

Energy and Respiration

Question Paper

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and Respiration
Sub Topic	
Booklet	Multiple Choice
Paper Type	Question Paper

Time Allowed : 24 minutes

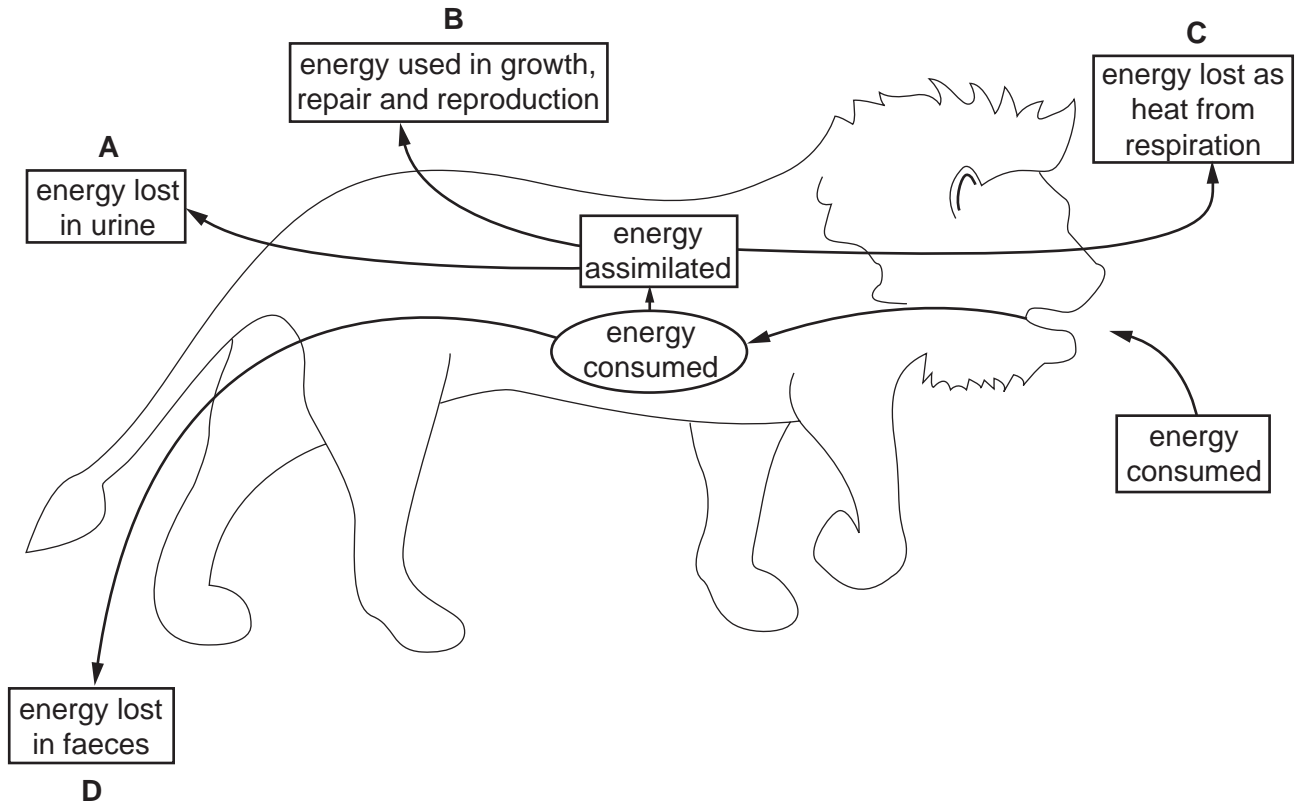
Score : / 20

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

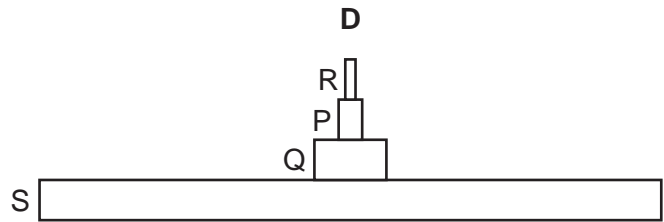
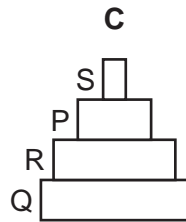
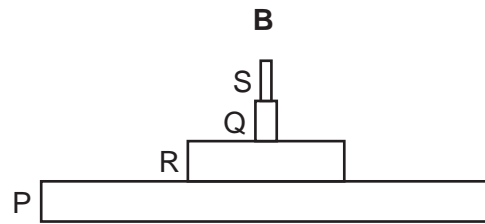
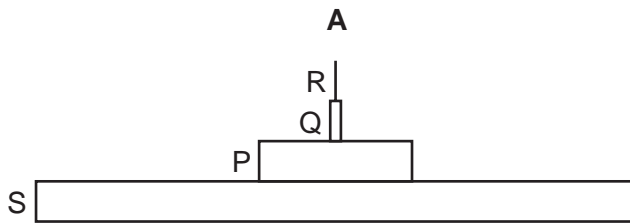
1 Of the prey consumed by the lion, into which box does the largest amount of energy go?



