1. An amoeba had its nucleus removed. For several days it continued to move and feed, but did not reproduce. A normal amoeba reproduced twice in that time. What conclusion can be drawn about the role of the nucleus in the amoeba?

1. The nucleus is necessary for cell growth.
2. The nucleus is necessary for reproduction.
3. The nucleus is the only place that contains DNA.
4. The nucleus regulates the activity of the cell.

2. Photosynthesis is a complex process that involves multiple stages and structures within the chloroplast. This process is crucial for converting light energy into chemical energy, which is used for growth. The stages in photosynthesis include the light-dependent reaction and the carbon fixation stage, or the Calvin cycle. Which of the following statements is incorrect regarding the details of photosynthesis?

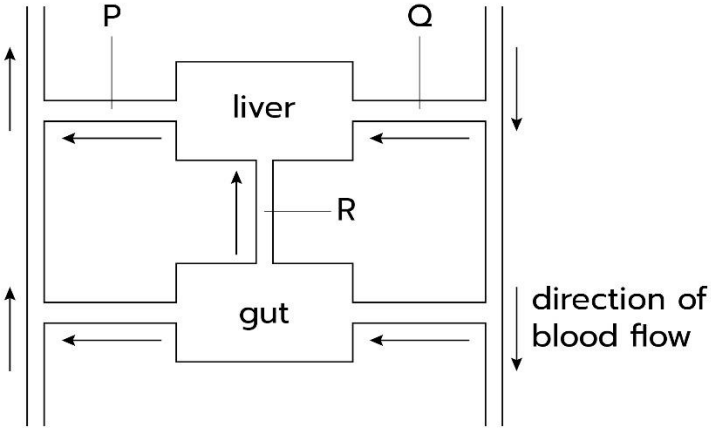
1. The light-dependent reaction occurs in the thylakoid membrane and generates ATP and NADPH.

2. The Calvin cycle, which synthesizes glucose, takes place in the stroma of the chloroplast.

3. Oxygen produced during photosynthesis comes from hydrolysis of carbon dioxide.

4. Chlorophyll absorbs light most efficiently in the blue and red spectrum.

3. The diagram shows the blood supply to the liver and gut.



What are the identities of the blood vessels **P**, **Q** and **R**?

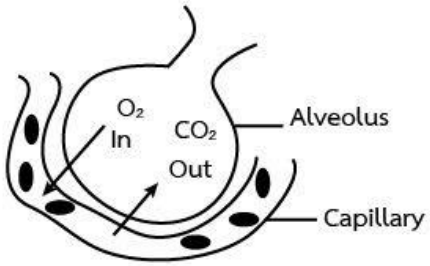
	P	Q	R
1.	Hepatic artery	Hepatic vein	Hepatic portal vein
2.	Hepatic vein	Hepatic portal vein	Hepatic artery
3.	Hepatic vein	Hepatic artery	Hepatic portal vein
4.	Hepatic portal vein	Hepatic artery	Hepatic vein

4. A newborn baby is temporary immune to the diseases its mother had. Which of the following is the reason for this?

1. Antigens from mother's blood pass into the baby across the placenta.
2. Viruses pass across the placenta and the baby has experienced all the mother's diseases in the uterus.
3. Antibodies in the mother's blood pass across the placenta into the baby's bloodstream.
4. The mother's blood flows through the baby

5. The diagram below represents one of many microscopic air sacs in a human lung. The alveolus (air sac) is the place where oxygen (O_2) and carbon dioxide (CO_2) move into or out of the blood, as represented in the diagram.

Which statement best explains why these gases are able to move in the directions shown in the diagram?



1. The CO_2 moves out of the capillary and into the alveolus to make more room for the blood to carry O_2.

2. The O_2 is needed by the cells, so it is actively transported into the blood. The CO_2 which is not needed, is actively transported out of the blood.

3. The blood coming to the lungs is low in CO_2 and high in O_2, so the gases each diffuse from a lower to a higher concentration in this area.

4. The blood coming to the lungs is high in CO_2 and low in O_2, so the gases each diffuse from a higher to a lower concentration in this area.

6. What conditions must be met for ultrafiltration to occur at the glomerulus?

I : A high hydrostatic pressure.

II : A low hydrostatic pressure.

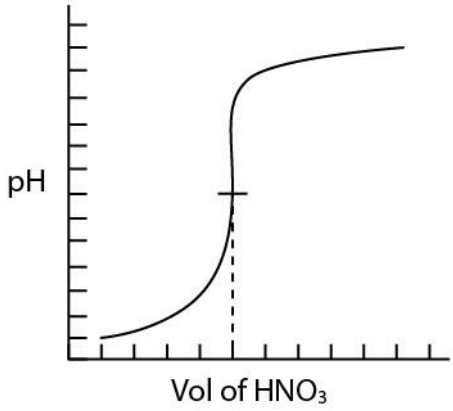
III : Presence of concentration gradient.

IV : Presence of pores at the wall of the glomerulus.

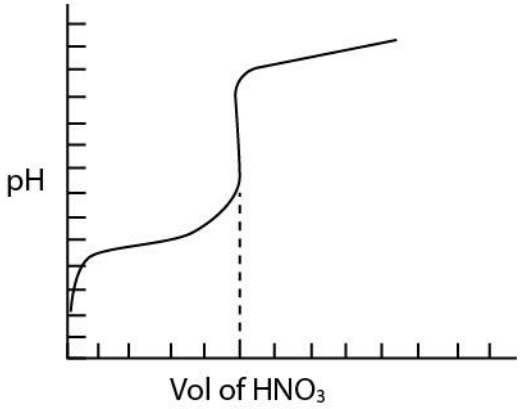
1. I and IV only
2. II and III only
3. I, III and IV only
4. II, III and IV only

7. When the HNO_3 acid solution is titrated with NH_3 , which of the following is a titration curve?

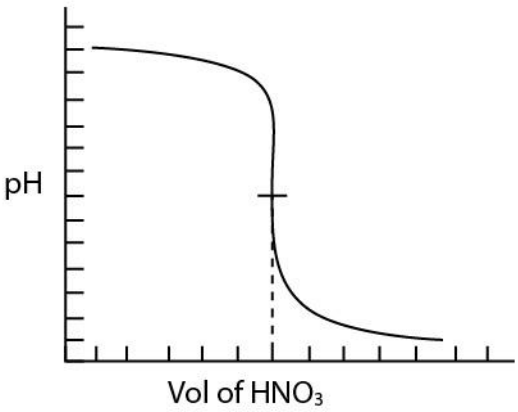
1.



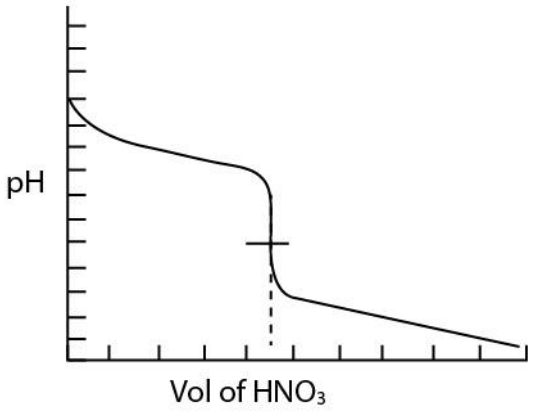
2.



