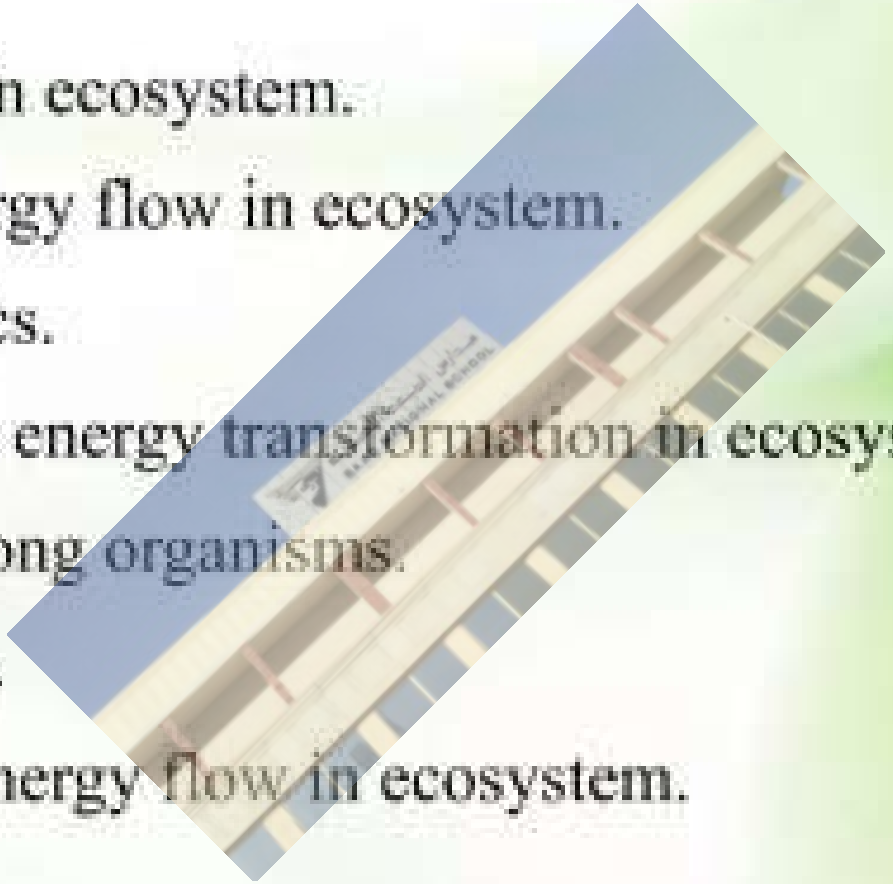
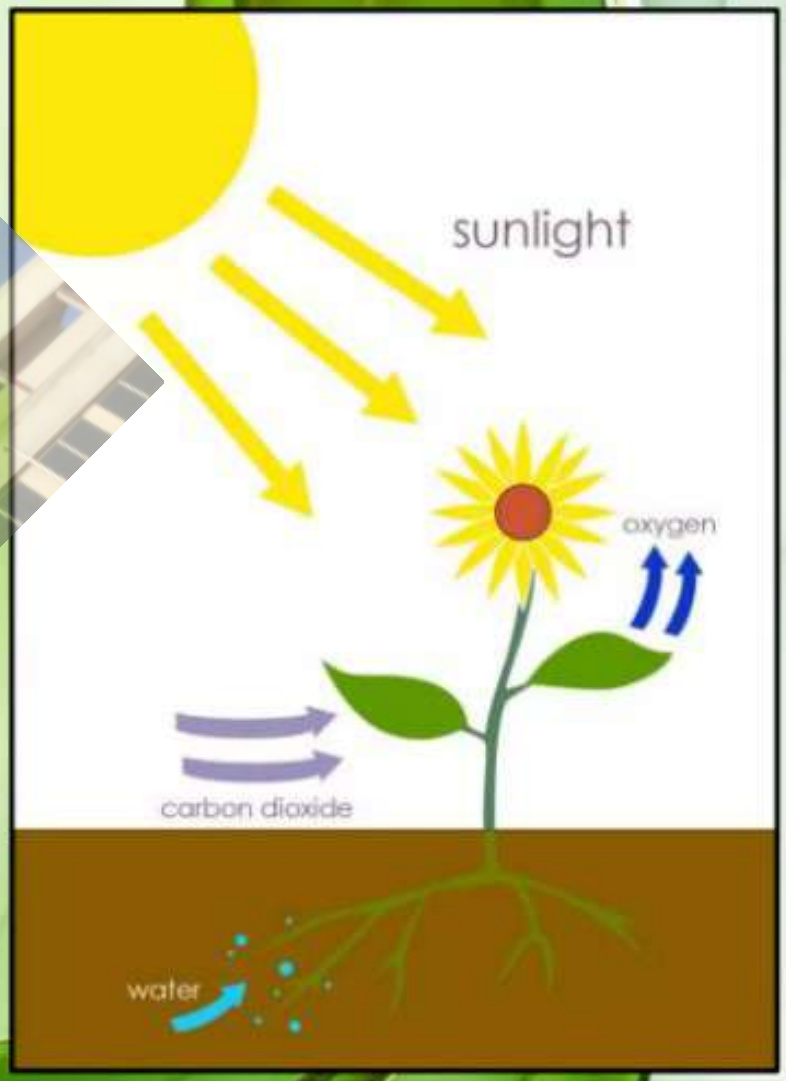
CONTENT

