

GRADE	10	SUBJECT	Life Sciences	WEEK	34 (Lesson 1)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME: 75 MIN
LESSON OBJECTIVES	Content: p. 35 (CAPS). Biodiversity and Endemism			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> Define explain key terms e.g. Biodiversity, endemism, indigenous, exotic Recognise the extent of biodiversity and endemism in Southern Africa Interpret data on biodiversity and endemism 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction</p> <p>Discussion</p> <p>1. Introduction</p> <ul style="list-style-type: none"> Ask learners to name living organisms that they know. Use the list provided by learners and adds on so examples from each of the five kingdoms are included (animals, plants, fungi, bacteria and protists). Use this list as the starting point when defining biodiversity. 	<ol style="list-style-type: none"> Individual work: learners to answer questions. Individual work: learners read case study on Succulent Karoo and answer questions. Learners to compare data and answer questions from activity. Pair work: learners discuss the questions and write down notes on ideas that they have. 	5 min	Text books: Focus on Life Science 10 (NCS); Oxford Successful Life Sciences 10; Understanding Life Sciences 10. Shutters Life Sciences.

<p>2. <u>Main Body (Lesson presentation)</u></p> <p>Define the terms biodiversity, endemism, indigenous and exotic.</p> <p>Describe biodiversity and endemism in South Africa.</p> <p>(Focus on Life Sciences Grade 10 activity 4 pp. 56-57). Allow time for learners to read case study and answer questions (Focus textbook). Walk around and assist learners. Have learners provide their answers to facilitate marking.</p> <p>Instruct learners to complete activity on comparing diversity and endemism in South Africa (see attached worksheet).</p> <p>Alternative activity in textbook (Oxford Successful Life Sciences p. 165).</p> <p>3. <u>Conclusion</u></p> <p>Recap lesson.</p> <p>Group learners into pairs</p> <p>Ask learners to discuss the following questions:</p> <ol style="list-style-type: none"> 1. How do you think scientists measure biodiversity? 2. How do you think scientists differentiate between species? <p>These questions will act as the starting point for the next lesson on classification and the answers will form the introduction of the next lesson.</p>	<p>5. Homework: List the importance of biodiversity:</p> <p>Ecologically (reduces carbon in atmosphere, natural processes such as decomposition, etc.)</p> <p>Economically (resource for food and medication especially for the poor, ecotourism- Link with strand 3 Environmental Studies)</p> <p>List and describe the threats to biodiversity:</p> <p>Deforestation</p> <p>Poaching</p> <p>Urbanisation</p> <p>Alien species</p> <p>Pollution</p> <p>Brief description of each</p> <p>Assessment: Worksheet could be marked.</p>	<p>30 min</p> <p>10 min</p> <p>30 min</p>	<p>Worksheet: Biodiversity and endemism in South Africa.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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GRADE	10	SUBJECT	Life Sciences	WEEK	34 (Lesson 2)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	TIME : 75MIN
LESSON OBJECTIVES	<p>Content: p. 35 (CAPS). Classification of everyday objects</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Classify everyday objects • Recognise that similarities and differences are the basis of classification • Construct a tree diagram to show classification 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction</p> <p>Hands on practical group-work</p> <p>Discussion</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Mark and recap previous day's lesson. • Consider answers of learners to questions posed at the end of lesson 1. <p>Question 1 Scientists can measure biodiversity by counting the number of species/ecosystems/different genes.</p> <p>Question 2 Animals that are the same will be in one species and those that are different will form another species.</p> <ul style="list-style-type: none"> • Discuss the everyday meaning of the words classify and class. 	<p>1. Individual work: learners to answer questions and mark work.</p>	<p>5 min</p>	<p>Text books: Focus on Life Science 10 (NCS); Oxford Successful Life Sciences 10; Understanding Life Sciences 10. Shutters Life Sciences.</p>

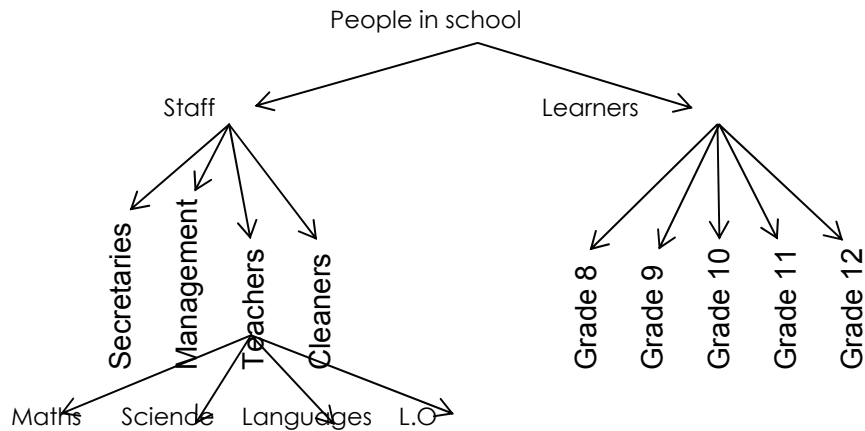
Class: A set or category of things having some property or attribute in common and differentiated from others by kind, type, or quality.

Classify: Arrange (a group of people or things) in classes according to shared qualities.

2. Main Body (Lesson presentation)

Describe an example of classification in everyday life.

Draw the following tree diagram on the board/OHP.



Stress to learners that those people that are similar, are grouped together and where they differ, they will be classified differently. The above tree diagram could be further divided, for example, learners in each grade could be divided into male and female or by subject choice.

Another example of classification in everyday life can be seen in the shopping malls. Similar items are packed next to one another (e.g. coffee, creamer and tea, compared to where soaps and toothpaste etc. are packed).

2. Learners pay attention and ask questions.

10 min

3. Group work: learners to follow instructions and group objects.

4. Construct a tree diagram based on classification of objects.

5. Report back to class explaining how classification was done

Everyday objects e.g. screws, nails, paper clips also of different sizes.

