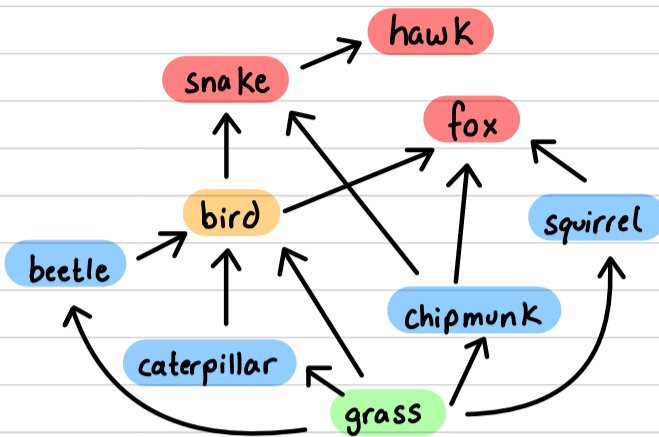


## Markscheme

- ① a) i) Decomposers.  
ii) Every organism would be connected to them via death/waste.

b) There are no arrows pointing to them - they are the start/base of all chains and webs

- c)  producer  
 herbivore  
 carnivore  
 omnivore  
} consumers



d) 9 food chains:

grass → squirrel → fox  
 grass → chipmunk → fox  
 grass → bird → fox  
 grass → caterpillar → bird → fox  
 grass → beetle → bird → fox

grass → bird → snake → fox  
 grass → chipmunk → snake → hawk  
 grass → beetle → bird → snake → hawk  
 grass → caterpillar → bird → snake → hawk

e) grass → bird → snake → fox  
 2° consumer

grass → beetle → bird → fox  
 3° consumer

grass → squirrel → fox  
 3° consumer

grass → bird → snake → fox  
 4° consumer

grass → chipmunk → snake → hawk  
 4° consumer

grass → beetle → bird → snake → hawk  
 5° consumer

② a) many possible answers. Notice that food chains in aquatic systems tend to be longer.

b) many possible answers.

③ phytoplankton → scallops → stingrays → ~~shark~~  
↑↑                      ↓↓                      ↑↑

Normally sharks prey upon stingrays and control their numbers. Without sharks, stingray population increases and they consume more scallops, reducing their numbers

\* this is a common outcome if apex predators are reduced/eliminated and how ecosystems can collapse

④ Herbivores consume producers directly, thus they receive more energy as less has been lost - allows for many herbivores to thrive. However, carnivores eat other consumers which have less energy available, limiting how many successful predators an ecosystem can support

⑤ Meat/muscle is much easier to digest than vegetation due to its high protein and lean composition. Vegetation is very fibrous so more difficult to break down physically and chemically.

⑥ a) grass → grasshopper → dragonfly → quoll

b) 
↙
↘
 fox  
 the insect population (grasshoppers and dragonflies) will decline due to increased predation from the fox. The fox, as it has a wider diet than the quoll will out-compete it, causing quoll numbers to decrease.

⑦ % energy transferred =  $\frac{\text{energy transferred to 1° consumer}}{\text{net production of plants}} \times 100$   
 =  $\frac{70 \text{ KJ m}^{-2} \text{ y}^{-1}}{800 \text{ KJ m}^{-2} \text{ y}^{-1}}$   
 = 8.75%