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Theoretical Examination II

(90 minutes)

Instructions

- [1] *Types of problems in this examination set are:*
- a) *Choose one correct answer.*
 - b) *Questions with short answer.*
 - c) *Essay questions with explanations.*
- [2] *You must fill the answer at the answer sheet.*
- [3] *Write your name and country at each page of answer sheet.*
- [4] *For multiple choices, you can just mark the correct answers by circling (O)*
- [5] *Jury will consider only the answer sheet.*

Choose one correct answer

- 1) When we use a towel to dry something, the most significant phenomenon involved is? **(Score 1)**
- a) adhesion
 - b) evaporation
 - c) absorption**
 - d) cohesion
 - e) transpiration
- 2) Which one of the following statements is true for rainbow? **(Score 1)**
- a) Colors in the rainbow are spectra of water molecules.
 - b) Rainbow can happen in space where matter does not exist
 - c) Dispersion by water molecules (droplets) in the sky produces rainbow.**
 - d) Rainbow may contain only one specific color (e.g. green or red).
 - e) Water molecules are scattered by the sky.

3) From the list below, which pair of plant and animal parts is most alike in their functions? **(Score 1)**

- a) Flower and hair.
- b) Leaf and ear.
- c) **Phloem and blood vessel.**
- d) Xylem and liver.
- e) Seed and head.

4). If *Hibiscus* plant is pollinated by *orchid*, what will most likely to happen? **(Score 1.5)**

- a) The offspring will look like orchid.
- b) The offspring will look like hibiscus.
- c) **No offspring will be produced.**
- d) The offspring will die.
- e) The offspring will look like both flowers.

5) If we travel in a plane at the same speed with the rotation of the earth, which direction should we fly such that we feel time “stop”? **(Score 1)**

- a) from north to south.
- b) from west to east.
- c) **from east to west.**
- d) from south to north.
- e) along equator.

6) In the bungee jumping sport, which component of the bungee jumping equipment absorbs energy? **(Score 1)**

- a) The helmet has a great air resistance, it will produce great friction.
- b) The jacket is very light and it produces Archimedes upward force in air.
- c) **The string behaves like a spring, it stores potential energy.**
- d) The safety harness must be set so it will slow down the jumper.
- e) The shoes behave like a spring so the jumper’s feet still clean.

7) How can an acrobat walk on a narrow string using only a balancing pole?

(Score 1)

- a) The acrobat is capable of reducing gravitational force.
- b) The balancing pole can “hold” the air to support the acrobat.
- c) **The balancing pole helps the acrobat to set his center of mass on the string.**
- d) The balancing pole can levitate the acrobat.
- e) The base of acrobat’s shoes is sticky.

8) We smell something because the source of the smell **(Score 1)**

- a) irradiates its presence through the air and we catch the signal.
- b) **evaporates some smell in gas form and our nose detects it.**
- c) sends electromagnetic signal to our brain and it tells our nose to pretend that some smell is present.
- d) creates sort of noise.
- e) sends ultrasonic wave to our nose.

9) Linda wants to investigate whether pumpkin seeds grow better in light or dark. You could suggest Linda to put the pumpkin seeds on pieces of