2 The table shows the results of a field study of four species in a food chain in an area of woodland.

species	number of individuals	biomass of one individual / arbitrary units	energy value per unit mass / arbitrary units
P	10000	0.100	1.0
Q	5	10.000	2.0
R	500	0.002	1.8
S	3	300 000.000	0.5

Which is the correct pyramid of energy from these data?



3 In a food chain, which link involves the **least** efficient energy transfer?

- A** Bull fishes feed on small crustacea.
- B** Herons feed on bull fishes.
- C** Mangrove plants trap sunlight during photosynthesis.
- D** Small crustacea feed on dead mangrove leaves.

4 Which uses energy to produce its own food supply from inorganic compounds?

- A autotroph
- B consumer
- C heterotroph
- D saprotroph

5 The diagram shows a tropical ocean food chain with 10 % efficiency of energy transfer between trophic levels.

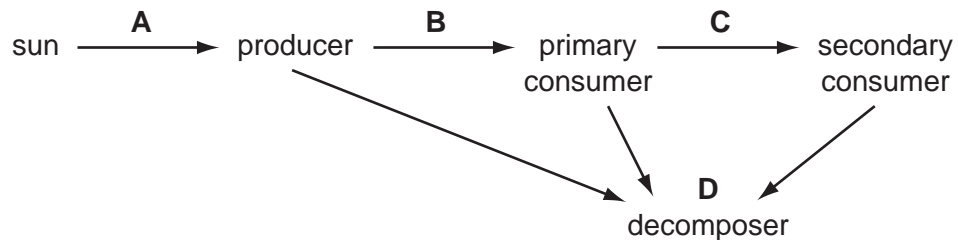


Net primary production of phytoplankton is $1300 \text{ g m}^{-3} \text{ yr}^{-1}$.

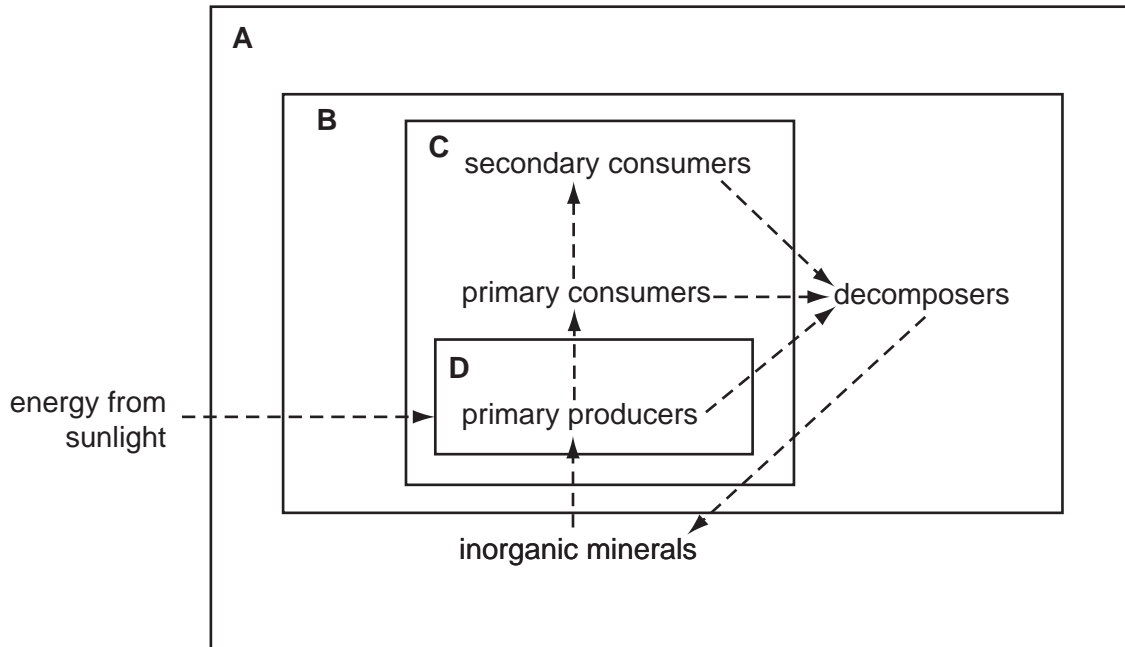
What is the net primary production per year for the carnivorous zooplankton and the tuna?

