

## How Plants Feed

### Question 3 Page 1

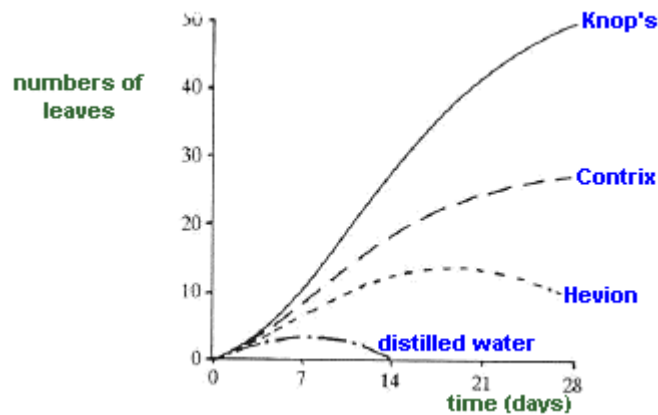
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Duckweed is a simple plant which grows in ponds. Its leaves float on the surface of the water and its roots hang down in the water. The minerals that the duckweed needs for growth are absorbed from the water that surrounds its roots.



The following experiment was carried out on duckweed growing in two different mineral waters (Contrix and Hevion), distilled water and Knop's solution. (Knop's solution is a solution of minerals especially prepared for growing plants. It has been used since 1865.)

The numbers of leaves which the duckweed plants grew were counted regularly over four weeks. The results are shown as a graph:



1. In which solution did the duckweed grow the most leaves?	
2. How many leaves are there in each of the solutions after 14 days?	Knop's =
	Contrix =
	Hevion =
	Distilled water =

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3. Describe in your own words how the duckweed grows in Hevion. (Hint: Explain the shape of the graph)

On each bottle of mineral water is a label which gives the concentrations of the different minerals in cubic decimetres of water. The table below shows these concentrations and also the minerals found in Knop's solution and distilled water.

Minerals	Concentration of minerals (mg/dm <sup>3</sup> )			
	Conrix	Hevion	Knop's	Distilled water
Nitrate	4	4	1000	0
Potassium	3	1	400	0
Phosphate	0	0	300	0
Calcium	467	78	800	0
Sulphate	1192	10	200	0
Magnesium	84	24	200	0

Note: Nitrates are mineral salts which contain nitrogen, sulphates contain sulphur and phosphates contain phosphorus.

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4. (a) Which mineral is present in Knop's solution but is missing from the other solutions? (b) Perhaps it is the absence of this mineral which is stopping the plants from growing so well in the other solutions. How could you carry out an experiment to prove this idea?	(a) =
	(b)
5. Give the name of another mineral which plants need for their growth, which is not given in the table above.	
6. Distilled water contains no minerals at all. (a) How can you explain the growth of the duckweed in distilled water during the first seven days? (b) What happens to the duckweed in the distilled water after 14 days?	(a)=
	(b) =
7. If you grew duckweed in rain water do you think that it would grow very well?	
8. Compare the minerals in Knop's solution with a bottled mineral water which you drink. Do you think that an animal, such as a human, needs the same minerals as a plant?	