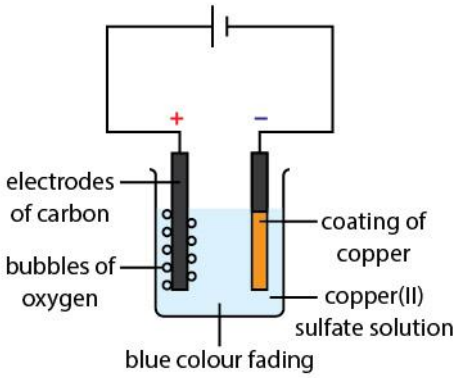
3.

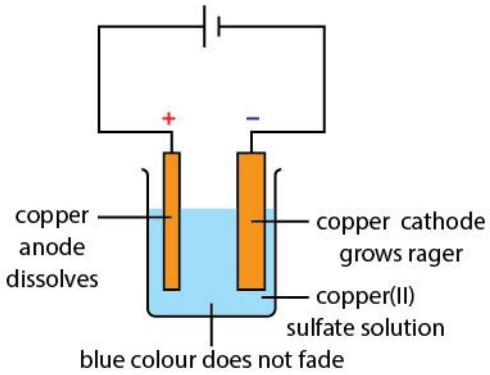


4.



8. Electrolysis of copper (II) sulfate solution will give different results, depending on the type of electrodes. These results are shown on the figure below.





Reduction Half-Reaction		E° (V)
$F_2(g) + 2\,e^-$	$\longrightarrow 2\,F\,(aq)$	2.87
$H_2O_2(aq) + 2\,H^+(aq) + 2\,e^-$	$\longrightarrow 2\,H_2O(l)$	1.78
$MnO_4^-(aq) + 8\,H^+(aq) + 5\,e^-$	$\longrightarrow Mn^{2+}(aq) + 4\,H_2O(l)$	1.51
$Cl_2(g) + 2\,e^-$	$\longrightarrow 2\,Cl^-(aq)$	1.36
$Cr_2O_7^{2-}(aq) + 14\,H^+(aq) + 6\,e^-$	$\longrightarrow 2\,Cr^{3+}(aq) + 7\,H_2O(l)$	1.33
$O_2(g) + 4\,H^+(aq) + 4\,e^-$	$\longrightarrow 2\,H_2O(l)$	1.23
$Br_2(l) + 2\,e^-$	$\longrightarrow 2\,Br^-(aq)$	1.09
$Ag^+(aq) + e^-$	$\longrightarrow Ag(s)$	0.80
$Fe^{3+}(aq) + e^-$	$\longrightarrow Fe^{2+}(aq)$	0.77
$O_2(g) + 2\,H^+(aq) + 2\,e^-$	$\longrightarrow H_2O_2(aq)$	0.70
$I_2(s) + 2\,e^-$	$\longrightarrow 2\,I^-(aq)$	0.54
$O_2(g) + 2\,H_2O(l) + 4\,e^-$	$\longrightarrow 4\,OH^-(aq)$	0.40
$Cu^{2+}(aq) + 2\,e^-$	$\longrightarrow Cu(s)$	0.34
$Sn^{4+}(aq) + 2\,e^-$	$\longrightarrow Sn^{2+}(aq)$	0.15
$2\,H^+(aq) + 2\,e^-$	$\longrightarrow H_2(g)$	0
$Pb^{2+}(aq) + 2e^-$	$\longrightarrow Pb(s)$	−0.13
$Ni^{2+}(aq) + 2\,e^-$	$\longrightarrow Ni(s)$	−0.26
$Cd^{2+}(aq) + 2\,e^-$	$\longrightarrow Cd(s)$	−0.40
$Fe^{2+}(aq) + 2\,e^-$	$\longrightarrow Fe(s)$	−0.45
$Zn^{2+}(aq) + 2\,e^-$	$\longrightarrow Zn(s)$	−0.76
$2\,H_2O(l) + 2\,e^-$	$\longrightarrow H_2(g) + 2\,OH^-(aq)$	−0.83
$Al^{3+}(aq) + 3\,e^-$	$\longrightarrow Al(s)$	−1.66
$Mg^{2+}(aq) + 2\,e^-$	$\longrightarrow Mg(s)$	−2.37
$Na^+(aq) + e^-$	$\longrightarrow Na(s)$	−2.71
$Li^+(aq) + e^-$	$\longrightarrow Li(s)$	−3.04

Consider the following information:

1) Cathode on figure A reacts as follows: $2Cu^{2+}$ (aq) + $4e^{-}$ ⟶ 2Cu (s).
2) Anode on figure B reacts as follows: $4OH^{-}$ (aq) ⟶ $2H_2O$ (l) + O_2 (g) + $4e^{-}$.
3) Anode on figure A reacts as follows: Cu (s) ⟶ Cu^{2+} (aq) + $2e^{-}$.
4) Cathode on figure B reacts as follows: Cu^{2+} (aq) + $2e^{-}$ ⟶ Cu (s).

Which of the following statements are false?

1. A, B and C
2. B and C
3. A and D
4. B and D

9. Baifern studied the rate of chemical reactions of substances A, B, and C by reacting them together. The reaction that occurred is shown on the equation and the table below.

$$2A + 3B + C \longrightarrow 3D + E$$

The experimental data of the above reaction are shown on the table below.

Experiment	[A]	[B]	[C]	Rate of reaction ($mol/dm^3.sec$)
1	0.1	0.4	0.3	7.0×10^{-4}
2	0.2	0.4	0.3	1.4×10^{-3}
3	0.1	0.8	0.3	5.6×10^{-3}
4	0.1	0.4	0.9	7.0×10^{-4}
5	0.2	0.8	0.9	1.1×10^{-2}

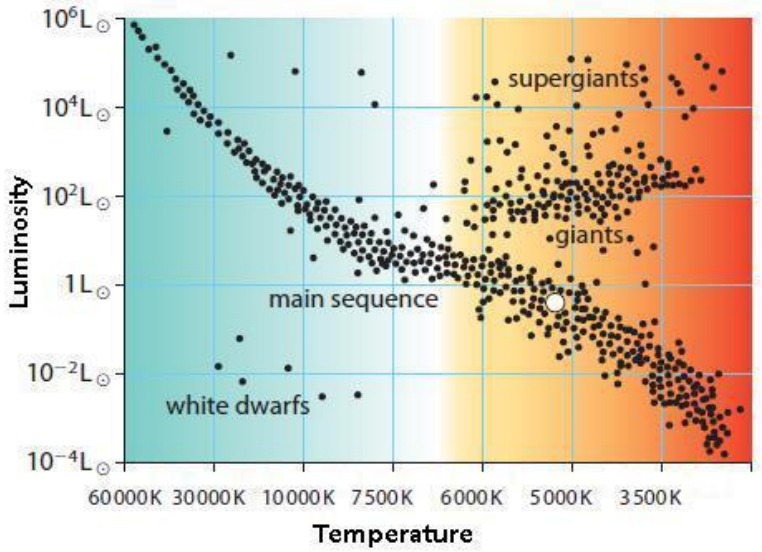
If [A] = 0.4 [B] = 0.2 and [C] = 0.1, what is the speed of this reaction?

