

KVPY SA Unofficial Answer Key 2022

Section A: Biology

Q1) Which of the following biomolecules is an end product of amylolysis?

A1) 3- Monosaccharides

Q2) Which one of the following is not used in constructing phylogenetic trees?

A2) 4- Habitat Similarity

Q3) Ceacum is located between?

A3) 1- Ileum and ascending colon

Q4) Which one of the following is an invasive species that has spread to many parts of Indian subcontinent?

A4) 1- Prosopis Juliflora

Q5) Which one of the following process maximally facilitates ascent of Sap?

A5) 2- Transpiration

Q6) Which one of the following biomolecule is not present in healthy colostrum?

A6) 4- Haemoglobin

Q7) You have to make mixed vegetable curry with Potato, Cauliflower, Radish, Tomato, Spiced with Mustard, Cinnamon and Clove. The culinary adventure consists of:

A7) 3- Stem, Meristem, Root, Fruit, Seed, Bark, Bud

Q8) Which of the following processes would be an immediate effect on a plant if there is a sudden and large increase in Salinity?

A8) 1- Plasmolysis of root cells

Q9) High blood glucose in diabetic patients is known to induce cataract. This is because of high glucose:

A9) 2- Causes osmotic changes in aqueous humour promoting lens impairment

Q10) Which of the following is most likely to occur because of climate change driven temperature increase

A10) 4- Birds shift their ranges to higher elevation

Q11) Which one of the following cell types contains Nissl's granules?

A11) 4- Neuron

Q12) Within the kingdom of animalia which one is the primary feature for classification of organisms?

A12) 1- Body Symmetry

Q13) In ureotelic organisms, urea is produced by:

A13) 3- Ornithine Cycle

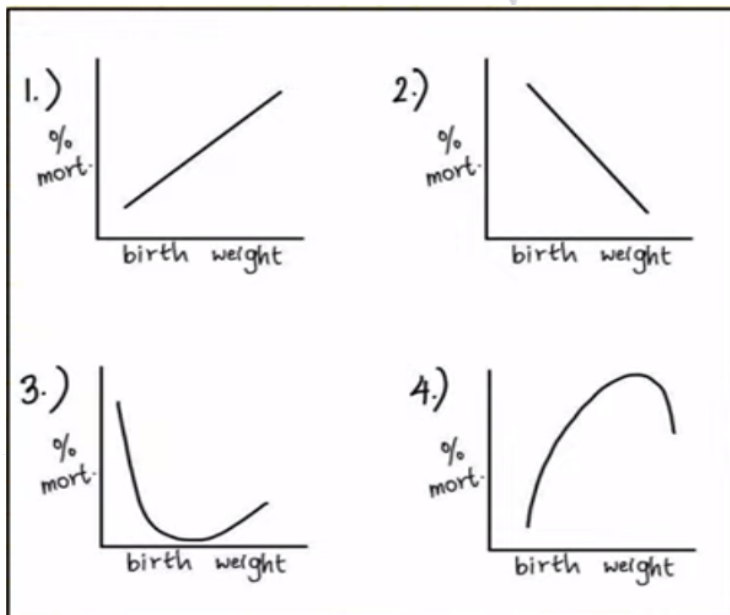
Q14) Which one of the following statements about pollen is incorrect?

A14) 1- Pollen is produced only by angiosperm.

Q15) Grazing food chains seldom extends to 4 to 5 trophic levels because

A15) 4- Almost 90% of energy in each heterotrophic level is not converted into biomass (upto/in) next level.

Q16) Which of the following plot is the best way to describe relationship between human infant mortality and birth weight?



A16) 3

Q17) Population growth rate is given by $\frac{dn}{dt} = rN$, where r is dependent on

A17) 4- Both birth rate and death rate

Q18) Match the Column I with Column II

A18) Cobweb- Sericin, Silk- Fibroin, Cotton- Cellulose, Hair- Keratin

Q19) A student performed an experiment on photosynthesis on two plants. He covered a part of a leaf from each plant with a black strap. He kept the first plant (Leaf A) in a dark room (away from sunlight) and other (Leaf B) in sunlight. After 48 hours, he exposed both plants to sunlight for a few hours and performed a starch test. Which of the following would have been the correct result?

A19) 4- Neither of them showed presence of starch.

Section B: Chemistry

Q1) How does Lithium and Magnesium resemble in property?

