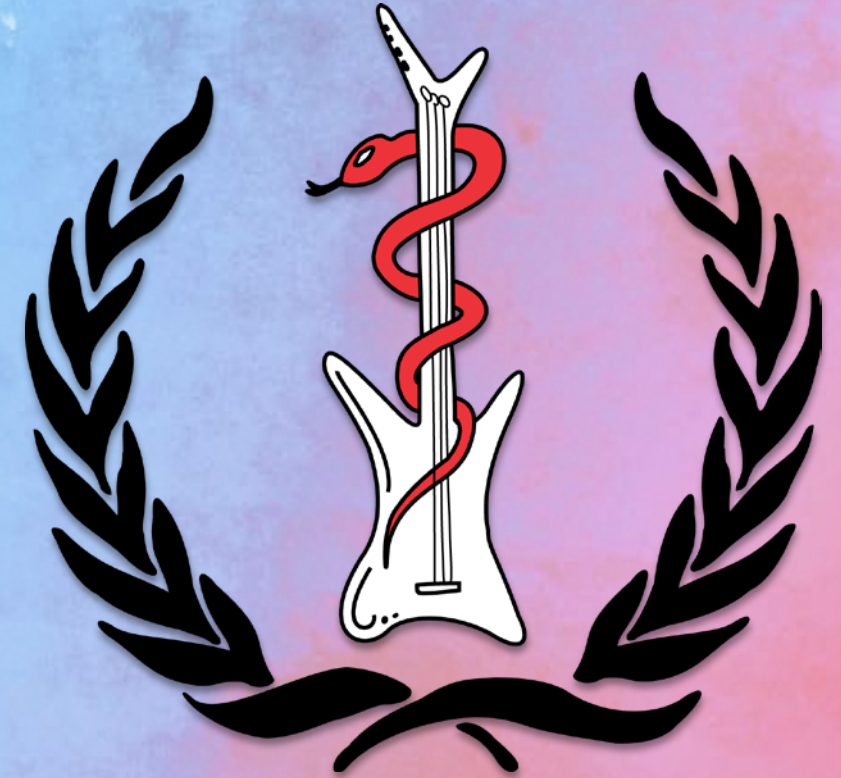


Associazione Studenti e Prof di Medicina Uniti Per

31 July 2021

IMAT Simulation

**INTERNATIONAL MEDICAL
ADMISSION TEST**



Studenti e Prof Uniti Per



@studentieprofunitiper



info@studentieprofunitiper.it

*In collaboration with the Tutor Service of
School of Medicine of the Padua's University*





Associazione Studenti e Professori di Medicina Uniti Per

LOGIC & GENERAL KNOWLEDGE

IMAT SIMULATION



*In collaboration with the Tutor Service of
School of Medicine of the Padua's University*



1. The library of Doctor Margaret has 160 books, divided in subjects: 20% of biology, 30% of medicine; 35% of literature; 5% of chemistry; 10% of history. Summing what books of different subjects can you obtain 88 as a result?

- A) Medicine and literature books
- B) Biology and literature books
- C) Literature and chemistry books
- D) Biology and chemistry books
- E) Biology and history books



The best way to solve this question is to look at the alternatives and calculate the amount of books. In option B, biology books are 20% of the total of 160, so 32. Literature books are 35% of the total, so 56. The sum is 88, so the correct answer is 88.

Correct answer: B



1. The library of Doctor Margaret has 160 books, divided in subjects: 20% of biology, 30% of medicine; 35% of literature; 5% of chemistry; 10% of history. Summing what books of different subjects can you obtain 88 as a result?

- A) Medicine and literature books
- B) Biology and literature books
- C) Literature and chemistry books
- D) Biology and chemistry books
- E) Biology and history books



2. Leonidas sells a small flat – whose market value is 100,000 euros – with a $\frac{4}{5}$ discount. What is the final price of the flat?

- A) 20,000 euros
- B) 40,000 euros
- C) 75,000 euros
- D) 80,000 euros
- E) 60,000 euros



4/5 of 100,000 is 80,000. The final price will be 20,000.

Correct answer: A



2. Leonidas sells a small flat – whose market value is 100,000 euros – with a $\frac{4}{5}$ discount. What is the final price of the flat?

- A) 20,000 euros
- B) 40,000 euros
- C) 75,000 euros
- D) 80,000 euros
- E) 60,000 euros



3. Marina's pencil case contains 1 blue pen, 2 red pens and 3 black pens. If she takes out one at random, what is the probability that it will be a red pen?

- A) $1/12$
- B) 1
- C) 2
- D) $1/3$
- E) $1/6$



The total amount of pencils is 6, 2 of which are red. The probability of getting a red pen is $\frac{2}{6}$, so $\frac{1}{3}$.

Correct answer: D



3. Marina's pencil case contains 1 blue pen, 2 red pens and 3 black pens. If she takes out one at random, what is the probability that it will be a red pen?

- A) $1/12$
- B) 1
- C) 2
- D) $1/3$
- E) $1/6$



4. An office worker walks every morning for 10 minutes at 6 km/h, then he covers a ten times greater distance by train at 120 km/h and finally makes a 5 km bus ride at 60 km/h. How long does it take him to travel to work altogether?

- A) The given data are insufficient
- B) 15 minutes
- C) 20 minutes
- D) 30 minutes
- E) 10 minutes



Walking at 6 km/h for 6 minutes the worker walk 1 km, because if he walks 1 km in 6 hours, in $1/60$ of that time he'd walk $1/6$ of 6 km. The second distance is ten time greater, so it covers 10 km in 5 minutes at 120 km/h. To cover the final 5 km at 60 km/h he takes 5 minutes. So, in total, the worker takes $10+5+5= 20$ minutes to travel to work.

Correct answer: C



4. An office worker walks every morning for 10 minutes at 6 km/h, then he covers a ten times greater distance by train at 120 km/h and finally makes a 5 km bus ride at 60 km/h. How long does it take him to travel to work altogether?

- A) The given data are insufficient
- B) 15 minutes
- C) 20 minutes
- D) 30 minutes
- E) 10 minutes



5. X : often = little : Y

- A) X = never, Y= Much
- B) X= trivial, Y= precious
- C) X= sometimes, Y= frequent
- D) X= usual, Y= occasional
- E) X= seldom, Y= much



“Seldom” is the opposite of “often” and
“much” is the opposite of “little”.

Correct answer: E



5. X : often = little : Y

- A) X = never, Y= Much
- B) X= trivial, Y= precious
- C) X= sometimes, Y= frequent
- D) X= usual, Y= occasional
- E) X= seldom, Y= much



6. ___: to exhaust = ___: to
compensate for

- A) To wear out, to make up for
- B) To tell off, fix up
- C) To wear, to supply with
- D) To get into, get at
- E) To put down, to put up



In this equation you have to find the synonyms; "to wear out" is a synonym for "to exhaust", while "to make up for" is a synonym to "to compensate for".

Correct answer: A



6. ___: to exhaust = ___: to
compensate for

- A) To wear out, to make up for
- B) To tell off, fix up
- C) To wear, to supply with
- D) To get into, get at
- E) To put down, to put up



7. If carpet = 12; sofa = 8; lamp= 8; armchair=?

- A) 18
- B) 14
- C) 10
- D) 12
- E) 16



Every number is equal to the number of letters of each word multiplied by two. "Armchair" has 8 letters, which multiplied by 2 makes 16.

Correct answer: E



7. If carpet = 12; sofa = 8; lamp= 8; armchair=?

- A) 18
- B) 14
- C) 10
- D) 12
- E) 16



8. Tom, Julia, Kate and David arrange to meet at the pub. Each of them arrives at the pub when his or her watch shows 10 p.m. It is known that two of them have watches that show the time as delayed, and the other two have watches that show the time sooner. If Kate's watch is delayed, it's NOT possible that:

- A) Kate arrived before Tom
- B) Kate arrived after Julia
- C) Kate arrived after Tom
- D) Kate arrived before David and Julia
- E) Tom arrived before David and Gary



We know that two people have delayed watches and two have faster watches, and that everybody will arrive when their own watch will show 10 p.m.

This means that the two people with faster watches will arrive sooner than the other two.

If Kate's watch is delayed, it's impossible for her to arrive before two people.

Correct answer: D



8. Tom, Julia, Kate and David arrange to meet at the pub. Each of them arrives at the pub when his or her watch shows 10 p.m. It is known that two of them have watches that show the time as delayed, and the other two have watches that show the time sooner. If Kate's watch is delayed, it's NOT possible that:

- A) Kate arrived before Tom
- B) Kate arrived after Julia
- C) Kate arrived after Tom
- D) Kate arrived before David and Julia
- E) Tom arrived before David and Gary



9. In a children's story there are three types of monster, Bongles, Crannies and Dervies. Some Bongles (but not all) are Crannies and all Crannies are Dervies. Which one of the following is definitely NOT true?

- A) No Dervies are Bongles
- B) Some Dervies are both Bongles and Crannies
- C) Some Dervies are neither Bongles nor Crannies
- D) Some Bongles are Dervies
- E) All Crannies are either Bongles or Dervies or both.



Some Dervies are also Bongles and Crannies, so B is true.
Some Dervies are neither Bongles or Crannies, so C is true.
Some Bongles are Dervies, so D is true, and all Crannies are Bongles, Dervies or both at the same time, so E is true.
On the other hand, it's false that there aren't Dervies that are also Bongles, so A is NOT true, and so it's the correct answer.

Correct answer: A



9. In a children's story there are three types of monster, Bongles, Crannies and Dervies. Some Bongles (but not all) are Crannies and all Crannies are Dervies. Which one of the following is definitely NOT true?

- A) No Dervies are Bongles
- B) Some Dervies are both Bongles and Crannies
- C) Some Dervies are neither Bongles nor Crannies
- D) Some Bongles are Dervies
- E) All Crannies are either Bongles or Dervies or both.



10. *“Studies are taking place to assess the benefits to dental health of adding fluoride to drinking water, a process known as mass medication. The Health Minister has urged consideration of fluoridation, particularly in deprived areas where dental care is poor. Fluoride can occur naturally in the water because of fluoride containing minerals. Fluoride, in the water, improves dental health by up to 50 percent. Even so, fluoridation should not take place. A campaign leader opposed to fluoridation has spoken of her experiences of living in a fluoridated area of the USA. She experienced feelings of apathy and depression; her 2-year-old son showed autistic tendencies and has white flecks on hi teeth. These symptoms disappeared when they returned home from the USA.”*

Which of the following is an underlying assumption of the argument above?

- A) Mass medication is always wrong
- B) Fluoridation is cheaper than improving dental facilities
- C) Fluoridation is only necessary in deprived areas
- D) The reported health symptoms were caused by fluoride in water
- E) Fluoridation of water is a person’s only source of fluoride



The question asks to find the underlying assumption of the argument above. The text says that fluoridation can help with dental health, but ends saying that a campaign leader has had experiences with health problems in a fluoridated area of the USA. This implies that these health problems are related to fluoridation, which is answer D says.

Correct answer: D



10. *“Studies are taking place to assess the benefits to dental health of adding fluoride to drinking water, a process known as mass medication. The Health Minister has urged consideration of fluoridation, particularly in deprived areas where dental care is poor. Fluoride can occur naturally in the water because of fluoride containing minerals. Fluoride, in the water, improves dental health by up to 50 percent. Even so, fluoridation should not take place. A campaign leader opposed to fluoridation has spoken of her experiences of living in a fluoridated area of the USA. She experienced feelings of apathy and depression; her 2-year-old son showed autistic tendencies and has white flecks on hi teeth. These symptoms disappeared when they returned home from the USA.”*

Which of the following is an underlying assumption of the argument above?

- A) Mass medication is always wrong
- B) Fluoridation is cheaper than improving dental facilities
- C) Fluoridation is only necessary in deprived areas
- D) The reported health symptoms were caused by fluoride in water
- E) Fluoridation of water is a person’s only source of fluoride



11. Dr Edward Jenner is well known for developing a vaccine against:

- A) Rabies
- B) Malaria
- C) HIV
- D) Smallpox
- E) Polio



Dr Edward Jenner developed a vaccine against smallpox.

Correct answer: D



11. Dr Edward Jenner is well known for developing a vaccine against:

- A) Rabies
- B) Malaria
- C) HIV
- D) Smallpox
- E) Polio



12. What does the letter P indicate in the OPEC organization acronym?

- A) Plastics
- B) Piracy
- C) Philosophy
- D) Physics
- E) Petroleum



OPEC stands for Organization of the Petroleum Exporting Countries.

Correct answer: E



12. What does the letter P indicate in the OPEC organization acronym?

- A) Plastics
- B) Piracy
- C) Philosophy
- D) Physics
- E) Petroleum



13. Which of these correlations is NOT correct?

- A) Mario Capecchi – chemistry
- B) Enrico Fermi – nuclear physics
- C) Riccardo Giacconi – astronomy
- D) Rita Levi-Montalcini – neurology
- E) Camillo Golgi – histology



Mario Capecchi was actually a genetist.

Correct answer: A



13. Which of these correlations is NOT correct?

- A) Mario Capecchi – chemistry
- B) Enrico Fermi – nuclear physics
- C) Riccardo Giacconi – astronomy
- D) Rita Levi-Montalcini – neurology
- E) Camillo Golgi – histology



14. Pablo Picasso was all of these things except one.
Which one is it?

- A) Poet
- B) Ceramist
- C) Sculptor
- D) Painter
- E) Graphic



Pablo Picasso was never a poet.

Correct answer: A



14. Pablo Picasso was all of these things except one.
Which one is it?

- A) Poet
- B) Ceramist
- C) Sculptor
- D) Painter
- E) Graphic



15. Which of these artists is not an impressionist?

- A) Monet
- B) Renoir
- C) Mirò
- D) Degas
- E) Toulouse-Lautrec



Mirò was a surrealist, while all the others are French impressionist.

Correct answer: C



15. Which of these artists is not an impressionist?

- A) Monet
- B) Renoir
- C) Mirò
- D) Degas
- E) Toulouse-Lautrec



16. Which is the capital of Tanzania?

- A) Dodoma
- B) Dar es Salaam
- C) Kigali
- D) Mogadiscio
- E) Nairobi



Dodoma is the capital of Tanzania.

Correct answer: A



16. Which is the capital of Tanzania?

- A) Dodoma
- B) Dar es Salaam
- C) Kigali
- D) Mogadiscio
- E) Nairobi



17. Which is the world's biggest island?

- A) Borneo
- B) Greenland
- C) Cuba
- D) Madagascar
- E) Sri Lanka



Greenland is the biggest island in the world (2.175.000 kmq).

Correct answer: B



17. Which is the world's biggest island?

- A) Borneo
- B) Greenland
- C) Cuba
- D) Madagascar
- E) Sri Lanka



18. In which condition can a lunar eclipse be observed?

- A) New moon
- B) First quarter
- C) Last quarter
- D) Full moon
- E) In shot



A lunar eclipse is an optical phenomenon in which the shadow of the Earth obscures completely or partially the Moon, which is observable in her full moon phase.

Correct answer: D



18. In which condition can a lunar eclipse be observed?

- A) New moon
- B) First quarter
- C) Last quarter
- D) Full moon
- E) In shot



19. Which of the pairing is incorrect?

- A) Iceland-Reykjavik
- B) Denmark-Copenhagen
- C) Norway-Oslo
- D) Finland-Helsinki
- E) Sweden-Malmö



All these states are paired with the corresponding capital except E. The capital of Sweden is Stockholm.

Correct answer: E



19. Which of the pairing is incorrect?

- A) Iceland-Reykjavik
- B) Denmark-Copenaghen
- C) Norway-Oslo
- D) Finland-Helsinki
- E) Sweden-Malmo



20. Down syndrome is caused by:

- A) The presence of a chromosome in excess
- B) The presence of two chromosomes in excess
- C) The lack of one chromosome
- D) A viral infection
- E) The lack of two chromosomes



Down syndrome or trisomy 21 is caused by the presence of three copies instead of two of the chromosome 21. The disease is caused by one excess chromosome.

Correct answer: A



20. Down syndrome is caused by:

- A) The presence of a chromosome in excess
- B) The presence of two chromosomes in excess
- C) The lack of one chromosome
- D) A viral infection
- E) The lack of two chromosomes



21. Who formulated the theory of motion of bodies which was considered true until the new discoveries of Galileo?

- A) Democrit
- B) Aristotle
- C) Euclid
- D) Ptolemy
- E) Galen



Democrit formulated the first atomist theory. Euclid formulated geometry theories. Ptolemy introduced the geocentric description of the universe. Aristotle wrote about physics and his theory of the motion of bodies was considered a landmark until the Middle Age.

Correct answer: B



21. Who formulated the theory of motion of bodies which was considered true until the new discoveries of Galileo?

- A) Democrit
- B) Aristotle
- C) Euclid
- D) Ptolemy
- E) Galen



22. Darwin formulated the theory of evolution using, by analogy, the theory of a famous economist. Who was that?

- A) Marx
- B) Pareto
- C) Smith
- D) Malthus
- E) Ricardo



Darwin read the work of Malthus called "An Essay on the Principle of Population", from which he was inspired in creating the law of natural selection related to the evolution of species.

Correct answer: D



22. Darwin formulated the theory of evolution using, by analogy, the theory of a famous economist. Who was that?

- A) Marx
- B) Pareto
- C) Smith
- D) Malthus
- E) Ricardo





Associazione Studenti e Professori di Medicina Uniti Per

BIOLOGY

IMAT SIMULATION



*In collaboration with the Tutor Service of
School of Medicine of the Padua's University*

23. A food item was burned in pure oxygen and released 830 kJ of energy. An identical food item of the same mass was found to produce 8 ATPs in respiration. Assuming it takes 31 kJ to produce one ATP molecule, estimate the efficiency of respiration.

- A) 25%
- B) 10%
- C) 45%
- D) 50%
- E) 30%



To calculate the efficiency you need to calculate the energy required to produce 8 molecules of ATP ($8 \times 31 = 248$ kJ) and divide it for the energy of complete oxidation (830kJ).

$248 : 830 = 0,299$, which means that 30% of the energy liberated by the oxidation is used to produce ATP, while the rest is liberated as heat.

Correct answer: E



23. A food item was burned in pure oxygen and released 830 kJ of energy. An identical food item of the same mass was found to produce 8 ATPs in respiration. Assuming it takes 31 kJ to produce one ATP molecule, estimate the efficiency of respiration.