- Concept of energy in ecosystem.
- Components of energy flow in ecosystem.
- Ecological energetics.
- Laws governing the energy transformation in ecosystem.
- Interconnection among organisms.
- The ten percent law.
- Representation of energy flow in ecosystem.
- Conclusion



CONCEPT OF ENERGY IN ECOSYSTEM

- Energy is the capacity to do work.
- Biological activities require consumption of energy which ultimately comes from sun.
- Except for the deep-sea hydrothermal ecosystem, sun is only the source of energy for all ecosystem on Earth.
- Of the total incident solar radiation less than 60% of it is **photosynthetically active radiation (PAR).**
- Solar energy of sun is transformed into chemical energy(Adenosine triphosphate) by the process of photosynthesis, then it is stored in plant tissues and then transformed into mechanical and heat form of energy during metabolic activities.



Components of the energy flow in Ecosystem

- Sun – The energy used for all plant life processes is derived from solar radiations and all animals are further dependent on plants. About 34% of the sunlight reaching the Earth's atmosphere is reflected back (by clouds and dust), 10% is held by ozone layer, water vapour and other atmospheric gases. The rest 56% reaches the earth's surface and out of that only 2 to 10% is used by plants and the remaining is absorbed as heat by water or ground.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- Producers – The green plants in the ecosystem-terminology are called producers. In a terrestria ecosystem major producers are herbaceous and woody plants. Likewise, primary producers in an aquatic ecosystem are various species like phytoplankton, algae and higher plants.