<p>PRACTICAL TASK</p> <p>Materials and Resources: See resources.</p> <p>Sequence Instruction</p> <ol style="list-style-type: none"> 1. Group learners into small groups (3-5). 2. Give each group a set of everyday objects (see resources). 3. Learners must group these objects based on similarities and differences. 4. Learners should construct a tree diagram (on large sheets of paper) to indicate how they have classified their objects. <p>Alternative activity Oxford Successful Life Sciences p. 169</p> <p>3. Conclusion</p> <p>Learners display their tree diagram and use these to explain to the class how classification was done.</p> <p>Show learners that there can be different classifications even of the same objects by different groups, using different criteria.</p>	<p>Assessment: Marks could be allocated for the keys.</p>	<p>20</p> <p>10 min</p>	<p>Different types of stationary could also be used e.g. pens, pencils, rulers, etc.</p>
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	TIME: 75 MIN
LESSON OBJECTIVES	<p>Content: p. 35 (CAPS). History of classification and the 5 kingdom classification</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> Describe the history of classification List the names and diagnostic features of the 5 kingdoms 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction</p> <p>Discussion</p> <p>1. <u>Introduction</u></p> <ul style="list-style-type: none"> Mark and recap previous day's work emphasising that similarities and differences lead to classification. Pre-knowledge: autotrophic vs. heterotrophic, unicellular vs. multicellular <p>2. <u>Main Body (Lesson presentation)</u></p> <p>Describe Aristotle's 2 kingdom classification (plants and animals). Question to learners: State differences between plants and animals. Answer: Plants are autotrophic (with chlorophyll) while animals are heterotrophic. Animal are motile (can move) while plants are sessile. Plant and animal cells differ e.g. cell wall, plastids, etc. (Link to strand 1).</p>	<p>1. Individual work: learners to answer questions.</p> <p>2. Learners to answer questions.</p>	<p>5 min</p> <p>5 minutes</p>	<p>Text books: Focus on Life Science 10 (NCS); Oxford Successful Life Sciences 10; Understanding Life Sciences 10. Shutters Life Sciences.</p>

<p>State that the 2 kingdom classification has limitations (cannot name and classify all organisms). E.g. Fungi have a cell wall but are not autotrophic. Some protists are autotrophic but motile.</p> <p>State that the 5 kingdom classification is one of the currently accepted classification systems.</p> <p>Name the five Kingdoms and the diagnostic characteristics of each. Kingdom Monera: Prokaryotes (No definite nucleus and not bound by a nuclear membrane). Mostly heterotrophic. Kingdom Protista: Eukaryotes (definite nucleus with a nuclear membrane) are unicellular. Some heterotrophic, others autotrophic. Kingdom Plantae: Eukaryotes, multicellular, autotrophic. Kingdom Fungi: Eukaryotes, unicellular or multicellular, heterotrophic, digest food before ingestion (taking food in). Kingdom Animalia: Eukaryotes, multicellular, heterotrophic, digest food inside of its body.</p> <p>Ask learners to give examples of each kingdom. Explain that Linnaeus classified organisms beyond the kingdom level. His system contains seven divisions (details to be discussed in lesson 4)</p> <p style="padding-left: 100px;">Kingdom Phylum Class Order Family</p>	<p>3. Learners pay attention and ask and answer questions.</p> <p>4. Learners to provide names of organism falling within each kingdom.</p> <p>5. Homework exercise: Learners to get more names of organisms for each kingdom.</p>	<p>25 min</p> <p>10 min</p>	
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<p>Genus Species</p> <p>Explain that using this system each different species can be named.</p> <p>3. Conclusion</p> <p>Recap lesson.</p>		<p>15 minutes</p>	
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GRADE	10	SUBJECT	Life Sciences	WEEK	34 (Lesson 4)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR:	DATE STARTED:	DATE COMPLETED:
LESSON OBJECTIVES	<p>Content: p. 35 (CAPS) Naming things in science</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Write scientific names correctly • Explain why scientific names are written in Latin 	

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED				
<p>Teacher direct instruction</p> <table border="1"> <tr> <td></td> <td>Human</td> <td>Lion</td> <td>Brown Squirrel</td> </tr> </table> <p>Discussion</p> <p>Quiz</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Mark and recap previous day's work, emphasising Linnaeus's classification system. <p>2. Main Body (Lesson presentation)</p> <p>Give examples of the classification of some organisms e.g. see table below (display to class on chalkboard/chart or projector).</p>		Human	Lion	Brown Squirrel	<p>1. Learners to pay attention and ask and answer questions.</p>	<p>5 min</p> <p>20 min</p>	<p>Text books: Focus on Life Science 10 (NCS); Oxford Successful Life Sciences 10; Understanding Life Sciences 10. Shuters Life Sciences.</p>
	Human	Lion	Brown Squirrel				

KINGDOM	Animalia	Animalia	Animalia
PHYLUM	Chordata	Chordata	Chordata
CLASS	Mammalia	Mammalia	Mammalia
ORDER	Primates	Carnivora	Rodentia
FAMILY	Homidae	Felidae	Scuridae
GENUS	Homo	Panthera	Tamiasciurus
SPECIES	sapien	leo	hudsonicus

Explain to learners that each classification is for a group sharing a particular characteristic. Humans, lions and squirrels fall within the phylum chordata (meaning they have backbones) All also fall within the Class mammalia (meaning they all suckle young with milk). Lions are grouped with dogs and other types of cats as Order Carnivora because of their large sharp teeth for tearing meat. Squirrels are grouped with rats as Order Rodentia because of the prominent front teeth.

Tell learners that all seven names are not required for naming organisms, but only the last two are required (binomial system).

Give the example of the species name of humans as *Homo sapien*

Explain that scientific names are either typed in italics or underlined when written. The genus name is written first with the first letter capitalised. The species name is written thereafter in small letters.

Mini exercise:

- Ask learners to write the correct scientific names for lions and brown squirrels.
- Instruct learners to swop books with peers and check the mark each

Linnaeus's classification for some organisms.