	net primary production of carnivorous zooplankton / $\text{g m}^{-3} \text{ yr}^{-1}$	net primary production of tuna / $\text{g m}^{-3} \text{ yr}^{-1}$
A	1.3×10^1	1.3×10^{-1}
B	1.3×10^0	1.3×10^{-2}
C	1.3×10^{-1}	1.3×10^{-2}
D	1.3×10^{-2}	1.3×10^{-4}

6 At which stage of a food chain of tropical grassland is the energy transfer least efficient?



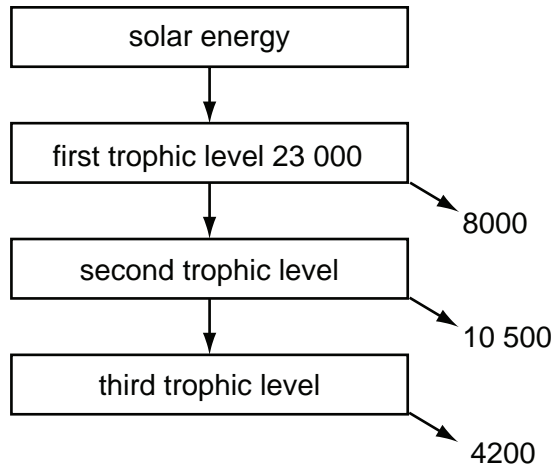
- 7 Which box contains only the parts of an ecosystem which are classed as a food web?



- 8 What is the main limiting factor on the amount of work that muscles can perform during aerobic exercise?
- A the percentage saturation of haemoglobin with oxygen in the lungs
 - B the speed of dissociation of oxygen from haemoglobin in the muscles
 - C the volume of blood flow through the lungs
 - D the volume of blood flow through the muscles
- 9 Why is aerobic respiration of a molecule of glucose considered more efficient than anaerobic respiration?
- A More ATP is produced.
 - B More carbon dioxide is produced.
 - C More water is produced.
 - D More oxygen is used.

- 10 In a freshwater food chain, which involves the least efficient energy transfer?
- A** Large fishes feed on the small fishes.
 - B** Small fishes feed on the water fleas.
 - C** Unicellular algae trap sunlight.
 - D** Water fleas feed on the unicellular algae.
- 11 Which stage of energy transfer has the lowest efficiency?
- A** sunlight → producer
 - B** producer → primary consumer
 - C** primary consumer → secondary consumer
 - D** secondary consumer → tertiary consumer
- 12 In a food chain, which link involves the least efficient energy transfer?
- A** Corn traps sunlight during photosynthesis.
 - B** Mice eat the grain from corn.
 - C** Mongooses feed on snakes.
 - D** Snakes feed on mice.
- 13 An insect consumes 180 J of plant material. Of this, 95 J of energy is passed out in the insect's faeces and 58 J is used for respiration.
- Which percentage of the energy, in the original plant material taken in by the insect, is converted into biomass?
- A** 10%
 - B** 15%
 - C** 32%
 - D** 47%

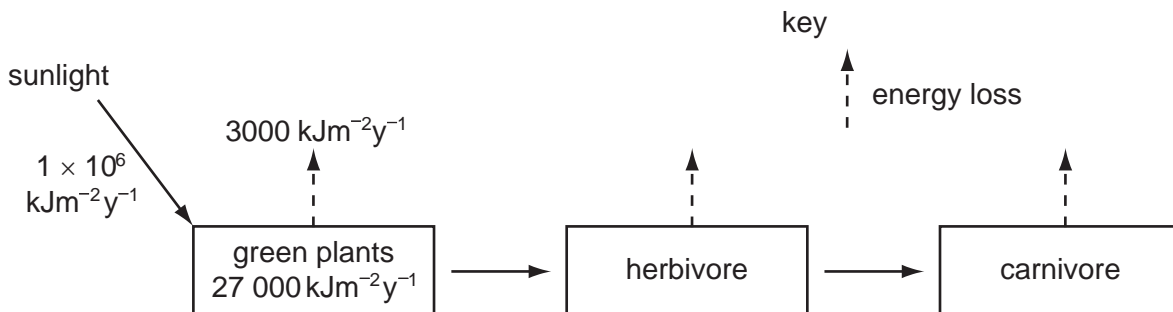
- 14 The diagram shows some values for gross primary productivity (GPP) and energy flow in an ecosystem, measured in $\text{kJ m}^{-2} \text{y}^{-1}$.



What percentage of GPP in the producers can be transferred to the tertiary consumers?

