



A Visit to iThemba LABS

(Work Sheet – High School Pupils)

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Questions

1. What does “LABS” stand for?
2. Is iThemba privately owned or does it belong to the people of South Africa?
3. Where does the money come from to run iThemba LABS?
4. Mention any three things that are being done at iThemba LABS.
5. Describe what happens in the control room.
6. How many cyclotrons are there?
7. Give an example of what the Van de Graaff generator is used for?
8. What energy do protons reach in the main cychotron : 300 MeV / 200 MeV / 150 MeV?
9. When are Physics experiments done at iThemba LABS?
10. Which two types of therapy are used to treat cancer and other tumours at iThemba?
11. Briefly describe the differences between these therapies.
12. Why is iThemba LABS unique in the world.
13. What kind of radioisotopes are made at iThemba?
14. Mention any two uses of these isotopes.
15. Are there other places that manufacture the same radiopharmaceuticals?
16. Are the research facilities at iThemba LABS used by anybody else?
17. Mention any two universities that participate in research projects at iThemba LABS.
18. Are there open days for the general public? If so, when are they?
19. Do the animals on site have anything to do with experiments being done?
20. Does South Africa have enough scientists?

Answers

1. "LABS" stands for "Laboratories for Accelerator Based Sciences.
2. iThemba LABS is funded by the Department of Science and Technology.
3. IThemba belongs to the people of South Africa. It is one of five facilities that are run by the National Research Foundation.
4. Radiotherapy, Research, Radioisotopes.
5. The control room is the place where the beam is controlled.
6. There are three cyclotrons, 2 injector cyclotrons and 1 separated-sector cyclotron.
7. The van de Graaff Generator is used in studies of materials – using different techniques, i.e. ion-beam analysis.
8. 200 MeV.
9. Over the weekends. During the weekdays, the beam is used for proton and neutron therapy, in the evenings and between therapy it is used to manufacture radionuclides.
10. Proton and Neutron Therapy.
11. Neutrons produce increased biological effects on larger slow-growing malignant tumours, which are resistant to conventional x-radiation.

Protons beams can be steered and focused very accurately and are most advantageous for treating well-defined lesions (benign and malignant) near critical radiosensitive structures (e.g. optic nerve, spinal cord, kidney) which can easily be protected from the radiation.
12. iThemba LABS is unique in the world because it is the only facility where both proton and neutron treatment is done.
13. Fluorine-18 and gallium-67.
14. Fluorine-18 is used for heart and brain scans; krypton-81 gas is used for lung studies.
15. No, the radiopharmaceuticals produced at iThemba LABS cannot be produced anywhere else in South Africa.
16. Yes, they are used by over 200 scientists from all over SA and the world.
17. University of Stellenbosch, University of Zululand.
18. Yes. Open days are on the last Wednesday of every month at 2pm.
19. No, the animals are looked after by the staff environmental club and have nothing whatsoever to do with any experiments.
20. No