Question 1 A bird feather and iron with the same mass are dropped in a vacuum chamber with the same

height and reach the floor at the same time of one second. If we repeat this experiment

but the air leaks into the chamber, compare the time of falling between the bird feather (t_b)

and iron (t_i). Choose the correct answer below and explain the reason.
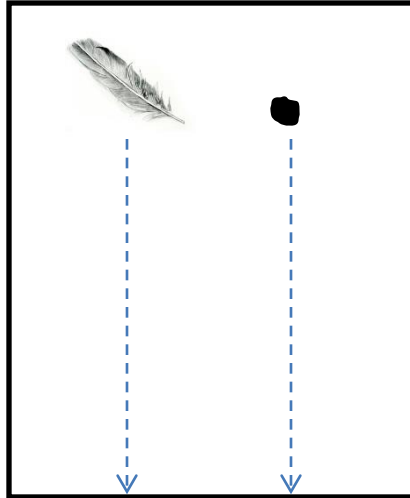
A. $t_b = t_i = 1$ s

B. $(t_b = t_i) > 1$ s

C. $t_b > t_i > 1$ s

D. $t_i > t_b > 1$ s

Answer: .... (1 point)

Explanation: .... (1 point)

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Question 2 A thermometer has very fainted mark scale so a student decides to re-mark the scale. He dips the thermometer tip into an icy water and notes the mercury level, and after some time does the same by dipping it in boiling water. The two levels are 25 cm apart. When he dips the thermometer in hot cooking oil, the mercury level is 8 cm below the top level. What is the temperature reading here?

Show your calculation.   (2 points)

Answer: ....

....

....

....

....
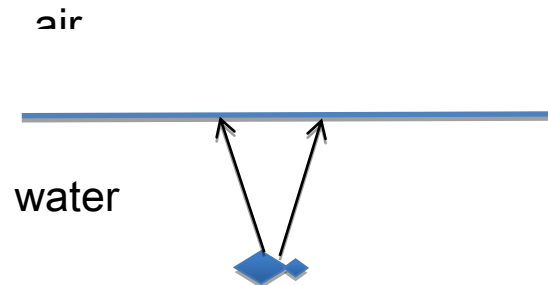
Question 3 A tourist is standing on a boat and looking at the fish below through a specially designed

glass floor. Would the fish appear to be shallower or deeper? Explain it.

Answer: ....

Explanation: ....

....   (1 point)

Draw paths of the light rays to identify the apparent position of the fish.   (1 point)

air

water

Question 4 Boxes with mass of 1 kg and 2 kg, made of the same material, are given the same brief push and

they slide along the cement floor. They move and come to stop due to friction. Complete the

following statements by filling in the blank with the greater symbol (>), smaller symbol (<) or

equal symbol (=).

(a) Just after the brief push, the velocity of 1 kg box is .... that of 2 kg box.   (0.5 point)

(b) Just after the brief push, the kinetic energy of 1 kg box is .... that of 2 kg box.   (0.5 point)

(c) The frictional force on 1 kg box is .... that of 2 kg box.   (0.5 point)

(d) The displacement of 1 kg box is .... that of 2 kg box.   (0.5 point)

Question 5 A DC motor is connected to a battery and it spins and lasts for a certain period of time. If two

batteries are connected in parallel and then connected to the motor, what would happen to

the motor? Choose the correct answer below and explain the reason.

A. Spins at the same speed and lasts for the same time.

B. Spins at the same speed and lasts for a longer time.

C. Spins at faster speed and lasts for the same time.

D. Spins at faster speed and lasts for a longer time.

E. Spins at slower speed and lasts for the same time.

F. Spins at slower speed and lasts for a longer time.

Answer: .... (1 point)

Explanation: ....