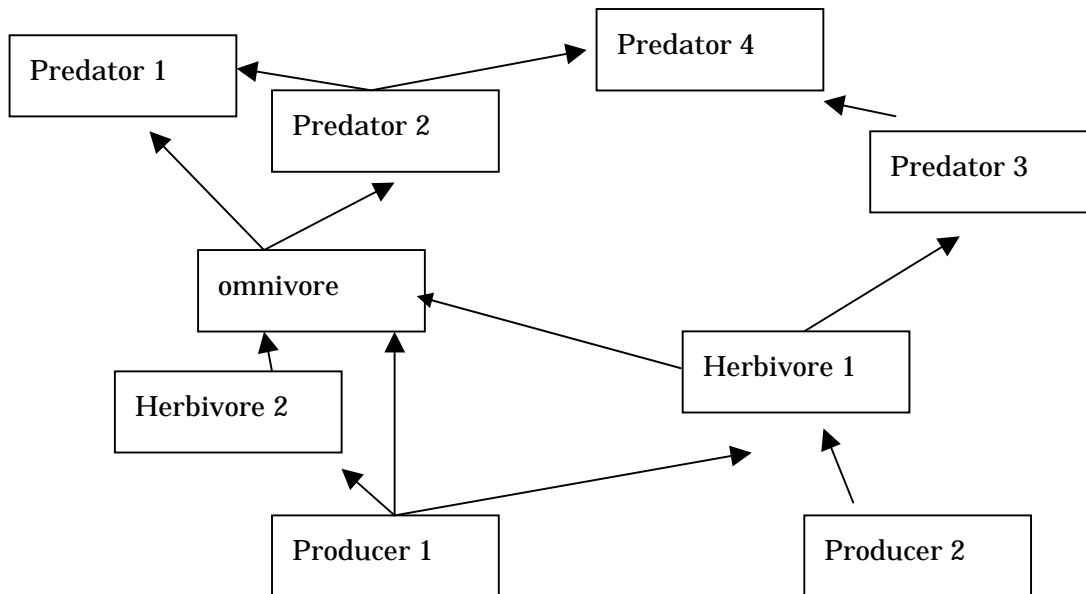
(Score 2)

- a) dry cotton and keep one group in a light and another in a dark place.
- b) damp paper and keep them in a warm place and cool place.
- c) moist cotton and keep them in a light place or dark place that is warm.
- d) **damp paper and keep one group in a light place and another in a dark place.**
- e) plastic and keep one group in a light place and another in a dark place.

10) In hydrology cycle, which is the correct sequence? **(Score 2)**

- a) Condensation of water vapor in the cloud, followed by evaporation of water from the ocean, and precipitation in the form of rain.
- b) Precipitation in the form of rain, followed by condensation of water vapor in the cloud and evaporation of water from the ocean.
- c) **Evaporation of water from the ocean, followed by condensation of water vapor in the cloud and precipitation in the form of rain.**
- d) Evaporation of water from the ocean, followed by precipitation in the form of rain and condensation of water vapor in the cloud.
- e) Condensation of water vapor in the rain, followed by precipitation in the cloud and evaporation of water from the ocean.

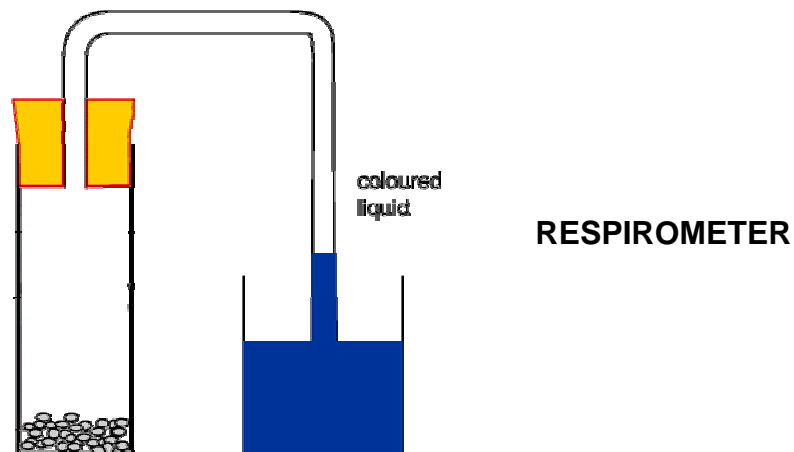
11) Analyze the following diagram



If population of predator 3 was severely decreased by a disease, which of the following statements is most likely to occur immediately? **(Score 2.5)**

- a) Herbivore 2 will increase in number.
- b) Predator 1 will increase in number.
- c) Herbivore 1 will decrease in number.
- d) Producer 2 will decrease in number.**
- e) The omnivore will increase in number.

12) Ahmad did an experiment regarding respiration rate of bean sprout using a respirometer with color liquid. The weight of bean sprout is 35 grams. The table below shows an observation result.



No	Observation time (minutes)	Displacement of color liquid (ml)	Mean of respiration rate(ml/minute)
0	0	0	1.5 ml/5 minutes
1	5	1.5	
2	10	3	
3	15	4.5	
4	20	6	

Based on data on the table above, answer questions **A** and **B** below.