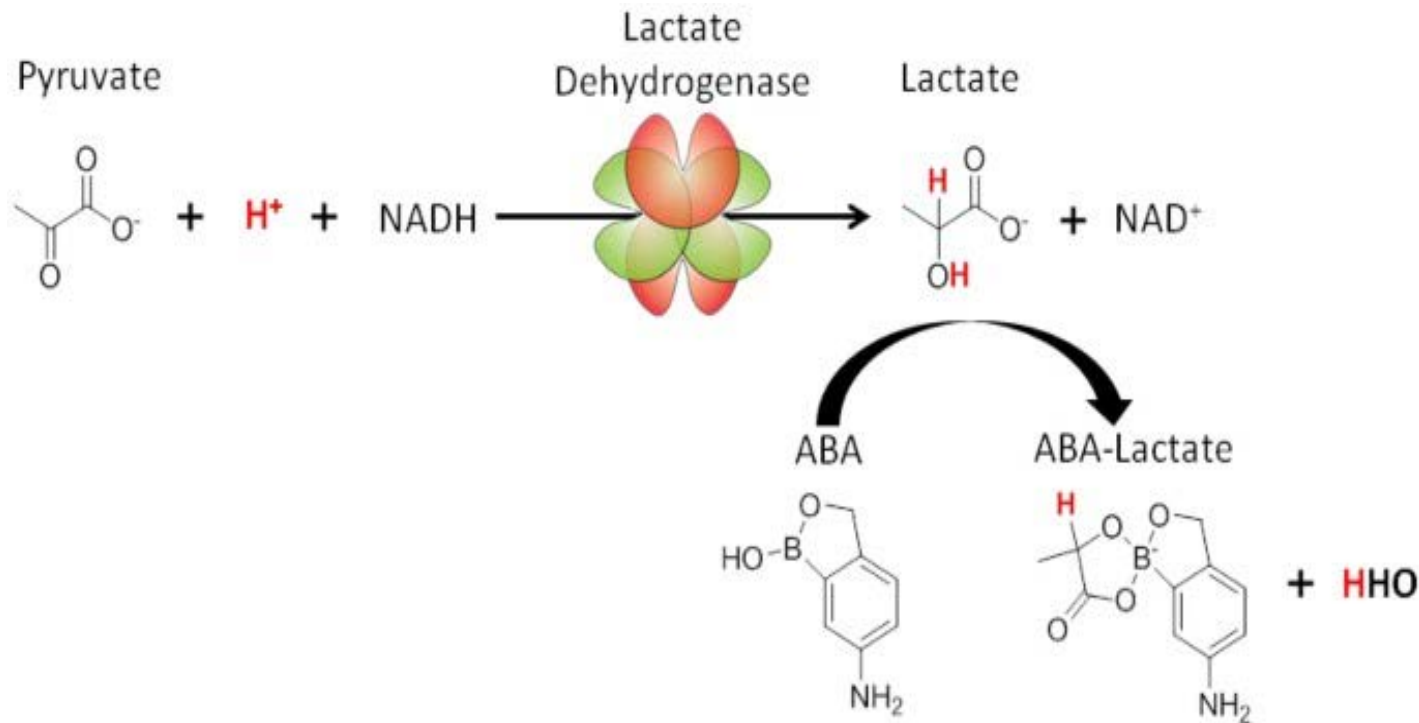
- A) 25%
- B) 10%
- C) 45%
- D) 50%
- E) 30%



24. What is the role of lactate dehydrogenase?

- A) It converts lactate to alanine
- B) It converts lactate to ethanol through an oxidative decarboxylation via the hydrolysis of ATP
- C) It converts lactate to pyruvate with the reduction of NAD^+ to NADH
- D) It converts lactate to acetyl-CoA via an oxidative decarboxylation via the hydrolysis of ATP
- E) None of the above





Lactate dehydrogenase (LDH) is an enzyme which is involved in a reversible reaction that converts lactate to pyruvate through the reduction of NAD^+ to $NADH$ thus acting as a substrate for gluconeogenesis, but also in the conversion of pyruvate to lactate which replenish the availability of NAD^+ during the anaerobic metabolism to sustain the glycolytic pathway.

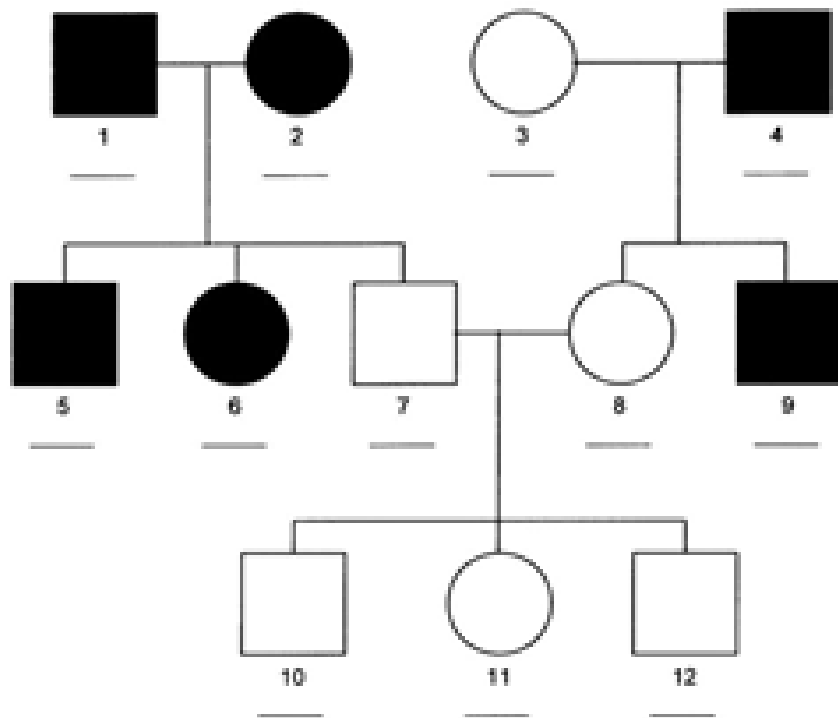
Correct answer: C



24. What is the role of lactate dehydrogenase?

- A) It converts lactate to alanine
- B) It converts lactate to ethanol through an oxidative decarboxylation via the hydrolysis of ATP
- C) It converts lactate to pyruvate with the reduction of NAD^+ to NADH
- D) It converts lactate to acetyl-CoA via an oxidative decarboxylation via the hydrolysis of ATP
- E) None of the above





25. The family tree on the left shows the inheritance pattern of a genetic disease. Which of the following statement/s is/are correct?

1. It is an X-linked disease
2. It is an autosomal recessive disease
3. It can show the inheritance pattern of Huntington's disease
4. It is a dominant disease

Choose the correct answer:

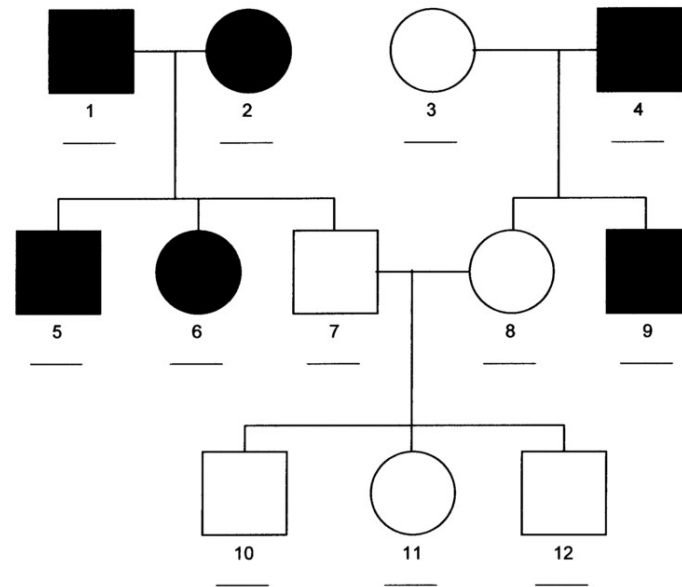
- A) 1 and 4
- B) 4 only
- C) 2 and 3
- D) 4 and 3
- E) 1 only

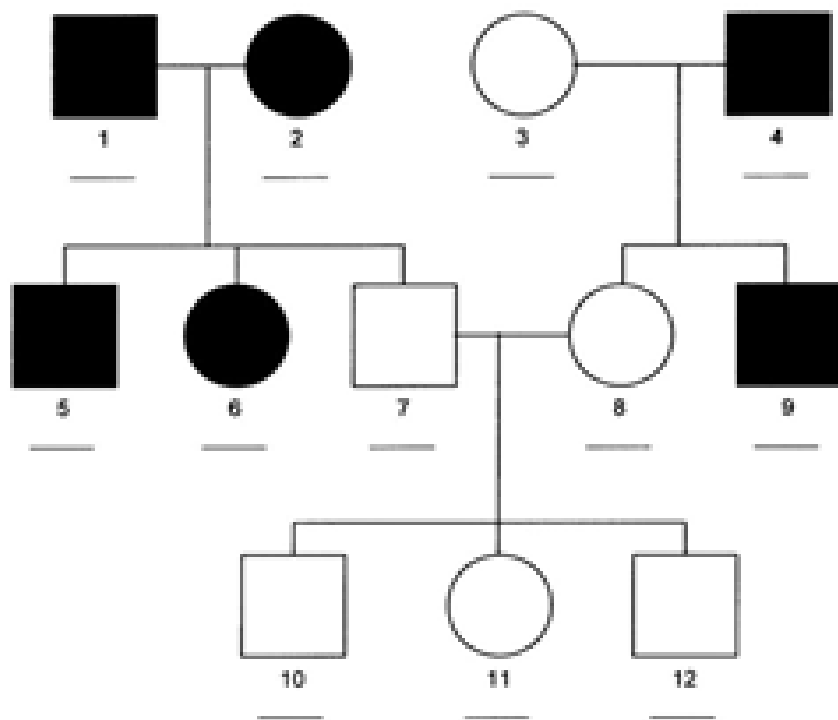
Statement 1 is incorrect because male 4 transmits the disease to his son (9), therefore it can not be an X-linked disease.

Statement 2 is also incorrect because in this case all the offspring of 1 and 2 would have been affected.

Statements 3 and 4 are instead correct: this is likely the inheritance pattern of an autosomal dominant disease, such as huntington's one.

Correct answer: D





25. The family tree on the left shows the inheritance pattern of a genetic disease. Which of the following statement/s is/are correct?

1. It is an X-linked disease
2. It is an autosomal recessive disease
3. It can show the inheritance pattern of Huntington's disease
4. It is a dominant disease

Choose the correct answer:

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



26. Which of the following statement/s about erythrocytes is/are correct?

1. they can carry carbon dioxide
2. on average their lifespan is around a month
3. they do not present a nucleus
4. they are able to proliferate
5. they are synthesized in the spleen
6. they are fragments of a bigger precursor

- A) 1, 3 and 4
- B) All correct
- C) 5, 6, 2 and 4
- D) 2, 3 and 6
- E) 1 and 3



Erythrocytes or red blood cells are the principal carriers of oxygen in blood. They also contribute to the expulsion of CO_2 : almost 20% of total CO_2 bind to hemoglobin in erythrocytes and is then eliminated by lungs.

Erythrocytes lack the majority of cellular organelles and a nucleus and for this reason they are not able to divide and proliferate. They have a limited lifespan: on average 100-120 days and therefore they need to be continuously synthesized in the bone marrow.

Red blood cells follow different steps to become mature, but the precursor do not break into fragments; it expelles organelles and nucleus while developing.



Correct answer: E



26. Which of the following statement/s about erythrocytes is/are correct?

1. they can carry carbon dioxide
2. on average their lifespan is around a month
3. they do not present a nucleus
4. they are able to proliferate
5. they are synthesized in the spleen
6. they are fragments of a bigger precursor

- A) 1, 3 and 4
B) All correct
C) 5, 6, 2 and 4
D) 2, 3 and 6
E) 1 and 3



27. A DNA filament in one of its coding region display originally the following sequence: ATG CGT CGT ACC GCC GAT.

After a mutation happens, the DNA filament sequence is changed in:

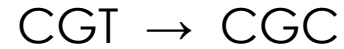
ATG CGT CGC ACC GCC GAT

Most likely, what are going to be the consequences of the mutation?

- A) It is going to cause a frameshift mutation
- B) There won't be any consequence
- C) The mutation cause the synthesis of a trunk protein
- D) It is going to influence the splicing of the transcript
- E) It results in the synthesis of a dysfunctional protein because of a missense mutation



The mutation is a base substitution, in particular T is substituted by C:



There is no deletion or addition of bases, so there aren't changes in the reading framework (A is wrong). Moreover the mutation takes place in the middle of a coding region therefore splicing sites are not affected (D also incorrect).

The mutation can be silent and have no consequences, missense and result in a dysfunctional protein or nonsense and cause a premature stop codon which result in a trunk protein.

No stop codon is produced, so it is not a nonsense mutation (C incorrect)

The substitution affects the 3rd position of the triplet: since the genetic code is redundant, often different triplets code for the same amino acid. Different triplet coding for the same amino acid mainly differ in the 3rd position.

In this particular case, both triplets code for arginine, so the mutation is silent.

Correct answer: B



27. A DNA filament in one of its coding region display originally the following sequence: ATG CGT CGT ACC GCC GAT.

After a mutation happens, the DNA filament sequence is changed in:

ATG CGT CGC ACC GCC GAT

Most likely, what are going to be the consequences of the mutation?

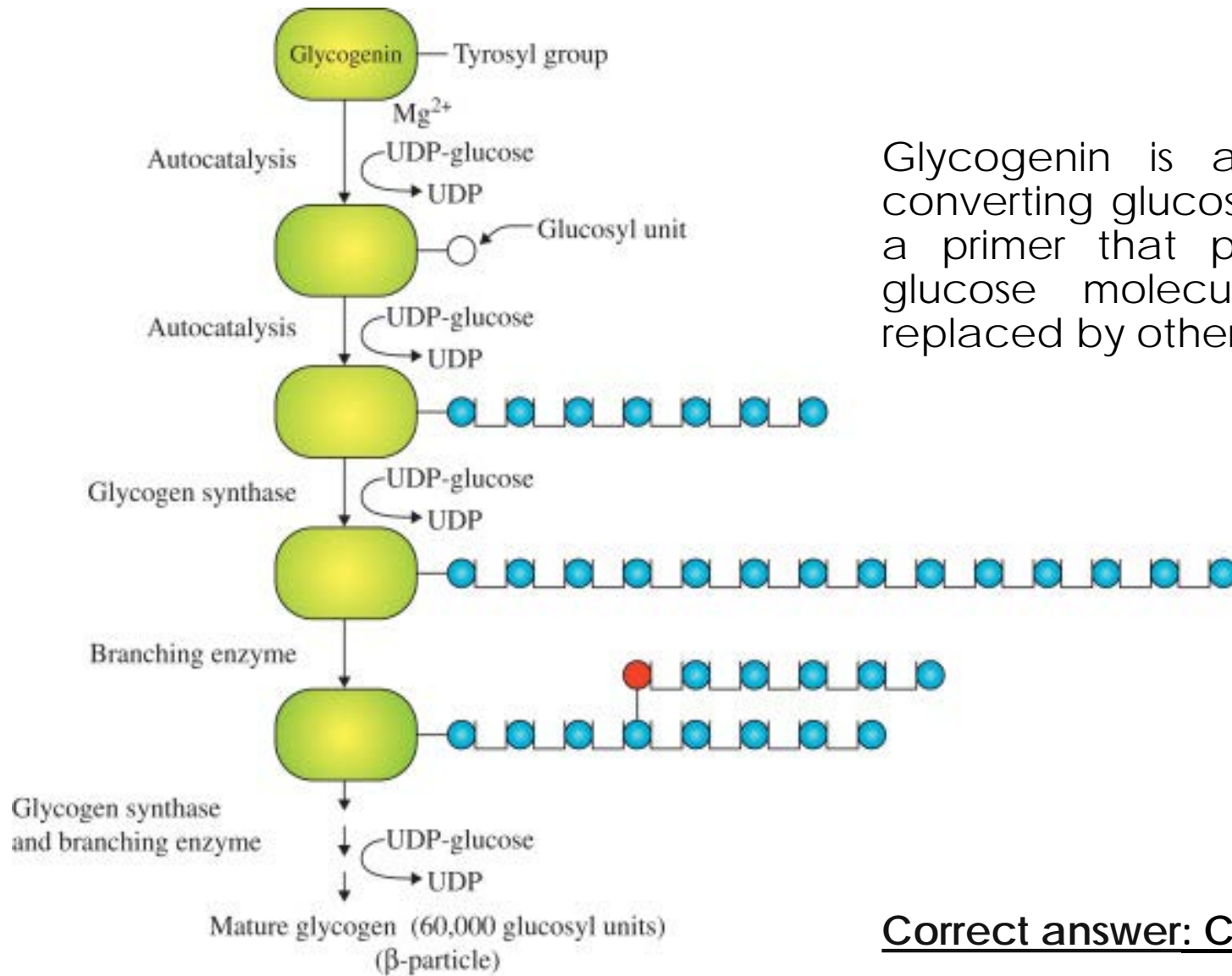
- A) It is going to cause a frameshift mutation
- B) There won't be any consequence
- C) The mutation cause the synthesis of a trunk protein
- D) It is going to influence the splicing of the transcript
- E) It results in the synthesis of a dysfunctional protein because of a missense mutation



28. What is glycogenin?

- A) It is a protein involved in the enzymatic cascade of glucagon
- B) It is a protein involved in the enzymatic cascade of insulin
- C) It is an enzyme involved in glycogen synthesis
- D) It is and enzyme involved in glycogenolysis
- E) None of the above





Glycogenin is an enzyme involved in converting glucose to glycogen acting as a primer that polymerises the first few glucose molecules, after which it is replaced by other enzymes.

Correct answer: C



28. What is glycogenin?

- A) It is a protein involved in the enzymatic cascade of glucagon
- B) It is a protein involved in the enzymatic cascade of insulin
- C) It is an enzyme involved in glycogen synthesis
- D) It is and enzyme involved in glycogenolysis
- E) None of the above



29. Which of the following components of a human immunodeficiency virus (HIV) contain peptide bonds?

1. capsid
2. envelope
3. reverse transcriptase

Choose the correct answer:

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

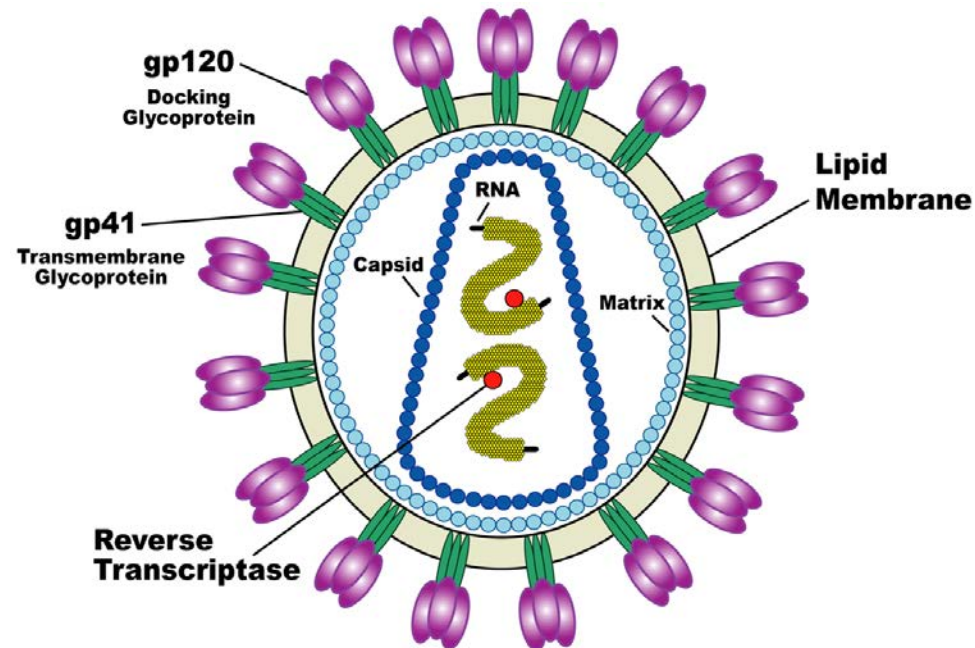


The peptidic bond is the covalent bond responsible for the union of amino acid in proteins.

- The capsid, which contains the nucleic acid of the virus, is of proteic nature just like the enzyme reverse transcriptase;
- the pericapsid or envelope is an external layer to the capsid present in some viruses like HIV, formed by phospholipid and glycoproteins.

All three options contain peptidic bonds.

Correct answer: A



29. Which of the following components of a human immunodeficiency virus (HIV) contain peptide bonds?

1. capsid
2. envelope
3. reverse transcriptase

Choose the correct answer:

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



30. The bacterium *clostridium botulinum* is able to produce one of the strongest neurotoxin known, the botulinum toxin. It acts on SNARE proteins present in neural synapses, degrading them and therefore impeding the release of acetylcholine in the neuromuscular junction. If botulinum intoxication is not cured, consequences can lead to the death of the patient.

Which of the following is the more probable cause of death given the previous information?