.... (1 point)
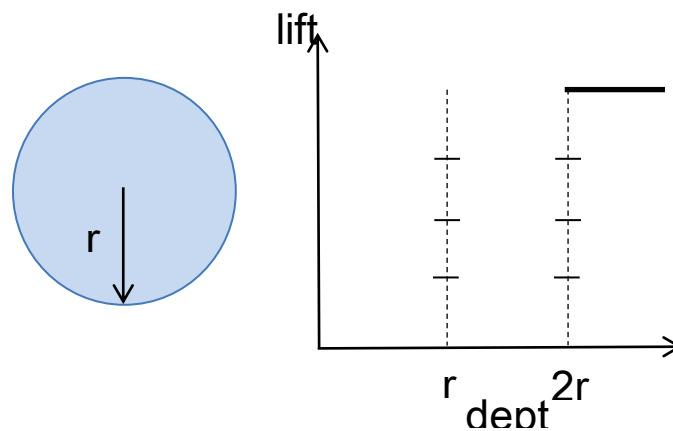
Question 6   An object experiences a lift force when it is either floating or sinking into the water. The

magnitude of lift force is proportional to the volume of liquid being replaced by the object. A

picture below shows the graph of the lift force exerted on a solid cylinder as it is sinking

vertically into the liquid. After it fully submerges into the water, the lift force become constant.
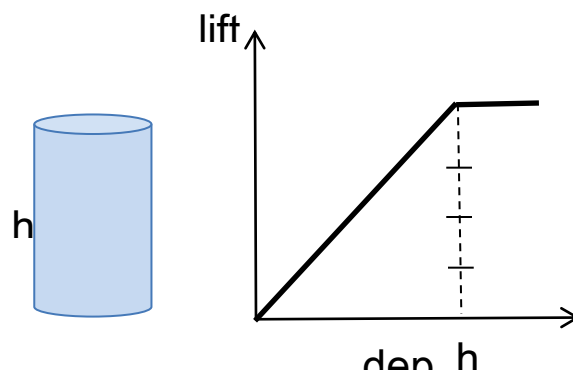

If we change the object to a "solid sphere" which can sink into the water. Draw a graph that

shows the lift force on the sinking sphere as a function of depth. (2 points)

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Question 7 If CO_2 is bubbled into two beakers, one containing pure water (solid line) and the other

containing plasma (dash line), which of the following graphs correctly describes the results?

(1 point)

A.

B.

C.

D.
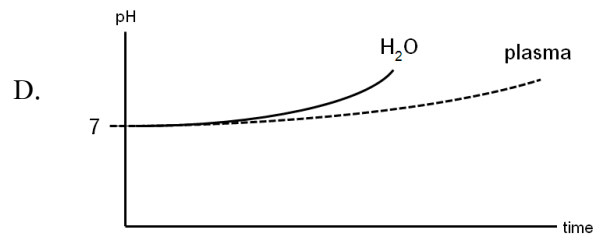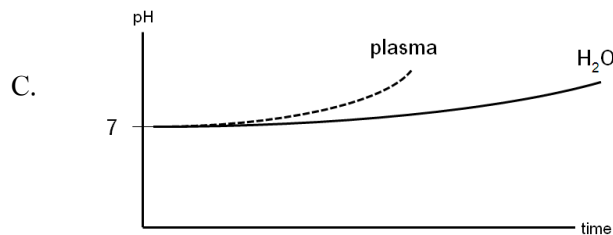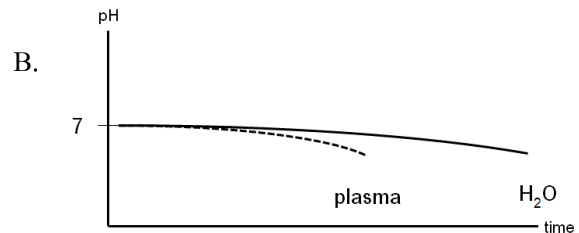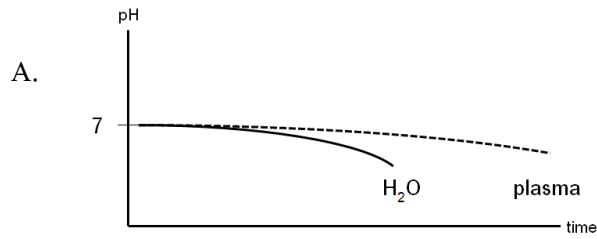
Question 8 A scientist designs an experiment to investigate effects of light on red algae and bacteria

aggregation. After illuminating a filament of red algae with light that passed through a prism,

thus exposing different segments of algae to different wavelengths of light, the scientist

added aerobic bacteria and then noted in which areas the bacteria congregated. The scientist noted

that the largest groups were found in the areas illuminated by the red and blue light.