Question A:

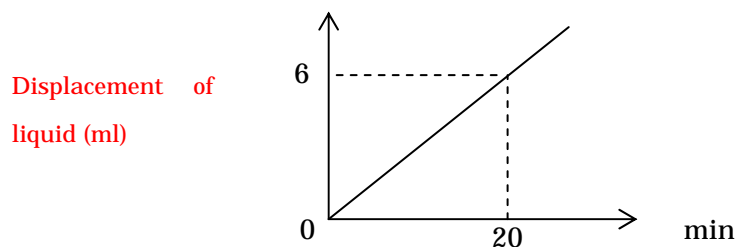
Predict the displacement of color liquid at 25th minute **(Score 1)**

- a) 6.5
- b) 7
- c) 7.5**
- d) 8
- e) 8.5

Question B:

Based on the above of data, draw a line graph of the displacement over time
(score 2)

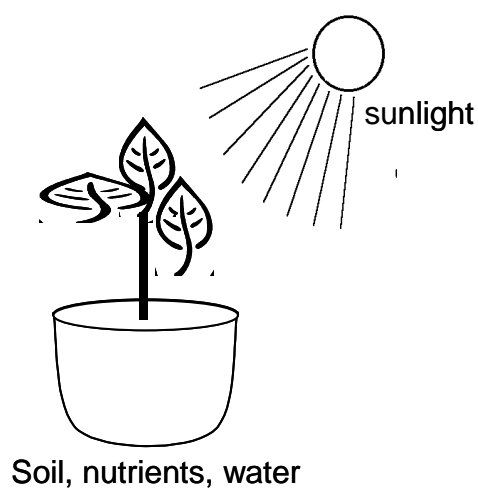
Answer:



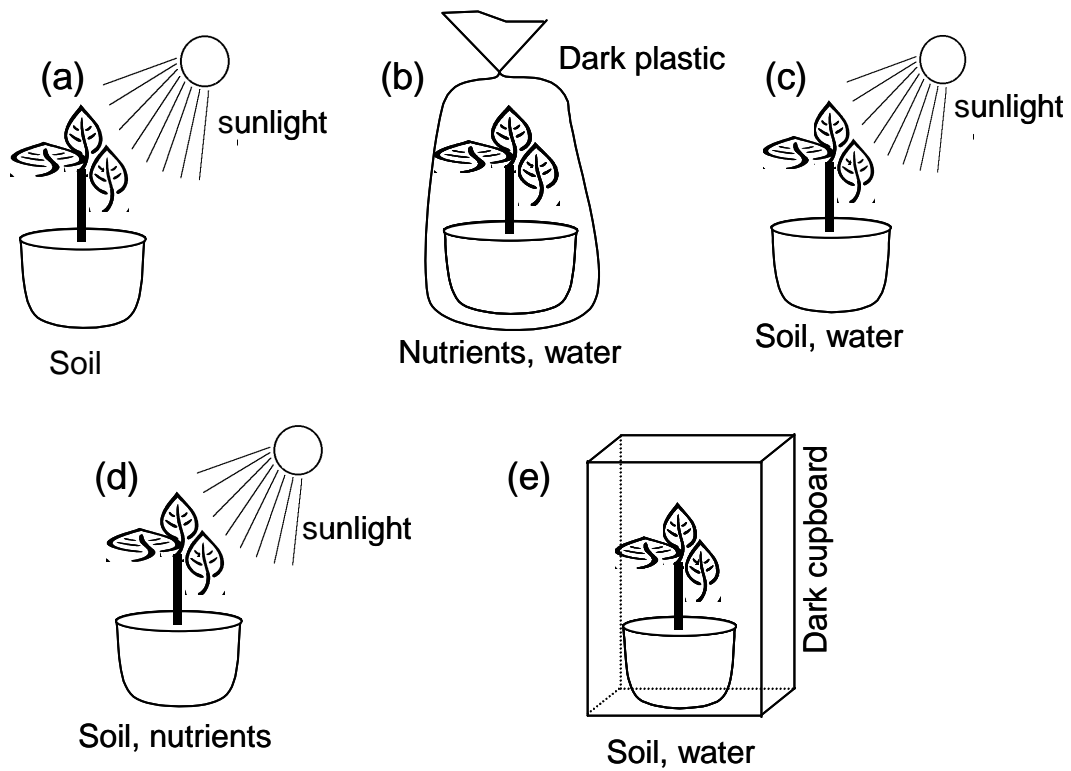
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- Without axis title : 0.5 reduced
- Prefect except no units: 0.5 reduced
- axis only: 1.5 reduced

13) Fany wants to prove that plants need some nutrients in the soil for healthy growth. In order to test her idea she uses two pots of plants. She sets up one pot of plants as shown below.



