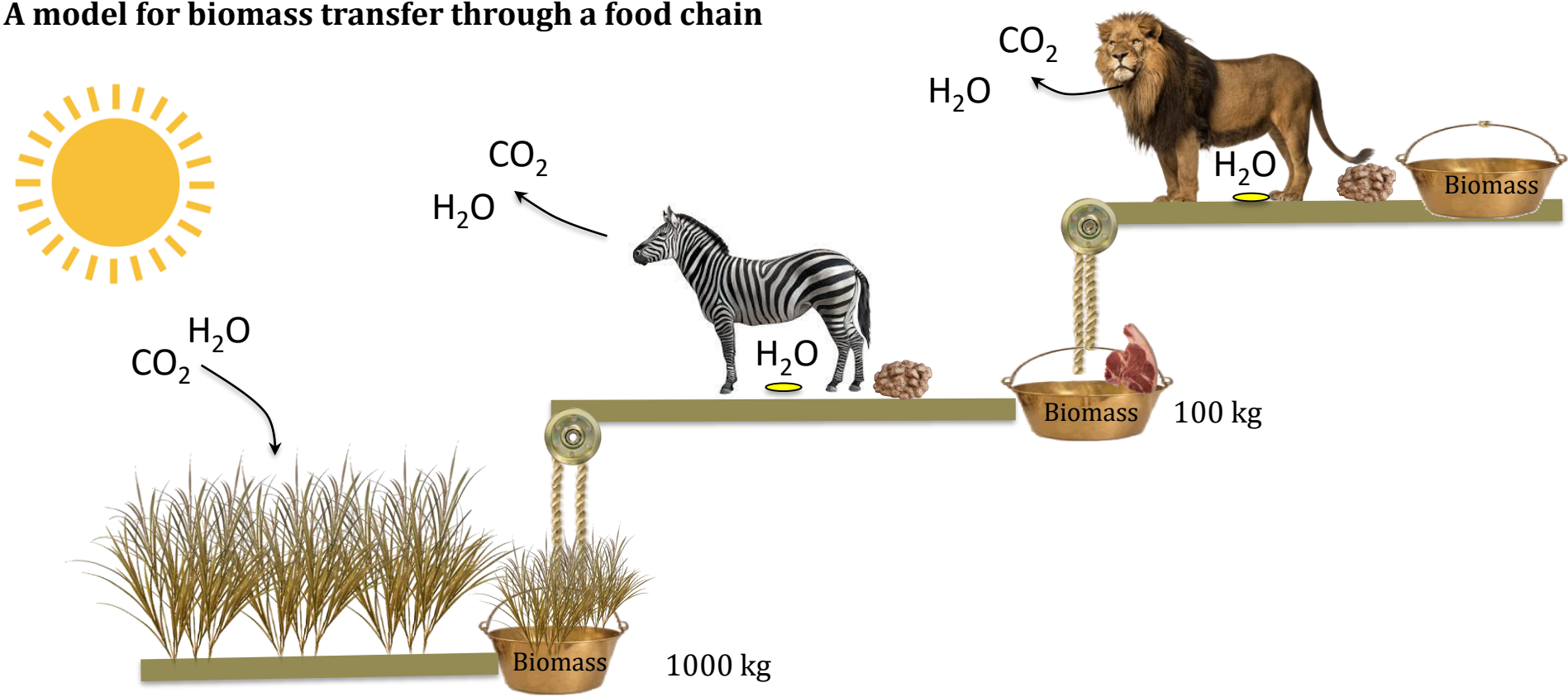
Topic	Biomass transfer in food chains.	**Level**	GCSE (or any course for students aged 11-16)
Outcomes	1. To explain the role of respiration, photosynthesis and excretion in the loss of biomass in food chains. 2. Explain how the loss of biomass in a food chain affects the number of organisms in each trophic level.		
Information for teachers	This activity gets students to think deeply about the transfer of biomass between trophic levels. We casually say when teaching food chains that only 10 % of the biomass from each trophic level is transferred to the level above. What we should say is that only 10% of the biomass from each trophic levels is transferred into the biomass of the trophic level above; otherwise we risk introducing a misconception. To understand this model properly, students need to know about respiration, food chains, biomass and photosynthesis. This activity is best used once students feel they understand biomass transfer as it is a good check to see if they do!		

A model for biomass transfer through a food chain



Biomass is transferred from one trophic (feeding) level to another when one organism eats another organism. However, not all of the ingested biomass forms new biomass in the consumer. Some biomass is egested as faeces, or lost as carbon dioxide and water through respiration, or as water and urea in urine. grass → zebra → lion

Use the model to answer the following questions

1. How many trophic levels are shown in the model?
2. In which trophic level is food first made? Name the process by which food is made and state the names of the reactants.
3. Name the secondary consumer in this model.
4. How is biomass transfer represented in this model?
5. Which trophic level in this model would have the greatest biomass? Assume all organisms of that species in the habitat are included.
6. Which trophic level would have the smallest biomass? Assume all organisms of that species in the habitat are included.
7. For every 1000 kg of grass that gets eaten, what mass becomes biomass (meat) in the zebra?
8. In the diagram, what mass of urine, water and carbon dioxide and faeces would have been excreted? Justify your answer
9. Assuming that only 10% of biomass gets incorporated into the biomass of the next trophic level, how much lion biomass would be produced from 100 kg of zebra?
10. Use this model to explain why there are fewer lions that zebras in the wild.
11. There is no tertiary consumer in this model. What would happen to the biomass in the lion?

Use the model to answer the following questions

1. How many trophic levels are shown in the model? 3
2. In which trophic level is food first made? Name the process by which food is made and state the names of the reactants. Producers. Photosynthesis. Carbon dioxide and water.
3. Name the secondary consumer in this model. Lion.
4. How is biomass transfer represented in this model? Through buckets containing food/biomass with ropes to pull the food up to the next trophic level.
5. Which trophic level in this model would have the greatest biomass? Assume all organisms of that species in the habitat are included. The producers.
6. Which trophic level would have the smallest biomass? Assume all organisms of that species in the habitat are included. The secondary consumers.
7. For every 1000 kg of grass that gets eaten, what mass becomes biomass (meat) in the zebra? 100 kg
8. In the diagram, what mass of urine, water, carbon dioxide and faeces would have been excreted? Justify your answer. 900 kg as the total biomass ingested was 1000 kg. 900 + 100 = 1000 kg.
9. Assuming that only 10% of biomass gets incorporated into the biomass of the next trophic level, how much lion biomass would be produced from 100 kg of zebra? 10 kg.
10. Use this model to explain why there are fewer lions that zebras in the wild. Biomass is lost at each trophic level by excretion of urine and faeces and release of waste gases from respiration. This means there is less biomass (food) available for lions than zebras because lions are higher up the food chain.
11. There is no tertiary consumer in this model. What would happen to the biomass in the lion? Used by decomposers or scavengers.