2. Individual work: learners to write scientific names of organisms.

10 min

3. Peer work: learners to

5 min

<p>other's work. Emphasise the capitalisation of only the first letter of the genus and that the names are underlined.</p> <ul style="list-style-type: none"> • Check a few books to ensure that marking was done correctly. <p>Ask learners if they know in which language the scientific names are written. Inform them that the names are written in Latin.</p> <p>Explain the reasons for writing scientific names in Latin.</p> <ul style="list-style-type: none"> • It is internationally agreed upon (standardised name) • There can be many common names for one species which can lead to confusion. <p>Quiz</p> <ol style="list-style-type: none"> 1) What is the next smallest classification after Order? <u>Family</u> 2) What is the smallest classification group? <u>species</u> 3) Name the two classification groups that all living organism have. <u>Genus and species</u> 4) Which part of the scientific name is capitalised? <u>The first letter of the genus</u> 5) What is binomial nomenclature? <u>Names made up of two names</u> <p>3. Conclusion</p> <p>Recap lesson. Give learners homework of finding the common names of some familiar organisms, e.g. house fly (<i>Musca domestica</i>), TB bacteria (<i>Mycobacterium tuberculosis</i>), domestic cat (<i>Felis catus</i>), king protea (<i>Protea cynaroides</i>) etc.</p> <p>Learners can use resources like the internet or encyclopaedias.</p> <p>Request learners to collect insects (insects can be frozen to preserve them) at home and/or to bring pictures of animals from newspapers or magazines for the next lesson.</p>	<p>assess whether peers can write scientific names correctly.</p> <ol style="list-style-type: none"> 4. Individual: learners to answer the quiz questions. 5. Homework exercise: Learners to find out the scientific names of some common organisms. Learners to collect organisms, or bring pictures of organisms. 	<p>10 min</p> <p>30 min</p>	
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GRADE	10	SUBJECT	Life Sciences	WEEK	34 (Lesson 5)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	TIME: 75 MIN
LESSON OBJECTIVES	<p>Content: pp. 36-37 (CAPS). Using keys and identification guides</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> Collect specimens and identify them using keys and field guides 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Observation of specimens Practical usage of keys and identification guides</p> <p>1. Introduction</p> <ul style="list-style-type: none"> Mark and recap previous day's work focusing on the scientific names. <p>2. Main Body (Lesson presentation)</p> <p>Provide learners with keys and identification guides. Ensure that each learner has access to some resource. Explain to learners how to use a key.</p> <p>The following key, for classroom furniture, could be used to explain how keys work.</p>	<ol style="list-style-type: none"> Individual work: learners to answer questions and mark work. Learners have collected insects without harming them from home, school gardens, parks, etc. (pictures could also be taken). Organisms to be 	5 min	<p>Text books: Focus on Life Science 10 (NCS); Oxford Successful Life Sciences 10; Understanding Life Sciences 10. Shutters Life Sciences.</p> <p>Identification guides: e.g. Field guide to insects of South Africa, Roberts bird guide, Sasol Birds of</p>

1	Has 4 legs	Go to 2	identified using keys/field guides.	30 min	Southern Africa, A guide to reptiles of Southern Africa, Field guide to mammals of Southern Africa, Field guide to trees of South Africa etc.
	Does not have legs	Go to 3			
2	Has a back rest (made of plastic)	Chair			
	Has a flat wooden top	Table			
3	Large and mounted to wall	Chalkboard			
	Has a sponge attached to it	Duster			

Assist learners where necessary.

Alternatively, identification guides can be given to learners and learners can be asked to write down the common and scientific names of organisms that they have seen in their local surroundings.

3. Conclusion

Recap lesson and get learners to clean and pack away. They should return live specimens back to where they found them.

Assessment: Learners could be assessed on the number of specimens brought and the accuracy of identification. Learners could also count the number of each type of organism caught. This information could be used to draw a bar graph, or to write up a scientific report on the biodiversity of the area

10 min

Collected insects, Pictures of animals/plants, and/or preserved specimens.

e.g. key p. 170 Oxford Successful Life Sciences 10

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BIODIVERSITY AND ENDEMISM IN SOUTH AFRICA

The table below shows figures of biodiversity and endemism of certain groups in South Africa.

Group	Number of species in South Africa	Percent endemic (%)	Number endemic
Plants	23 420	?	14 052
Reptiles	363	?	?
Birds	694	8	56
Mammals	258	16	41
TOTAL	?		14 279

Answer the following questions

- 1) Which group has the least species? (1)
- 2) Why do you think there are more plant species than any of the other groups? (2)
- 3) What is the total number of species in all groups (2)
- 4) Calculate what percentage of plants is endemic. (3)
- 5) Calculate how many reptiles are endemic. (2)

[10]

MEMO

- 1) Mammals ✓
- 2) Plants are the producers ✓ and all other organisms (heterotrophs) are dependent on them ✓ / plants evolved before other groups
- 3) $23\,420 + 363 + 694 + 258 = 24\,735$ ✓
- 4) $\frac{14\,052}{23\,420} \times 100 = 60\%$ ✓
- 5) $14\,279 - 41 - 56 - 14\,052 = 130$ ✓

GRADE	10	SUBJECT	Life Sciences	WEEK	Week 35 (Lesson 1)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME: 75 MIN
LESSON OBJECTIVES	Content: p. 36 (CAPS) Life's history: Different representations of the history of life on earth.			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain what the term "History of Life" means • Explain different representations of the history of life on Earth • Answer questions on the history of life on Earth 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Group work Discussion Quiz 1. Introduction <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: classification of organisms and biodiversity. 	1. Individual work: learners mark work and answer questions 2. Group work: learners to follow instructions, and complete task.	5 min 10 min	Understanding Life Sciences Grade 10; Focus on Life Science 10; Shutters Top Class Life Sciences10; Oxford Successful Life Sciences 10.