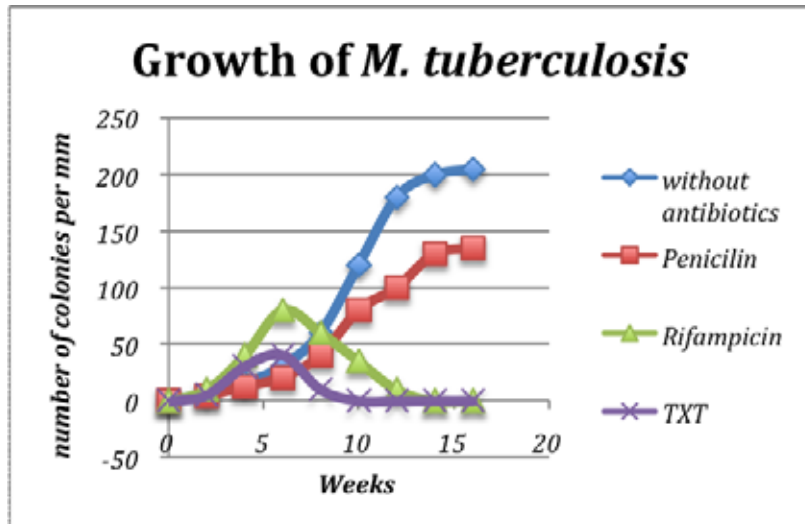
Which ONE of the following should she use for the second pot of plants? (Score 2)



ANSWER: C

Questions with short answers

14) The following graphs represent the growth of *Mycobacterium tuberculosis* in various mediums containing specific antibiotic.



a) Write down the most potent antibiotic for *Mycobacterium tuberculosis* to be used in human. **(Score 2)**

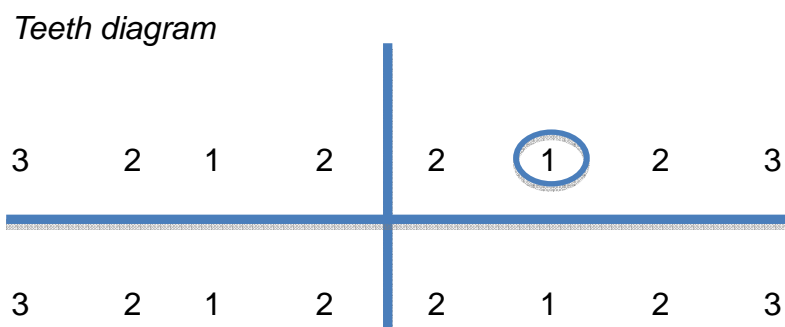
Answer: TXT

b) How many weeks at least should *rifampicin* be used to treat effectively the *Mycobacterium tuberculosis*. **(Score 2)**

Answer: around from 12 to 17 weeks

Note: no time: full marks

15) The following diagram shows an arrangement of your teeth. Your dentist circles the tooth, which has a hole on it. Write down the type of tooth **(Score 2)**



Answer: Canine

16) Smoking is not acceptable because the cigarette contains toxins. **List 3 risks for person, who is smoking (Score 3)**