- A) Hemorrhage
- B) Severe dehydration
- C) Lack of oxygen in central nervous system (anoxia)
- D) Multiple organ dysfunction due to cellular death
- E) Asphyxia

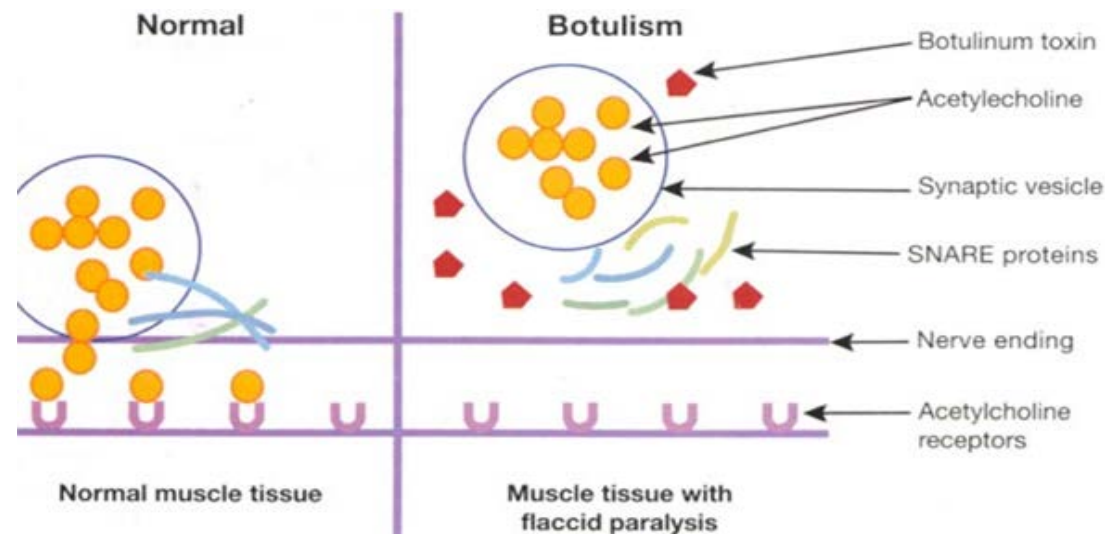


The breakage of SNAREs proteins lead to paralysis, because muscles no longer receive signals.

Main symptoms of botulism poison are:

- slurred speech and facial weakness
- difficulty in swallowing
- muscle weakness
- difficulty in breathing

Death is usually due to **respiratory paralysis**, and consequent **asphyxia**.



Correct answer: E



30. The bacterium *clostridium botulinum* is able to produce one of the strongest neurotoxin known, the botulinum toxin. It acts on SNARE proteins present in neural synapses, degrading them and therefore impeding the release of acetylcholine in the neuromuscular junction. If botulinum intoxication is not cured, consequences can lead to the death of the patient.

Which of the following is the more probable cause of death given the previous information?

- A) Hemorrhage
- B) Severe dehydration
- C) Lack of oxygen in central nervous system (anoxia)
- D) Multiple organ dysfunction due to cellular death
- E) Asphyxia



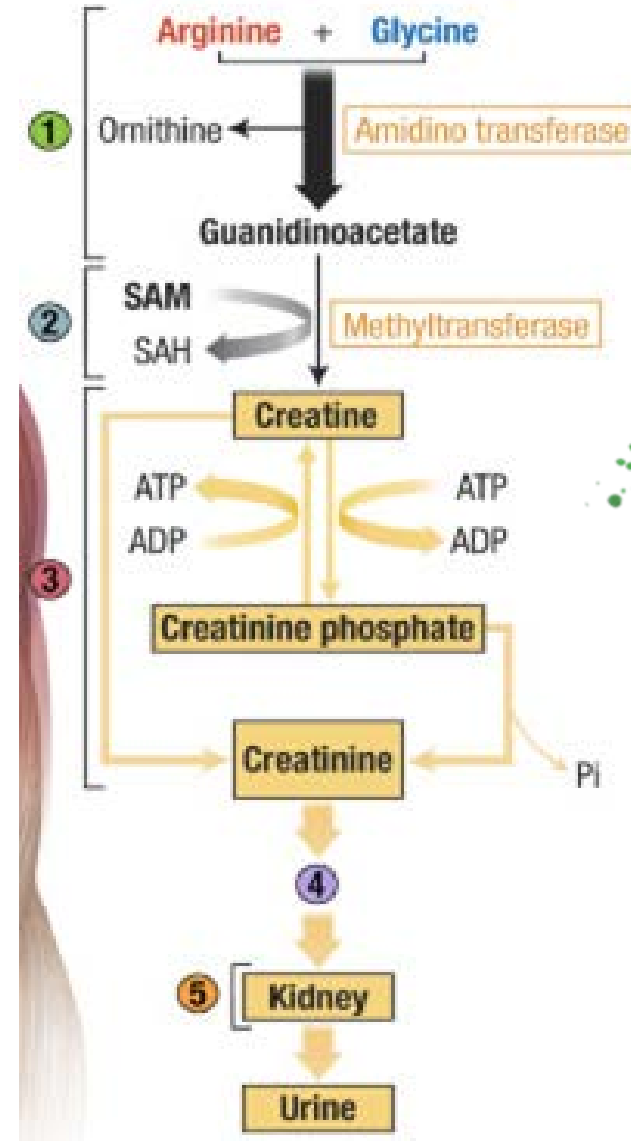
31. What's the main role of Carnitine?

- A) It is the transporter responsible for the transfer of fatty acids from the cytosol to the mitochondrion
- B) It is the transporter of fatty acids that is responsible for the uptake of glycerol in the cell
- C) It is a protein responsible for the uptake of cholesterol in the intestine
- D) It activates the enzyme Fatty Acyl-CoA synthetase which activates the fatty acids inside the cytosol
- E) It is an ammonium compound involved in the urea cycle



Carnitine is a quaternary ammonium compound which transfers long-chain fatty acids from the cytosol to the mitochondrion: once inside the cytosol fatty acids are activated by the enzyme fatty acyl CoA synthetase which transfers CoA to the fatty acid chain, then there is the exchange of CoA with Carnitine in order to transfer fatty acids inside the mitochondrion to be reconverted in fatty acyl CoA once inside the mitochondrion and then entering the beta-oxidation metabolism.

Correct answer: A



31. What's the main role of Carnitine?

- A) It is the transporter responsible for the transfer of fatty acids from the cytosol to the mitochondrion
- B) It is the transporter of fatty acids that is responsible for the uptake of glycerol in the cell
- C) It is a protein responsible for the uptake of cholesterol in the intestine
- D) It activates the enzyme Fatty Acyl-CoA synthetase which activates the fatty acids inside the cytosol
- E) It is an ammonium compound involved in the urea cycle



32. What is GLUT-2 and where is it located?

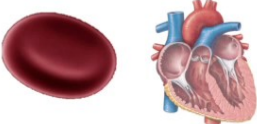


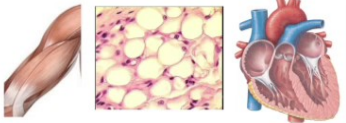
- A) It is the glucagon receptor located in the liver
- B) It is the glucose receptor located in the liver
- C) It is the glucose receptor located in the pancreas and liver
- D) It is a transmembrane carrier protein located in muscle cells
- E) It is a transmembrane carrier protein located in liver, pancreas, intestine and kidneys



GLUT-2 is one out of fourteen isomers of transmembrane carrier proteins involved in the uptake of glucose from the bloodstream: after its uptake, glucose gets converted to glucose 6-phosphate in order to “trap” it in the cell, since its phosphorylated form cannot pass through the plasma membrane.

GLUT-2, in particular, is a bidirectional transporter, allowing glucose to flow in 2 directions; **is expressed by renal tubular cells, liver cells and pancreatic beta cells**. It is also present in the basolateral membrane of the **small intestine epithelium**. Bidirectionality is required in liver cells to uptake glucose for glycolysis and glycogenesis, and release of glucose during gluconeogenesis.

Correct answer: E

GLUT1	<ul style="list-style-type: none"> • Blood • Blood-Brain Barrier • Heart (lesser extent) 	<ul style="list-style-type: none"> • Insulin-Independent
GLUT2	<ul style="list-style-type: none"> • Liver • Pancreas • Small Intestine 	<ul style="list-style-type: none"> • Insulin-Independent • High K_m • Low Affinity
GLUT3	<ul style="list-style-type: none"> • Brain • Neurons • Sperm 	<ul style="list-style-type: none"> • Insulin-Independent • Low K_m • High Affinity
GLUT4	<ul style="list-style-type: none"> • Skeletal Muscle • Adipose Tissue • Heart 	



32. What is GLUT-2 and where is it located?

- A) It is the glucagon receptor located in the liver
- B) It is the glucose receptor located in the liver
- C) It is the glucose receptor located in the pancreas and liver
- D) It is a transmembrane carrier protein located in muscle cells
- E) It is a transmembrane carrier protein located in liver, pancreas, intestine and kidneys



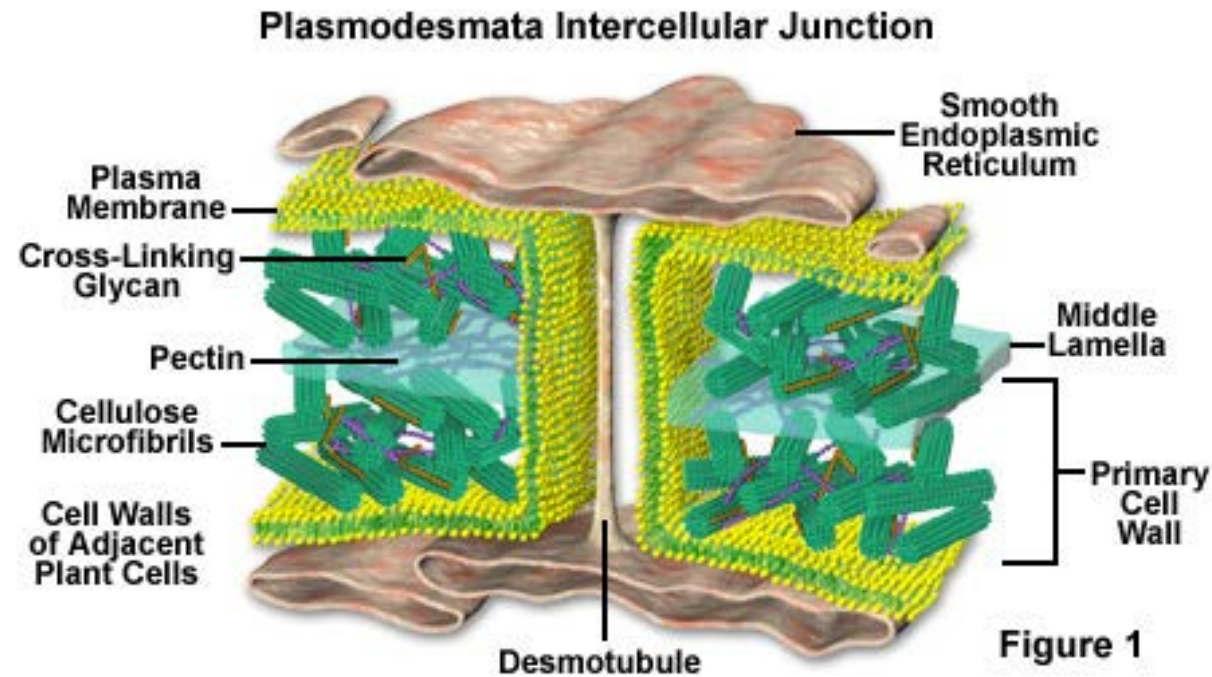
33. Plasmodesmata are typical structures in plant cells: they are very similar to one of the following animal cell structures.

Choose the option that most resembles them.

- A) Desmosomes
- B) Gap junctions
- C) Basal laminae
- D) Tight junctions
- E) Ion channels



Plasmodesmata are structures that are characteristic of vegetal cells and they put in communication adjacent cells through cellular walls. The cellular wall is not continuous: there are many spaces in which, between two cells, there's no material and the two cells, therefore, can exchange cytoplasm and small molecules, such as ions, sugars and signal molecules. This is why they can be compared to gap junctions, which have the same characteristics but in animal cells.



Correct answer: B

33. Plasmodesmata are typical structures in plant cells: they are very similar to one of the following animal cell structures.

Choose the option that most resembles them.

- A) Desmosomes
- B) Gap junctions
- C) Basal laminae
- D) Tight junctions
- E) Ion channels



34. A group of cells in a non-specified human tissue has been subjected to the same mutation. This causes the cells to acquire some properties: increased uptake of glucose and use of aerobic glycolysis as main energy source, increased proliferative abilities and resistance to apoptosis.

Which of the following statements describes those cells better?

- A) They have become tumoral cells
- B) They are unlikely to cause problems
- C) At a certain point every cell of the human body acquire those features as part of their normal healthy development
- D) The individual will certainly die without medical assistance
- E) The process described can happen only in specific tissues



The features described are typical of cancer cells and they are not part of a healthy cellular development.

The consequences of the mutations depends on its extension and on the kind of cells it affects. Any kind of cell can be subjected to similar mutations although some are more dangerous.

Not always the formation of cancer cells leads to the development of a tumor: the immune system displays mechanisms able to recognize and destroys cancer cells. The information provided are not enough to determine if they will pathological.

Correct answer: A



34. A group of cells in a non-specified human tissue has been subjected to the same mutation. This causes the cells to acquire some properties: increased uptake of glucose and use of aerobic glycolysis as main energy source, increased proliferative abilities and resistance to apoptosis.

Which of the following statements describes those cells better?

- A) They have become tumoral cells
- B) They are unlikely to cause problems
- C) At a certain point every cell of the human body acquire those features as part of their normal healthy development
- D) The individual will certainly die without medical assistance
- E) The process described can happen only in specific tissues



35. Which cell(s) are more likely to contain the most mitochondria:

1. Erythrocyte
2. Epidermal cell
3. Lymphocyte
4. Muscle cell

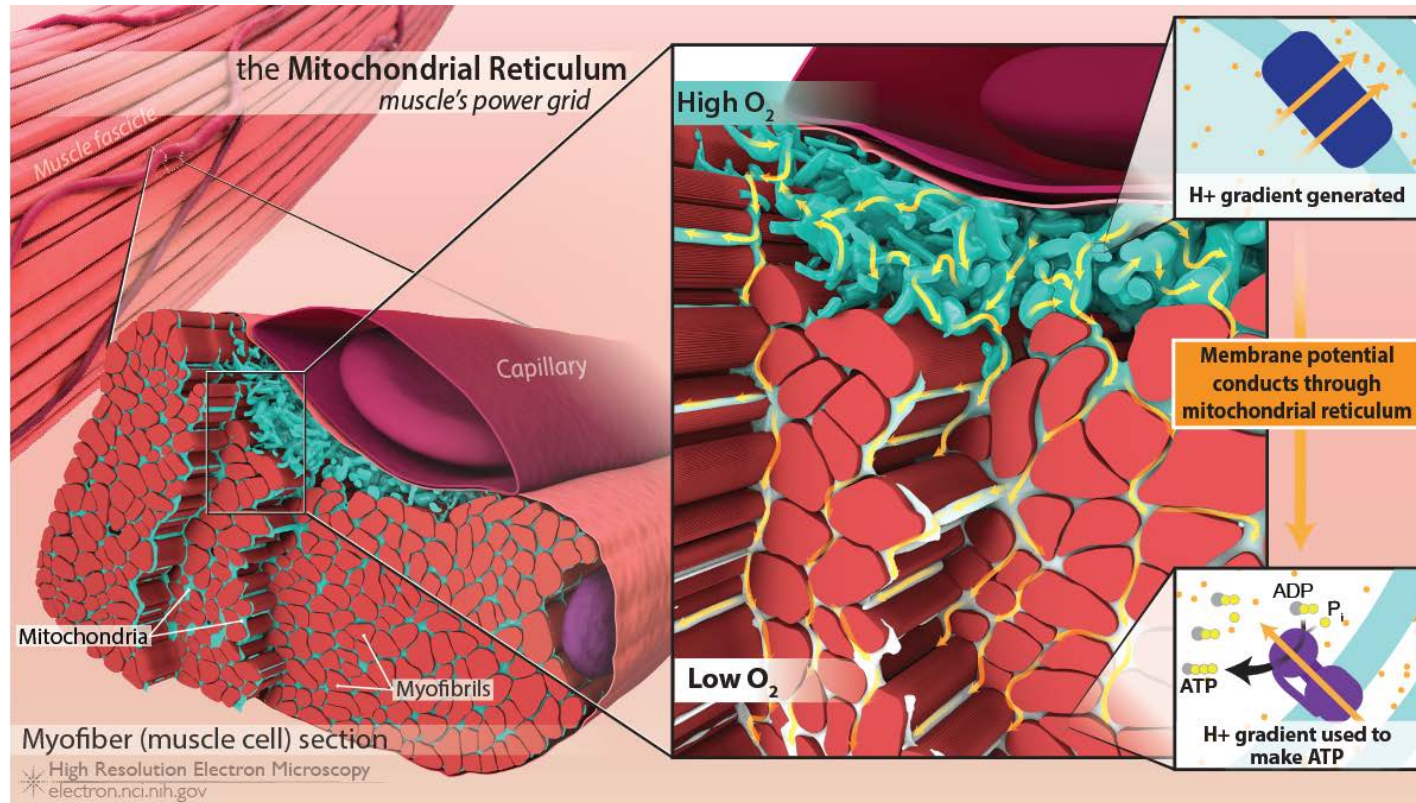
Choose the correct answer:

- A) 1 and 3
- B) 2 and 4
- C) Only 4
- D) 2 and 3
- E) Only 2



Cells use mitochondria to produce energy, therefore cells who consume a lot of energy need more mitochondria to function.

Muscle cells consume great amounts of energy, and need to respond quickly to the nervous stimulus. For this reason, they are the cells most likely to contain many mitochondria.



Correct answer: C



35. Which cell(s) are more likely to contain the most mitochondria:

1. Erythrocyte
2. Epidermal cell
3. Lymphocyte
4. Muscle cell

Choose the correct answer:

- A) 1 and 3
- B) 2 and 4
- C) Only 4
- D) 2 and 3
- E) Only 2





Associazione Studenti e Professori di Medicina Uniti Per

ANATOMY & PHYSIOLOGY

IMAT SIMULATION



*In collaboration with the Tutor Service of
School of Medicine of the Padua's University*

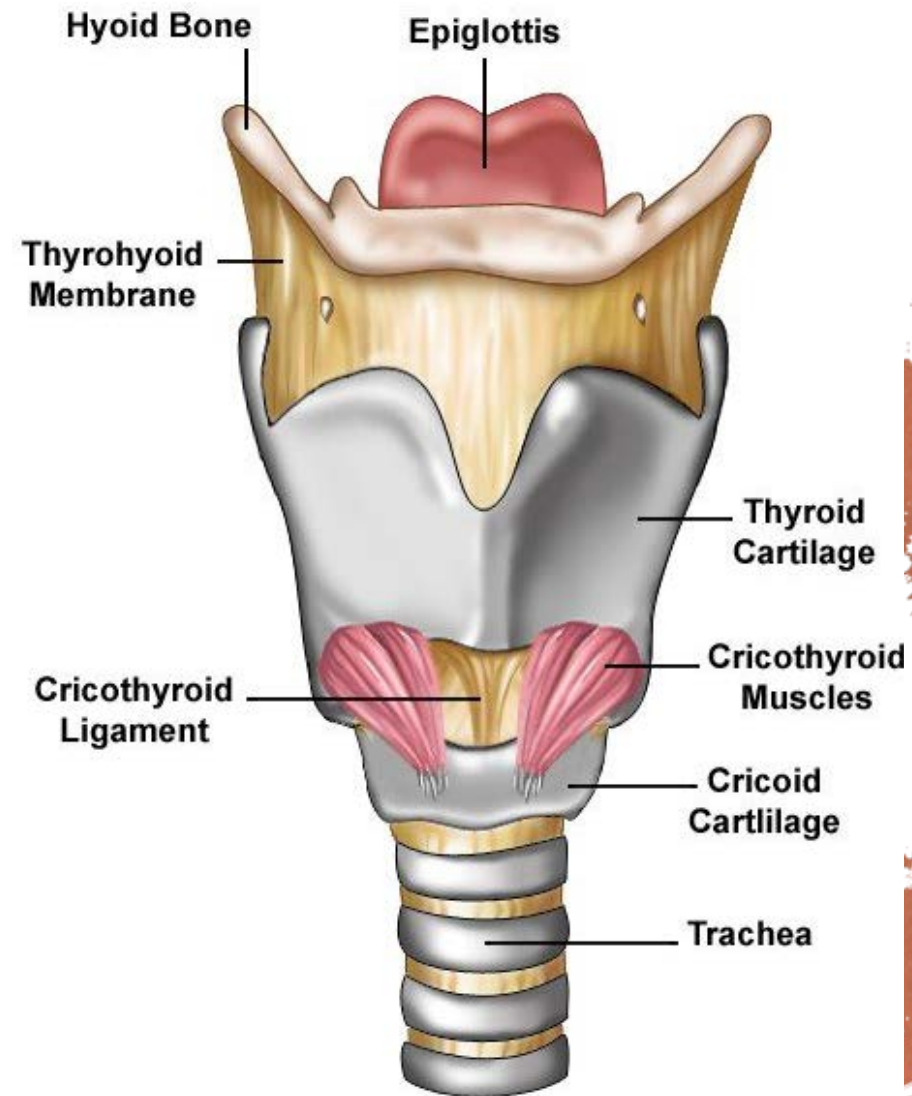
36. What is the correct order of the following structures in the larynx?