<p>2. Main Body (Lesson presentation)</p> <p>Divide learners into groups of 4 or 5, ensuring the class has 5 groups in total. Open the discussion with the following: in the last few lessons you have learnt that many different taxa (groups of organisms), including animals, plants, fungi, bacteria, and protists, exist on Earth. Scientists explain that organisms that exist today and those that have existed in the past, help us understand the history of life. Each group should read the idea on the origin of life as instructed and report back to the class.</p> <p>Provide learners with Annexure 1. Each group must be allocated one of the numbered ideas on the origins of life. One elected member will present information to the class.</p> <p>Educators could also use internet, libraries or other research material where available instead of the annexure provided.</p> <p>3. Conclusion</p> <p>Educator to recap ideas presented, and fills in gaps which were left out by learners in their feedback.</p>	<p>3. Group work presentation: Learners will present while others will listen attentively and take notes.</p> <p>4. Learners answer questions and take down summary or notes.</p> <p>5. Homework exercise: learners to research their own religious explanations as explanations of the origins of life. They should also research the explanations by those that explain Life's origins by "Intelligent Design" and explain how this theory differs from those of Creationism.</p>	<p>20 min</p> <p>10 min</p> <p>25 min</p>	<p>Annexures/instruction sheets.</p> <p>Transparencies/chalkboard /PowerPoint presentation could also be used.</p>
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME: 60 MIN
LESSON OBJECTIVES	Content: p. 36 (CAPS) Life's history: The relationship to changes in climate (e.g. increase in oxygen levels, ice ages) and geological events (e.g. movement of continents; introduction to biogeography); bivalves and ammonites on the Makhlatini flats in northern KZN, whale fossils in the Sahara, trilobites in the Karoo.			
	The learners must be able to: <ul style="list-style-type: none"> • Explain how changes in climate have affected life on earth • Explain how geological events have affected life on earth • Answer questions on the history of life on earth 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Group work Discussion Quiz 1. Introduction <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: classification of organisms, biodiversity, different ideas about the origin of life on Earth. 	1. Individual work: learners mark work and answer questions.	8 min	Understanding Life Sciences Grade 10; Focus on Life Science 10; Shutters Top Class Life Sciences10; Oxford Successful Life Sciences

<p>2. Main Body (Lesson presentation)</p> <p>Explain to learners how scientist use the changing climate to explain the origin of life on Earth.</p> <p>Cooling of the Earth (Ice Age): Long periods of time when Earth experienced extremely low temperatures. Four major Ice Ages identified: 700 million years ago 320 million years ago 286 million years ago</p> <p>The current ice ages, which is said to have begun just less than 3 million years ago. Ice ages charecterized by formation of large ice sheets/glaciers. Glaciation thought to be responsible for mass extinction.</p> <p>Scientists attribute the causes for glaciation to the following: Changes in the Earth's orbit Reduction of CO₂ in the atmosphere Continental Drift</p> <p>Use the following diagrams or similar diagrms to explain Continental Drift:</p>	<p>2. Individual work: learners to pay attention ask and answer questions.</p> <p>3. Individual work: learners listen, pay attention, ask and answer questions.</p>	<p>15 min</p> <p>15 min</p>	<p>10.</p> <p>Worksheet. Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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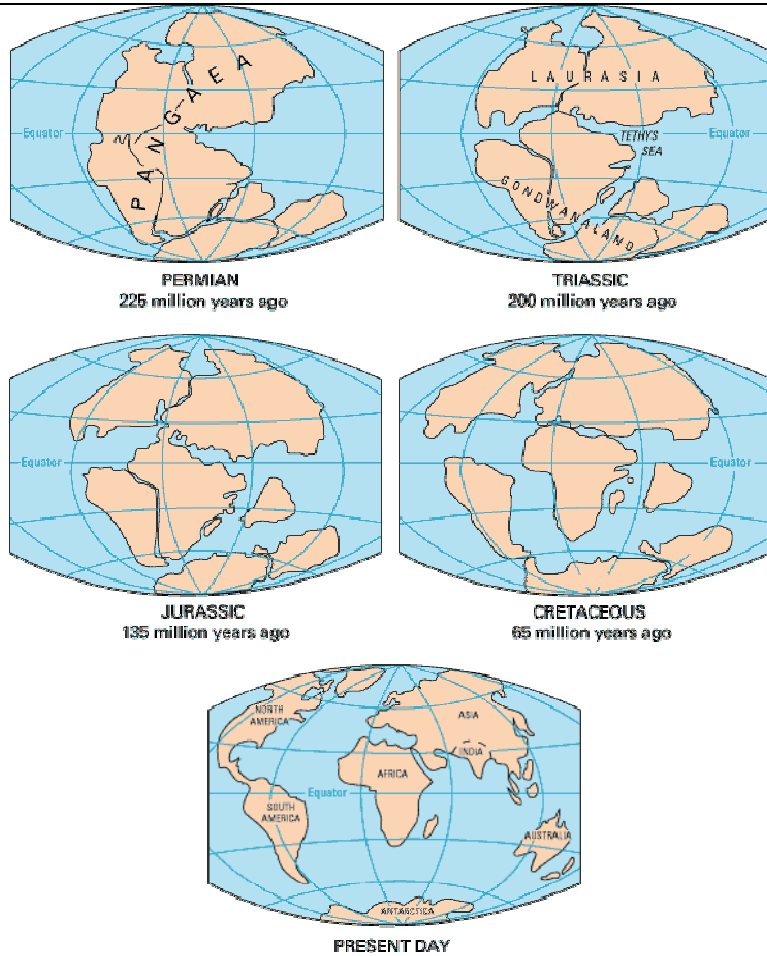


Plate tectonics.

Modern theory emanating from continental drift.

This theory suggests that the earth is made up of plates fitting together like a jigsaw puzzle.

4. Learners answer questions and take down summary or notes.
5. Homework exercise:
Understanding Life Sciences
Grade 10 3rd edition p. 297,
Activity 4.2.1

7 min

15 min

<p>Plates lie on top of hotter material, this causes the plates to move apart.</p> <p>3. Conclusion</p> <p>Educator to recap concepts discussed and provide summary for learners.</p> <p>Bibliography: www.pubs.usgs.gov</p>			
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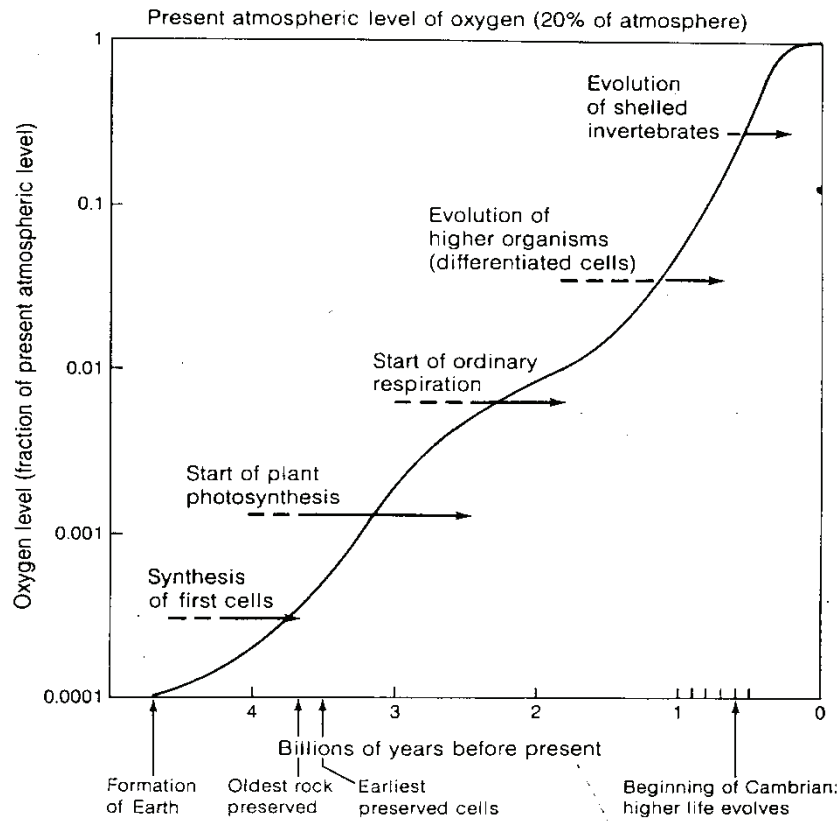
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME:	
LESSON OBJECTIVES	<p>Content: p. 36 (CAPS) Life's history: The relationship to changes in climate (e.g. increase in oxygen levels)</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain how changes in oxygen levels have affected life on earth • Answer questions on the history of life on earth 				