Answers

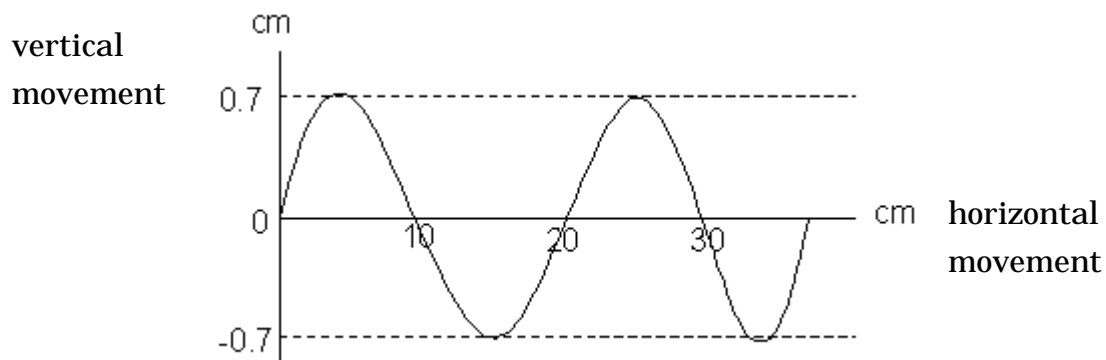
- a) Heart disease**
- b) Lung cancer**
- c) Fetus abnormality**
- d) etc (similar reason)**

17) During the first few weeks, a corn seedling uses its cotyledon in order to supply nutrients for growth before the root can absorb water and nutrient from the ground. Which part in a fertilized chicken egg has a similar function to cotyledon? **(Score 1)**

Answer : Amnion

Note: egg yolk

18) The diagram below shows the outline of the wave of water surface.



(a) Determine the wavelength **(Score 1)**

Answer: 20 cm

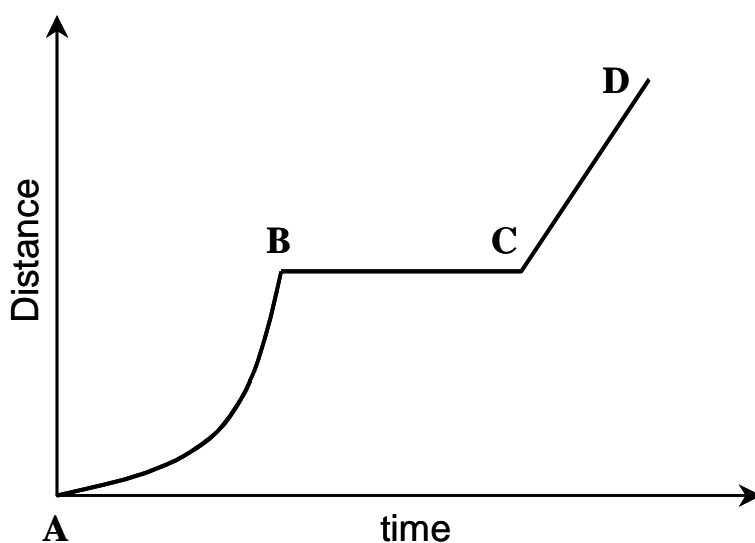
No unit: 0.5

(b) Determine its amplitude **(Score 1)**

Answer: 0.7 cm

Note: no unit : 0.5

19) Look at the graph below.



Which section of the graph that indicates the object is

a) moving with constant speed (**Score 1**)

Answer: section CD

b) at rest (**Score 1**)

Answer: section BC

20) Melting and boiling points of 6 substances labeled A to F are given in the table below.

Substance	Melting point ($^{\circ}\text{C}$)	Boiling point ($^{\circ}\text{C}$)
A	101	232
B	-30	-5
C	44	130
D	-45	89
E	-5	15
F	1	40

a) Which substance(s) is/are gas(es) at room temperature (25°C)? (**score 1**)

Answer: substances B and E

(0. 5 for each correct answer); more than 2 no marks

(b) Which substance(s) is/are liquid(s) at room temperature (25 °C)? (**score 1**)