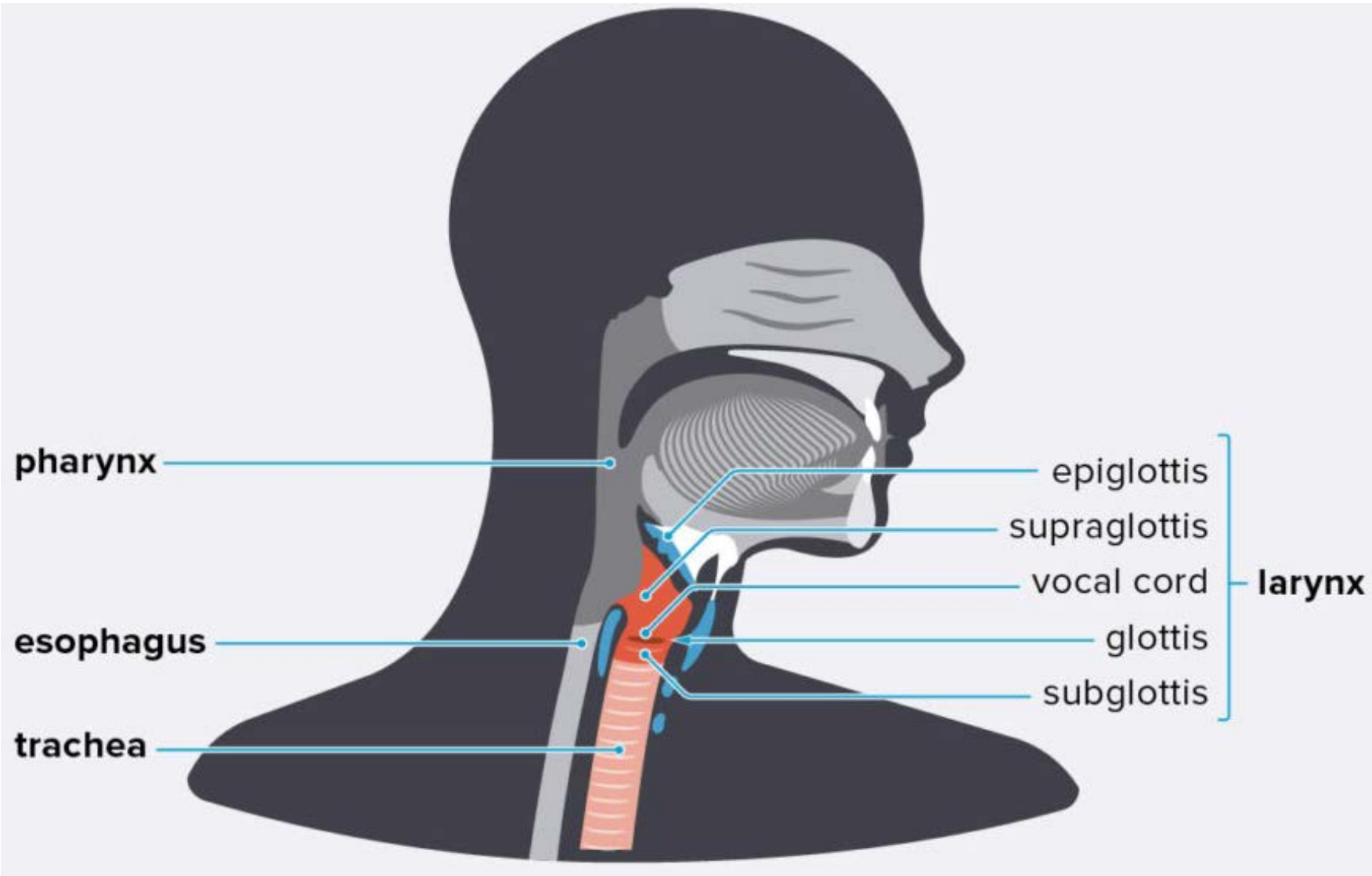
1. Vocal folds
2. Thyroid Cartilage
3. Epiglottis
4. Trachea

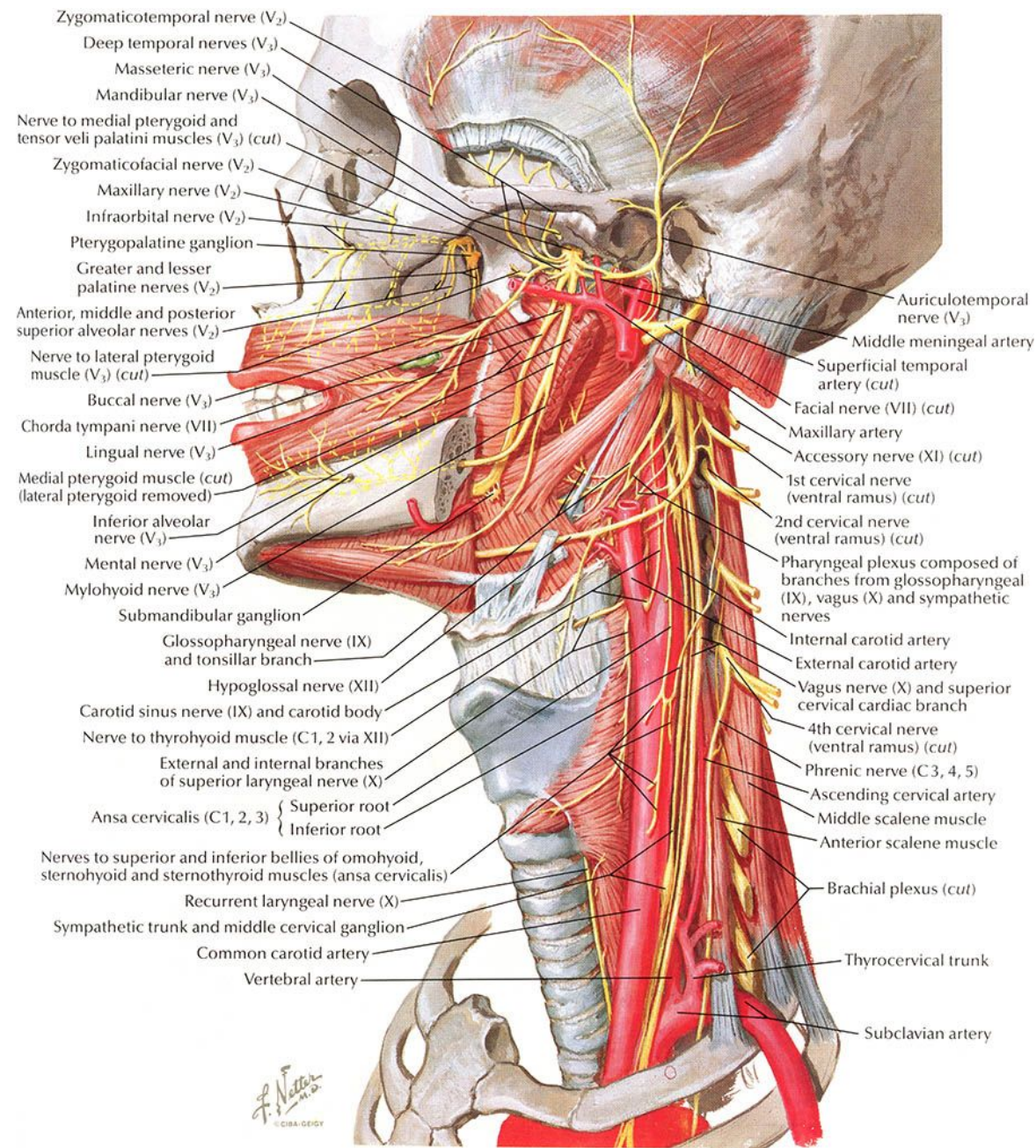
- A) 2, 3, 4, 1
- B) 1, 4, 3, 2
- C) 3, 4, 1, 2
- D) 3, 2, 1, 4
- E) 3, 2, 4, 1



The **larynx**, commonly called the **voice box**, is an organ in the top of the neck involved in breathing, producing sound and protecting the trachea against food aspiration. In adult humans, the larynx is found in the anterior neck at the level of the cervical vertebrae C3–C6. It connects the inferior part of the pharynx (hypopharynx) with the trachea. The laryngeal skeleton consists of nine cartilages: three single (epiglottic, thyroid and cricoid) and three paired (arytenoid, corniculate and cuneiform). The hyoid bone is not part of the larynx, though the larynx is suspended from the hyoid. The larynx extends vertically from the tip of the epiglottis to the inferior border of the cricoid cartilage. Its interior can be divided in supraglottis, glottis and subglottis.

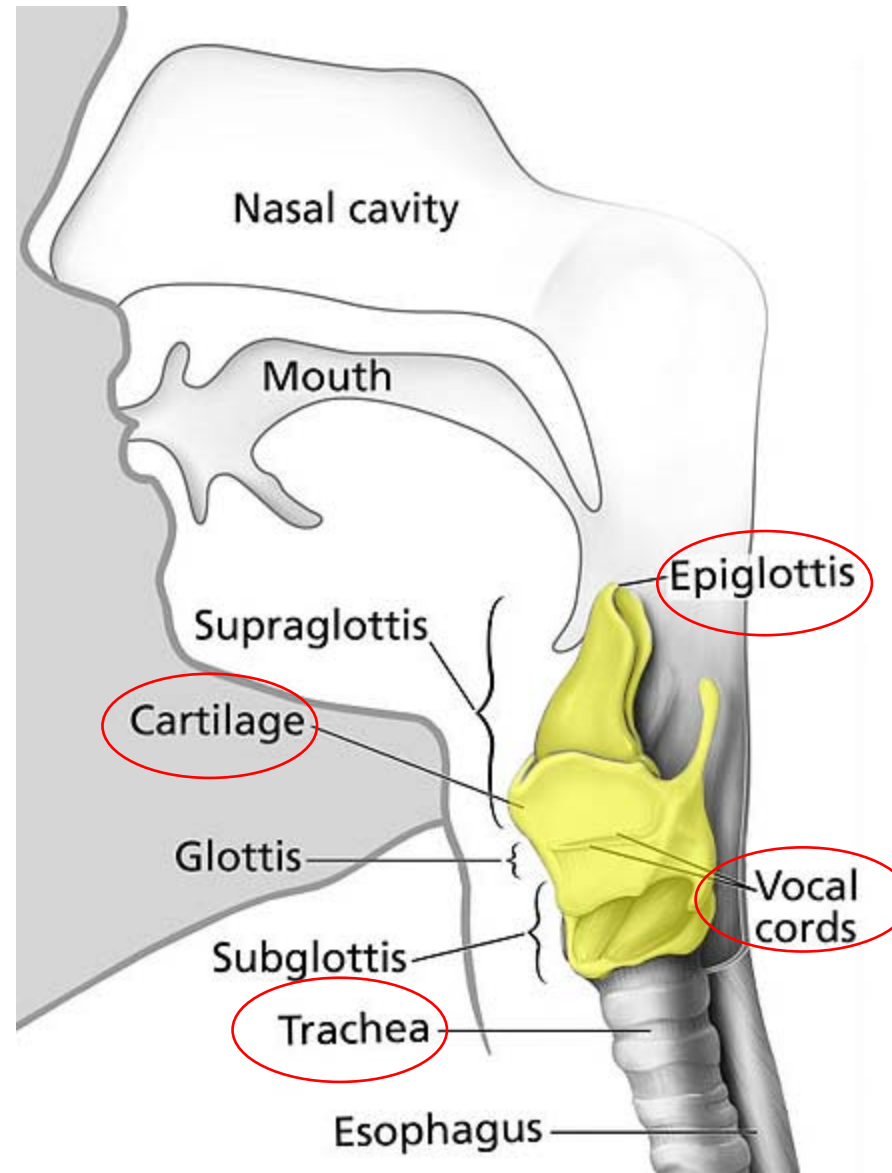






The correct order of the structures in the larynx is:

1. Epiglottis (3)
2. Thyroid Cartilage (2)
3. Vocal folds(1)
4. Trachea(4)



36. What is the correct order of the following structures in the larynx?

1. Vocal folds
2. Thyroid Cartilage
3. Epiglottis
4. Trachea

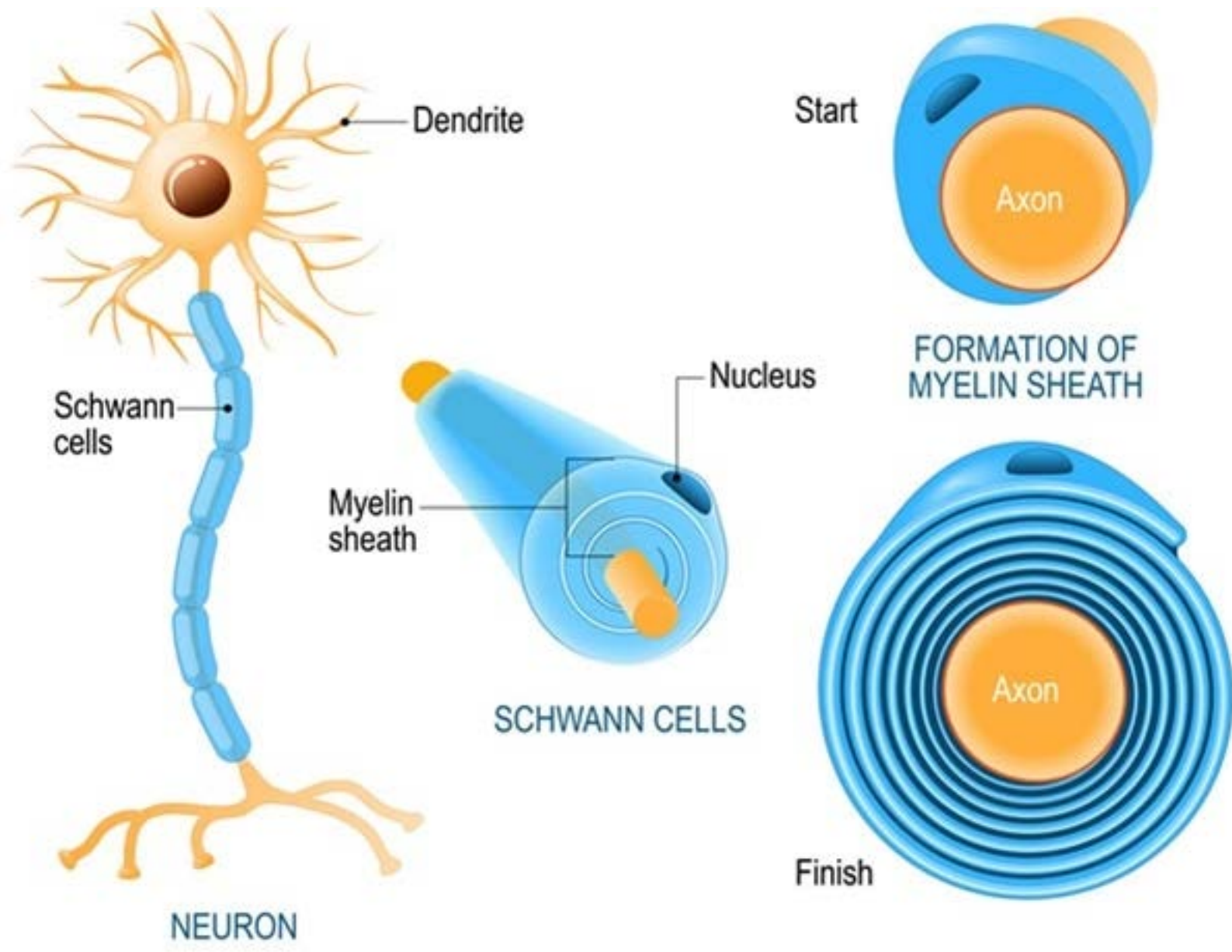
- A) 2, 3, 4, 1
- B) 1, 4, 3, 2
- C) 3, 4, 1, 2
- D) 3, 2, 1, 4
- E) 3, 2, 4, 1



37. Schwann cells are:

- A) A variety of glial cells
- B) Blood cells
- C) A variety of hepatocytes
- D) Also called Silvio's cells
- E) Part of the bone





Schwann cells or **neurolemmocytes** are the principal glia of the peripheral nervous system (PNS).

Glial cells function to support neurons and in the PNS, also include satellite cells, olfactory ensheathing cells, enteric glia and glia that reside at sensory nerve endings, such as the Pacinian corpuscle.

The two types of Schwann cells are myelinating and nonmyelinating. Myelinating Schwann cells wrap around axons of motor and sensory neurons to form the myelin sheath.

The Schwann cell promoter is present in the downstream region of the human dystrophin gene that gives shortened transcript that are again synthesized in a tissue-specific manner.

Schwann cells are involved in many important aspects of peripheral nerve biology—the conduction of nervous impulses along axons, nerve development and regeneration, trophic support for neurons, production of the nerve extracellular matrix, modulation of neuromuscular synaptic activity, and presentation of antigens to T-lymphocytes.



37. Schwann cells are:

- A) A variety of glial cells
- B) Blood cells
- C) A variety of hepatocytes
- D) Also called Silvio's cells
- E) Part of the bone

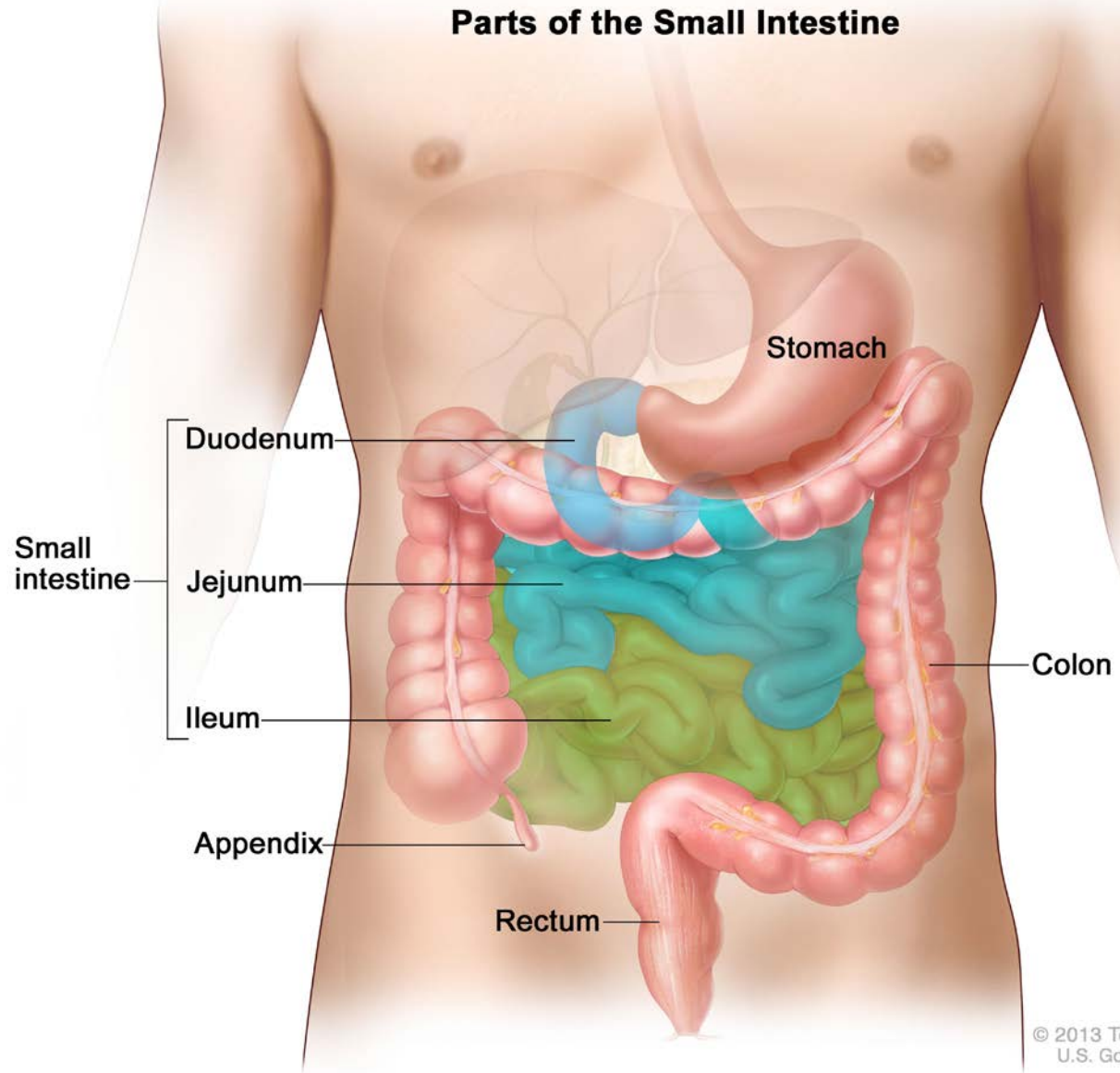


38. Which of the following structures are part of the small intestine?

1. Duodenum
2. Cecum
3. Appendix
4. Jejunum
5. Ileum

- A) 1, 2 and 3
- B) 1, 4 and 5
- C) 3, 4 and 5
- D) 2, 3 and 5
- E) Only 4





© 2013 Terese Winslow LLC
U.S. Govt. has certain rights



The **small intestine** or **small bowel** is an organ in the gastrointestinal tract where most of the absorption of nutrients and minerals from food takes place.