1. 4.07×10^{-4}
2. 4.07×10^{-5}
3. 7.04×10^{-4}
4. 7.04×10^{-5}

10. At the time of the Big Bang, all parts of the universe were in the same place. If we know how fast any two galaxies are moving apart and how far apart they are now, we can calculate the age of the universe. Given that Hubble's constant (H_0) is 72 kms^{-1} Mpc^{-1}, what is the age of the universe?

1. 4.6×10^6 years
2. 13.8×10^6 years
3. 7.2×10^9 years
4. 1.36×10^{10} years

11. When observing the sky during daytime, the Sun can sometimes be seen in different colors, such as white, yellow, or red. At the present time, the Sun is the main sequence star. The surface temperature of the Sun is about 5,600 degrees Celsius, and the luminosity is approximately 3.846×10^{26} watts as shown in the picture.



What kind of a spectrum does the Sun have, and what color does it have?

1. spectrum A, white
2. spectrum M, red
3. spectrum G, yellow
4. spectrum F, yellow - white

12. From studying various aspects of the solar system, scientists have obtained the following information:

A. Sunspots emit more radiation than nearby areas, so they appear as dark spots.

B. The sun releases energy in the form of electromagnetic waves and high-energy particles, creating the solar wind.

C. A coronal mass ejection releases enormous amounts of high-velocity particles, mostly protons.

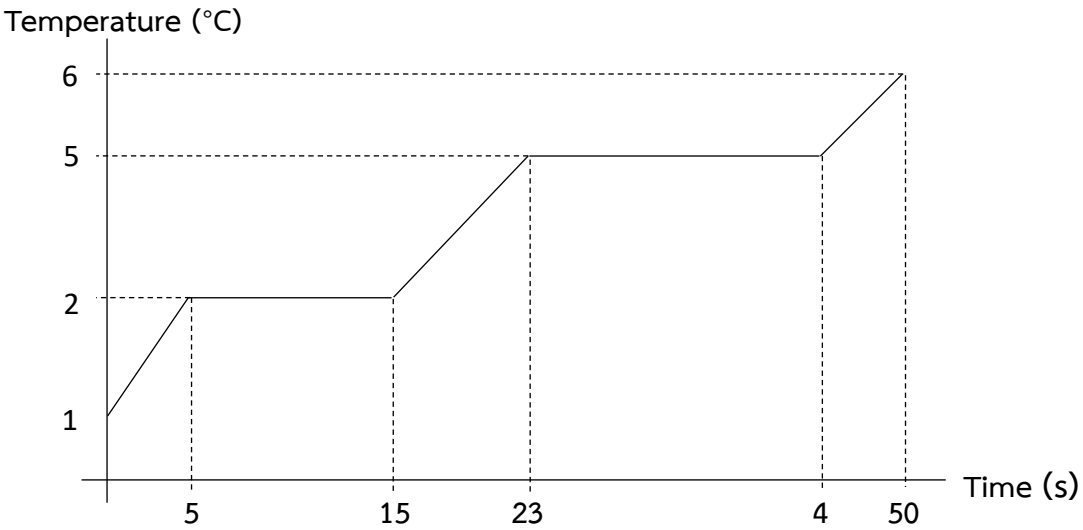
D. The photosphere is the innermost layer of the Sun's atmosphere and has a temperature of about one million Kelvin.

E. The outer protoplanetary disk contains the original material of the solar nebula that did not form planets.

Which of the following choices is correct?

	A	B	C	D	E
1.	✓	✓	✗	✗	✗
2.	✗	✗	✓	✓	✓
3.	✗	✓	✓	✗	✓
4.	✓	✓	✗	✗	✓

13. A substance with a mass of 4 kg in a solid state at a temperature of 10 °C is received heat using a device with a power of 125 W. During the process, there is a heat loss to the surroundings of 20%. The graph shows the observing of temperature change of the substance.



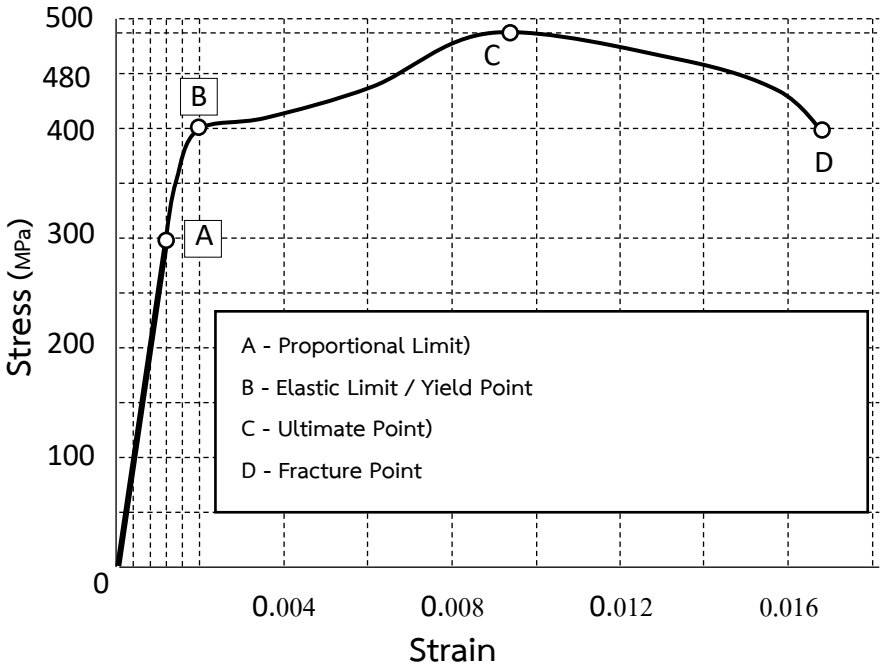
Consider the following statements

1. The latent heat of vaporization of this substance is 550 J/kg
2. The specific heat in the liquid state of this substance is 8 J/kg.K.
3. The latent heat of fusion of this substance is 312.5 J/kg.
4. The specific heat in the solid state of this substance is 8.33 J/kg.K.

How many statements are incorrect?