In addition to the above, the scientist also set up 4 experimental groups in parallel.

I   Red algae not exposed to the white light

II   Red algae not exposed to the white light and then added the aerobic bacteria

III   Red algae exposed to the white light directly without passing through prism

IV   Red algae exposed to the white light directly without passing through prism and then added

the aerobic bacteria

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For questions 8.1 and 8.2, choose experimental groups I, II, III and /or IV

8.1 Which is the positive control group? _____ (1 point)

8.2 Which is the negative control group? _____ (1 point)

8.3 What is the explanation for the congregation of bacteria in the red and blue areas?

(write down ✓ if correct or ✗ if wrong)   (2 points)

	8.3.1 These areas had the highest pH
	8.3.2 These areas had the most N_2 being produced.
	8.3.3 These areas had the most CO_2 being consumed.
	8.3.4 These areas had the most oxygen being released.

Question 9 Catalase is an enzyme found in animal and plant cells, which catalyze breakdown of

hydrogen peroxide into oxygen and water.

$$2H_2O_2 \text{-----}> O_2 + 2H_2O$$
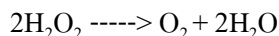
The activity of catalase can be observed by first soaking many pieces of same small

discs of filter paper in a solution containing the enzyme. The discs are then submerged

in a diluted solution of hydrogen peroxide. The filter discs are observed to sink at first

but float to the surface. Which experiments can be used to measure the rate of the breakdown

of the reaction? (write down ✓ if correct or ✗ if wrong) (2 points)

	9.1 Measure the distance that discs drop down from the surface of the solution.
	9.2 Measure the time that discs take to rise to the surface of the solution.
	9.3 Measure the weight of the discs before and after soaking in the solution.
	9.4 Count the number of discs that have floated to the surface in a fixed time.

Question 10 How does acid rain result in the decline of coral reefs in ocean? (1 point)

Answer: ....

....

Question 11 The diagram below shows the different systems in the human body working together.

Study it carefully.
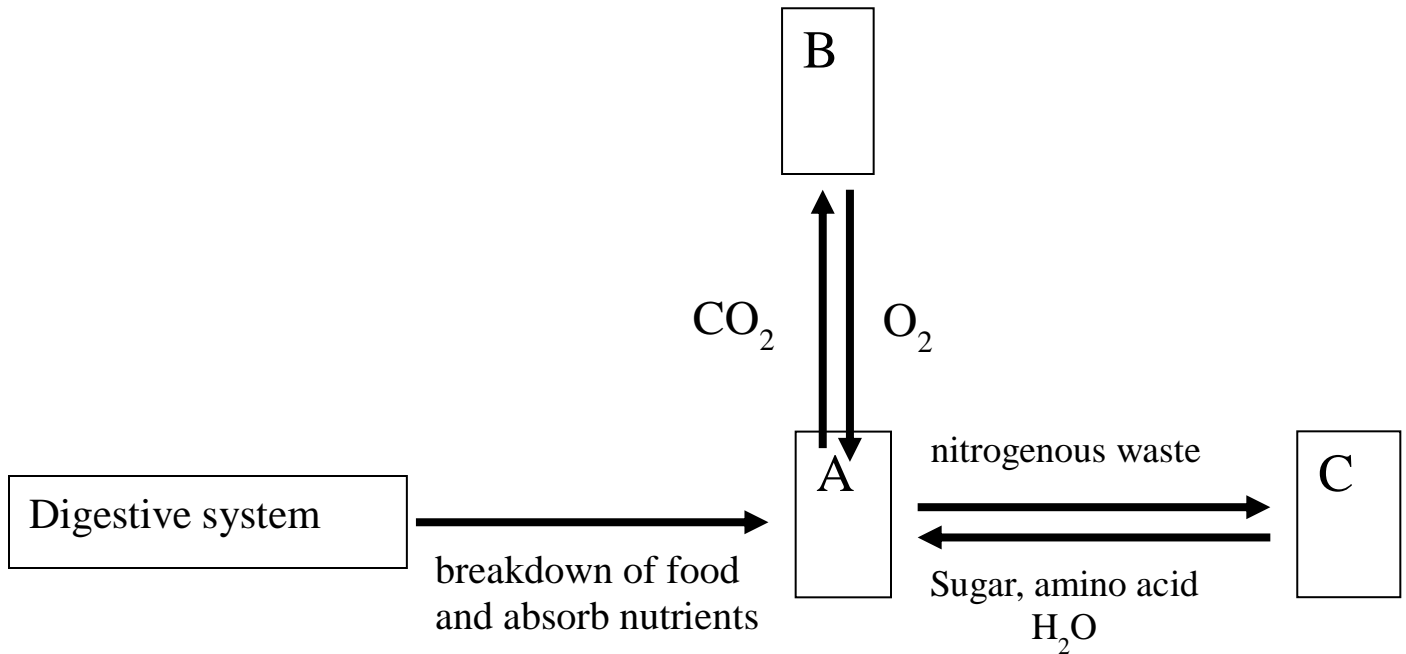
What organ system do letters A, B, and C represent respectively?

