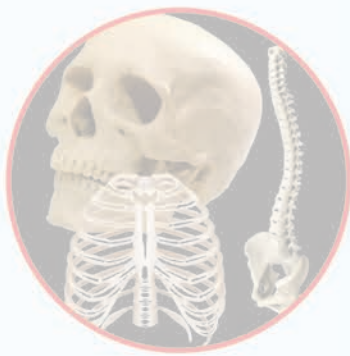




Explore the World

SCIENCE

Class - 5



Scribbling page

Introduction

Millat Foundation for Educational Research and Development (MFERD) is an organization conceived with the vision of providing a common platform for the networking, co-ordination, collaboration and co-operation among Muslim educational institutions, thereby complementing the efforts of individuals and organizations in achieving excellence in education within the boundaries of Islamic Shariah. MFERD aims to address the various challenges faced by these institutions and find solutions through research and development.

One of its major program is to design a value based curriculum for school to nurture and culture our future generations with excellence.

Curriculum is the sum total of all learning experience a child undergoes including academics, activities, learning environment, assessment and interaction with teachers, students, parents all together from the moment a child walks in the school until he/she steps out.

After years of research in child psychology, education from Islamic perspective, and review of various curricula, a value based curriculum has been designed in accordance with National Curriculum Framework and International standards to focus on all round development of the children so that they identify their identity, realize the need and become leaders of tomorrow.

This curriculum is comprised of:

- **Objectives** - as per Islam psychology, education and stakeholders
- **Syllabus** - as per age group and government standards
- **Methodology** - child centric and appropriate to the subject and objectives
- **Resources** - including teacher training, teaching aids manuals and more
- **Assessment** - formative, summative, self, co-scholastic, behavioral and long term
- **Activities** - curricular, co-curricular and extra curricular with guidelines for events
- **Scheduling** - calendar, day-year plans, workload, period split and competitions
- **Observation** - feedback and research

Central Academic Development department has been setup to plan, train and monitor the implementation of this curriculum in various schools at all the levels.



Preface

Explore the world - Science is a 'brain based learning' book designed to address the curiosity of this age group along with hands-on experimentation. It is based on methodology of 'Learning by Doing'. Children at this age needs to explore the world around them. They need to comprehend What's being taught, What's happening around, What's expected of them; take clues from it and understand on their own.

Greater the understanding of the details, greater the child will appreciate Islam. Science coexisted, infact flourished in the Islamic era. Islam teaches mankind to observe and learn from the nature. This book prepares young minds to appreciate the importance of environment in a holistic manner, to get them familiarized with the surrounding and to view it with a sense of care and responsibility. It imbibes in children the values of love and respect for nature and its laws.

The Alif Laam Meem Series aims at encouraging learners to believe in the Almighty and also believe in the self, develop skills and become confident while enjoying the content of this book. They wear the Scientists' hat and tread on the journey to explore the world. It also aims at training the learners to locate and comprehend the relationship between the natural, social and cultural environment to develop an understanding based on observations drawn from life experience.

The language is simple and clear to comprehend. There is an attempt towards building scientific aptitude and temperament in the learners. Besides making them realize the existence of Allah and His creations, this book teaches them to be thankful to Allah for all His bounties, refrain from inhumane acts and to develop reasoning that leads to the correct path destined for us.

The salient feature of the book:

- ❖ Test the knowledge of the child through '**Explore**' section so as to involve them.
- ❖ Encourage scientific thinking through '**Reasoning**' section.
- ❖ Arouse curiosity in learners through various interactive and interesting activities.
- ❖ '**Young Scientist at work**' to promote independent work and develop observation, data collection, inferential, mathematical, linguistic and other skills.
- ❖ '**Skills acquired**' to help the learner realize his/her learning and growth.
- ❖ '**Mind Mapping**' to summarize the lesson through memory techniques.
- ❖ '**Self Assessment**' to ensure learning takes place; and includes **Assessment** to help the students get familiar with **CCE system**.
- ❖ **Quranic verses and Hadeeth:** To prove the laws of nature laid by Allah.
- ❖ **Multiple intelligence :** Using arts, language, logic, rhythm in science to implement multiple intelligence.
- ❖ **Take home activity:** Activities given to make the child apply his knowledge.