1. 1 statement
2. 2 statements
3. 3 statements
4. 4 statements

14. The graph below shows the relation between stress and strain (Stress-Strain Curve) of the certain material.



10 10

ASMOPSS

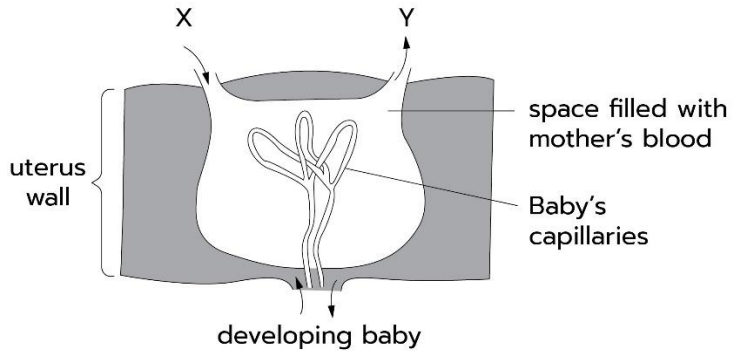
This material is used to make a wire sling 10 meters long with a radius of gyration of 8 mm to hang a sign of mass 1,256 kg as shown in the figure. How the wire will behave under these conditions? The weight of the wire itself is neglected, the acceleration due to gravity g is 10 m/s² and $\pi \approx 3.14$.

1. The wire temporarily stretches by 4.17 mm due to the load.
2. The wire temporarily stretches by 5 mm due to the load.
3. The wire temporarily stretches by 6.25 mm due to the load.
4. The sign weight is excessive, causing permanent deformation or failure of the wire.

15. Which of the following states the differences between a sensory neurone and a motor neurone correctly?

	Sensory neurone	Motor neurone
1.	Transmits impulses to receptor	Transmits impulses to effector
2.	Transmits impulses from the central nervous system	Transmits impulses to the central nervous system
3.	Cell body is located in the middle of the neurone	Cell body is located at one end of the neurone
4.	Connects receptors to effectors	Connects receptors to the central nervous system

16. The diagram shows the arrangement of blood vessels in the uterus wall and placenta of a pregnant woman. The pregnant woman has high blood pressure.



Which of the following explains why the foetus may be underdeveloped?

1. High hydrostatic pressure of maternal blood results in less time for diffusion of nutrients into the foetal blood.
2. High hydrostatic pressure of maternal blood results in more time for diffusion of nutrients into the foetal blood.
3. The foetal blood pressure will also increase.
4. The foetus heart will be damaged.

17. Anabolic steroids are hormones that affect muscle growth. Many athletes take synthetic anabolic steroids, in hopes of developing larger muscles so they can perform better at their sport. These hormones can act like the hormone testosterone. When men take an excess of anabolic steroids, they can have an increase in feminine features. This is due to the fact that the excess of these chemicals signals the male body to stop producing testosterone.
One reason why anabolic steroids can imitate the hormone testosterone is because

1. anabolic steroids and testosterone both interact with the same cell receptors
2. testosterone acts only on muscle cells
3. females produce small amounts of the hormone testosterone
4. an increase in testosterone in males using anabolic steroids increases male features

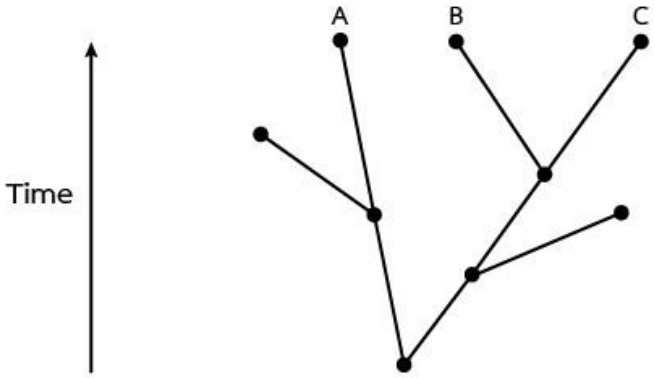
18. NCl_3 (l) decomposes according to the equation shown.

$$\mathbf{2NCl_3\ (l) \longrightarrow N_2\ (g) + 3Cl_2\ (g)}$$

A sealed container of volume 250 cm^3 contains an unreactive gas at a pressure of 1.00×10^5 Pa. 0.241g of NCl_3 (l) was injected into the sealed container. The sealed container was heated to make the NCl_3 (l) decompose fully and then cooled to 20°C. Calculate the final total pressure inside the sealed container at 20°C after the NCl_3 (l) has fully decomposed.

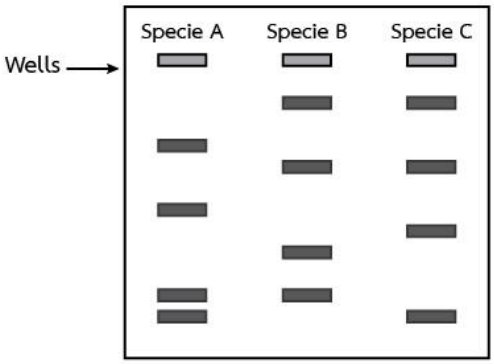
1. 1.39×10^6
2. 1.39×10^5
3. 1.39×10^4
4. 1.39×10^3

19. The evolutionary tree below represents possible relationships between several species of plants.

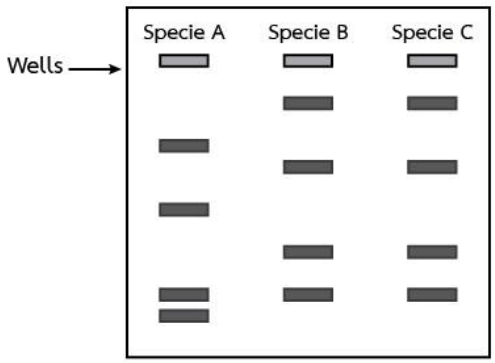


According to the tree, species B and C are more closely related to each other than to species A. Which gel electrophoresis diagram would best support this statement?

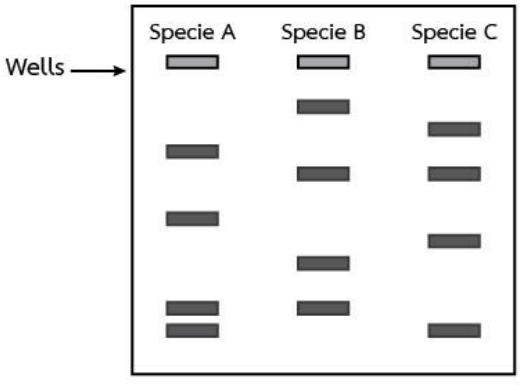
1.



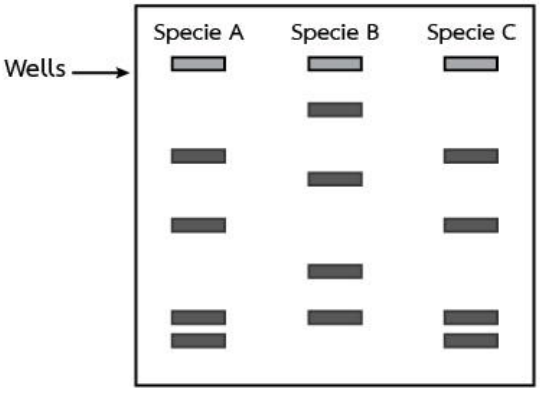
2.