Answer: substances D and F

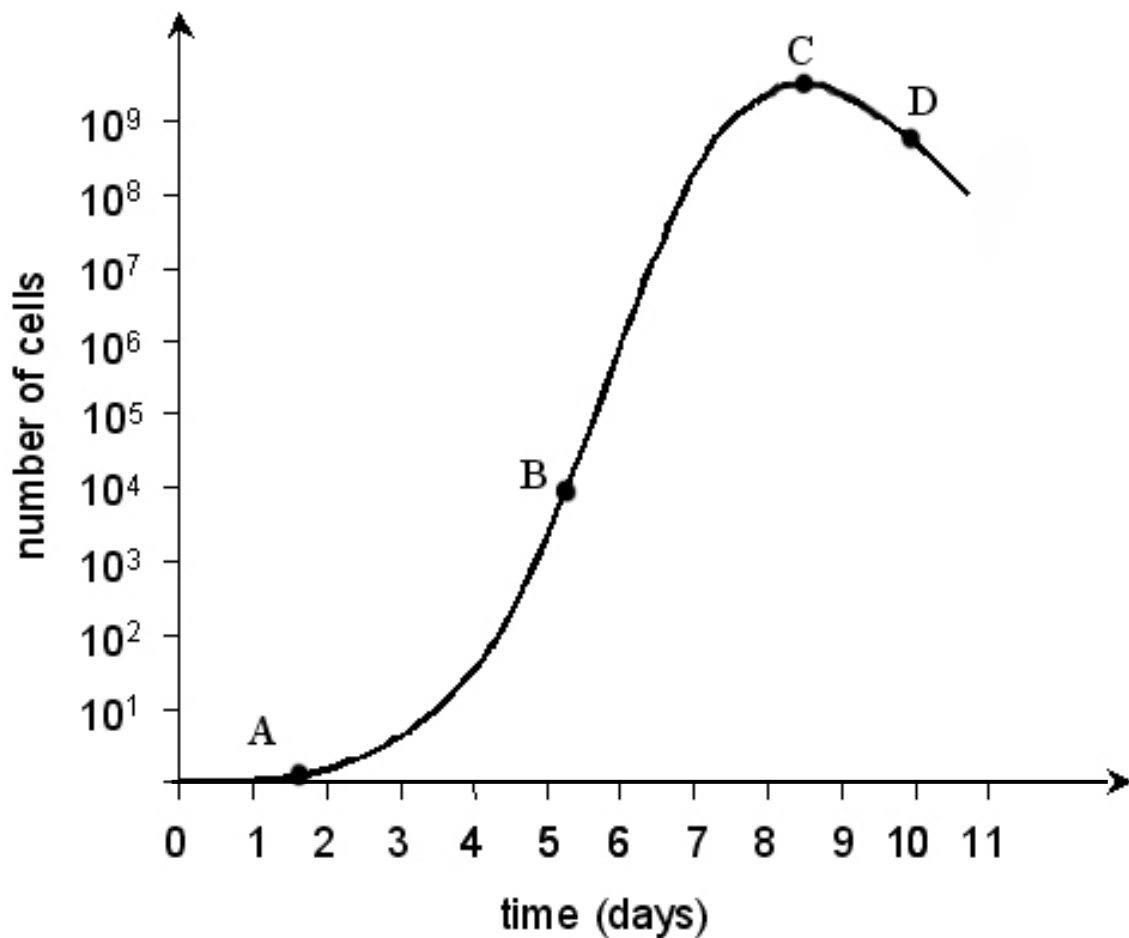
(0.5 for each correct answer) ; more than 2 no marks

21) Salt can be produced from seawater by evaporation. Suppose seawater consists of 60% mass of salt materials. The density of seawater is 1.2 kilograms/liter. Calculate the mass of salt produced if 100 liters seawater is completely evaporated. (**Score 2**)

Answer: $60\% \times 100 \text{ liter} \times 1.2 \text{ kg/liter} = 72 \text{ kg}$

- formula is correct but without unit: full mark
- only 72 : 1.0
- only 72 kg: 1.5
- only formula but wrong answer: 1.0

22) The following graph shows the number of population of *Eschericia coli*.



Explain the growth pattern of *Escherichia coli* population at specified points below.

a) point A.....(score 1)

answer : growth preparation stage/ lag / start growing

b) point B (score 1)