11.1 Oragan system A = _____(0.5 point)

11.2 Oragan system B = _____(0.5 point)

11.3 Oragan system C = _____(0.5 point)

11.4 Which organ system controls the functions of organ systems A, B and C?

Answer .... (0.5 point)

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Question 12 Given below is a food web that exists in an ecosystem. A, B, C, D, E, F and G are organisms. If species "D" is an agricultural pest, which biological control measure is recommended for limiting the size of the population "D"? (write down ✓ if correct or ✗ if wrong) (2 points)
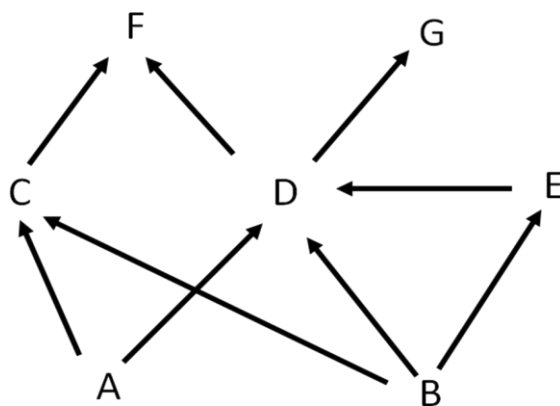
12.1 eliminate the populations "F"	
12.2 increase the populations "E"	
12.3 increase the populations "G" and eliminate the populations "E"	
12.4 eliminate the populations "G" and increase the population "B"	

Question 13 A picture of the rabbit on the moon is shown below. Shade the photo below to produce the correct image of the Moon during the phase last quarter. (1.5 point)

Question 14 Earth rotates 360 degree in 24 hours. What is the local time at the longitude 115.5° E if the local

time at the longitude 120° E is 2pm? (2 points)

Answer: ....

Question 15 Draw the ray of light and write down the following parts of a Newtonian reflection

telescope. (2 points)
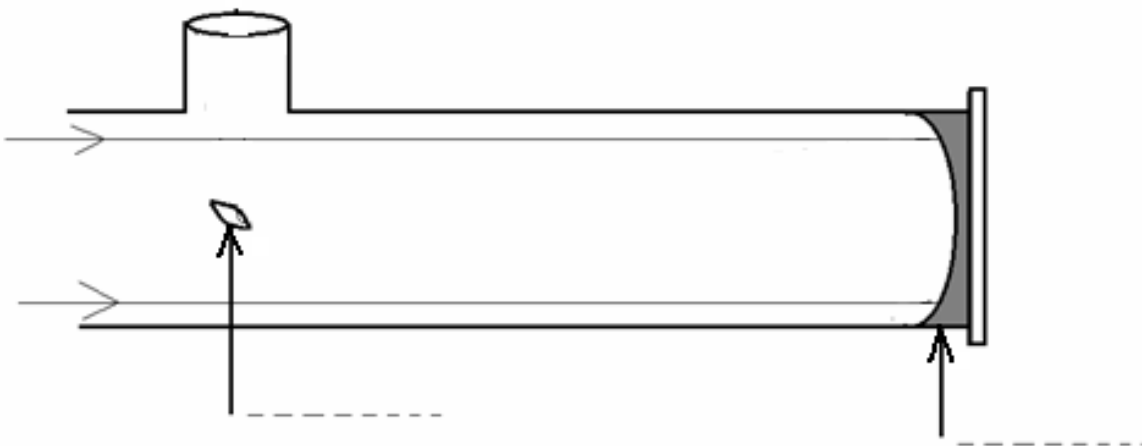
Question 16 What is the state of matter mostly found in the mantle of the Earth? (0.5 point)