We strive to keep our standards high and continually improve the Alif Laam Meem Series based on your feedback and our research. Therefore, we request you to kindly send in your valuable suggestions to us and help this mission be successful.

We wish and pray for the wide spread use of this syllabus and inspire other experienced hands to come forward and do such work or better.



Excerpts from National Curriculum Framework 2005

An overall summary of the National Curriculum Framework 2005

The fact that learning has become a source of burden and stress on children and their parents is an evidence of a deep distortion in educational aims and quality. To correct this distortion, the present NCF proposes five guiding principles for curriculum development

- (i) connecting knowledge to life outside the school;
- (ii) ensuring that learning shifts away from rote methods;
- (iii) enriching the curriculum so that it goes beyond textbooks;
- (iv) making examinations more flexible and integrating them with classroom life; and
- (v) nurturing an over-riding identity informed by caring concerns within the democratic polity of the country

National Curriculum Framework 2005 on the perspective of education

Education must be able to promote values that foster peace, humaneness and tolerance in a multicultural society.

The National Curriculum Frame document seeks to provide a framework within which teachers and schools can choose and plan experiences that they think children should have. In order to realize educational objectives, the curriculum should be conceptualized as a structure that articulates required experiences. For this, it should address some basic questions:

- (i) What educational purposes should the schools seek to achieve?
- (ii) What educational experiences can be provided that are likely to achieve these purposes?
- (iii) How can these educational experiences be meaningfully organized?
- (iv) How do we ensure that these educational purposes are indeed being accomplished?

National Curriculum Framework 2005 on the Guiding Principles of education

Children acquire varied skills naturally while growing up in their environment. They also observe life and the world around them. When imported into classrooms, their questions and queries can enrich the curriculum and make it more creative. Such reforms will also facilitate the practice of the widely acknowledged curricular principles of moving from 'known to unknown', from 'concrete to abstract', and from 'local to global'.

The MFERD books are designed to adhere to the guiding principles laid down in the National Curriculum Framework 2005. We want the followers/students to abide and fulfill the educational objectives framed by the NCF so that they not only become honest and faithful citizens but also to be a part of the ever growing global world and economy. We sincerely believe that by following this curriculum the students will develop their personality which will be a beacon of light for others to reflect and ponder and be like one.

For MFERD's approach to address these perspectives please refer to the back cover page.

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1

HOW DO SCIENTISTS WORK

You will learn about

- Scientific method
- Scientists of the Golden Age
- Difference between
 - Invention and discovery
 - Science Fair and Science Exhibition

EXPLORE

We have learnt about science process skills in Class IV. Write at least three process skills and give examples of their use in day-to-day life.

Now divide your class into four groups. Each group has to take an object from the classroom and start discussing about it. One student in each group has to note down their observations.

For example, take a piece of 'chalk' and communicate about its various aspects like shape, colour, smell, etc. among the group and also note down the observations.

REASONING

- What did Allah ask us to observe and think about?
- What can we learn by observing and thinking?
- Are inventions and discoveries a result of thinking and observing?
- Do scientists observe and think at the same time?
- Can I become a scientist too by simply observing!!!

In our daily life we see many things but we observe a few. There are people who see new things and observe them keenly. They are none other than scientists.

Scientists explore, investigate and invent new things. They also discover the things that are not known to the world. Scientists study science and think new ways to make our living easier and comfortable.

You may think, what is science, how does science help us?

WHAT IS SCIENCE

The word science comes from a Latin word '*scientia*' which means 'knowledge'. Science is a branch of knowledge based on observation and experiment.

Why do vehicles have round wheels? Why do things fall on the ground? How does a seed germinate?

These are a few questions that gave rise to new discoveries in different fields of sciences.

The Quran has a total of 6666 verses, out of which 647 verses deal with observation, reasoning, thinking and research.

Arabic	English Translation	Number of times mentioned in Surah	Number of times mentioned in Ayaat
التفكير	ponder	13	17
التعقل	reasoning	30	50
التذكر	reflect	71	279
التبصر	insight	62	142
النظر	thoughtfulness	48	113
الاعتبار	study of law	8	9
التفقه	intelligence	12	20
مخاطبة أهل الآل باب	research	10	16
البحث	search	1	1
الاجموع	Total		647

The Almighty has created the world for you and me to ponder, reflect, reason and thank Him for all the bounties He has spread in the world for us to use in a judicious manner. We have to develop a scientific temperament in order to understand the signs of the Almighty which are around us and strengthen our faith. To know about these signs, we need to read and understand the Quran, as it is the word of Almighty.