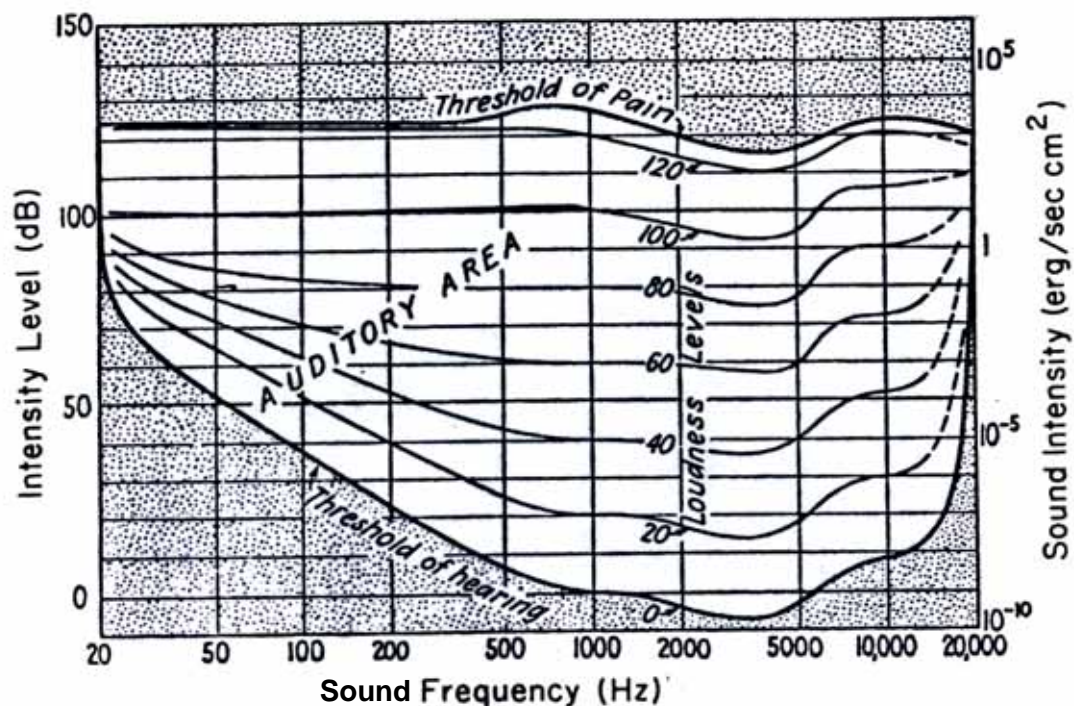
**answer: high multiplication stage / highest or fastest growth rate (similar meaning)
rapid growth, etc.**

c) point C (score 1)

answer : no increase in population / max population / stationary rate / almost constant / no growth / stagnant growth

d) point D(score 1)

answer : decreasing growth stage



23) The figure above describes auditory area for normal human in intensity level as a function of frequency. Sound intensity is defined as the acoustic power per unit area.

Based on the figure, answer the questions below.

a) Human ears give responses for the frequency range between and Hz **(Score 1)**

Answer: 20 and 20000 Hz

b) Can we hear the sound having the intensity level of 40 dB at frequency of 50 Hz? **(Score 1)**

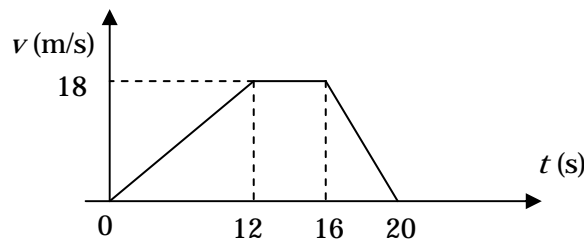
Answer: No.

c) What is the approximate maximum and minimum intensity level for the frequency of 1000 Hz that can be heard by human ears? **(Score 2)**

Answer: Look at the graph, maximum around 130 dB and minimum 0 dB. 1 for each correct answer.

24) A car starts from rest on a straight level road. It has the same acceleration of 1.5 m/s^2 for 12 seconds, then the same speed for 4 seconds. An unchanged braking force is then applied to bring it to rest in a further 4 seconds. Draw a speed-time graph for the motion of the car. **(Score 3)**

ANSWER:



Note:

1 for each part

- Without axis title : 0.5 reduced
- Prefect except no units: 0.5 reduced
- axis only: 1.5 reduced

25) The color of clouds that do not cause rain is usually white whereas the color of clouds that cause rain looks dark. Explain why **(Score 1)**

Answer: Because the white cloud only contains the water vapor (gas phase) whereas dark cloud contains raindrop (liquid phase).

or

White cloud less dense than dark cloud

White cloud more transparent than dark cloud

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