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Discussion Quiz <ol style="list-style-type: none"> Introduction <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: classification of organisms, biodiversity, different ideas about the origin of life on earth. Main Body (Lesson presentation) Change in oxygen levels.	<ol style="list-style-type: none"> Individual work: learners mark work and answer questions. Individual work: learners complete task. 	8 min 20 min	Understanding Life Sciences Grade 10; Focus on Life Science 10; Shutters Top Class Life Sciences10; Oxford Successful Life Sciences 10. Worksheet. Transparencies/chalkboard /PowerPoint presentation could also be used.

Provide learners with the following graph as a handout:



Provide them

with the following questions:

1. Explain the changes of oxygen over time as illustrated in the graph.

(The level of oxygen increases steadily over time)

2. How did the advent of green plants affect the level of oxygen?

(Caused the increase of oxygen as oxygen is released during photosynthesis)

<p>3. When, according to the graph, were the earliest preserved cells recorded? (3.5 billion years ago)</p> <p>4. How did the change in oxygen levels affect life on earth? (As oxygen levels increased an increase in biodiversity was noted)</p> <p>Educator to lead general discussion on oxygen and carbon dioxide levels in current times, link to environment.</p> <p>3. Conclusion</p> <p>Educator to recap concepts discussed and provide summary for learners.</p> <p>Bibliography: www.physics1.howard.edu</p>	<p>3. Learners to participate in discussion and ask and answer questions</p> <p>4. Learners answer questions and take down summary or notes.</p>	<p>10 min</p> <p>7 min</p>	
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	TIME: 75 MIN
LESSON OBJECTIVES	<p>Content: p. 36 (CAPS) Geological timescales</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain the need for the use of geological timescales • Interpret diagrams, graphs and tables relating to geological timescales • Answer questions on geological timescales 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction Discussion Quiz</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: history of life <p>1. Instruction:</p> <ol style="list-style-type: none"> Create a list of 20 major events in your lifetime Place a number beside each event according to which happened longest ago (1) and which happened most recently (20). Rewrite the list in reverse chronological order, with the most recent at the top and the longest ago at the bottom. To the new list, add information about exactly how many years ago the event occurred. 	<p>1. Individual work: learners to follow instructions and complete task.</p> <p>2. Individual work: learners</p>	<p>10 min</p>	<p>Understanding Life Sciences Grade 10; Focus on Life Science 10; Shutters Top Class Life Sciences10; Oxford Successful Life Sciences 10.</p>

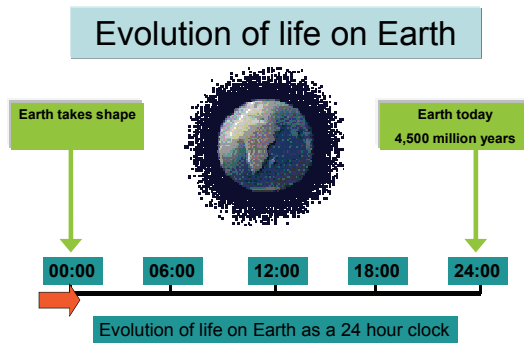
2. Main Body (Lesson presentation)

Use the feedback from the learners to discuss the difference between relative time, ordering events by which happened first, and absolute time, the number of years ago each event happened.

Why is there a need for the geological timescale?

(Scientists use the geological timescale as they state that the history of life took place over billions of years and it is therefore more convenient to have developed a time scale that uses units which are larger than “century”).

Then use the following analogy to introduce Geological Timescale:



to follow instructions, pay attention, ask and answer questions.

25 min

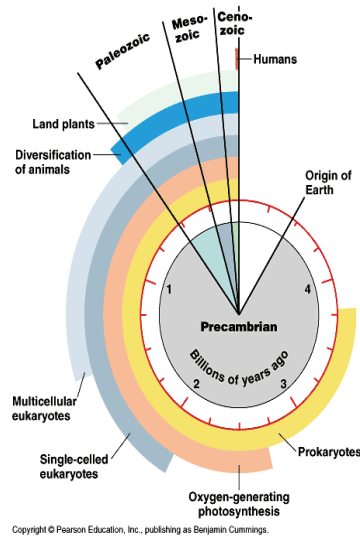
Worksheets/instruction sheets.
Transparencies/chalkboard/PowerPoint presentation could also be used.