Answer: ....

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Question 17 Match the following layers to the corresponding number.   (2 points)

Lithosphere, Crust, Mesosphere, and Asthenosphere
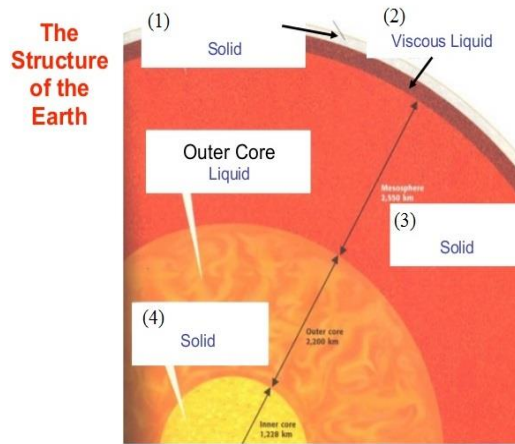
Answer:

(1) ……………………………..   (2) ………………………………...

(3) …………………………………   (4) …………………………………

Question 18 Which 2 factors cause clouds to appear in the Troposphere?   (1 point)

Answer: ....

Question 19 What happens to the density of the air when the altitude increase? and why?   (1 point)

Answer: ....

....

....

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Question 20 A king's crown has a volume of 110 cm^3 and a mass of 1,920 g. The density of gold

is 19.3 g/cm^3. Is the crown made of pure gold? Explain your answer.   (2 points)

Answer: ....

....

....

....

....

....

Question 21 A mixture of salt, sand, iron filings and a small piece of cork can be separated using

a 4-steps procedure that can remove iron filling, cork, sand, and salt respectively.

Identify the separation techniques in each step.   (2 points)

Step 1: ....

Step 2: ....

Step 3: ....

Step 4: ....

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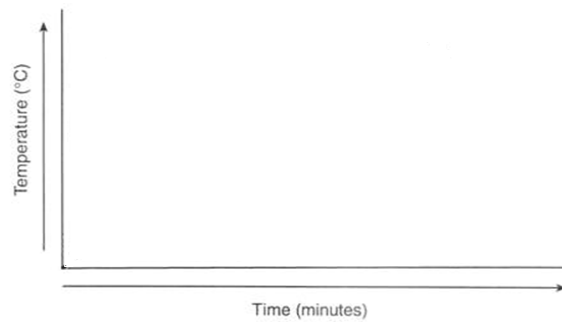Website : www.imso.go.th
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Question 22 Explain how this graph would change if we heat twice as much water under the same condition.

(2 points)
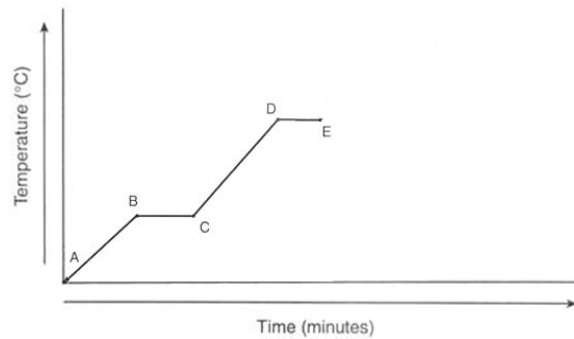
Draw the expected new heating curve using the same scale.

What would stay the same? Why?	What would change? Why?