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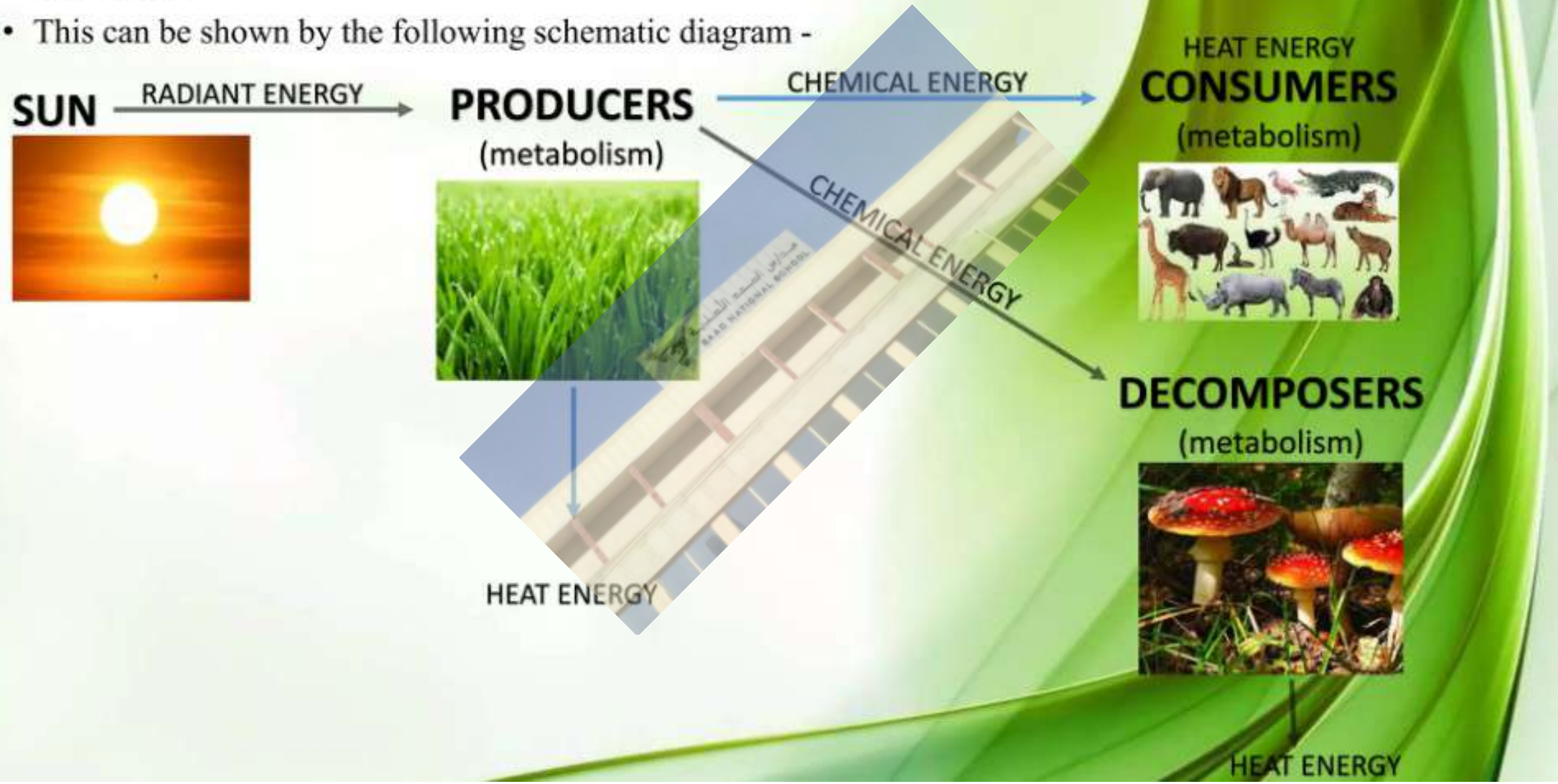
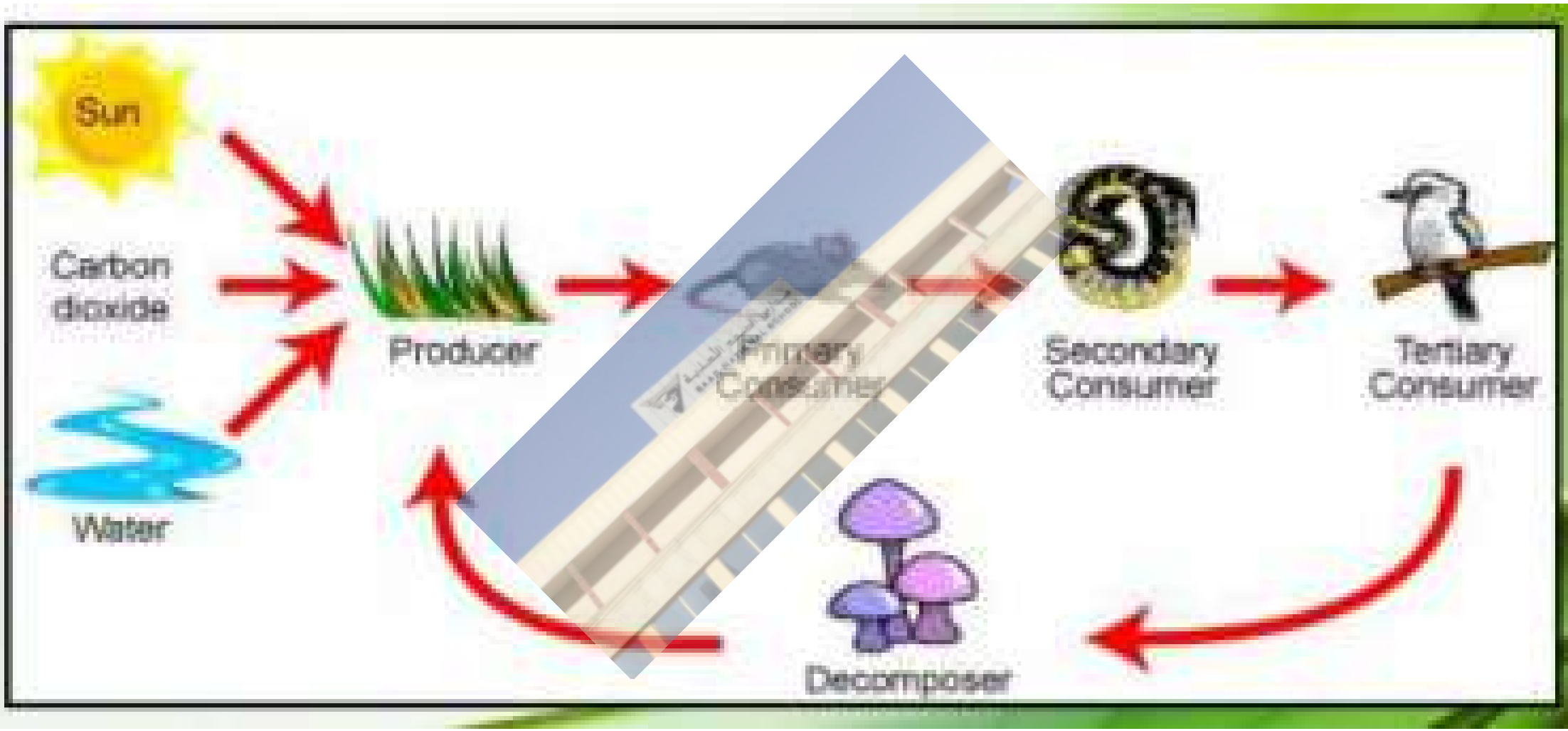
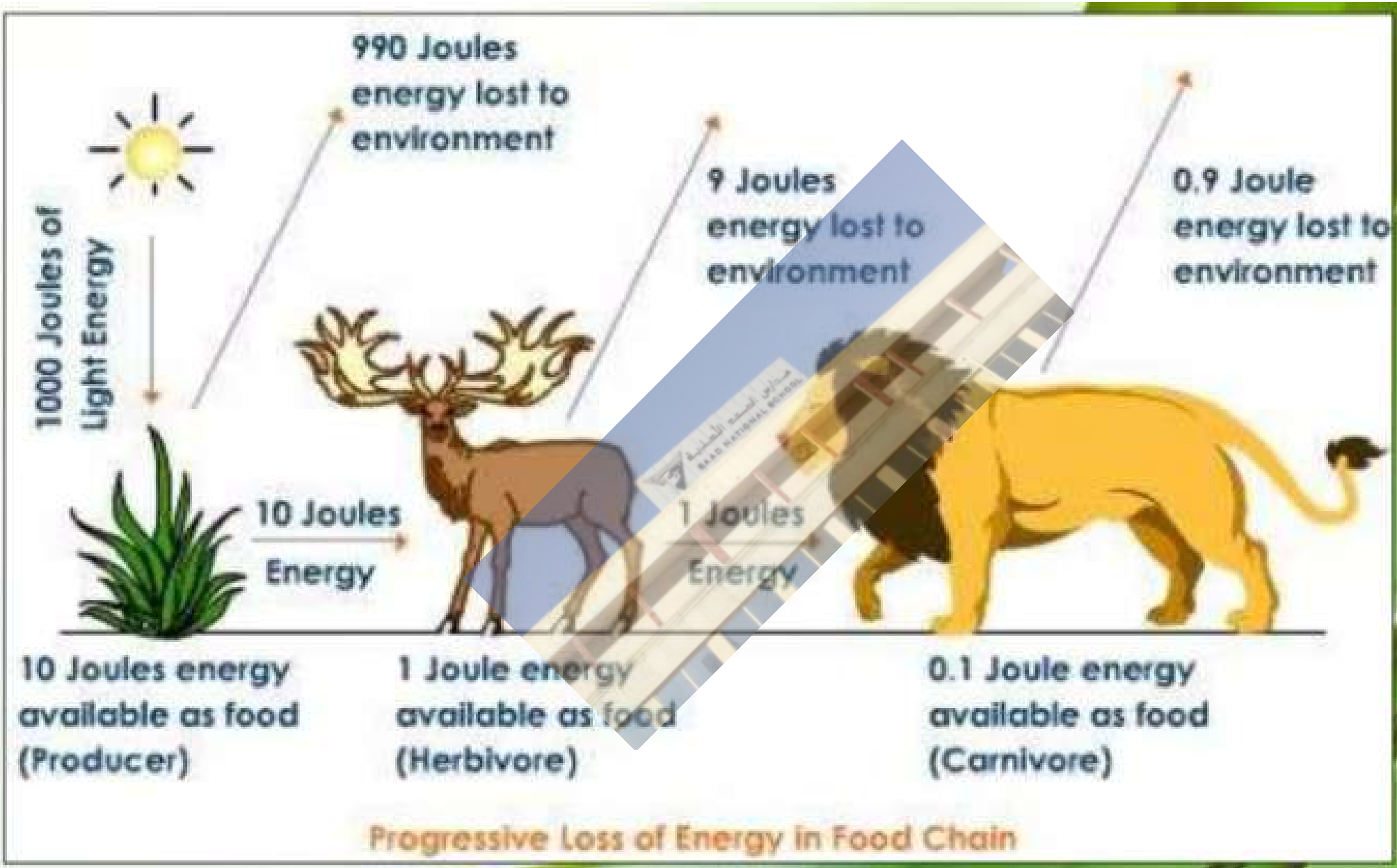
- Consumers – All animals depend on plants (directly or indirectly) for their food needs. Hence, they are called consumers and also heterotrophs.