HOW DO SCIENTISTS WORK

Many inventions are a result of observation and research by the scientist. They carry out repeated experiments which results in providing new facilities for the ordinary man.

Since the beginning of the Islamic age, scientists have taken the Quran as a guide and inspiration for scientific research and development. The Quranic verses provided hints and inspired the scientists to observe and experiment. Thus, paving the way for modern science, scientific equipments, research methods, etc.

Fact zone **The systematic method to be followed for research was first designed and developed by a scholar and a scientist Al-Haitham (Abu Ali Hasan Ibn-Al-Haitham).**

During the Islamic caliphate, scientists stated the process of research by following the commands mentioned in the Quran. Before this, learned people used to observe and develop theories which were compiled together and called as philosophies. The Muslims travelled throughout the world and gathered all the information available to the world at that time. They studied the philosophies of Indians, Greeks, Egyptians, Romans, Chinese and more.

Muslim scientists laid down the foundation for modern scientific research and contributed to the world that formed the basis of modern science and this led to the betterment of society today.



Ibn Sina Ibn Sina famous in the western world as Avicenna is regarded as the Father of Early Modern Medicine. He learnt all the branches of knowledge that existed by the age of 16. He mastered the Quran, medicine, chemistry, astronomy, psychology, geology and sciences. He became a Hafiz at the age of 16. He was also a scientist who wrote the book Canon of Medicine which is the single most famous book in the history of medicine.



Zakariya Al-Razi Zakariya Al Razi is considered as the father of Pediatrics who developed the first original treatise on smallpox and measles.

Ibn Nafis Ibn Nafis was a great physician who discovered the blood circulatory system 400 years prior to William Harvey.



Abbas Ibn Firnas Abbas Ibn Firnas designed aerodynamic flying suit and made the first flying attempt.

Al Zahrawi Al Zahrawi is regarded as the Father of Modern Surgery. He wrote Al- Tasrif a medical encyclopedia in 30 volumes which includes Surgery, Medicine, Orthopedics, Pharmacology, Nutrition, etc. He made many surgical tools that were used by the surgeons for centuries and are still used today in a modified form.



Al-Khwarizmi Al-Khwarizmi was one of the greatest mathematicians. The word algebra is taken from his book Al-Maqala fi Hisab-al Jabr wa-al-Muqabilah.

This is not the end of the list. There are many more scientists from this age who contributed a lot to the world by setting foundation of the modern world with their discoveries and inventions. They also wrote many books and influenced the world for nearly one thousand years i.e. 700 C.E. - 1600 C.E. This age is mentioned as the Glorious Muslim Era (Golden Age of Islam).

But where did all these books and inventions disappear

Some were lost or burnt while some of the works were translated into Latin and then the originals in Arabic were destroyed. However, many original books and manuscripts are preserved in museums and libraries.

Fact zone

The word scientist first appeared in 1833.



SELF ASSESSMENT

Find out more about some scientists who lived between 7th and 13th centuries.

Research can be done in many ways. Scientists do research to invent or to discover. Now, you might be wondering what is the difference between invention and discovery.

Discovery: Discovery is to explore something that already exists in nature but not known or known only to a few. Example: Finding of dinosaur bones.

Invention: Invention is the creation of something new that comes to the mind. Inventions are a result of observation and experiment. In olden days people used to invent new things depending on their requirement and availability of the materials. Knife, wheel, arrow and spear were the olden days inventions; whereas computer, television, telephone, electric bulb are the inventions of the present generations.

Observation leads to invention and discovery. Children are keen observers. Children can be considered as young scientists as they observe very keenly and try to come up with their own answers and also conduct experiments.



They learn more about science by doing projects and experiments in a fun way. If you want to develop your idea into full science fair project you need to follow a process called Scientific Method. Scientists also follow scientific method that helps to carry out their investigation further. If you follow the steps you can also become a scientist.

Fact zone

On an average 41 new species are discovered by scientists every single day.