Evolution of life on Earth

24 hours = 4,500 million years
 1 hour = 187.5 million years
 1 min = 3.125 million years
 1 sec = 52 thousand years

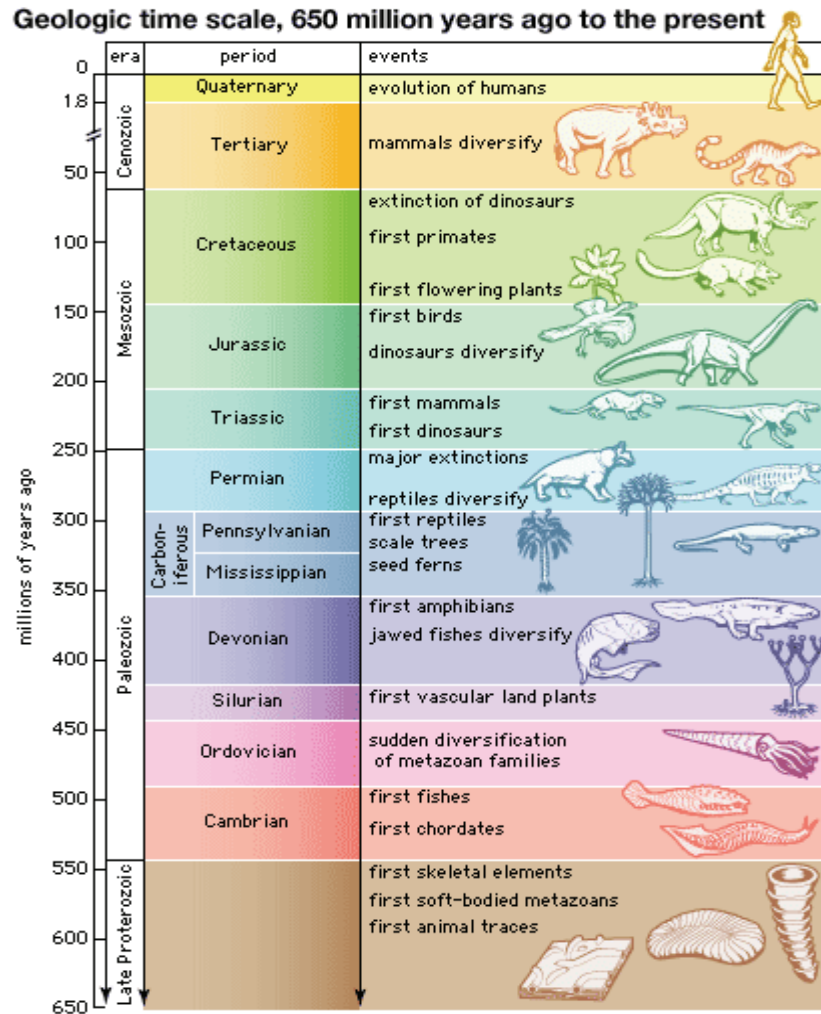
00:00 06:00 24:00

Evolution of life on Earth as a 24 hour clock



Alternate activity: Shutters Top Class Life Sciences 10 p. 237 Activity 11.1

- Learners answer questions and take down summary or notes.



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Use the table above or table in learners textbook or any other resource to discuss the geological timescale and the events unfolding. Explain that the scale is divided into eras, which are divided into periods, which are divided into epochs. Explain to them that they need not memorise the table, but would need to answer questions on a given table or similar information

4. Homework exercise:
Understanding Life Sciences
Grade 10 p. 305, activity 4.2.4.
Assessment (SBA) :
Research Project Understanding
Life Sciences Grade 10 p. 306,
activity 4.2.5 & 4.2.6/ Shutters Top
Class Life Sciences Grade 10 p.
240 activity 11.2 and p. 241
activity 11.3.

10 min

15 min

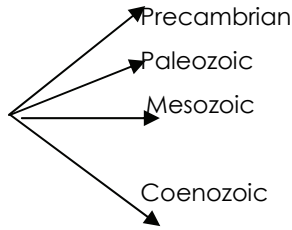
<p>provided in a graph.</p> <p>3. Conclusion</p> <p>Recap lesson.</p> <p>Bibliography: www.rbksch.org Encyclopaedia Britannica</p>			
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Name of Teacher:		HOD:	
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GRADE	10	SUBJECT	Life Sciences	WEEK	Week 35 (Lesson 5)	TOPIC	Biodiversity and classification
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME: 75 MIN
LESSON OBJECTIVES	Content: p. 36 (CAPS) Life's history: The three eras: Paleozoic, Mesozoic and Coenozoic, each era divided into periods			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> • Name the three eras in life's history • Explain significant events in the different eras • Answer questions on the different eras 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Discussion Quiz 1. Introduction <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: Life's history. 	1. Individual work: learners mark work and answer questions.	5 min 5 min	Understanding Life Sciences Grade 10; Focus on Life Science 10; Shutters Top Class Life Sciences10; Oxford Successful Life Sciences

<p>2. Main Body (Lesson presentation)</p> <p>Mention that Earth's history has been divided into eras and that the eras are divided into periods.</p>  <p>Life's history eras</p> <p>Next, divide the learners into five groups and assign each group to graphically depict the major events of each of the following below. The group must elect a scribe and the scribe must report back when they are done (educator may provide flip charts or transparencies to learners).</p> <ul style="list-style-type: none"> • the Archean Eon • the Proterozoic Eon • the Paleozoic Era • the Mesozoic Era • the Cenozoic Era <p>Educators can use 4 groups and fuse the first two into the Precambrian.</p> <p>Since the different divisions are composed of vastly different stretches of time, you may find it easiest to divide learners into groups that are sized proportional to the length of the time division. The major events for these time divisions are as follows:</p> <p>Archean ("Ancient") Eon: formation of the oceans and sea floors, meteor bombardment, formation of small volcanic islands, and the evolution of blue-green algae floating in the oceans as algal mats (the only known life at that time).</p> <p>Proterozoic ("Early Life") Eon: formation of two supercontinents, still a lot of volcanic</p>	<p>2. Learners pay attention and answer and ask questions.</p> <p>3. Group work: learners to follow instructions and complete task.</p>	<p>10 min</p>	<p>10.</p> <p>Annexures/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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<p>activity, and the evolution of multi-celled organisms at the very end of the Proterozoic.</p> <p>Paleozoic ("Ancient Life") Era: (in order) the evolution of fish, evolution of land plants, evolution of terrestrial insects (e.g. giant dragonflies and centipedes) evolution of terrestrial tetra pods (four-limbed vertebrates similar to amphibians).</p> <p>Mesozoic ("Middle Life") Era: (in order) evolution of small dinosaurs (e.g. <i>Coelophysis</i>), the break-up the supercontinent Pangea, evolution of sauropod dinosaurs ("long-neck" dinosaurs such as <i>Diplodocus</i> and <i>Brachiosaurus</i>), evolution of small rodent-like mammals, evolution of ceratopsian (e.g. <i>Triceratops</i>) dinosaurs and <i>Tyrannosaurus rex</i>, evolution of birds, and the giant meteor impact at the end of the Mesozoic.</p> <p>Note: There are many different types of dinosaurs that appear in the Mesozoic and the learners should not be limited to those mentioned above. The dinosaurs mentioned above are merely some of the more recognizable dinosaurs.</p> <p>Cenozoic ("Recent Life") Era: evolution of modern mammals, build-up of the Himalayas, continents attain their modern positions.</p> <p>The scribe will present information to the class.</p> <p>Educators could also use internet, libraries or other research material where available instead of the annexure provided.</p> <p>3. Conclusion</p> <p>Educator to recap the ideas presented, and fills in the gaps which were left out by learners in their feedback.</p>	<p>4. Group work presentation: learners will present while others will listen attentively and take notes.</p> <p>5. Learners answer questions and take down summary or notes.</p>	<p>15 min</p> <p>10 min</p>	
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GRADE	10	SUBJECT	Life Sciences	WEEK	Week 36 (Lessons 2,3)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:	TIME:
LESSON OBJECTIVES	<p>Content: p. 36 (CAPS) Mass extinctions</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Research the different Mass extinctions. • Explain each of the five Mass extinctions • Answer questions on Mass extinctions 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction</p> <p>Practical</p> <p>Discussion</p> <p>Quiz</p> <p>1. <u>Introduction</u></p> <ul style="list-style-type: none"> • Mark and recap previous day's work while learners present their work. • Pre-knowledge: History of Life on Earth, Geological Timescale, extinctions • Educator to briefly explain the difference between extinctions and mass extinctions and the theories related to the causes of mass extinctions. 	<p>1. Individual work: learners to answer questions and mark work.</p>	<p>10 min</p>	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences Explained 11.</p> <p>Various issues of newspapers, periodicals, magazines.</p>