A1) A- Size

Q2) How many number of acidic hydrogens are there in H_3PO_4 , H_3PO_3 , H_3PO_2

A2) 3,2,1

Q3) Thermal stability of hydrides of Group 16 elements order

A3) $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$

Q4) How many moles of HCL formed from 5.6 L of Cl_2 and 11.2 L of H_2 at STP?

$\text{H}_2 + \text{Cl}_2 = 2\text{HCL}$

A4) 0.5 mole

Q5) Which one of the following has 17.75% N in the given compound?

A5) Pyridine

Q6) What is the stability order of the given compounds cation on Cyclopentane, cation on Cyclopentene, cation on Cyclopentadiene, cation on Cycloheptatriene?

A6) $d > b > a > c$

Q7) Hydrocarbon with the formula C_5H_{10} gives tert alcohol with dil sulphuric and gives ketone and carboxylic acid with KMnO_4 ?

A7) D- 2 Methyl Butene

Q8) P equilibrium Q, initially conc of $P=2$, $Q=0$, after equilibrium is established, the conc of P was halved. Final conc of Q after second equilibrium if $K_c = 3/2$

A8) $24/25$

Q9) Which structure represents 2-methyl butane?

Q10) Properties of the solution when Alkali metal added to liquid NH_3 , Color, Paramagnetism, reason of behaviour

Q11) Isobaric PV graph convert to TS graph

Q12) What is the amount of work done in isothermal, isobaric, adiabatic expansion

Q13) Acetyl chloride reacted with benzene and nitrobenzene in the presence of AlCl_3 . What is the major product?

Q14) Iodination is carried out in the presence of?

A14) HI

Q15) Geometry of Thionyl Tetrafluoride?

A15) OSF_4 (Trigonal bipyramidal molecular geometry)

Section C: Mathematics

Q1) No. of positive integers satisfying: $\frac{1}{x} + \frac{1}{x+1} + \frac{1}{x+2} = \frac{13}{12}$

A1) 1

Q2) Find number of integers n such that $n+3$ divided n^3-3

A2) 16

Q3) 1,2,3,..., n are written on a board. A random number 'k' in between 1 and n is erased then average of rest was given 16. Find the value of $n+k$.

A3) 47

Q4) Sum of sides of right triangle is 42, difference of median and altitude on hypotenuse is 2. Find the area of triangle.

A4) 63

Q5) $x^6 - 6x^5 + 15x^4 - 20x^3 + 15x^2 - 6x + 1 = 0$. Here a = smallest root, b = largest root. Find $(a^2 + b^2) / (a + b + 1)$

A5) $\frac{2}{3}$

Q6) In triangle ABC, O is circumcenter. I is Incentre. BCIO is cyclic. Find angle B + angle C.

A6) A- 120

Q7) A work is done by company A and B. A can complete it in 9 days, B can complete the same in 18 days. If A started the work in 2 days then B joined. They were together for 4 days then A left. Then B was asked to increase its efficiency to twice. Determine how many days are required to complete the work.

A7) 1 day

Q8) Ordered pairs (a,b) such that $(a-b)$ is a root of $x^2+ax+b = 0$

Q9) In convex quadrilateral ABCD, $AC=BD$ & $AB=CD$ and angle $ABC= 50$ degree, angle $ACB = 40$ degree. Find acute angle between AC & BD.

A9) 80

Q10) Find 2 digit number such that $Ab= 4(a!+b!)$. A and b are the digits of the 2 digit number.

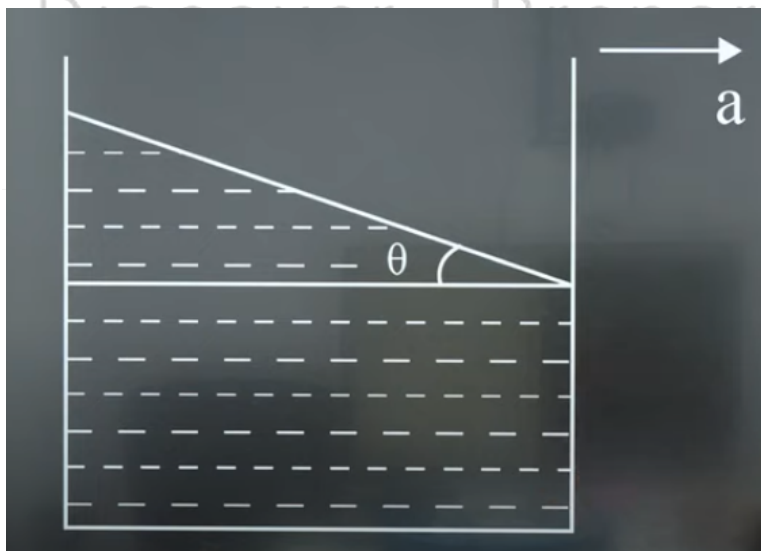
A10) 44

Section D: Physics

Q1) In expansion of gas from initial volume V_1 , to final volume V_2 , through which process work done is maximum?