It lies between the stomach and large intestine, and receives bile and pancreatic juice through the pancreatic duct to aid in digestion.

The small intestine is about 20 feet (6 meters) long and folds many times to fit in the abdomen. Although it is longer than the large intestine, it is called the small intestine because it is thinner in width.

The small intestine has three distinct regions – the duodenum, jejunum, and ileum. The duodenum, the shortest, is where preparation for absorption through small finger-like protrusions called villi begins. The jejunum is specialized for the absorption through its lining by enterocytes: small nutrient particles which have been previously digested by enzymes in the duodenum. The main function of the ileum is to absorb vitamin B12, bile salts, and whatever products of digestion that were not absorbed by the jejunum.



38. Which of the following structures are part of the small intestine?

1. Duodenum
2. Cecum
3. Appendix
4. Jejunum
5. Ileum

- A) 1, 2 and 3
- B) 1, 4 and 5
- C) 3, 4 and 5
- D) 2, 3 and 5
- E) Only 4



39. Which of the following is/are part of the lymphatic system?

1. Lymph nodes
2. Sympathetic chain
3. Thoracic duct
4. Azygos

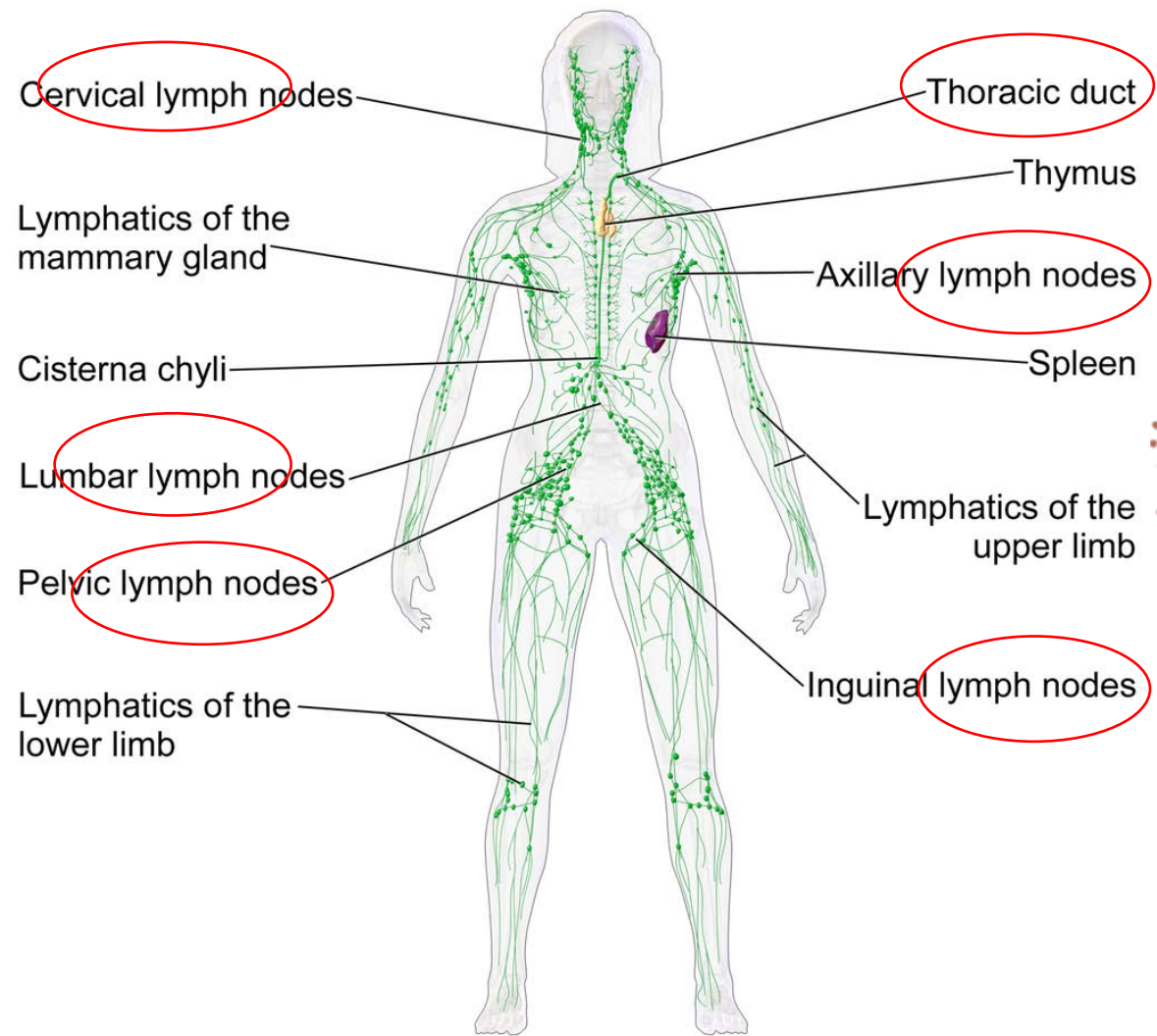
- A) 1 only
- B) 1 and 2
- C) 1 and 3
- D) 3 only
- E) 3 and 4

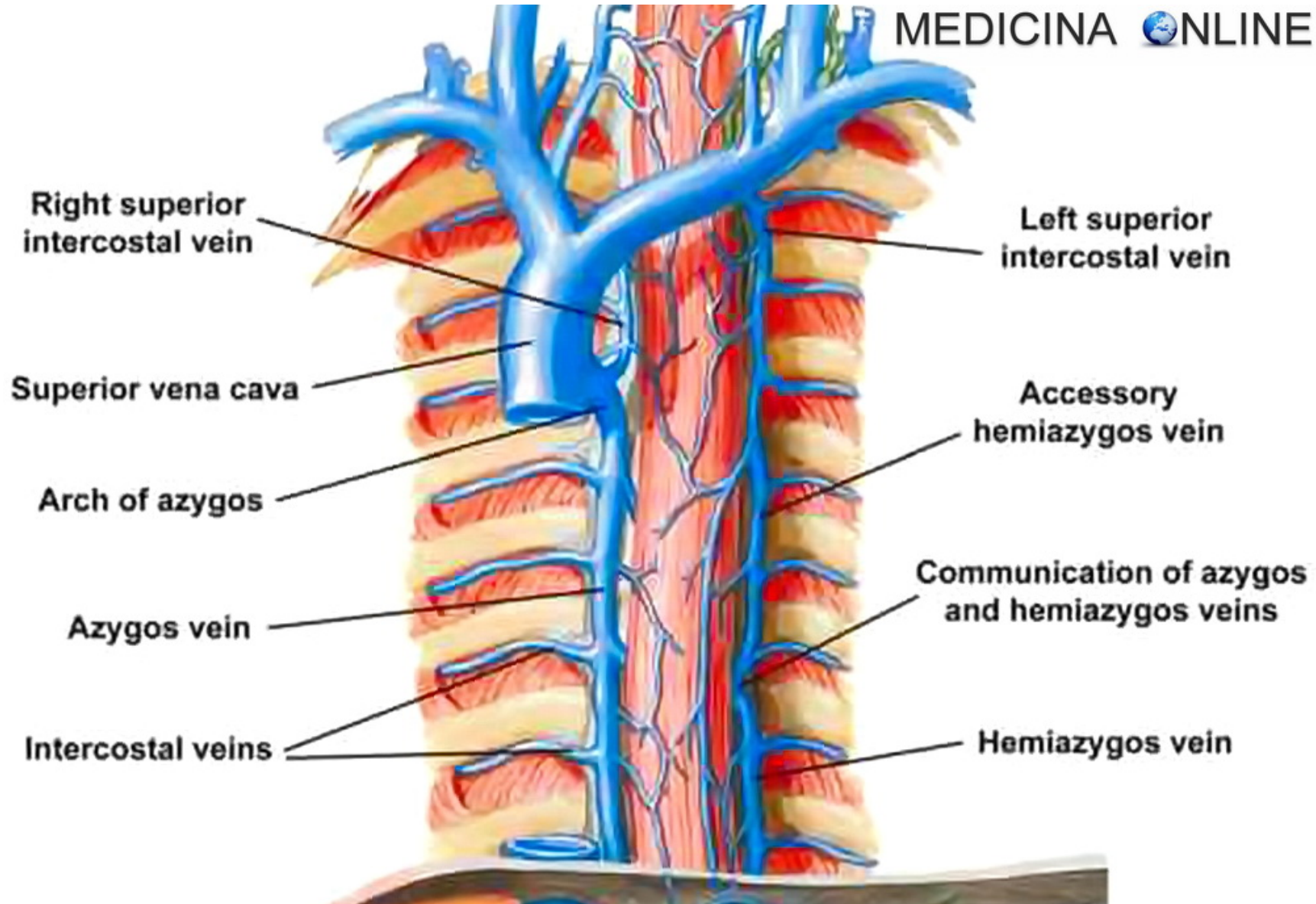


The **lymphatic system**, or **lymphoid system**, is an organ system in vertebrates that is part of the circulatory system and the immune system.

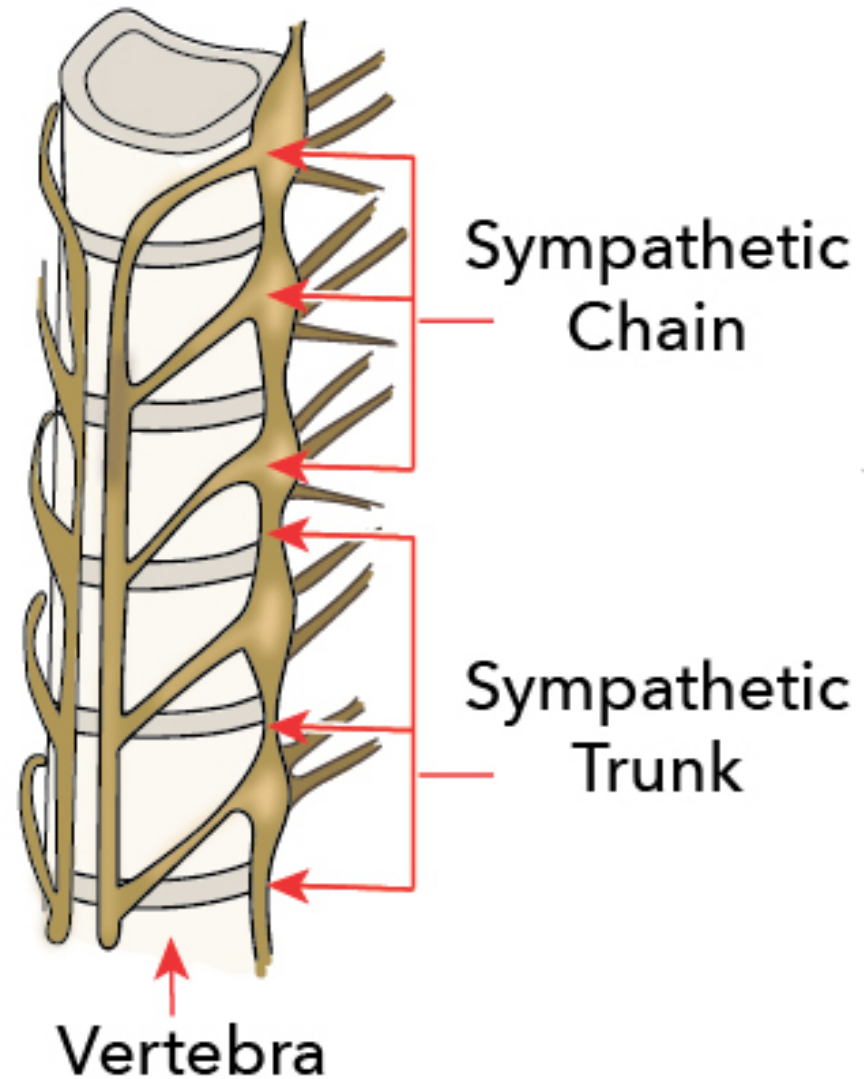
It is made up of a large network of lymph, lymphatic vessels, lymph nodes, lymphatic or lymphoid organs, and lymphoid tissues.

The vessels carry a clear fluid called lymph towards the heart.





The **sympathetic trunks** (**sympathetic chain, gangliated cord**) are a paired bundle of nerve fibers that run from the base of the skull to the coccyx.



39. Which of the following is/are part of the lymphatic system?

1. Lymph nodes
2. Sympathetic chain
3. Thoracic duct
4. Azygos

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



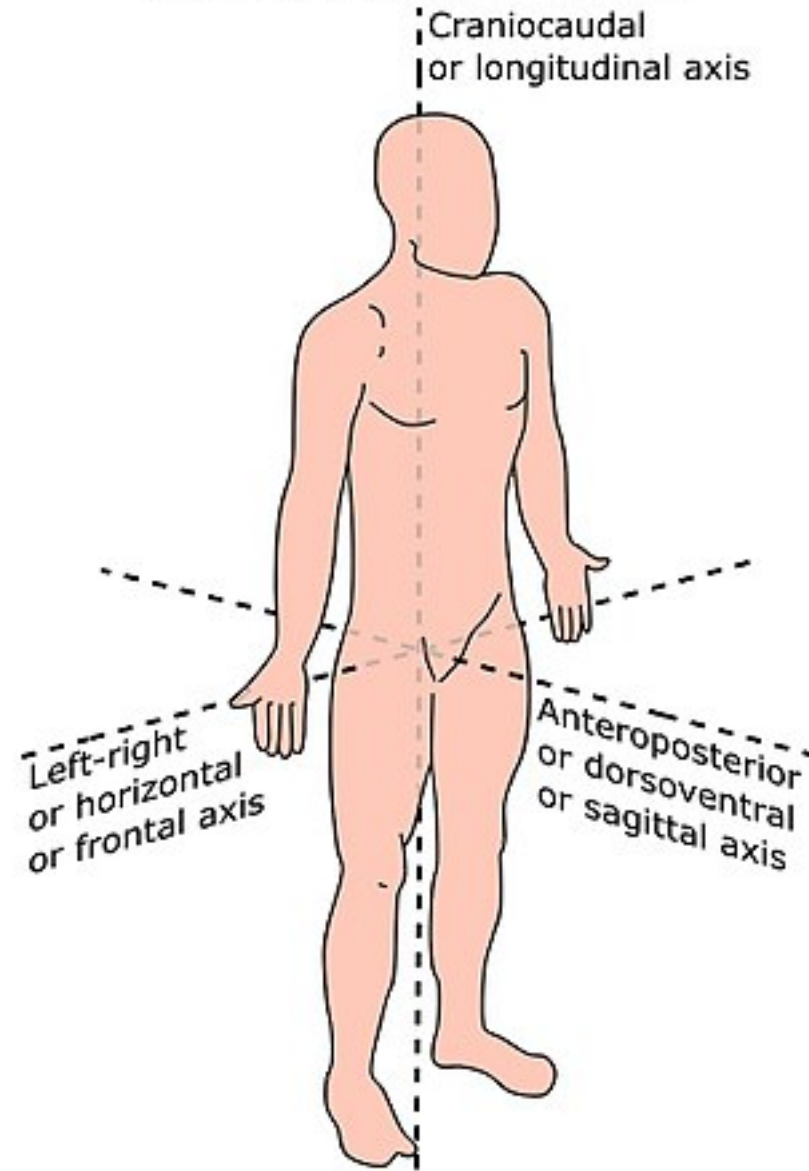
40. What is the correct order of the following brain structures, in a craniocaudal projection ?

1. Pons
2. Cerebrum
3. Medulla
4. Midbrain

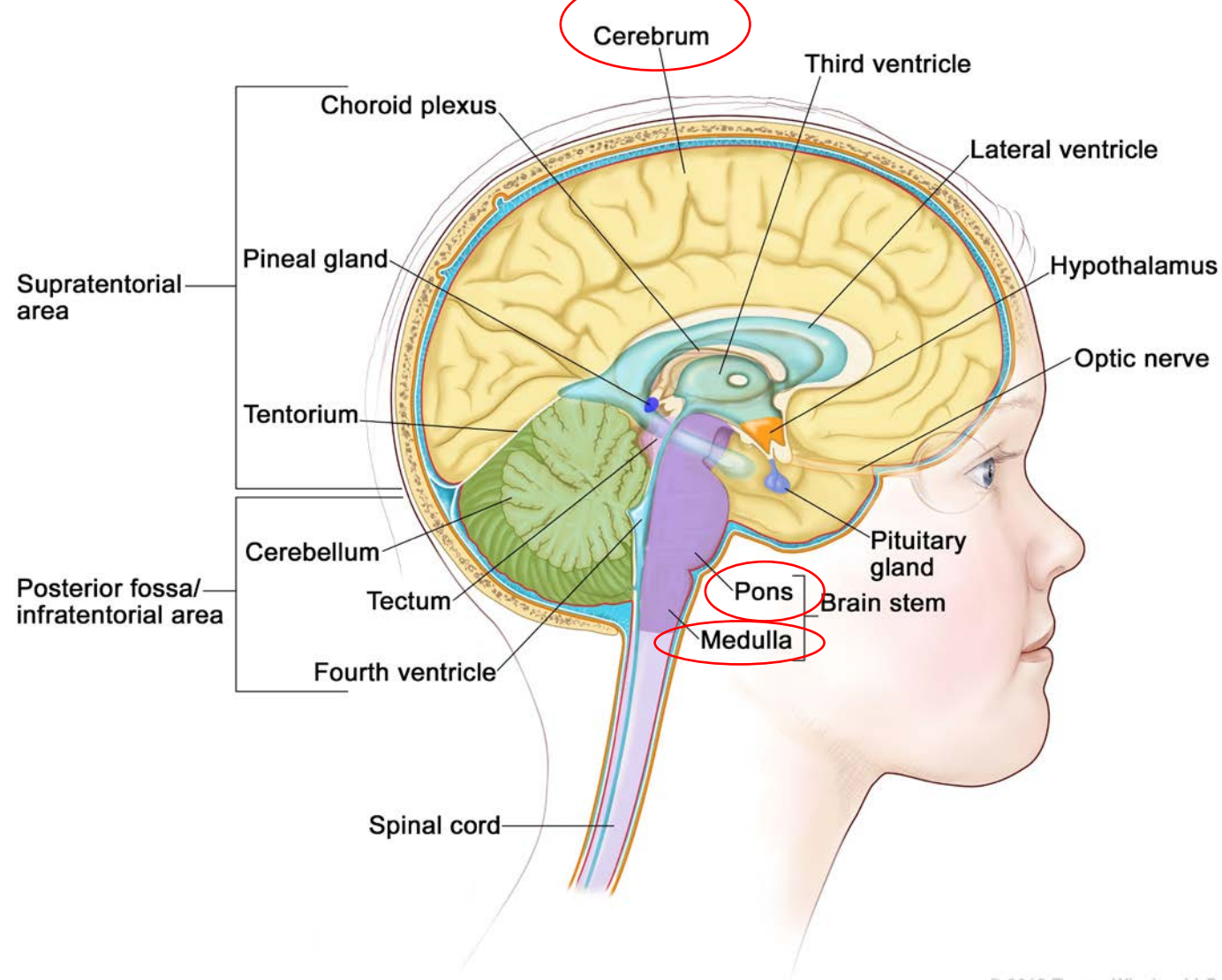
- A) 2, 4, 1, 3
- B) 3, 4, 1, 2
- C) 3, 1, 4, 2
- D) 1, 2, 3, 4
- E) 3, 2, 1, 4