<p>2. <u>Main Body (Lesson presentation)</u></p> <p>Divide the class into five groups, and assign each group with one of the following extinction events to research:</p> <p>Late Ordovician Late Devonian End-Permian (sometimes called "Permian-Triassic") End-Triassic End-Cretaceous (also known as "Cretaceous-Tertiary" or "K-T")</p> <p>Guiding questions for research:</p> <ul style="list-style-type: none"> • When did this extinction take place? • Describe the extent of the extinction. How many kinds of organisms lived on Earth before the extinction? What percentages were lost during the extinction? Did new kinds of organisms evolve after this extinction? • What did Earth look like at that time? Were the continents in the same locations they are in today? If not, how were they arranged? • How do scientists know what they know about the event? What evidence have they used to support their ideas? • Name some of the kinds of organisms that went extinct during the extinction? • What explanations have scientists put forth to explain why so many groups of organisms disappeared during this extinction? Do scientists agree on the cause for this extinction? <p>Additional requirements:</p> <ul style="list-style-type: none"> • The years the extinction event took place. • A drawing or other visual representation of three species that went extinct during their event. • A map showing the location and names of the continents at that time. • A pie chart or other graphics indicating the percentage of life on Earth that went extinct at that time. • Two facts about this extinction event that make it significant in the history of life on Earth (significant life forms that went extinct, new life forms that evolved 	<p>2. Learners to listen, follow instructions, complete the task, ask and answer questions.</p>	<p>35 min</p>	<p>Worksheets/instruction sheets. Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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<p>after this extinction, etc.).</p> <p>In addition to their prescribed textbooks and library materials, students might use the online resources about mass extinctions from the Discovery Channel, Nova Science Now, the PBS series "Evolution" and Enchanted Learning. Useful resources on geologic time are available from PBS and the National Museum of Natural History. They may also consult scientific articles drawing connections between mass extinctions and oxygen levels, asteroid impacts, climate change and lava flows.</p> <p>In the second session learners present their research to the class.</p> <p>3. Conclusion</p> <p>Recap lesson. To wrap up, discuss: What commonalities do you see among these extinctions? What differences?</p> <p>Bibliography:</p> <p>Nova Science Now; the Discovery Channel; the PBS series "Evolution"; Enchanted Learning; National Museum of Natural History; oxygen levels, asteroid impacts, climate change and lava flows; PBS</p>	<p>3. Group work: Learners present their work to the class</p> <p>4. Homework: what evidence do scientists put forth today to support the idea that we are entering the sixth extinction? Do you tend to believe the prediction that in the decades ahead, we may witness an extinction event on par with those last seen millions of years ago? Explain.</p>	<p>35 min</p> <p>10 min</p> <p>35 min</p>	
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Annexure 1

1. Theory of Special Creation

According to this theory, all the different forms of life that occur today on planet earth, have been created by God, the Almighty. This idea is found in the ancient scriptures of almost every religion. According to Hindu mythology, Lord Brahma, the God of Creation, created the living world in accordance to his wish. According to the Christian belief, God created this universe, plants, animals and human beings in about six natural days. The Sikh mythology says that all forms of life including human beings came into being with a single word of God. Special creation theory believes that the things have not undergone any significant change since their creation.

The theory of Special Creation was purely a religious concept, acceptable only on the basis of faith. It has no scientific basis.

2. Theory of Spontaneous Generation

This theory assumed that living organisms could arise suddenly and spontaneously from any kind of non-living matter. One of the firm believers in spontaneous generation was Aristotle, the Greek philosopher (384-322 BC).



Aristotle

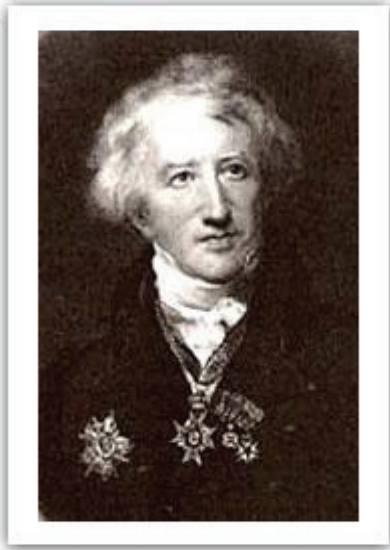
He believed that dead leaves falling from a tree into a pond would transform into fishes and those falling on soil would transform into worms and insects. He also held that some insects develop from morning dew and rotting manure. Egyptians believed that mud of the Nile river could spontaneously give rise to many forms of life. The idea of spontaneous generation was popular almost till seventeenth century. Many scientists like Descartes, Galileo and Helmont supported this idea. In fact, Von Helmont went to the extent stating that he had prepared a 'soup' from which he could spontaneously generate rats! The 'soup' consisted of a dirty cloth soaked in water with a handful of wheat grains. Helmont stated that if human sweat is added as an 'active principle' to this, in just 17 days, it could generate rats!