A1) C- Isobaric

Q2) A fluid in a container is accelerated horizontally with acceleration a as shown. Find the angle which the free surface makes with horizontal.



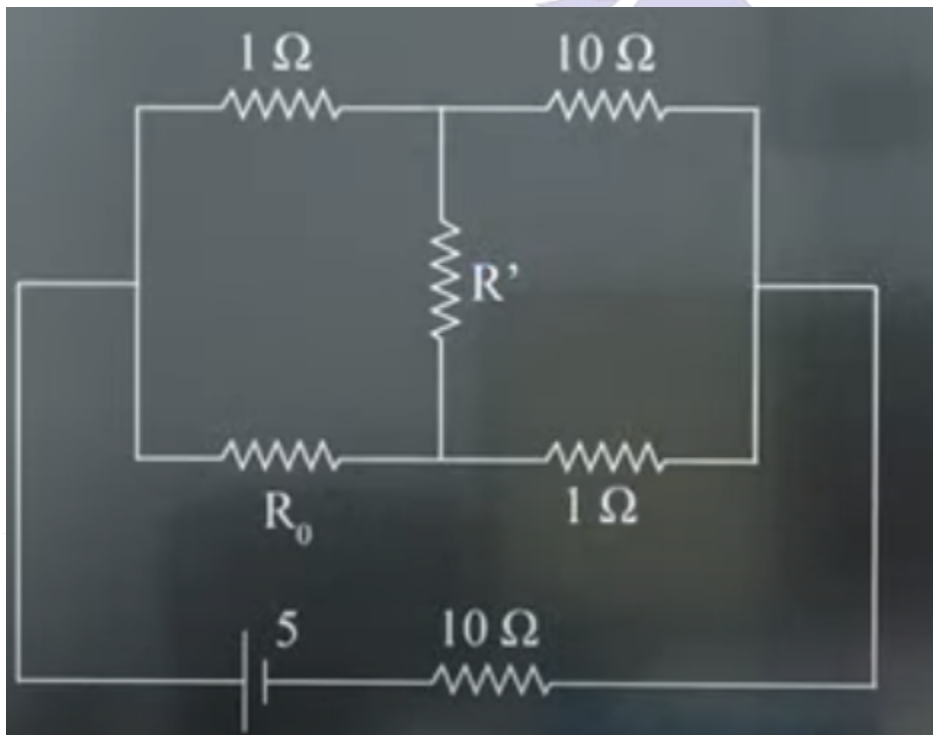
A2) A- $\tan (a/g)$

Q3) One Kilogram of ice at -8°C is heated to convert it into water at 10°C . Find the amount of heat required for the process? ($S_{\text{water}} = 1 \text{ cal/ gm}^{\circ}\text{C}$, $S_{\text{ice}} = 1/2 \text{ cal/ gm}^{\circ}\text{C}$)
 A3) 94 Kcal

Q4) A girl of mass $m = 50 \text{ kg}$ has a height of 1.5 m . Her COM is at a height of 1 m . She bends by 0.2 m in order to jump a height of 1 m from ground. What is the ratio of force applied by the ground to the weight of the girl?
 A4) C-6

Q5) A test tube of length 20 cm is open from one side. Now it is inserted such that only 10 cm of tube is available above the outside water surface. Find the level of water depressed (Atmospheric pressure = 100000 Pascals , Density of water = 1000 kg/ m^3)
 A5) B- 9.8 cm

Q6) Initially the value of $R' = 1$. Now when the R' is changed to 10 , the current through R' does not change. Find the value of unknown resistance R_0 ?



A6) C- $R_0 = 0.1$

Q7) A uranium reactor produces a power of 1 GW and has an efficiency of 4.2% . Find the mass of Uranium ($\text{U}235$) required in half an hour to power the reactor.
 A7) A- 0.522 Kg