Anatomical axes

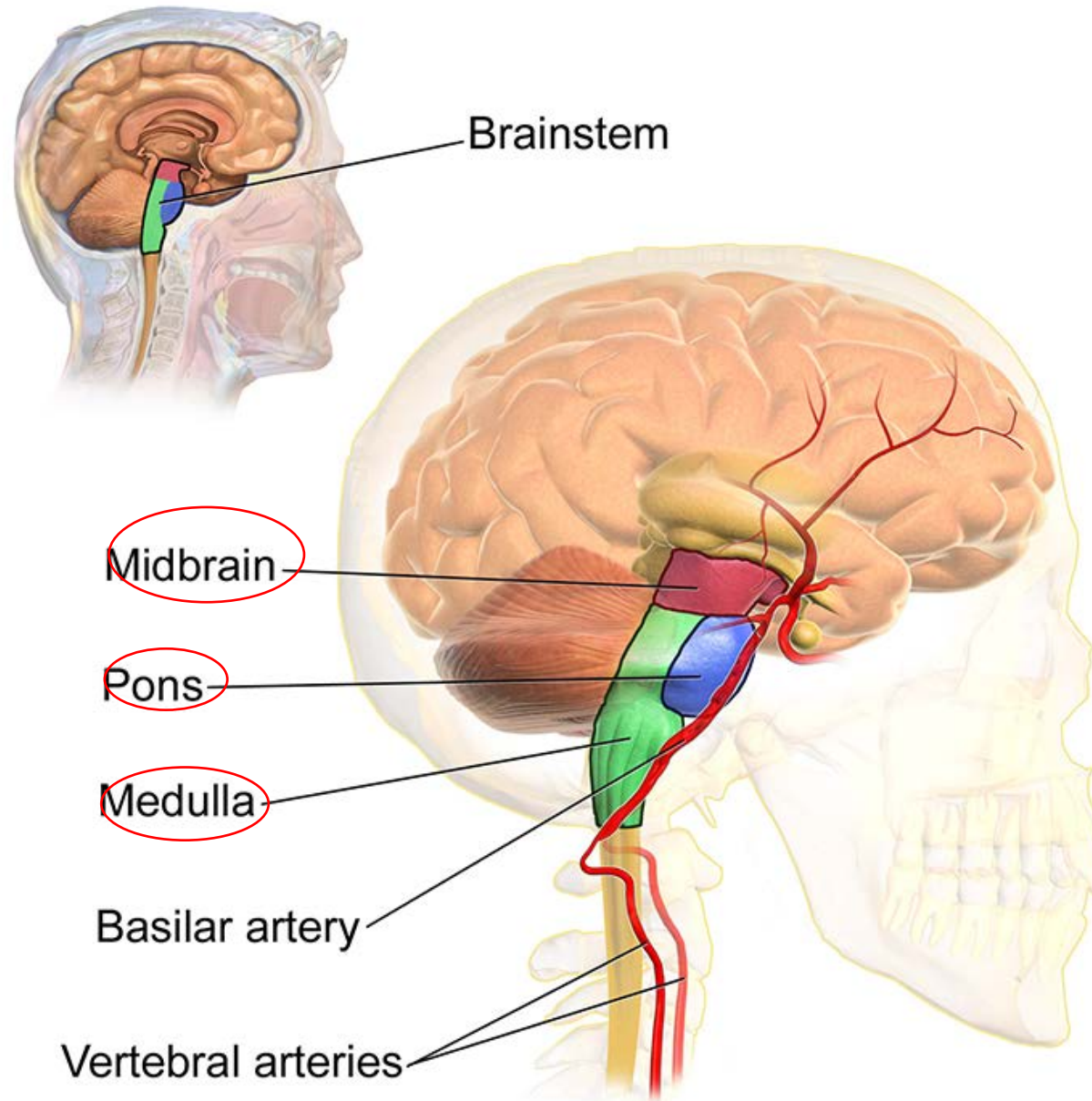


Anatomy of the Brain (Medial)



© 2013 Terese Winslow LLC
U.S. Govt. has certain rights





40. What is the correct order of the following brain structures, in a craniocaudal projection ?

1. Pons
2. Cerebrum
3. Medulla
4. Midbrain

- A) 2, 4, 1, 3
- B) 3, 4, 1, 2
- C) 3, 1, 4, 2
- D) 1, 2, 3, 4
- E) 3, 2, 1, 4

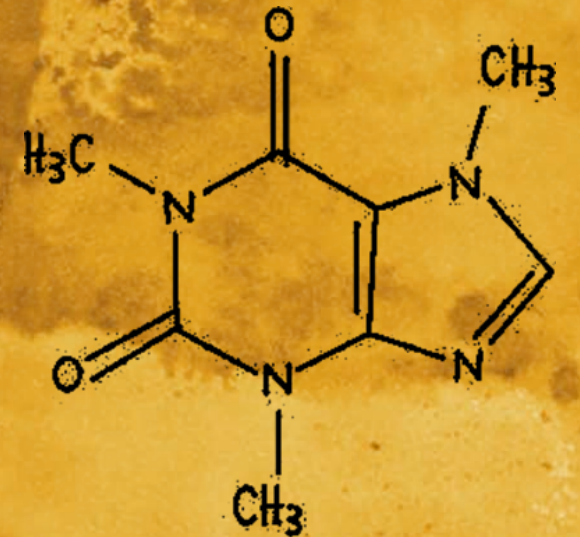
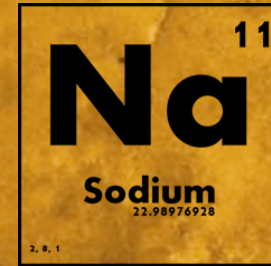




Associazione Studenti e Professori di Medicina Uniti Per

CHEMISTRY

IMAT SIMULATION



In collaboration with the Tutor Service of
School of Medicine of the Padua's University

41. A 250 ml solution 0.5M of HCl was added to an HCl solution of unknown concentration, resulting in 1L solution 0.25M. What is the concentration of the unknown HCl solution?

- A) 0.125 M
- B) 0.16 M
- C) 0.25 M
- D) 0.1 M
- E) 0.22 M



1) Find the n of the final and starting solutions

$$n = M \times V$$

$$0.5 \times (250 \times 10^{-3}) = 125 \times 10^{-3} \text{ mol}$$

$$0.25 \times 1 = 0.25$$

2) Subtract to find the difference in moles

$$0.25 - 0.125 = 0.125$$

3) Find the difference in Volume

$$1000 - 250 \text{ ml} = 750 \text{ ml or } 3/4 \text{ L}$$

4) $M = n/V$

$$0.125 / (750 \times 10^{-3}) = 0.16$$

Correct answer: B



41. A 250 ml solution 0.5M of HCl was added to an HCl solution of unknown concentration, resulting in 1L solution 0.25M. What is the concentration of the unknown HCl solution?

- A) 0.125 M
- B) 0.16 M
- C) 0.25 M
- D) 0.1 M
- E) 0.22 M



42. Which of the following elements belongs to the Chalcogens group?

- A) Xe
- B) Os
- C) Te
- D) At
- E) Cs



The Chalcogens are also known as the oxygen group, because they all are listed below it. They are; Oxygen, Sulfur, Selenium, Tellurium(Te), Polonium and Livermonium.

Xenon(Xe) is a Noble Gas.

Astatine(At) is an Halogen.

Cesium(Cs) is an Alkali Metal.

Osmium(Os) is a Transition Metal.

Correct answer: C



42. Which of the following elements belongs to the Chalcogens group?

- A) Xe
- B) Os
- C) Ie
- D) At
- E) Cs



43. Given the reaction: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
Which volume of CO_2 is formed from 4 moles of C_3H_8 , at standard temperature and pressure (STP)?

- A) 238,8 l
- B) 298,8 l
- C) 248,8 l
- D) 218,8 l
- E) 268,8 l



Looking at the stoichiometric coefficients, we can see how the ratio between C_3H_8 and CO_2 is 1:3

This means that from 4 moles of reagent (C_3H_8) will develop $(4 \times 3) = 12$ moles of carbon dioxide. We also know that at STP, 1 mole of gas takes 22.4 l

To obtain the volume of gas developed in the reaction, multiply the number of moles of the same by the molar volume:

$$V_{CO_2} = 12 \text{ mol} \times 22,4 \frac{\text{l}}{\text{mol}} = 268,8 \text{ l}$$

Correct answer: E



43. Given the reaction: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
Which volume of CO_2 is formed from 4 moles of C_3H_8 , at standard temperature and pressure (STP)?

- A) 238,8 l
- B) 298,8 l
- C) 248,8 l
- D) 218,8 l
- E) 268,8 l



44. Which is the IUPAC of the following compound: $\text{CH}\equiv\text{C}-\text{CH}_2\text{Cl}$?

- A) 1-chlorpropyne
- B) 3-chlorpropene
- C) Chloroacetylene
- D) 3-chlorpropyne
- E) 1-chlorine-1-proyne



It is an alkyne, the main chain is composed of 3 carbon atoms, we begin to number the carbon atoms so that the triple bond has the lowest number possible (in this case 1), the chlorine is therefore bound to the carbon number three.

Correct answer: D



44. Which is the IUPAC of the following compound: $\text{CH}\equiv\text{C}-\text{CH}_2\text{Cl}$?

- A) 1-chlorpropyne
- B) 3-chlorpropene
- C) Chloroacetylene
- D) 3-chlorpropyne
- E) 1-chlorine-1-proyne



45. Which of the following statements regarding optical isomerism are correct?

- 1) The property of a compound to rotate the plane of polarized light depends on the percentage of enantiomers that compose it
- 2) Two enantiomers have identical chemical and physical properties in an achiral environment
- 3) A carbon atom is said to be asymmetrical when it is bound to at least three different substituents
- 4) All amino acids, except glycine, have chiral carbon and are all in the form of D in living organisms

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



Enantiomers have the ability to rotate the plane of polarized light of the same amount, but in the opposite direction. In a compound in which both enantiomers are present, the percentage of each one determines the direction of rotation: in particular, a mixture consisting of 50% of each of the two has no optical activity and is called racemo.

(ANSWER 1 CORRECT)

Two enantiomers have the same physical and chemical properties except for other optically active substances (achiral environment) and differ only by interaction with polarized light.

(ANSWER 2 CORRECT)

Chiral isomers must have an asymmetric carbon, or linked to 4 different substituents.

(ANSWER 3 WRONG)

Some natural compounds, such as sugars and amino-acids, are present in the form of enantiomers that are defined D and L depending on the position of the substituents. Amino acids, except glycine, are all chiral and in living organisms are found in the L form.

(ANSWER 4 WRONG)

Correct answer: B



45. Which of the following statements regarding optical isomerism are correct?

- 1) The property of a compound to rotate the plane of polarized light depends on the percentage of enantiomers that compose it
- 2) Two enantiomers have identical chemical and physical properties in an achiral environment
- 3) A carbon atom is said to be asymmetrical when it is bound to at least three different substituents
- 4) All amino acids, except glycine, have chiral carbon and are all in the form of D in living organisms

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



46. Which of the following gives the right combination with a starting volume of 200 ml of water 1M?

	Initial M	Volume added	Final M
1	2 M	200 ml	1.5 M
2	1 M	400 ml	1.5 M
3	1 M	800 ml	1 M
4	1.5 M	500 ml	2 M
5	2 M	150 ml	0.2 M

- A) 1, 2, 3
- B) 1, 2
- C) 4, 5
- D) 5, 3
- E) 1, 3



To find the final M when adding a solution of different M:

$$M = n/V \rightarrow n = M \times V$$

$$\mathbf{Final\ M = \frac{Tot.\ n}{Tot.\ V}}$$

In this case:

1) $0.2\ L \times 2\ M = 0.4\ \text{moles}$
 $0.4 + 0.2\ (\text{from the given one}) = 0.6$
 $0.6/0.4 = 1.5\ M$

3) Since 800 ml already are 1 M, then it will be
 $0.2 + 0.8\ \text{moles} = 1$
 $1/1 = 1\ M$

Correct answer: E



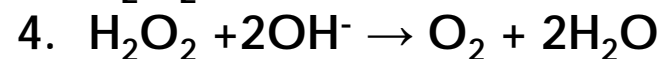
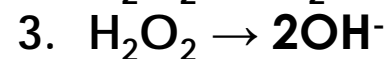
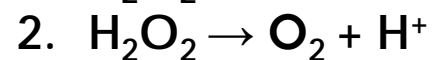
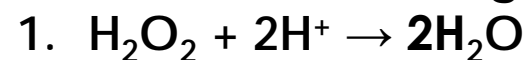
46. Which of the following gives the right combination with a starting volume of 200 ml of water 1M?

	Initial M	Volume added	Final M
1	2 M	200 ml	1.5 M
2	1 M	400 ml	1.5 M
3	1 M	800 ml	1 M
4	1.5 M	500 ml	2 M
5	2 M	150 ml	0.2 M

- A) 1, 2, 3
- B) 1, 2
- C) 4, 5
- D) 5, 3
- E) 1, 3



47. Hydrogen peroxide can be either the oxidising or the reducing agent. In which of the following reactions oxygen is reduced?



A) 1 and 3 only

B) 2 and 4 only

C) 1, 2 and 4

D) 1 and 4 only

E) 3 and 4 only



Hydrogen peroxide can be either the oxidising or the reducing agent, but the question asks when its Oxygen is reduced (so when it's the oxidising agent).

In the first option Oxygen's ox.n. goes from "-1" to "-2" . Oxygen is reduced.

In the second Oxygen's ox.n. goes from "-1" to "0" . Oxygen is oxidised.

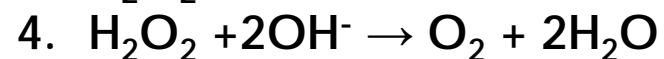
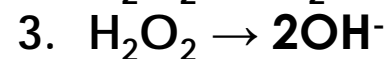
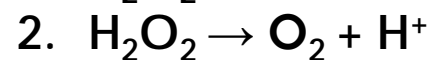
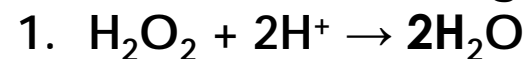
In the third Oxygen's ox.n. goes from "-1" to "-2" . Oxygen is reduced.

In the fourth Oxygen's ox.n. goes from "-1" to "0" . Oxygen is oxidised.

Correct answer: A



47. Hydrogen peroxide can be either the oxidising or the reducing agent. In which of the following reactions oxygen is reduced?



A) 1 and 3 only

B) 2 and 4 only

C) 1, 2 and 4

D) 1 and 4 only

E) 3 and 4 only



48. What mass of solute must be dissolved in 900 cm^3 of solution to be 17% m/V?

- A) 278 g
- B) 153 g
- C) 96 g
- D) 125 g
- E) 263 g



In the chemistry of the solutions, the concentrations may be expressed in % m/V, i.e.

$$[\text{Mass}(\text{solute}) / \text{Volume}(\text{solution})] \times 100$$

Applying the inverse formula we then calculate the mass of solute:

$$\text{Mass} = [\% \text{ m/V} \times \text{Volume}] / 100 = [17\% \times 900\text{ml}] / 100 = 153 \text{ g}$$

Correct answer: B



48. What mass of solute must be dissolved in 900 cm^3 of solution to be 17% m/V?

- A) 278 g
- B) 153 g
- C) 96 g
- D) 125 g
- E) 263 g



49. What is the freezing point depression of a solution of 0.16 moles of Na_2CO_3 in 100 mL of ethanol?

[$K_f = 1.99 \text{ K}\cdot\text{kg}/\text{mol}$; density of ethanol = $789 \text{ kg}/\text{m}^3$]

- A) 4 K
- B) 1,2 K
- C) 9,6 K
- D) 12 K
- E) 3,2 K



To calculate the freezing point depression: $\Delta T_f = K_f \times m$, where m = molality:

$$m \text{ (molality)} = \frac{\text{number of moles of the solute (n)}}{\text{weight of the solvent (kg)}}$$

Note that for strong electrolytes, such as Na_2CO_3 , we have to multiply per the Van't Hoff factor i , which indicates for ionic compounds the number of discrete ions in the formula. In this case $i = 3$ because, in a solvent, Na_2CO_3 dissociates in two Na^+ ions and one CO_3^{2-} (carbonate) ion.

To solve the exercise, we have to find the mass of the solvent knowing its density and its volume and remembering that $\rho = m/V$.

$$\rho \text{ of ethanol} = 789 \text{ kg/m}^3 = 789 \times 10^{-4} \text{ kg/mL}$$

$$V = 100 \text{ mL}$$

$$m = 0.0789 \text{ kg}$$

Replacing the numerical values in the formula of the freezing point depression, we obtain that its value corresponds to 12.

Correct answer: D



49. What is the freezing point depression of a solution of 0.16 moles of Na_2CO_3 in 100 mL of ethanol?

[$K_f = 1.99 \text{ K}\cdot\text{kg}/\text{mol}$; density of ethanol = $789 \text{ kg}/\text{m}^3$]

- A) 4 K
- B) 1,2 K
- C) 9,6 K
- D) 12 K
- E) 3,2 K



50. Which of the following element has this electronical configuration:
 $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$?