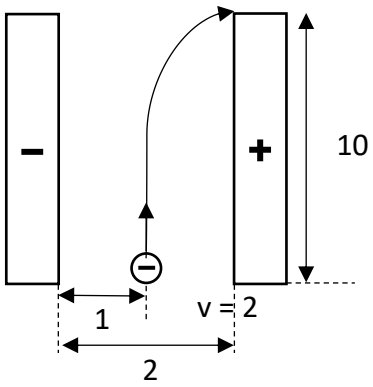
3.



4.



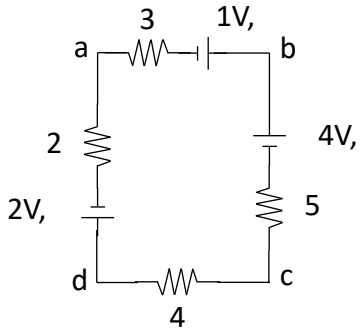
20. An electron is shot vertically at a velocity of 2 m/s entering symmetrically into the two metal plates placed parallel to each other and separated by a distance of 2 cm. After firing, it is found that the electron moves to collide with the end of one of the conductive plates as shown in the figure. Find the electric potential difference between the two conductors in volts, neglecting the acceleration due to the gravity. Given that mass of an electron $= 9 \times 10^{-31}$ kg and the charge of an electron $= -1.6 \times 10^{-19}$ C



1. 6×10^{-15}
2. 5.1×10^{-14}
3. 9×10^{-13}
4. 3.5×10^{-12}

21. Find the electric potential difference between A and C according to the diagram below.

1. 0 V
2. 1 V
3. 2 V
4. 3 V



22. A guitar string anchored between the nut and the saddle with a separation of 65 cm achieve a fundamental frequency of 440 Hz. How far should you place your finger from the nut to achieve a fundamental frequency of 550 Hz?

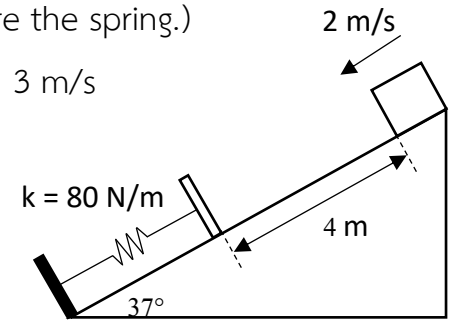
1. 3 cm
2. 7 cm
3. 13 cm
4. 17 cm

23. In the resonance tube experiment, a resonance tube produces its maximum loudness 4 times while the piston is being moved along its length. If the last resonance is reached when the piston is 61.25 cm from the speaker end, what is the frequency of this speaker? Given that the experiment is conducted at 30°C, and the speed of sound in air at 0°C is 332 m/s.

1. 857 Hz
2. 1,000 Hz
3. 1,716 Hz
4. 2,000 Hz

24. A wooden box with a mass of 2 kg is pushed to slide down at a speed of 2 m/s from the top of the inclined plane with a coefficient of kinetic friction of 0.625, and then it collides with a spring with a spring constant of 80 N/m, as shown in the figure. At the moment of impact, the box reaches a speed of 3 m/s, how far will the box compress the spring? Given that sin 37° = 0.6, cos 37° = 0.8, and gravitational acceleration = 10 m/s².

1. 0 cm (The wooden box stops sliding before the spring.)
2. The speed of the wooden box is less than 3 m/s when the box reaches the spring.
3. 27.4 cm
4. 30.0 cm



25. A fired rocket is launched with an acceleration of 20 m/s^2 at an angle of 53° with the horizontal. The fired rocket has burned for 5 seconds before the fuel runs out. How long has the fired rocket been in the air? Given that sin 53° = 0.8, cos 53° = 0.6, and gravitational acceleration = 10 m/s².

1. 20.12 s
2. 23.20 s
3. 26.35 s
4. 29.23 s

26. To determine the amount of citric acid ($H_3C_6H_5O_7$) in a sample of pomelo, 10 ml of fresh pomelo juice was extracted from 250 g of pomelo. Two to three drops of phenolphthalein were then added to the pomelo juice. Titration with 0.1 M sodium hydroxide (NaOH) solution was performed. It was found that after using 50 ml of NaOH, pomelo juice turned light pink. How much % of citric acid is in the pomelo pulp?

1. 0.10%
2. 0.15%
3. 0.19%
4. 0.25%

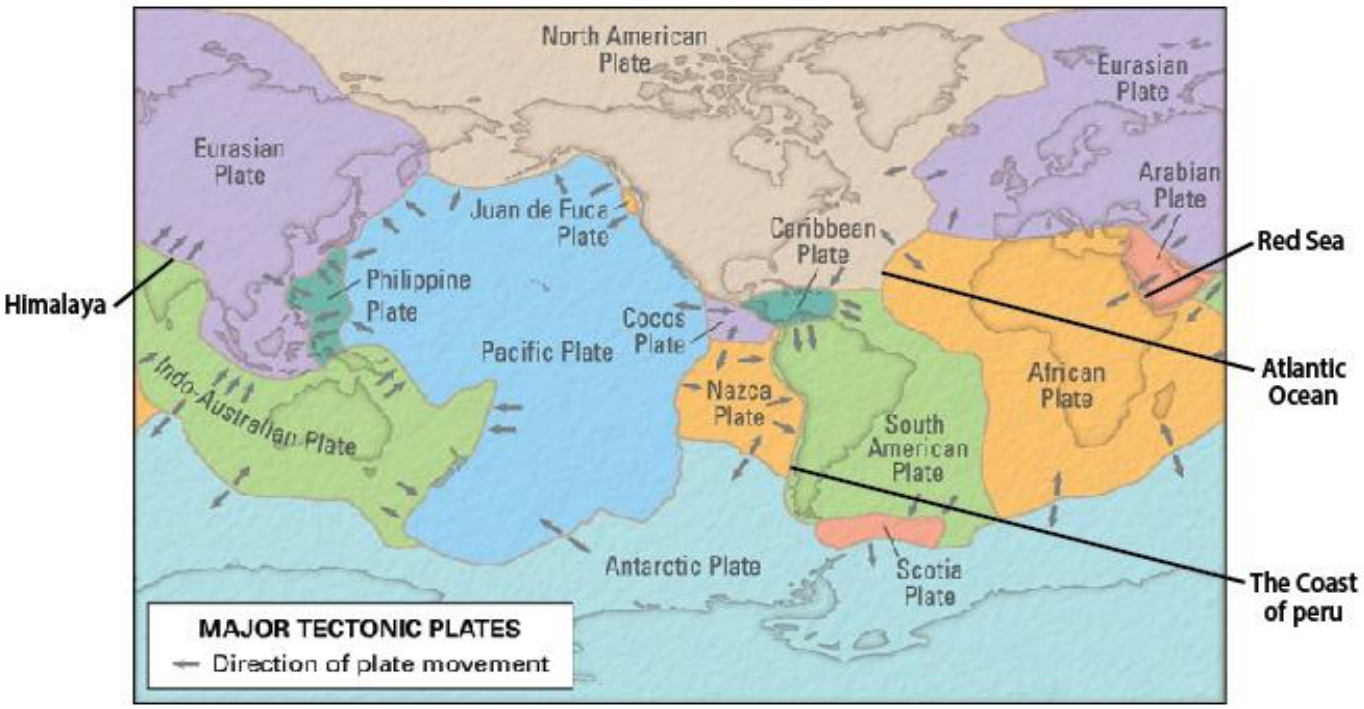
27. The study of neutron star systems could tell us a great deal about the universe.

