1a: My project is an investigation into the germination of cress. Specifically, the question is how much water is required in order that a cress seed will germinate.

1b: The main aim of my project is to determine the exact amount of water necessary for the germination of ten cress seeds. I am really trying to achieve the minimum amount of water necessary for the germination of ten cress seeds.

1c: My interest in cress germination was stimulated by my visit to a cress farm in October 2010 with my grandparents. During this tour given by the farm owner, I was intrigued by the number of water holes and rivulets employed by the farm in the production of cress. I wondered whether it was really necessary to use so much water to produce cress.

1d. The science club teacher and the two technicians helped me to acquire the resources necessary for this project. The science teacher and a senior prefect discussed the project with me and helped me to lay the seeds properly. I needed the following items:

- Cress seeds
- Water
- A syringe
- Filter paper
- Petri dishes
- Tweezers
- Seed scoop

2a: I shall place ten water cress seeds in five different petri dishes, adding a different amount of water to each, in order to determine whether the particular quantity of water is sufficient to enable the seeds to germinate.

2b: I shall add different amounts of water, in increasing increments of 5ml, ranging from 5ml to 25ml. I shall identify the point at which the different amounts of water lead to a different result in terms of the seeds germinating. I shall then test in more detail, in increments of 1ml, between the 5ml point at which the seeds did not germinate and the 5ml point at which they did.

For example, if the seeds germinated at 15ml and above, but not at 5ml or 10ml, I intend to test the quantities of 11, 12, 13, 14 and 15ml respectively , in order to determine which is the least quantity of water necessary for seed germination. In this example, 15ml is the control quantity, in that I will have already determined that this is a sufficient amount for seed germination.

2c: The steps which I will take to complete the project are as follows:

(i) I will fit five sheets of filter paper, arranged in layers, into each petri dish.

(ii) Using a seed scoop and tweezers, I will add ten seeds to each petri dish, placing them carefully on top of the filter paper. The seed scoop is to be used to move an approximate quantity of seeds at the same time. The tweezers are to be used to ensure that the correct designated total of ten seeds is present in each petri dish.

(iii) I will fill a beaker with filtered water drawn from a special tap. I will then, using a syringe, draw the necessary quantity of water from the beaker and add it to each petri dish.

(iv) One week later, I will observe the seeds in each petri dish in order to determine whether the seeds have germinated. I would expect a seed which has germinated to have roots and leaves.

(v) I will then repeat this process, in accordance with the method set out above.

2d: The seeds are coated with a fungicide (which is a chemical sprayed on the seeds to prevent the growth of fungi) which, if touched with bare skin, can cause an allergic reaction or a rash. I therefore intend to wear gloves and use the seed scoop and tweezers in order to avoid touching the seeds with my hands.

3a: In my view, the project was successful, in that I was able to determine clear answers to the essential question of the amount of water necessary for seed germination. I did experience a particular difficulty in relation to the 3ml quantity of water, in that some but not all of the seeds germinated. However, because substantially more seeds germinated than did not, I treated this as a positive result.

3b: My results are set out in tabulated form below.

Amount of Water (ml)	**Germinated: Yes/No**	**Additional information**
1	No	Absolutely no germination or signs of germination
2	No	Small signs of germination but no germination yet
3	Yes	Some did not germinate but most did
4	Yes	None
5	Yes	None
10	Yes	One seed did not germinate
15	Yes	None
20	Yes	None
25	Yes	All cress plants grew well, and to a significantly greater height than the plants in all other cases

The overall result therefore was that 3ml of water was the minimum amount necessary to enable the water cress seeds to germinate. However, because some seeds did not germinate with this amount of water, and all the seeds germinated with the use of 4ml of water, it may be that the minimum effective amount of water is somewhere between 3 and 4ml.

4a: I have learned that it is possible to do longer-term experiments, over a significant period of time, because prior to this exercise I have only previously done experiments which can be completed within a single science class. I also realised that special care and effort is required in setting up an experiment properly.

4b: I could have measured the quantities of water in smaller increments, so as to ascertain the precise point between 3ml and 4ml of water which provided the minimum effective amount of water to ensure that the seeds would germinate.

4c: With more time, I could have tested the use of amounts of water greater than 25 ml, in order to determine whether there was a maximum amount of water that one could use before the seeds ceased to germinate. I could have tested the proposition that too much water might cause the seeds to be flooded and so fail to germinate.

5a: If a business was growing cress, it would obviously wish to use as little water as possible in order to save money. It would wish to consume the minimum amount of water necessary consistently with ensuring that the crop of cress would flourish.

5b: One important environmental issue raised is the preservation of water supplies. By identifying the minimum amount of water necessary to enable the cress to grow, one can avoid the unnecessary and wasteful use of water in the process. In addition, depending on other factors such as temperature, it may be possible to grow the cress satisfactorily in conditions where water is scarce.