- A) Ar
- B) Br
- C) Se
- D) Br⁻
- E) Ga⁺



Periodic Table of the Elements

Atomic Number Atomic Mass
Symbol
 Name
 Electron Configuration

1 IA 1A																	18 VIIIA 8A	
1 H Hydrogen 1s ¹	2 IIA 2A												13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	2 He Helium 1s ²
3 Li Lithium [He]2s ¹	4 Be Beryllium [He]2s ²											5 B Boron [He]2s ² 2p ¹	6 C Carbon [He]2s ² 2p ²	7 N Nitrogen [He]2s ² 2p ³	8 O Oxygen [He]2s ² 2p ⁴	9 F Fluorine [He]2s ² 2p ⁵	10 Ne Neon [He]2s ² 2p ⁶	
11 Na Sodium [Ne]3s ¹	12 Mg Magnesium [Ne]3s ²	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum [Ne]3s ² 3p ¹	14 Si Silicon [Ne]3s ² 3p ²	15 P Phosphorus [Ne]3s ² 3p ³	16 S Sulfur [Ne]3s ² 3p ⁴	17 Cl Chlorine [Ne]3s ² 3p ⁵	18 Ar Argon [Ne]3s ² 3p ⁶	
19 K Potassium [Ar]4s ¹	20 Ca Calcium [Ar]4s ²	21 Sc Scandium [Ar]3d ¹ 4s ²	22 Ti Titanium [Ar]3d ² 4s ²	23 V Vanadium [Ar]3d ³ 4s ²	24 Cr Chromium [Ar]3d ⁵ 4s ¹	25 Mn Manganese [Ar]3d ⁵ 4s ²	26 Fe Iron [Ar]3d ⁶ 4s ²	27 Co Cobalt [Ar]3d ⁷ 4s ²	28 Ni Nickel [Ar]3d ⁸ 4s ²	29 Cu Copper [Ar]3d ¹⁰ 4s ¹	30 Zn Zinc [Ar]3d ¹⁰ 4s ²	31 Ga Gallium [Ar]3d ¹⁰ 4s ² 4p ¹	32 Ge Germanium [Ar]3d ¹⁰ 4s ² 4p ²	33 As Arsenic [Ar]3d ¹⁰ 4s ² 4p ³	34 Se Selenium [Ar]3d ¹⁰ 4s ² 4p ⁴	35 Br Bromine [Ar]3d ¹⁰ 4s ² 4p ⁵	36 Kr Krypton [Ar]3d ¹⁰ 4s ² 4p ⁶	
37 Rb Rubidium [Kr]5s ¹	38 Sr Strontium [Kr]5s ²	39 Y Yttrium [Kr]4d ¹ 5s ²	40 Zr Zirconium [Kr]4d ² 5s ²	41 Nb Niobium [Kr]4d ⁴ 5s ¹	42 Mo Molybdenum [Kr]4d ⁵ 5s ¹	43 Tc Technetium [Kr]4d ⁵ 5s ²	44 Ru Ruthenium [Kr]4d ⁷ 5s ¹	45 Rh Rhodium [Kr]4d ⁸ 5s ¹	46 Pd Palladium [Kr]4d ¹⁰	47 Ag Silver [Kr]4d ¹⁰ 5s ¹	48 Cd Cadmium [Kr]4d ¹⁰ 5s ²	49 In Indium [Kr]4d ¹⁰ 5s ² 5p ¹	50 Sn Tin [Kr]4d ¹⁰ 5s ² 5p ²	51 Sb Antimony [Kr]4d ¹⁰ 5s ² 5p ³	52 Te Tellurium [Kr]4d ¹⁰ 5s ² 5p ⁴	53 I Iodine [Kr]4d ¹⁰ 5s ² 5p ⁵	54 Xe Xenon [Kr]4d ¹⁰ 5s ² 5p ⁶	
55 Cs Cesium [Xe]6s ¹	56 Ba Barium [Xe]6s ²	57-71	72 Hf Hafnium [Xe]4f ¹⁴ 6s ² 6p ²	73 Ta Tantalum [Xe]4f ¹⁴ 6s ² 6p ²	74 W Tungsten [Xe]4f ¹⁴ 6s ² 6p ²	75 Re Rhenium [Xe]4f ¹⁴ 6s ² 6p ²	76 Os Osmium [Xe]4f ¹⁴ 6s ² 6p ²	77 Ir Iridium [Xe]4f ¹⁴ 6s ² 6p ²	78 Pt Platinum [Xe]4f ¹⁴ 6s ¹ 6p ¹	79 Au Gold [Xe]4f ¹⁴ 6s ¹ 6p ¹	80 Hg Mercury [Xe]4f ¹⁴ 6s ² 6p ²	81 Tl Thallium [Xe]4f ¹⁴ 6s ² 6p ¹	82 Pb Lead [Xe]4f ¹⁴ 6s ² 6p ²	83 Bi Bismuth [Xe]4f ¹⁴ 6s ² 6p ³	84 Po Polonium [Xe]4f ¹⁴ 6s ² 6p ⁴	85 At Astatine [Xe]4f ¹⁴ 6s ² 6p ⁵	86 Rn Radon [Xe]4f ¹⁴ 6s ² 6p ⁶	
87 Fr Francium [Rn]7s ¹	88 Ra Radium [Rn]7s ²	89-103	104 Rf Rutherfordium [Rn]5f ¹⁴ 6d ² 7s ² *	105 Db Dubnium [Rn]5f ¹⁴ 6d ³ 7s ² *	106 Sg Seaborgium [Rn]5f ¹⁴ 6d ⁴ 7s ² *	107 Bh Bohrium [Rn]5f ¹⁴ 6d ⁵ 7s ² *	108 Hs Hassium [Rn]5f ¹⁴ 6d ⁶ 7s ² *	109 Mt Meitnerium [Rn]5f ¹⁴ 6d ⁷ 7s ² *	110 Ds Darmstadtium [Rn]5f ¹⁴ 6d ⁸ 7s ² *	111 Rg Roentgenium [Rn]5f ¹⁴ 6d ⁹ 7s ² *	112 Cn Copernicium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² *	113 Uut Ununtrium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ¹ *	114 Fl Flerovium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ² *	115 Uup Ununpentium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ³ *	116 Lv Livermorium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ⁴ *	117 Uus Ununseptium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ⁵ *	118 Uuo Ununoctium [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7p ⁶ *	

Configurations denoted with a * are unknown and the listed values are predicted.

	57 La Lanthanum [Xe]5d ¹ 6s ²	58 Ce Cerium [Xe]4f ¹ 5d ¹ 6s ²	59 Pr Praseodymium [Xe]4f ³ 6s ²	60 Nd Neodymium [Xe]4f ⁴ 6s ²	61 Pm Promethium [Xe]4f ⁵ 6s ²	62 Sm Samarium [Xe]4f ⁶ 6s ²	63 Eu Europium [Xe]4f ⁷ 6s ²	64 Gd Gadolinium [Xe]4f ⁷ 5d ¹ 6s ²	65 Tb Terbium [Xe]4f ⁹ 6s ²	66 Dy Dysprosium [Xe]4f ¹⁰ 6s ²	67 Ho Holmium [Xe]4f ¹¹ 6s ²	68 Er Erbium [Xe]4f ¹² 6s ²	69 Tm Thulium [Xe]4f ¹³ 6s ²	70 Yb Ytterbium [Xe]4f ¹⁴ 6s ²	71 Lu Lutetium [Xe]4f ¹⁴ 5d ¹ 6s ²
	89 Ac Actinium [Rn]6d ¹ 7s ²	90 Th Thorium [Rn]6d ² 7s ²	91 Pa Protactinium [Rn]5f ² 6d ¹ 7s ²	92 U Uranium [Rn]5f ³ 6d ¹ 7s ²	93 Np Neptunium [Rn]5f ⁴ 6d ¹ 7s ²	94 Pu Plutonium [Rn]5f ⁶ 7s ²	95 Am Americium [Rn]5f ⁷ 7s ²	96 Cm Curium [Rn]5f ⁷ 6d ¹ 7s ²	97 Bk Berkelium [Rn]5f ⁷ 7s ²	98 Cf Californium [Rn]5f ¹⁰ 7s ²	99 Es Einsteinium [Rn]5f ¹¹ 7s ²	100 Fm Fermium [Rn]5f ¹² 7s ²	101 Md Mendelevium [Rn]5f ¹³ 7s ²	102 No Nobelium [Rn]5f ¹⁴ 7s ²	103 Lr Lawrencium [Rn]5f ¹⁴ 6d ¹ 7s ²

Alkali Metal

Alkaline Earth

Transition Metal

Basic Metal

Semimetal

Nonmetal

Halogen

Noble Gas

Lanthanide

Actinide

© 2014 Todd Helmenstine
chemistry.about.com

Correct answer: C



50. Which of the following element has this electronical configuration:
 $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$?

- A) Ar
- B) Br
- C) Se
- D) Br⁻
- E) Ga⁺

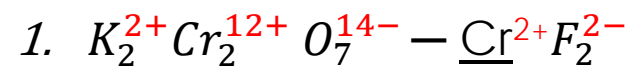


51. In which of the following compound pairs, the oxidation stages of the underlined atoms are equal?

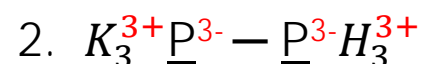
1. $K_2\underline{Cr}_2O_7 - \underline{Cr}F_2$
2. $K_3\underline{P} - \underline{P}H_3$
3. $K\underline{N}O_2 - \underline{N}H_3$

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

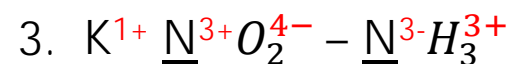




First pair's underlined element (Chromium) does not have same oxidation state. So, first statement is wrong.



If we write oxidation states of these 2 compounds. It will be easy to see they have same oxidation states.



If we compare states of Nitrogen atoms, right side's Nitrogen atom lost 3 atoms. Left side's Nitrogen atom gained 3 atoms. So, their oxidation state is not same.

Correct answer: B



51. In which of the following compound pairs, the oxidation stages of the underlined atoms are equal?

1. $K_2\underline{Cr}_2O_7 - \underline{Cr}F_2$
2. $K_3\underline{P} - \underline{P}H_3$
3. $K\underline{N}O_2 - \underline{N}H_3$

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



52. The IUPAC name of caffeine is 1,3,7-trimethylpurin-2,6-dione; knowing this which of these functional groups are NOT present in this substance?

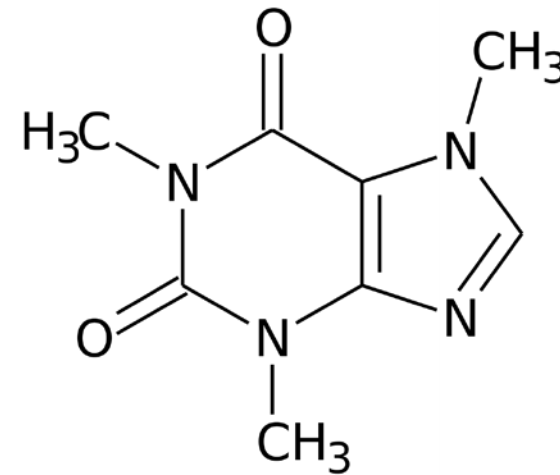
1. Double bond
2. Ketone group
3. Carboxylic group
4. Hydroxyl group

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



Observing the IUPAC name we can see that at the base of the caffeine there is a purine therefore a double ring with atoms of carbon and nitrogen with double bonds. Substituents are attached to this base: in this case methyl groups and two carbons contain the carbonyl group. So in caffeine there are both double bonds and carbonyl groups. The question asked which functional groups were not present.

Correct answer: A



52. The IUPAC name of caffeine is 1,3,7-trimethylpurin-2,6-dione; knowing this which of these functional groups are NOT present in this substance?

1. Double bond
2. Ketone group
3. Carboxylic group
4. Hydroxyl group

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

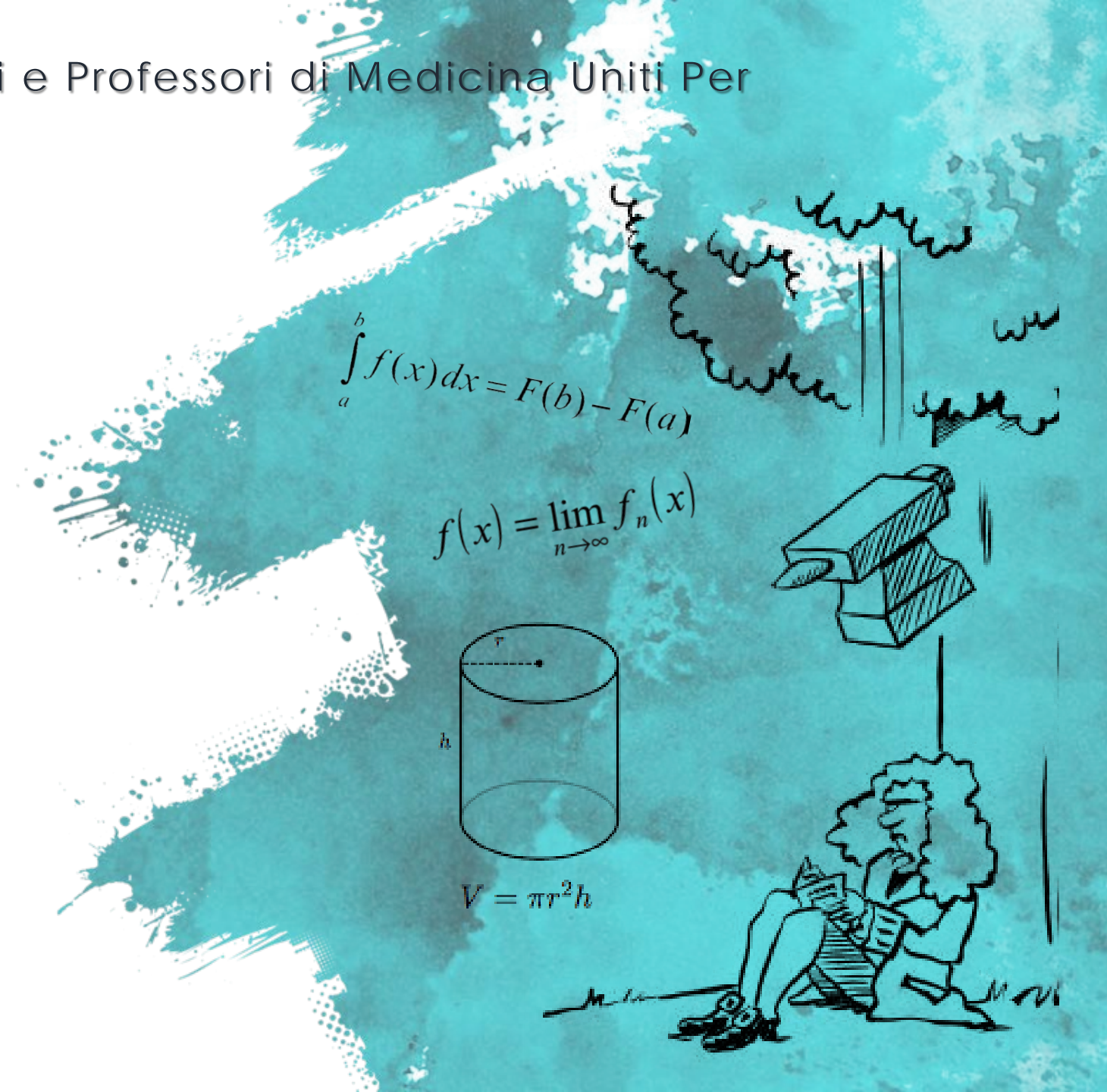




Associazione Studenti e Professori di Medicina Uniti Per

MATH & PHYSICS

IMAT SIMULATION



In collaboration with the Tutor Service of
School of Medicine of the Padua's University

53. A bridge over a stream is in the form of a parabolic arch. The stream is 20 feet across and the bridge is 10 feet high at midstream. What is the equation of the arch?

A) $-\frac{1}{10}x^2 + 10$

B) $-\frac{1}{10}x^2 + 10x - 10$

C) $\frac{1}{100}x^2 + 10$

D) $\frac{1}{10}x^2 - 10$

E) $\frac{1}{10}x^2 + 10$



The formula of a parabola is $y = ax^2 + bx + c$

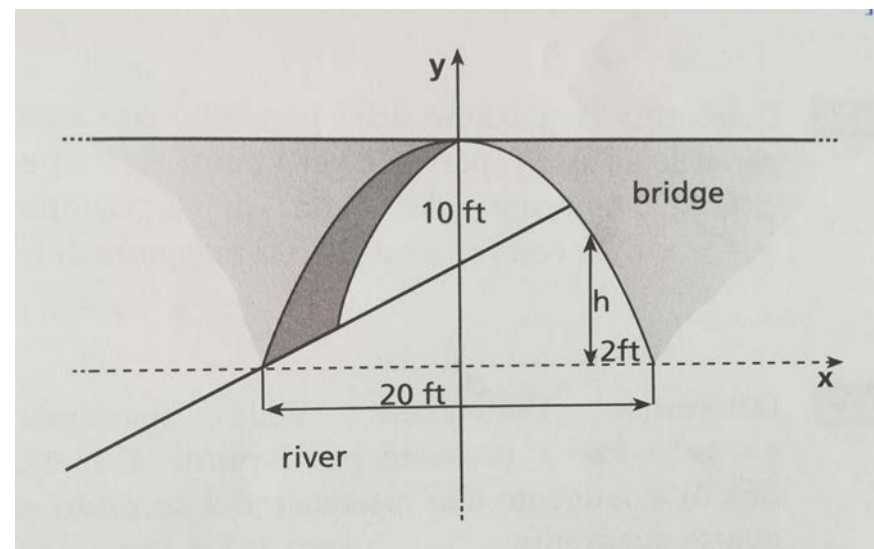
From the image we can find three points:

V(0;10)

A(10;0)

B(-10;0)

At this point we can replace these points in the general formula.



$$\begin{cases} V: 10 = c \\ A: 0 = 100a + 10b + c \\ B: 0 = 100a - 10b + c \end{cases}$$

$$\begin{cases} 10 = c \\ 100a = -10b - c \\ 100a = 10b - c \end{cases} \rightarrow \begin{cases} 10 = c \\ -10b - 10 = 10b - 10 \\ 100a = 10b - c \end{cases}$$

$$\begin{cases} 10 = c \\ -20b = 0 \\ 100a = 10b - c \end{cases} \rightarrow \begin{cases} 10 = c \\ b = 0 \\ a = -\frac{1}{10} \end{cases}$$

$$y = -\frac{1}{10}x^2 + 10$$

Correct answer: A



53. A bridge over a stream is in the form of a parabolic arch. The stream is 20 feet across and the bridge is 10 feet high at midstream. What is the equation of the arch?

A) $-\frac{1}{10}x^2 + 10$

B) $-\frac{1}{10}x^2 + 10x - 10$

C) $\frac{1}{100}x^2 + 10$

D) $\frac{1}{10}x^2 - 10$

E) $\frac{1}{10}x^2 + 10$

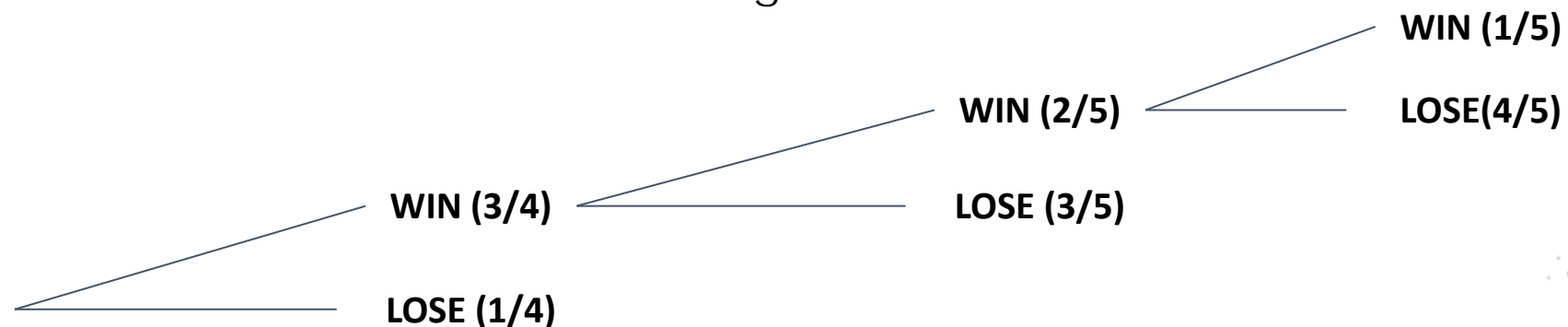


54. Gon is doing a test which is divided into 3 stages, with increasing difficulty. The chances of winning the first stage are 75%. If you pass the first stage, the chances of winning the second are 40%. If you pass them both, the chances of winning the third stage are 20%. To win you have to pass them all in this order. If Gon lost, what is the probability of him losing in the second stage?

- A) $3/5$
- B) $30/47$
- C) $25/94$
- D) $9/20$
- E) $45/94$



This problem is based on Bayes theorem. All we have to do is find the favorable and total cases of Gon losing.



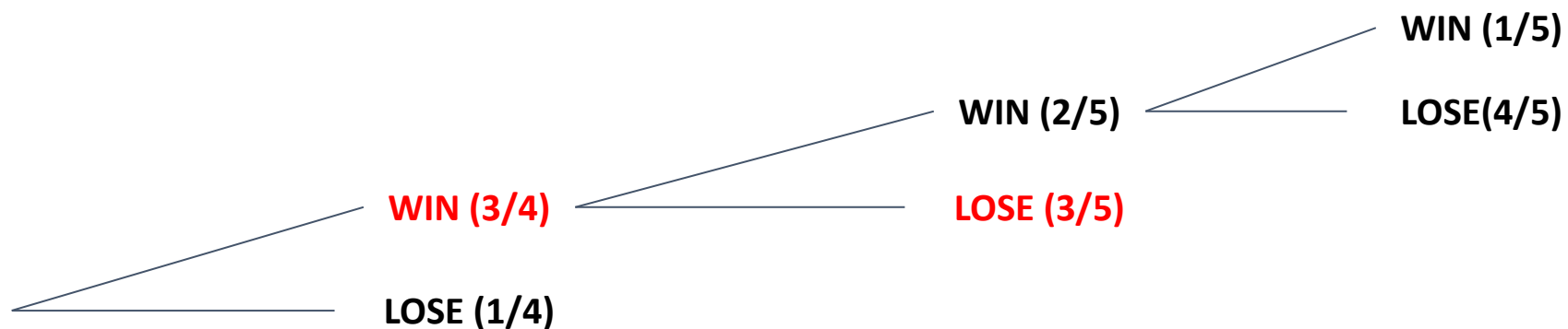
The total cases see Gon losing. However, it's easier to consider the winning probability and then subtract that from 1, because there is just one way to win it all against three different ways to lose.