A neutron star is a collapsed core of a massive supergiant star. Some neutron stars emit beams of electromagnetic radiation that make them detectable as pulsars. Neutron stars have also been identified in other parts of the electromagnetic spectrum. This includes visible light, near infrared, ultraviolet, X-rays, and gamma rays. Very hot gases can sometimes appear around the surface of a neutron star. The source of gas is the companion star, which can be stripped off by the gravitational force of a neutron star if these two stars are sufficiently close enough.

From this information, which of the following is the most ideal type of a space telescope to study hot gas at the surface of a neutron star?

1. Infrared telescope
2. Visible light telescope
3. Ultraviolet telescope
4. X-rays telescope

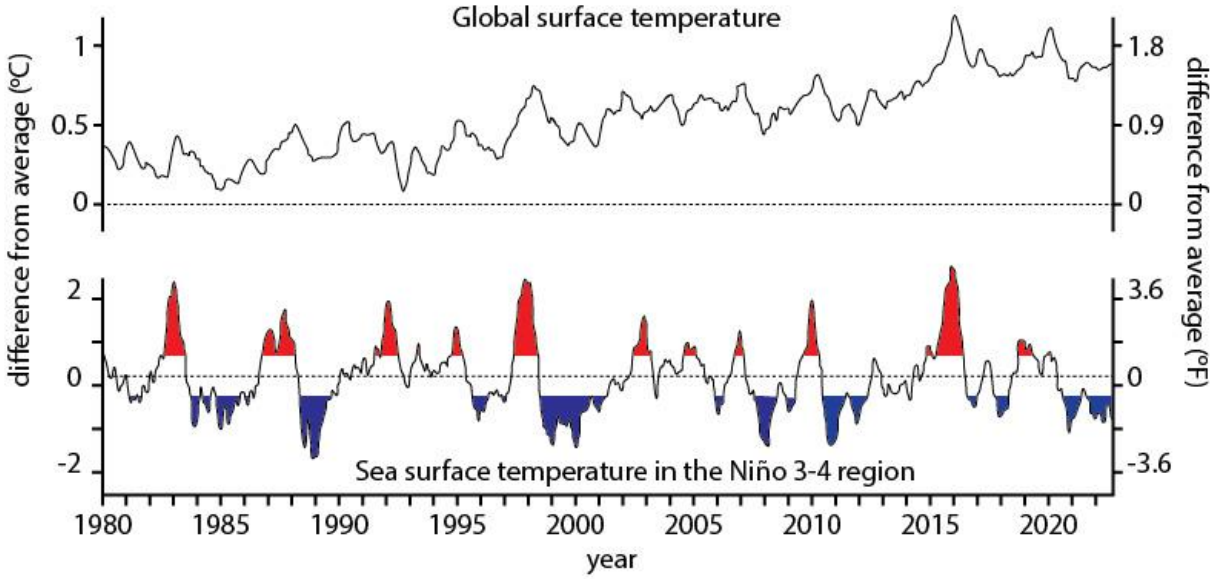
28. Geologists surveyed tectonic plates around the world and found that each plate has a different direction of movement as shown in the figure.



If the tectonic plates are constantly moving, which event will happen in the future?

1. The Red Sea will become widened.
2. The Himalayas will decrease in height.
3. The Atlantic Ocean will become smaller.
4. A rift valley will form on the coast of Peru.

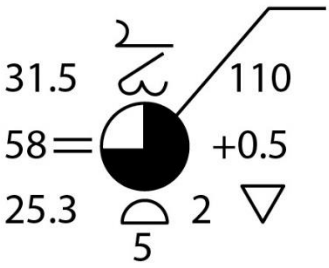
29. Scientists collected the data of the average global surface temperature and the average sea surface temperature during the 20th century. The information is presented as shown.



Based on the information, which of the statements is correctly summarized?

1. La Niña occurred more frequently than El Niño.
2. During El Niño, the global surface temperature dropped.
3. The difference in the average sea surface temperature was higher in 1998 than in 1992.
4. The difference in the average sea surface temperature of above 2 degree Celsius happened over 3 times.

30. A student looks at a weather forecast one morning and notices the weather symbols from the surface weather station as shown on the weather map.



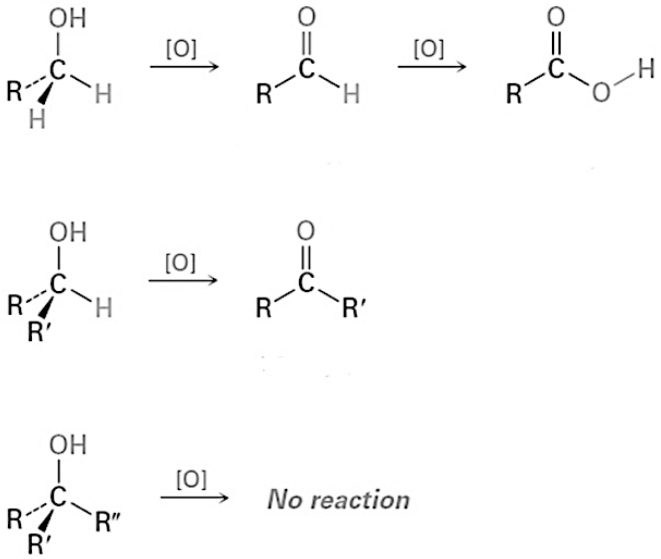
Based on the weather forecast information, which activity is appropriate and consistent with the information above?

1. Avoid traveling by boat due to strong winds.
2. Do laundry because it is sunny, and the sky is clear.
3. Prepare a raincoat and an umbrella before leaving as heavy rains are expected.
4. Exercise in the garden since it is cloudy with a gentle breeze.

31. A horizontal rectangular surface has dimensions 1.4 cm by 2.5 cm and is in a uniform magnetic field that is directed at an angle of 30° above the horizontal. What must the magnitude of the magnetic field be in order to produce a flux of 4.2×10^{-4} Wb through the surface?

1. 1.2 T
2. 2.4 T
3. 3.6 T
4. 4.8T

32. Consider the information below and answer the following question.



A) Primary alcohols are always oxidized to aldehydes and carboxylic acids.