- Decomposers – The heterotrophic organisms, mainly fungi and bacteria, which meet their energy and nutrient requirements by degrading dead organic matter or detritus are called decomposers. They are also known as **saprotrophs**.

- Plants capture only 2 to 10 % of the PAR and this small amount of energy sustains the entire living world!
- So, it is very important to know how solar energy captured by plant flows through different organisms of an ecosystem.
- This can be shown by the following schematic diagram -




Sun
Carbon dioxide
Water
Producer
Primary Consumer
Secondary Consumer
Tertiary Consumer
Decomposer



Progressive Loss of Energy in Food Chain

Worksheets

energy follow in ecosystems worksheet

Total questions: 50

Worksheet time: 1hrs 28mins

Instructor name: Dr. Ezz Turky

Name

Class

Date

1. What is a biotic element

a) Non-Living thing that produces it's own energy

b) Living thing that shapes an ecosystem

c) Living thing that produces it's own energy

d) Non-Living thing that shapes an ecosystem

2. What is a producer

a) Living thing that produces its own energy

b) Non-Living thing that shapes an ecosystem

c) Non-Living thing that produces its own energy

d) Living thing that shapes an ecosystem

3. What is the most common example of a producer?

a) Pizza

b) Plants

c) Animals

d) Bacteria

4. What is a consumer?

a) Living thing that breaks down chemicals from producers and consumers

b) Living thing that consumes energy produced by a producer

c) Someone who shops at a store

d) Non-Living thing that consumes energy produced by a producer

5. What is a decomposer?

a) A green box

b) Living thing that consumes energy produced by a producer

c) Living thing that breaks down chemicals from producers and consumers

6. What is an abiotic element?

a) A non-living thing.
b) Living thing
c) A consumer

7. What is a common example of a decomposer?

a) Fungi
b) Animals
c) Bacteria
d) Plants

8. What are some examples of biotic elements

a) Sunlight
b) Producers
c) Water
d) Decomposers
e) Consumers

9. What does an ecosystem include?

a) Hopefully pizza.
b) Only living things
c) Just animals
d) All living and non-living things in one area?