To win, Gon has to win each stage, so the probability is the product of each winning probability: $3/4 \cdot 2/5 \cdot 1/5 = 6/100$.

$1 - (6/100) = 94/100$, are the total cases of Gon losing the test.



Now we have to find the favorable cases, the ones in which Gon loses at the second stage (so he passes the first and then loses)



Following the tree: $3/4 \cdot 3/5 = 9/20$.

Probability= favorable cases/ total cases:

$$(9/20)/(94/100) = 45/94.$$

Correct answer: E



54. Gon is doing a test which is divided into 3 stages, with increasing difficulty. The chances of winning the first stage are 75%. If you pass the first stage, the chances of winning the second are 40%. If you pass them both, the chances of winning the third stage are 20%. To win you have to pass them all in this order. If Gon lost, what is the probability of him losing in the second stage?

- A) $3/5$
- B) $30/47$
- C) $25/94$
- D) $9/20$
- E) $45/94$



55. The function $y = (-2x + 10)^2$ corresponds to:

- A) A parabola with downward concavity, tangent to the x axis
- B) A parabola with upward concavity, tangent to the x
- C) A parabola which is not tangent to the x axis
- D) A circumference with centre (5;0)
- E) A linear function



First, we solve the squared equation: $y = (-2x + 10)^2 = 4x^2 - 40x + 100$

The equation now corresponds to a generic parabola function: $y = ax^2 + bx + c$

With $a > 0$; $4 > 0$. This data allows us to conclude its concavity is upwards.

In order to study if it is tangent to the x axis, we set up a system between the parabola and our linear function of the x axis which is $y = 0$:

$$\begin{cases} y = 0 \\ y = 4x^2 - 40x + 100 \end{cases}$$

The system is solved by replacing the first into the second and obtaining a second degree equation as follows:

$$4x^2 - 40x + 100 = 0$$

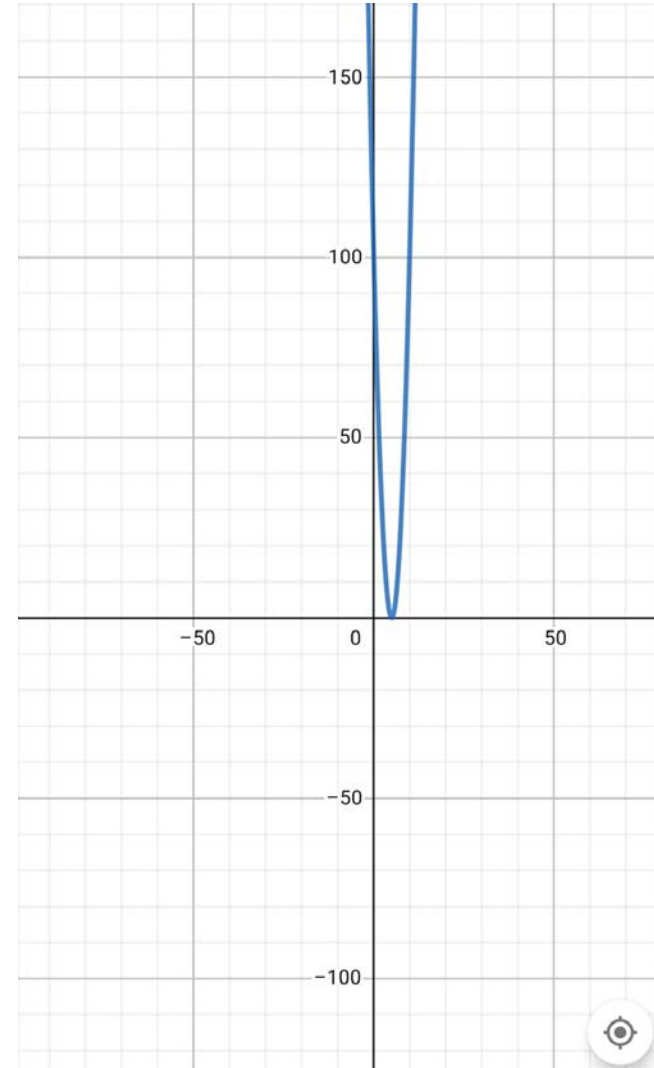
$$\Delta = b^2 - 4ac = 1600 - 1600 = 0$$

Since $\Delta=0$, the linear function $y=0$ is tangent to the parabola.



This graph confirms our hypothesis.

Correct answer: B



55. The function $y = (-2x + 10)^2$ corresponds to:

- A) A parabola with downward concavity, tangent to the x axis
- B) A parabola with upward concavity, tangent to the x
- C) A parabola which is not tangent to the x axis
- D) A circumference with centre (5;0)
- E) A linear function



56. Determine the point B, belonging to $AC=10a$, so as the sum of the semicircles with diameter AB and BC is $\frac{13\pi a^2}{2}$

- A) $AB=4a$ v $AB=6a$
- B) $AB=8a$ v $AB=12a$
- C) $AB=5a$ v $AB=6a$
- D) $AB=2a$ v $AB=3a$
- E) $AB=4a$ v $AB=9a$



The formula of the area of a circle is $A = \pi r^2$ so the area of a semicircle is $A = \frac{\pi r^2}{2}$

Knowing that: $A_1 + A_2 = \frac{13}{2} \pi a^2$

Replacing our data:

$$\frac{\pi}{2} \left(\frac{10a-x}{2} \right)^2 + \frac{\pi}{2} \left(\frac{x}{2} \right)^2 = \frac{13}{2} \pi a^2$$

$$\frac{100a^2 - 20ax + x^2}{4} + \frac{x^2}{4} = 13a^2$$

$$100a^2 - 20ax + x^2 + x^2 - 52a^2 = 0$$

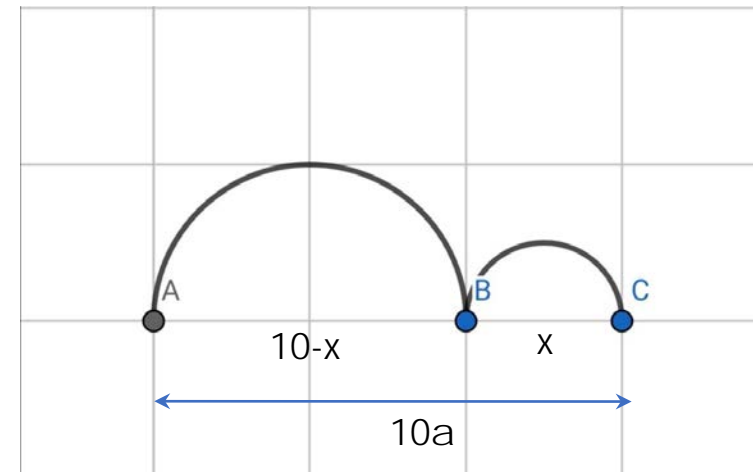
$$2x^2 - 20ax + 48a^2 = 0$$

$$\Delta = b^2 - 4ac = 400a^2 - 384a^2 = 16a^2$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{20a \pm 4a}{4}$$

$$x_1 = 6a \quad x_2 = 4a$$

Correct answer: A



56. Determine the point B, belonging to $AC=10a$, so as the sum of the semicircles with diameter AB and BC is $\frac{13\pi a^2}{2}$

- A) AB=4a v AB=6a
- B) AB=8a v AB=12a
- C) AB=5a v AB=6a
- D) AB=2a v AB=3a
- E) AB=4a v AB=9a



57. A mouse manages to escape the cage you've been keeping it in. It then starts running around your lab at a constant speed of v_m until it's too tired to go on. At this point, it starts slowing down, in uniformly decelerating motion, until it stops. During the deceleration, which lasts for 10 seconds, it covers a distance of 20 meters. What was the speed of the mouse (v_m)?

- A) 2 m/s
- B) 3 m/s
- C) 4 m/s
- D) 5 m/s
- E) 6 m/s



When dealing with uniformly accelerating motion (or decelerating) we use two main equations to describe it.

$$v = v_0 + a \cdot t$$
$$s = s_0 + v_0 \cdot t + \frac{1}{2} \cdot a \cdot t^2$$

In this case, $v_0 = v_m$

Let's imagine that the mouse is at the end of its run: how would the equations apply to this particular moment?

First of all, $v = 0$, because the mouse stops.
In addition, $t = 10\text{s}$, as stated by the problem
On top of this, $s = 20\text{ m}$, as stated by the problem.

Therefore, our equations turn into:

$$0 = v_m + a \cdot 10\text{ s}$$
$$20\text{ m} = v_m \cdot 10\text{ s} + \frac{1}{2} \cdot a \cdot 100\text{ s}^2$$



Solving the first equation for acceleration, and then replacing it in the second...

$$a = -\frac{v_m}{10 s}$$

$$20 m = v_m \cdot 10 s - \frac{1}{2} \cdot \frac{v_m}{10 s} \cdot 100 s^2$$

Which simplifies into

$$20 m = v_m \cdot 10 s - \frac{1}{2} \cdot v_m \cdot 10 s$$

$$20 m = \frac{1}{2} v_m \cdot 10 s$$

Therefore

$$v_m = 2 \cdot \frac{20 m}{10 s} = 4 \frac{m}{s}$$

Correct answer: C



57. A mouse manages to escape the cage you've been keeping it in. It then starts running around your lab at a constant speed of v_m until it's too tired to go on. At this point, it starts slowing down, in uniformly decelerating motion, until it stops. During the deceleration, which lasts for 10 seconds, it covers a distance of 20 meters. What was the speed of the mouse (v_m)?

- A) 2 m/s
- B) 3 m/s
- C) 4 m/s
- D) 5 m/s
- E) 6 m/s



58. An electric circuit contains a generator and three resistors in series. When a voltmeter is placed in parallel with the first resistor R_1 , a voltage ΔV is measured. If the voltmeter has an internal resistance $r=0,5R_1$, what is the voltage across the first resistor when the voltmeter is absent?

- A) $3/2 \Delta V$
- B) $1,1 \Delta V$
- C) It is the same, because voltmeters are designed not to influence the voltage across two points
- D) $3\Delta V$
- E) $2/3 \Delta V$



Voltmeters are devices used to measure voltage across two points of an electric circuit. With the purpose of solving the exercise, we must consider it just as an additional resistor. First, we apply Ohm's first law:

$$i_v = \frac{\Delta V}{r} = \frac{2\Delta V}{R_1} \quad i_r = \frac{\Delta V}{R_1}$$

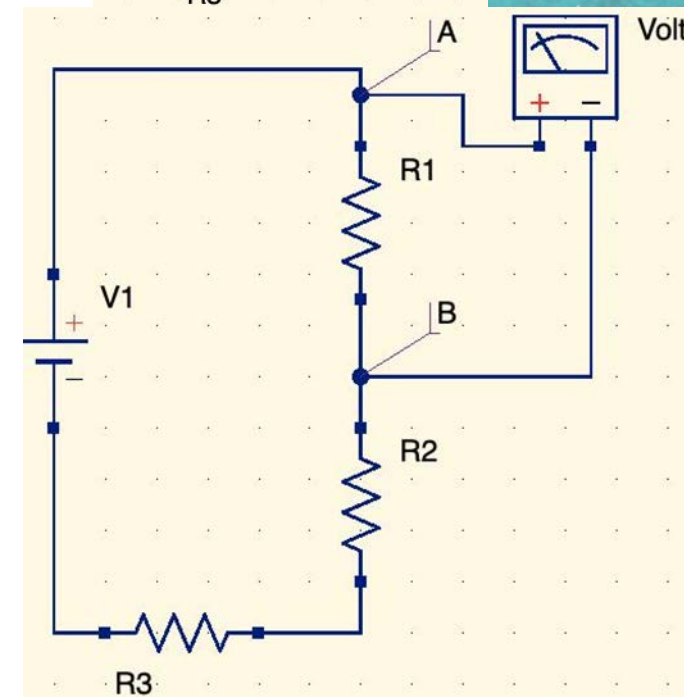
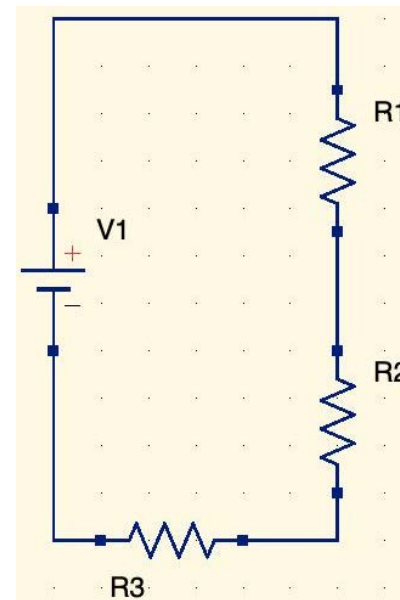
Where i_v is the current flowing through the voltmeter and i_R is the current flowing through the first resistor.

The voltmeter and the resistor are in parallel, so the voltage across them is the same.

The point A is a node in the circuit. According to Kirchhoff's first law, the sum of the currents flowing into a node is equal to the sum of the currents flowing out of the node. It then must be true that:

$$i = i_v + i_r = 3 \frac{\Delta V}{R_1}$$

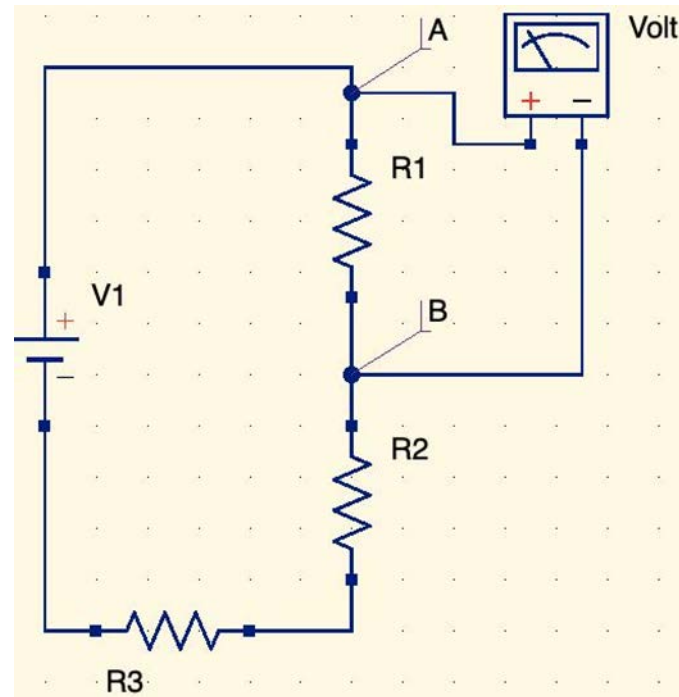
Where i is the current entering the node A, that is, the total current flowing in the circuit



If we apply Ohm's first law again, without the voltmeter:

$$\Delta V' = i \cdot R_1 = 3R_1 \cdot \frac{\Delta V}{R_1} = 3\Delta V$$

Correct answer: D



58. An electric circuit contains a generator and three resistors in series. When a voltmeter is placed in parallel with the first resistor R_1 , a voltage ΔV is measured. If the voltmeter has an internal resistance $r=0,5R_1$, what is the voltage across the first resistor when the voltmeter is absent?

- A) $3/2 \Delta V$
- B) $1,1 \Delta V$
- C) It is the same, because voltmeters are designed not to influence the voltage across two points
- D) $\underline{3\Delta V}$
- E) $2/3 \Delta V$



59. Which of these are state functions?

- A) Heat, Work, Gibbs free energy
- B) Entropy, Heat, Work
- C) Entropy, Enthalpy, Heat
- D) Entropy, Enthalpy, Gibbs free energy
- E) Entropy, Enthalpy, Heat



State functions are those in which the value only depends on the current equilibrium of the system, not on the path which the system took to reach its present state.

For instance, **enthalpy is a state function** because its value can be described with a formula

$$(H = U + pV)$$

that only depends on the conditions of the system in the given moment, and not on how the system reached this state. For the same reasons, Entropy and Gibbs free energy are state functions as well.

Work, instead, depends on the path that the system has followed up the given moment, so it's **not a state function**. The same goes for heat.

Correct answer: D



59. Which of these are state functions?

- A) Heat, Work, Gibbs free energy
- B) Entropy, Heat, Work
- C) Entropy, Enthalpy, Heat
- D) Entropy, Enthalpy, Gibbs free energy
- E) Entropy, Enthalpy, Heat



60. A tank is full of water. A manometer measures a pressure of 4×10^4 Pa at the bottom of the tank. What's the height of the water inside the tank? Use $g = 10 \text{ m/s}^2$ and $d = 1000 \text{ kg/m}^3$ (density of water).

- A) 0,04 km
- B) 0,004 km
- C) 400000 mm
- D) 4000000 mm
- E) 0,004 cm



For Stevin's law:

$$P = d \cdot g \cdot h$$

Then, with the inverse formula, it is possible to calculate the h:

$$h = \frac{P}{d \cdot g} = \frac{4 \cdot 10^4 \text{ Pa}}{10 \frac{\text{m}}{\text{s}^2} \cdot 1000 \text{ kg/m}^3} = 4 \text{ m} = 0,004 \text{ km}$$

Correct answer: B



60. A tank is full of water. A manometer measures a pressure of 4×10^4 Pa at the bottom of the tank. What's the height of the water inside the tank? Use $g = 10 \text{ m/s}^2$ and $d = 1000 \text{ kg/m}^3$ (density of water).

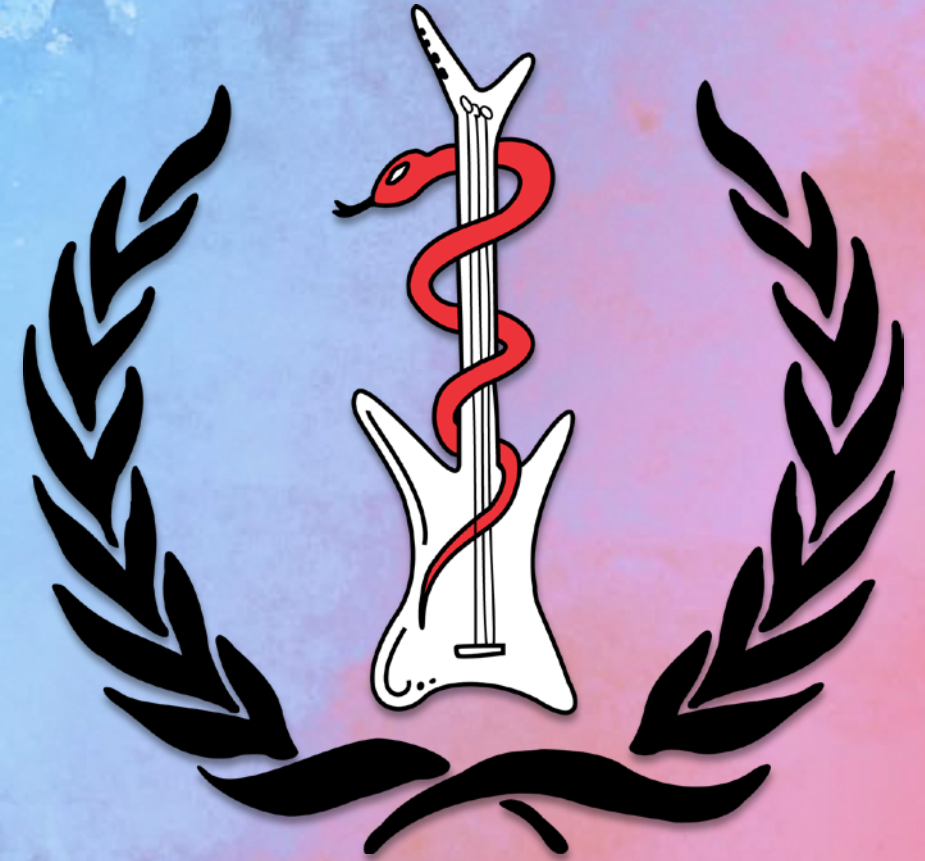
- A) 0,04 km
- B) 0,004 km
- C) 400000 mm
- D) 4000000 mm
- E) 0,004 cm



Associazione Studenti e Professori di Medicina Uniti Per

***Thanks for
attention!***

See you soon!



Studenti e Prof Uniti Per



@studentieprofunitiper



info@studentieprofunitiper.it