SCIENTIFIC METHOD

The following steps can help you to become a scientist

Observation: When you see, you use only one sense. When you observe, you use all your senses. Observation is based on curiosity and desire to explore the world around us. What you observe makes you ask a question or a solution to the problem.

Questioning: After observation, a question comes to your mind, or you try to seek a solution to the problem based on observation. For example, when mangoes are not ripe, they are sour. Once they become ripe, they turn sweet - why!

Hypothesis: Hypothesis is a probable answer to the question after observation.

Plan an experiment: You design an experiment to prove the hypothesis. This requires a few materials and certain procedure to follow.

Conduct an experiment: Perform the experiment carefully by following the steps written in the planning of the experiment. Record your data.

Result: While doing experiment, data is collected that should be precise and accurate; this data should be made easy to understand by making tables, charts, and graphs. Did you come up with the same result when you repeat the experiment?

Conclusion: This is a brief summary of what you have discovered based on your experimental results. Was your hypothesis correct? What questions come in your mind now? Your hypothesis need not always be correct.



SELF ASSESSMENT

- To become a scientist you need to follow _____.
a. Scientific method b. model c. imagination ()
- To guess the answer is called _____.
a. observation b. conclusion c. hypothesis ()
- _____ leads to inventions and discovery.
a. conclusion b. observation c. hypothesis ()

YOUNG SCIENTIST AT WORK

- Observation** : If we blow a balloon it increases in size.
- Questioning** : I wonder, if air has mass!
- Hypothesis** : Even though I do not see air but I believe air has mass.
- Plan an experiment** : Balloons, digital weighing scale, and ruler.
- Conduct an experiment**

- Get some balloons of the same size.
- Weigh them before starting the experiment.
- Blow some air in one of the balloon.
- Tie with a thread, so that it doesn't leak air.
- Measure the maximum diameter or circumference of the balloon and note it down in the notebook.
- Weigh the balloon and record the mass in the notebook.
- Repeat the experiment with increasing size of the balloon.

Use the following table to record the weight and measurements

Measurement	Balloon without Air	Balloon with Air
Length		
Circumference		
Mass		

Result : The data obtained during the experimentation is recorded in a table or plotted on a graph for easy interpretation.

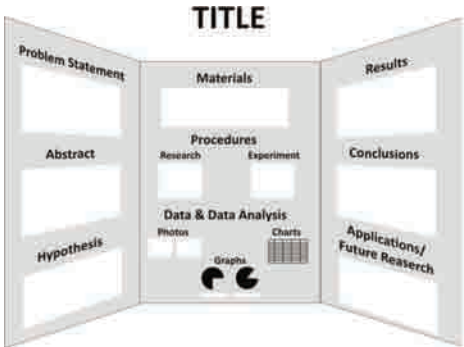

Conclusion: My hypothesis was correct. As the balloons increased in size with air, they gained weight indicating that air has weight.

Further investigation: How can you find that air has pressure? These investigations and discoveries are presented in a science fair.

Fact zone

A 10 year old accidentally created a new molecule, Tetranitratoxy Carbon in science class in 2012.