B) The alkyl group of tertiary alcohols reduces the electron density around the carbon atom. This makes it difficult for oxidation reactions to occur.

C) Secondary alcohols are easily oxidized into ketones by chromic acid reagent.

Based on the figure above, which of the statements regarding the oxidation reaction with organic substances are incorrect?

1. A only
2. B and C
3. A and B
4. A, B, and C

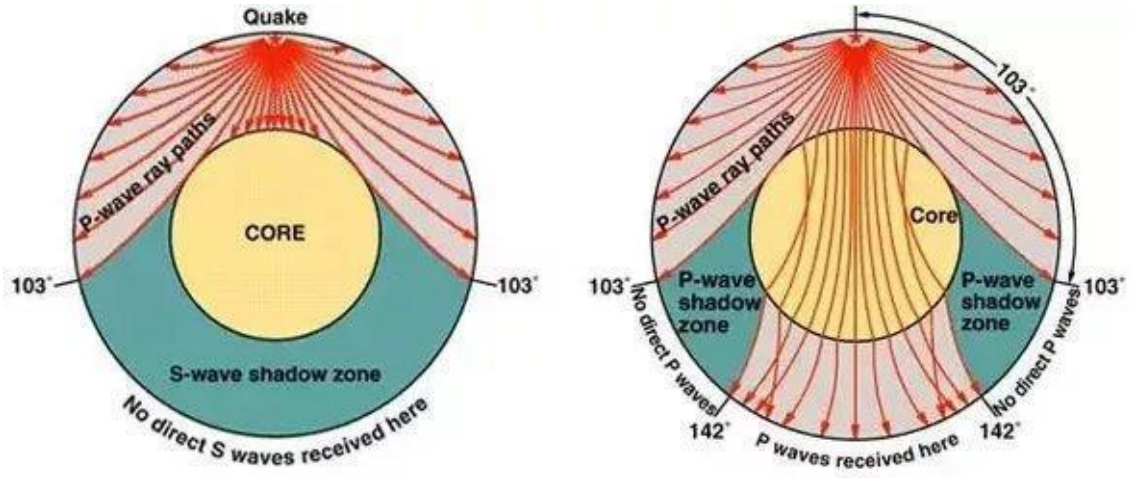
33. The penetrating ability of propylene glycol ($C_3H_8O_2$) into starch granules was determined by soaking 150 g of cassava starch in 5% w/w of propylene glycol solution for a 24 h at 25° C with constant stirring, using a ratio between cassava starch and propylene glycol solution equal to 1:2. The soaking solution was sampled to analyze the amount of propylene glycol remaining. The data obtained were used to calculate the amounts of propylene glycol existing inside starch granules (mol/100 g starch) at soaking times. The experimental results are shown in the table.

Soaking time (h)	Amount of propylene glycol (mmol/100 g starch)	
	Remaining in solution	Inside starch granules
24	?	78

How many moles (mmol) and volume (cm^3) of propylene glycol are there in the remaining solution? (Density of $C_3H_8O_2$: 1.04 g/cm^3)

1. 78, 6.00
2. 79, 8.00
3. 80, 6.00
4. 81, 8.00

34. The shadow zone is the area of the Earth from angular distances of 104 to 140 degrees, for a given earthquake that does not receive any direct P waves. P and S waves radiate spherically away from an earthquake's focus in all directions and return to the surface by many paths. The seismic shadows are the effect of seismic waves striking the core-mantle boundary.



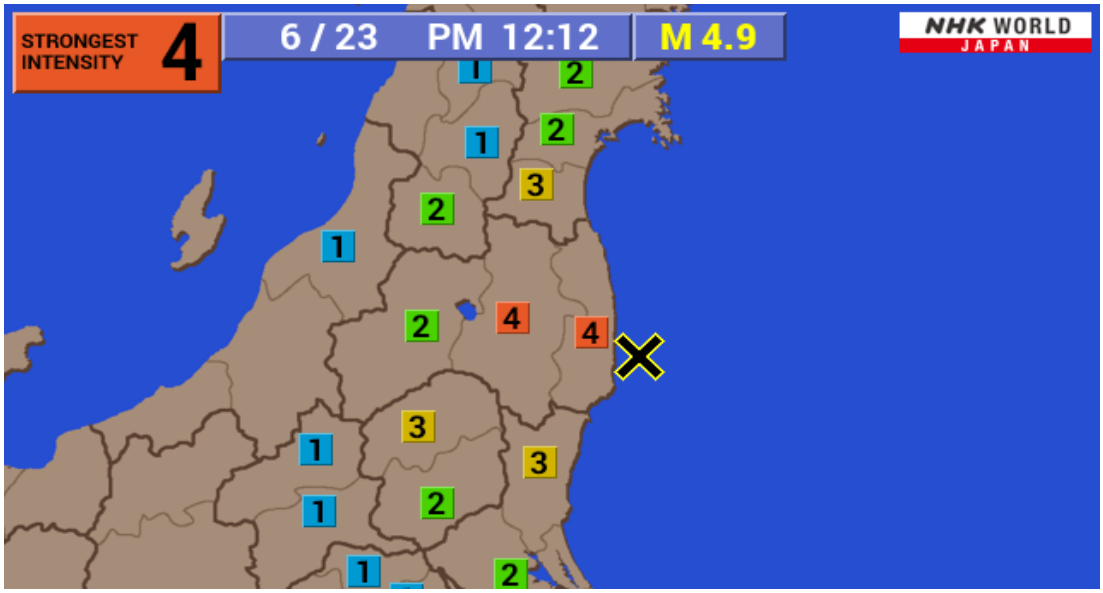
What conclusion can be drawn from the discovery of seismic shadow zones?

1. The inner core is solid
2. The outer core is liquid
3. It constitutes the volume of the Earth's core
4. It is the thickness of the earth's mantle

35. At a football game, the intensity level of the shout of a single person in the stands at the center of the field is about 50 dB. What would be the intensity level at the center of the field if all 10,000 fans at the game shouted from roughly the same distance away from that center point?

1. 70 dB
2. 90 dB
3. 110 dB
4. 130 dB

36. A 4.9 magnitude earthquake in Japan is 50 kilometers from the epicenter. There is no tsunami threat from the quake. The seismic activities of an intensity of 3 or higher on the Japanese scale that have occurred in the past 30 days are noted here.



Why does the earthquake intensity differ in each area?

1. There were 30 earthquakes that had occurred in this area.
2. Seismic waves lose energy as they travel through the Earth's crust.
3. Earthquakes create distinct types of waves with different velocities.
4. They are propagated when the solid medium has varying vertical elastic properties.

37. Heat–moisture treatment (HMT) refers to a physical modification of starch through incubation of starch granules at low moisture levels, usually below 30% and heating them at a high temperature, above the glass transition temperature but below the gelatinization temperature, for a certain period of time. Moisture content of starch samples during treatment has been reported to be an important factor that affects the physicochemical properties of the modified products. Water in starch samples acts as a plasticizer, rendering starch polymeric chains more flexible, and thus facilitating the rearrangement of amylose/amylopectin unit chains.