- A** 1.3% **B** 6.7% **C** 18.3% **D** 19.6%

- 15 The diagram shows the flow of energy through a food chain.



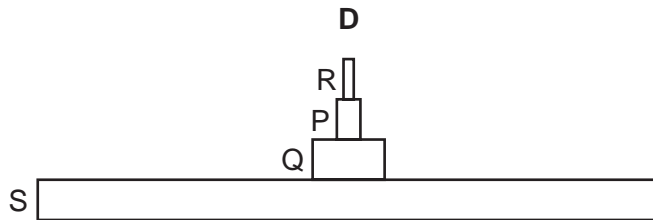
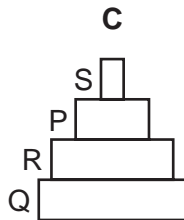
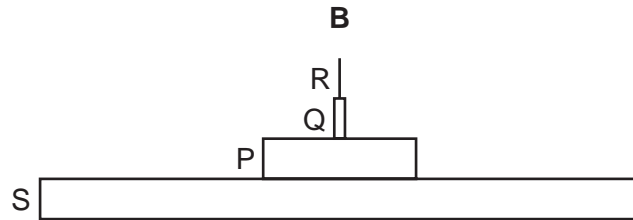
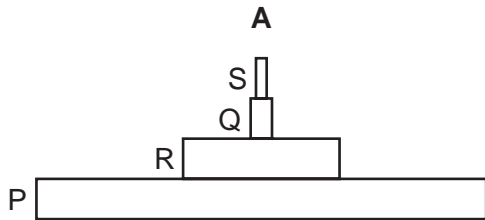
What percentage of the energy is used by the green plants for photosynthesis?

- A** 0.03% **B** 0.30% **C** 2.70% **D** 3.00%

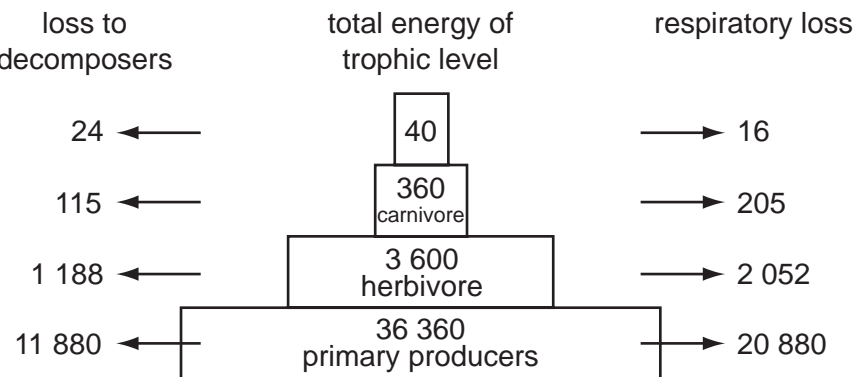
16 The table shows the results of a field study of four species in a food chain in an area of woodland.

species	number of individuals	biomass of one individual / arbitrary units	energy value per unit mass / arbitrary units
P	10 000	0.100	1.0
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Which is the correct pyramid of energy from these data?



- 17 The diagram represents loss of energy from a food chain to decomposers, transfer of energy to the next trophic level and energy loss through respiration. All figures are in $\text{kJ m}^{-2}\text{y}^{-1}$.



What is illustrated by this diagram?

- A Carnivores lose more energy than herbivores.
 - B Energy loss to decomposers is higher than respiratory loss.
 - C Energy transfer between trophic levels is about 10 %.
 - D The energy of the final trophic level is not used.
- 18 A square metre of grassland receives about 1047000 kJ of solar light energy each year.
- The table shows what happens to this energy.

used in evaporation of water	523500kJ
transmitted to the ground	335000kJ
reflected by the leaves	165000kJ
used for growth	21 500kJ
used for other life processes	1500kJ
respiratory heat losses	500kJ

How much energy is used by the grass in photosynthesis?

- A 2000kJ
- B 19500kJ
- C 21500kJ
- D 23500kJ

- 19** The rate of absorption of light energy measured in a field is $6300 \text{ kJ m}^{-2} \text{ day}^{-1}$. Only 1% of this energy is converted into new plant production. 10% of the net production at one trophic level is transferred to the next trophic level.

How much energy is entering the primary consumers?

- A** $0.063 \text{ kJ m}^{-2} \text{ day}^{-1}$
- B** $0.63 \text{ kJ m}^{-2} \text{ day}^{-1}$
- C** $6.3 \text{ kJ m}^{-2} \text{ day}^{-1}$
- D** $63 \text{ kJ m}^{-2} \text{ day}^{-1}$