Difference between Science Fair and Science Exhibition

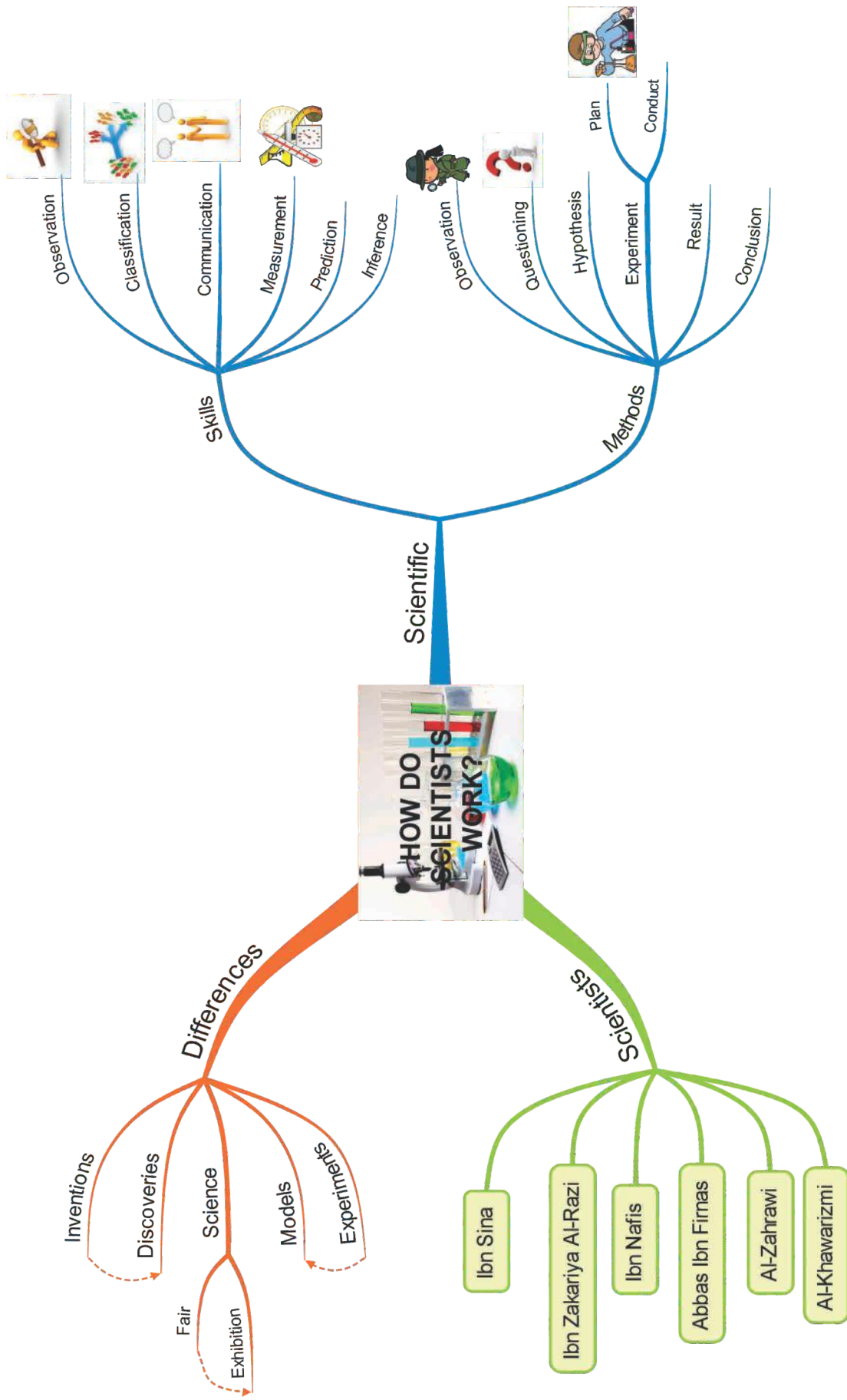
Science Fair	Science Exhibition
<ol style="list-style-type: none"> 1. Students think and work like scientists 2. Original concept, publishable 3. Planning and designing their own experiment plays an important role 4. Observation play an important role 5. Curiosity and creativity driven 6. Own innovative and creative ideas 7. Data is collected to find the results, which are not known before 8. Use their own creative scientific techniques and procedures 	<ol style="list-style-type: none"> 1. Students do not think like scientists 2. Not an original concept, not publishable 3. Cook-book science experiments copied from text books 4. Observation is not a factor 5. Curiosity and creativity does not play any role 6. Other’s work 7. Display already known and established facts known before 8. Just follow others methods, procedures and instructions 

KEYWORDS

discovery : find out existing materials known to only a few people

invention : creating something new that comes to mind

MIND MAP



ASSESSMENT 1

- I. Conduct a survey in your school and find out how many students know about Science Fair and Science Exhibition. Create awareness among children about Science Fair and Science Exhibition.
- II. Conduct a role play on scientists who contributed to the world.
- III. Form 2 teams and setup a debate to discuss as to how to use the resources given by the Almighty in a judicious manner.

ASSESSMENT 2

I. Answer the following questions.

1. Write about the scientific method.
2. Discuss about any two Muslim scientists who contributed to the world.
3. Differentiate between
 - a) Discovery and invention
 - b) Science Fair and Science Exhibition

II. State whether the statement is true or false. If false, correct the statement.

1. Abbas Ibn Firnas was a great physician.
2. The period between 700 C.E. – 1600 C.E. is called as the golden age of Islam.
3. The scientific method was first designed by Ibn Sina.