Plasticizers can be defined as low-molecular-weight substances that are incorporated into a polymer matrix to enhance the flexibility and processability by increasing the spacing between molecular chains and increasing segmental mobility, commonly through reducing the hydrogen bonding between the polymer chains. Besides water, hydrophilic molecules such as glycerol, sorbitol, xylitol, and urea have been widely studied as plasticizers, especially in the production of thermoplastic starch (TPS) and starch film. Interaction of the plasticizer with the starch biopolymer replaces some of the starch–water interactions and reduces the intermolecular entanglements within the biopolymer by inducing stronger hydrogen bonding between the plasticizer and the biopolymer.

The plasticizing phenomenon that occurs during HMT of starch differs from that of TPS or starch film since the starch granules remain intact throughout the treatment process. In this instance, plasticization of starch chains is influenced not only by interactions between the plasticizer and starch chains, but also by the ability of the plasticizer to penetrate into starch granules. Therefore, the extent of plasticization is dependent on both the granular structure of the starch and the

chemical structure of the plasticizer, including molecular size, composition, and functional groups.

What characteristics of plasticizer substances should be used in starch modification by HMT?

A) Plasticizers are smaller-sized and should contain a polyol group.

B) Propanol glycerol and erythritol can be used as plasticizers.

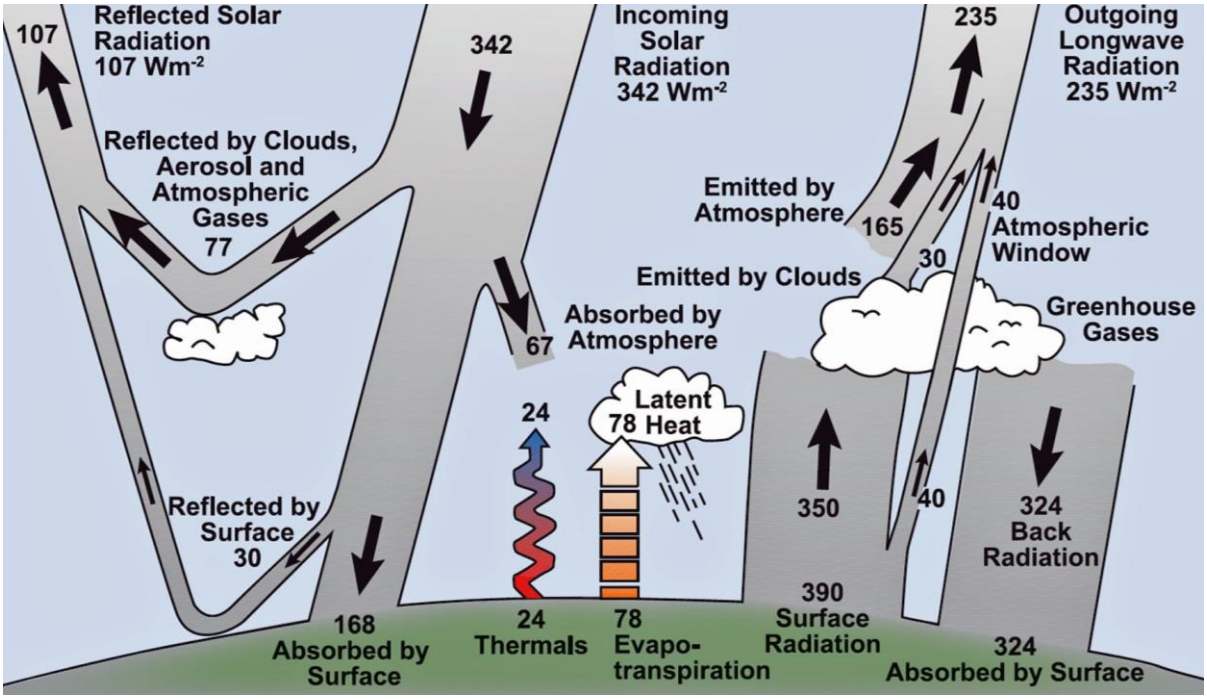
C) The structure of plasticizers should be branched.

1. A and B
2. A and C
3. B and C
4. A, B, and C

38. A 0.3-kg glider is moving to the right on a frictionless, horizontal air track with a speed of 1.8 m/s. It has a head-on collision with a 0.2-kg glider that is moving to the left with a speed of 3.2 m/s. Find the final velocity (magnitude and direction) of each glider if the collision is elastic.

	0.3-kg glider		0.2-kg glider	
	magnitude	direction	magnitude	direction
1.	2.8	→	2.2	→
2.	2.2	←	2.8	→
3.	9	→	6.2	→
4.	6.2	←	9	→

39. Earth's energy budget describes the balance between the radiant energy that reaches Earth from the Sun and the energy that flows from Earth back out to space as shown in the figure below.



The Earth-atmosphere system is constantly trying to maintain a balance between the energy that reaches Earth from the sun and the energy that flows from Earth back out to space. If the Earth system is changed through natural phenomena, the Earth's temperature will eventually increase or decrease in order to restore an energy balance.

What factors affect changes in the energy budget?

A. Forest fire
B. Earth axis tilt
C. Volcanic eruptions
D. Earth orbital period
E. Mass transportation
F. Ocean surface current

1. A, B, C, and E
2. A, B, D, and E
3. A, B, C, D and F
4. A, B, D, E, and F

40. Four substances, aluminum oxide (Al_2O_3), aluminum chloride ($AlCl_3$), magnesium oxide (MgO), and magnesium chloride (MgCl2), are labeled A, B, C, and D in no particular order. Two substances were taken in equal amounts and mixed in water before the pH was measured. The results are as shown on the table.

Mixtures	pH
A and B	> 7
B and D	> 7
C and D	< 7
A and C	< 3

From the results, what substances are A, B, C, and D?

	Substances			
	A	B	C	D
1.	Al_2O_3	$AlCl_3$	MgO	$MgCl_2$
2.	$AlCl_3$	MgO	$MgCl_2$	Al_2O_3
3.	$AlCl_3$	$MgCl_2$	Al_2O_3	MgO
4.	Al_2O_3	MgO	$AlCl_3$	$MgCl_2$

คำตอบวิชาวิทยาศาสตร์ ชั้นมัธยมศึกษาปีที่ 6

ข้อ	คำตอบ	ข้อ	คำตอบ
1	2	21	1
2	3	22	3
3	3	23	2
4	3	24	4
5	4	25	2
6	1	26	3
7	4	27	4
8	2	28	1
9	3	29	3
10	4	30	4
11	3	31	2
12	3	32	3
13	Free*	33	3
14	2	34	2
15	3	35	2
16	1	36	2
17	1	37	1
18	2	38	2
19	2	39	1
20	3	40	4

* หมายเหตุ : ข้อ 13 ข้อมูลในรูปกราฟไม่สมบูรณ์