10. An ecosystem that is biodiverse would have...

a) A huge variety in plant and animal species
b) No biotic or abiotic elements at all
c) Many different toppings on a pizza.
d) Little variety in different types of plants and animals

11. What is a biotic element

a) Living thing that produces it's own energy
b) Non-Living thing that produces it's own energy
c) Living thing that shapes an ecosystem
d) Non-Living thing that shapes an ecosystem

12. What is a producer

a) Non-Living thing that shapes an ecosystem
b) Living thing that produces its own energy
c) Non-Living thing that produces its own energy
d) Living thing that shapes an ecosystem

13. What is the most common example of a producer?

a) Plants
b) Bacteria
c) Animals
d) Pizza

14. What is a consumer?

a) Living thing that consumes energy produced by a producer
b) Living thing that breaks down chemicals from producers and consumers
c) Non-Living thing that consumes energy produced by a producer
d) Someone who shops at a store

15. What is a decomposer?

a) A green box
b) Living thing that consumes energy produced by a producer
c) Living thing that breaks down chemicals from producers and consumers

16. What is an abiotic element?

a) A non-living thing.
b) A consumer
c) Living thing

17. What is a common example of a decomposer?

a) Animals
b) Bacteria
c) Plants
d) Fungi

18. What are some examples of biotic elements

a) Producers
b) Decomposers
c) Consumers
d) Sunlight
e) Water

19. What does an ecosystem include?

a) All living and non-living things in one area?
b) Only living things
c) Just animals
d) Hopefully pizza.

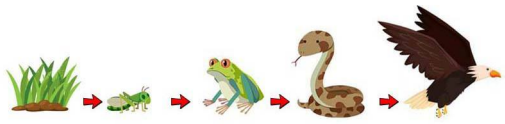
20. An ecosystem that is biodiverse would have...

a) A huge variety in plant and animal species

b) Little variety in different types of plants and animals

c) Many different toppings on a pizza.

d) No biotic or abiotic elements at all

21. 

Identify the producer in the image above.

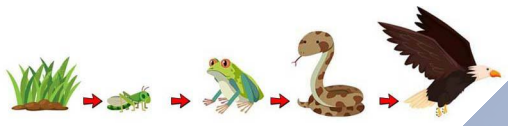
a) Snake

b) Frog

c) Grass

d) Eagle

e) Grasshopper

22. 

How many consumers are in the image above?

a) 3

b) 1

c) 4

d) 2

23. 

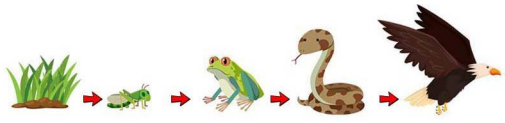
What level consumer is the snake?

a) Quaternary

b) Secondary

c) Tertiary

d) Primary

24. 

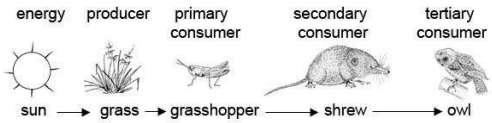
Which description matches the bald eagle?

a) Apex predator

b) Secondary consumer

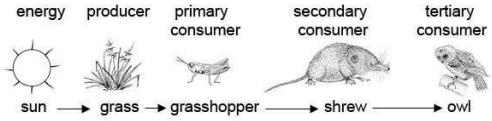
c) Autotroph

d) Herbivore

25. 

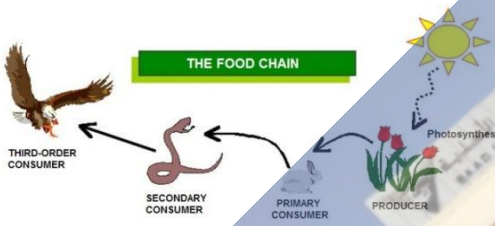
Identify the organism that receives the most energy.

a) Grass
b) Shrew
c) Owl
d) Grasshopper

26. 

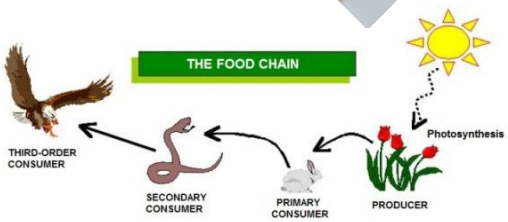
Which organism gets the least amount of energy?

a) Grass
b) Owl
c) Grasshopper
d) Shrew

27. 

