, Cl, Ar
 B) Ar, Cl, S, P, Si, Al, Mg, Na
 C) Na, Al, Mg, Si, S, P, Cl, Ar
 D) Na, Mg, Al, P, Si, Cl, Ar
 E) Ar, Cl, S, P, Si, Mg, Al, Na
- 43) **Mr Dylan, who is 87 years old and smokes 3 packs of cygarettes a day, uses home-based oxygen therapy. The cylinder contains 7L of gas with a pressure of 200 bar. One day he falls asleep on his roof with the cylinder nearby himself, exposed to the sun. The cylinder heats up from a temperature of 25°C a 30°C. Which is the pressure mr. Dylan will read on the barometer when he wakes up?**
- A) 240 mmHg
 B) $24 \cdot 10^6$ Pa
 C) 2400 bar
 D) 240000 N/cm²
 E) 20,3 bar
- 44) **Which of the following sentences about the covalent bond is correct?**
- A) It is a directional bond.
 B) It generates crystals from which it is possible to isolate a single couple of ions.
 C) The force through which the bond is guaranteed is linked with the Coulomb force.
 D) It can give shape to ionic compounds not often existing at the solid state.
 E) It is the attraction between positively charged ions and negatively charged ions which, once they are bonded, become a molecule.

- 45) **Balance the following reaction: $\text{NH}_3 + \text{O}_2 \leftrightarrow \text{NO} + \text{H}_2\text{O}$ ($\Delta H = -905 \text{ kJ/mol}$).**
- A) 2; 4; 2; 6
B) 1; 2; 1; 3
C) 2; 1; 2; 3
D) The reaction does not occur for the enthalpy values.
E) 4; 5; 4; 6
- 46) **How many grams of water have to evaporate from 100,0g of a 40% solution KCl in order to obtain a 50% solution?**
- A) 32 g
B) 18 g
C) 40 g
D) 10 g
E) 20 g
- 47) **Given the reaction $2\text{NO}_3^- + 4\text{Zn} + 10\text{H}^+ \rightarrow \text{N}_2\text{O} + 4\text{Zn}^{2+} + 5\text{H}_2\text{O}$ show the wrong sentence.**
- A) Zn oxides.
B) It occurs in an acid environment.
C) N is reduced.
D) N is the spectator ion.
E) The reaction shown is a redox.
- 48) **A buffer solution made of a weak base and its salt:**
1. has a pH of approximately 7;
 2. has an invariable pH;
 3. its pH depends on the K_b of the weak basis;
 4. its pH depends on the K_a of the strong acid.
- A) None of them.
B) Number 1, 2 and 3
C) Number 2 and 3
D) Only number 2
E) Only number 3
- 49) **If 4L of water are added to a pH =2 solution of H_2SO_4 (strong acid), the solution's pH:**
- A) is equal to 7
B) is greater than 7
C) is less than 7
D) stays invariable
E) none of the given answers is correct
- 50) **Which of the following inorganic compounds does not alter the pH of the aqueous solution it is added to?**
- A) Na_2O
B) H_2CO_3
C) CO
D) KH_2PO_4
E) CH_3COONa
- 51) **Consider the following compounds: diethyl ether, 1-butanol, propanal, propanone. Which of the following sentences is correct?**
- A) They are functional isomers.

- B) They are tautomers.
- C) They are positional isomers.
- D) They are optical isomers
- E) The rare amount of medicine students that do not smoke, in their moments of sadness use diethyl ether to become happier.

52) Which of the following reaction occurs to benzene?

- A) Radicalic substitution
- B) Electrophilic substitution
- C) Electrophilic addition
- D) Radicalic addition
- E) None of the previous: benzene is amphoteric par excellence

53) To which value corresponds the ratio between the volume of a cube inscribed and circumscribed to the same sphere of radius 4 cm?

- A) $1/4$
- B) 2
- C) $3 \cdot 3^{1/2}$
- D) $2^{1/2}$
- E) 1

54) Calculate the result of the following equation $X = \log_2(16\sqrt{2})$

- A) 5
- B) $2/7$
- C) $10/3$
- D) $9/2$
- E) 1

55) Which of the following are the conditions for which the radical $\sqrt{\frac{1-a}{2a}}$ exists?

- A) $0 < a \leq 1$
- B) $a > 2$
- C) $a \neq 1$
- D) $\forall x \in R - \{0\}$
- E) $\exists x \in N$

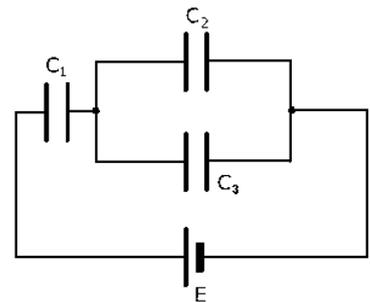
56) Michela is in charge of the Medical School library at Sacco hospital. It is a Monday during the winter exam session and she notices that the library is almost full and there are only 5 seats remaining. It is 10am and both the first and second year have finished lectures; there are 20 students from the first year and q5 students from the second year who would like to go to the library to study. Since only 5 people are allowed in the library, how many possible groups can Michela form, provided that at least 3 of the students are from the second year (since they have to prepare the anatomy exam)?

- A) 6785366
- B) 86450
- C) 500
- D) 16!
- E) It is not possible to determine

- 57) After having passed the Medical School admission test, a future student throws his Alpha Test out of the window with velocity of 7 m/s in a horizontal direction. Knowing that the window is 20m above ground, at what distance from the window will the book fall?
- A) 0 m
 B) 2,8 m
 C) 28 m
 D) 14 cm
 E) 14 m

- 58) In the circulation, blood exiting the heart passes through the aorta, which has a cross section of 5.3 cm^2 , up the capillaries, which have an individual cross section of $5,3 \cdot 10^{-7} \text{ cm}^2$ but a total cross section of 5.300 cm^2 if considered all together. Without considering other parameters, how does the velocity of blood change in capillaries with respect to the aorta?
- A) It remains the same
 B) Decreases 1000-fold
 C) Increases 1000-fold
 D) Decreases 7000-fold
 E) Increases 7000-fold

- 59) Calculate the equivalent capacitance of the represented circuit, knowing that $C_2=2 \cdot C_1$ and $C_3 = 2 \cdot C_2$
- A) $\frac{6}{7} \cdot C_1$
 B) $10 \cdot C_1$
 C) C_1
 D) $7 \cdot C_1$
 E) It cannot be calculated without knowing C_1



- 60) Two watermelons of respective masses $m_1 = 10 \text{ kg}$ and $m_2 = 60 \text{ kg}$ are placed on a table at a distance of 60 cm and they attract each other with a given force: what is the order of magnitude of this force?
- A) 10^{-2}
 B) 10^{-11}
 C) 10^{-7}
 D) 10^{-9}
 E) 10^{10}