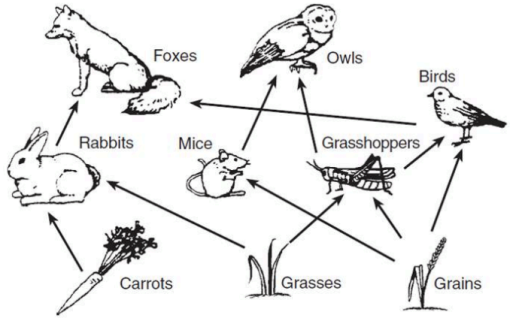
What might happen to the snake population if the eagles were to die out?

a) The snake population would decrease
b) The snake population would increase
c) The snake population would remain the same

28. 

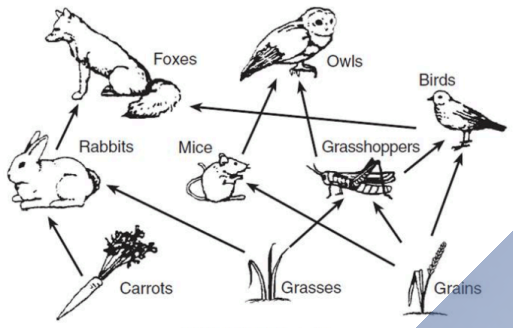
What might happen to the rabbit population if the snake population increases?

a) The rabbit population would increase
b) The rabbit population would stay the same
c) The rabbit population would decrease

29. 

How many producers are in the food web above?

a) 9
b) 3
c) 5
d) 1

30. 

How many organisms above could be absorbed by a decomposer?

a) Only the secondary consumers
b) All 9 organisms
c) Only the producers
d) Only the consumers

31. Earthworms break down dead and decaying living things then return that matter to the soil where it is digested by

a) fungi and bacteria
b) birds
c) animals
d) insects

32. Where do consumers directly get matter and energy to live and grow?

a) by eating producers and other consumers
b) they make their own food
c) from the sun
d) they eat waste material and dead organisms

33. What is a food web?

a) The exchange of nutrients between producers and consumers
b) A model for the transfer of matter and energy in an ecosystem
c) The decomposition and recycling of matter
d) A trap created by a plant and animal to capture food

34. Which member of an ecosystem is responsible for capturing energy from the sun and turning it into food?

a) consumers
b) producers
c) decomposers
d) herbivores

35. Which level of an energy pyramid represents the largest amount of organisms?

a) 3rd level consumers
b) producers
c) primary consumers
d) secondary consumers

36. Which organisms on the energy pyramid will have the most energy available to them?

a) carnivore
b) herbivore
c) producer
d) each organism will have the same amount of energy

37. In an energy pyramid, which way does energy transfer?

a) from the top to the bottom of the pyramid
b) from the bottom to the top of the pyramid

38. What is the difference between a food chain and a food web?

a) The food chain is only one link within the food web
b) Food chains begin with a herbivore while food webs begin with a producer
c) Food chains begin with a producer while food webs begin with a herbivore
d) The food web is only one part of the food chain

39. This type of organism occupies the 3rd level of a food chain

a) herbivore
b) consumer
c) carnivore
d) producer

40. What are decomposers?

a) organisms that feed on plants
b) organisms that feed on dead animals parts
c) organisms that break down dead or decaying animals

41. Earthworms break down dead and decaying living things then return that matter to the soil where it is digested by

a) birds
b) animals
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42. Where do consumers directly get matter and energy to live and grow?

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c) A model for the transfer of matter and energy in an ecosystem
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44. Which member of an ecosystem is responsible for capturing energy from the sun and turning it into food?

a) herbivores
b) producers
c) consumers
d) decomposers

45. Which level of an energy pyramid represents the largest amount of organisms?

a) primary consumers
b) 3rd level consumers
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d) each organism will have the same amount of energy

47. In an energy pyramid, which way does energy transfer?

a) from the bottom to the top of the pyramid
b) from the top to the bottom of the pyramid

48. What is the difference between a food chain and a food web?

a) The food chain is only one link within the food web
b) The food web is only one part of the food chain
c) Food chains begin with a herbivore while food webs begin with a producer
d) Food chains begin with a producer while food webs begin with a herbivore

49. This type of organism occupies the 3rd level of a food chain

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b) producer
c) herbivore
d) consumer

50. What are decomposers?

a) organisms that feed on dead animals parts
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