The theory of Spontaneous Generation was disproved in the course of time due to the experiment conducted by Fransisco Redi, (1665), Spallanzani (1765) and later by Louis Pasteur (1864) in his famous Swan neck experiment. This theory was disproved, as scientists gave definite proof that life comes from pre-existing life.

3. Theory of Catastrophism

It is simply a modification of the theory of Special Creation. It states that there have been several creations of life by God, each preceded by a catastrophe resulting from some kind of geological

disturbance. According to this theory, since each catastrophe completely destroyed the existing life, each new creation consisted of life form different from that of previous ones.



Georges Cuvier

A French scientist Georges Cuvier (1769-1832) and Orbigney (1802 to 1837) were the main supporters of this theory.

4. Cosmozoic Theory (Theory of Panspermia)

According to this theory, life has reached this planet Earth from other heavenly bodies such as meteorites, in the form of highly resistance spores of some organisms. This idea was proposed by Richter in 1865 and supported by Arrhenius (1908) and other contemporary scientists. The theory did not gain any support. This theory lacks evidence, hence it was discarded.



Arrhenius

5. Theory of Chemical Evolution

This theory is also known as Materialistic Theory or Physico-Chemical Theory. According to this theory, origin of life on earth is the result of a slow and gradual process of chemical evolution that probably

occurred about 3.8 billion years ago. This theory was proposed independently by two scientists - A.I. Oparin, a Russian scientist in 1923 and J.B.S Haldane, an English scientist, in 1928.



J.B.S. Haldane & A.I. Oparin

According to this theory,

- Spontaneous generation of life, under the present environmental conditions is not possible.
- Earth's surface and atmosphere during the first billion years of existence were radically different from that of today's conditions.
- The primitive earth's atmosphere was a reducing type of atmosphere and not oxidising type.
- The first life arose from a collection of chemical substances through a progressive series of chemical reactions.
- Solar radiation, heat radiated by earth and lighting must have been the chief energy source for these chemical reactions.

<http://www.tutorvista.com/content/biology/biology-iii/origin-life/origin-life-theories.php>

GRADE	10	SUBJECT	Life Sciences	WEEK	Week 36 (Lesson 4)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR:	DATE STARTED:	DATE COMPLETED:	TIME:
LESSON OBJECTIVES	<p>Content: p. 38 (CAPS) Fossil formation and methods of dating</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Make fake fossils. • Explain what fossils are and how most fossils form. • Answer questions on fossils 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction Discussion Practical Quiz Group work</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Mark and recap previous day's work. • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils. 	<p>1. Individual work: learners to answer questions and mark work.</p>	<p>5 min</p>	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences Explained 11.</p>



<p>2. Main Body (Lesson presentation)</p> <p>Get learners into groups of four.</p> <p>Procedure:</p> <ol style="list-style-type: none"> 1. Show the class the fake fossil imprint you made and ask them what they think made the imprint. Ask how they know. 2. Tell them how you made your fake fossil and that they will get to make their own fake fossil. 3. Distribute two colours of clay to each group and ask them to flatten each piece of clay until it is about 5cm thick. Have them select a leaf or a shell and press it between the layers of clay. 4. Tell learners to separate their layers of clay and give each group a chance to share the results with the class. As each pair shares its fake fossil, have the class guess what the original "fossil" looked like for each of the sets of imprints. 5. Display a number of actual fossils. Ask them to tell what they know about fossils. Ask the class what they think the animals or plants looked like <i>before</i> they were fossilized. Explain that fossils are formed when something dies and then is covered for a very long time without being destroyed. You could also use pictures of fossils on transparencies, PowerPoint or charts. 6. Explain that the real fossils were not pressed between clay by people, but were formed by natural forces. Tell as much of these stories as your learners are ready for. 7. Ask learners if they think we made real fossils today. "What makes you think that?" <p>3. Conclusion</p> <p>Recap lesson and get learners to clean and pack away.</p> <p>Bibliography: www.lessoncorner.com</p>	<ol style="list-style-type: none"> 2. Group work: learners to follow instructions and "make fossils". 3. Classroom discussion. 4. Homework exercise: group work. Name and explain the difference between the different types of fossils. Provide examples of the different fossils in the form of diagrams, transparencies, charts, photos or even actual specimens. Each group would present their completed work the following day. 	<p>15 min</p> <p>15 min</p> <p>10 min</p> <p>40 min</p>	<p>Two chunks of clay for each group (two colours).</p> <p>An assortment of leaves or sea shells.</p> <p>Examples of actual leaf or shell fossils, if possible.</p> <p>Worksheets/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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GRADE	10	SUBJECT	Life Sciences	WEEK	Week 36 (Lesson 5)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR:	DATE STARTED:	DATE COMPLETED:	TIME:
LESSON OBJECTIVES	<p>Content: p. 37 (CAPS) Fossil formation and methods of dating</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> Name and explain the different types of fossils. Answer questions on fossils 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction Discussion Quiz</p> <p>1. Introduction</p> <ul style="list-style-type: none"> Mark and recap previous day's work while learners present their work. Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils Educator to summarise at end to fill gaps and consolidate. The following could be used to supplement. 	<p>1. Individual work: learners to answer questions and mark work.</p>	<p>12 min</p>	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences explained 11.</p> <p>Learners' presentations and necessary resources.</p>

Type of Fossil	How the Fossil Was Formed	Picture Example			Worksheets/instruction sheets. Transparencies/chalkboard/PowerPoint presentation could also be used.
Mould Fossil	A fossilized impression made in the substrate a negative image of the organism				
Cast Fossil	Formed when a mould is filled in.				

Trace Fossil	Fossilized nests, gastroliths, burrows, footprints, etc.	
True Form Fossil	Fossils of the actual animal or animal part.	

2. Main Body (Lesson presentation)

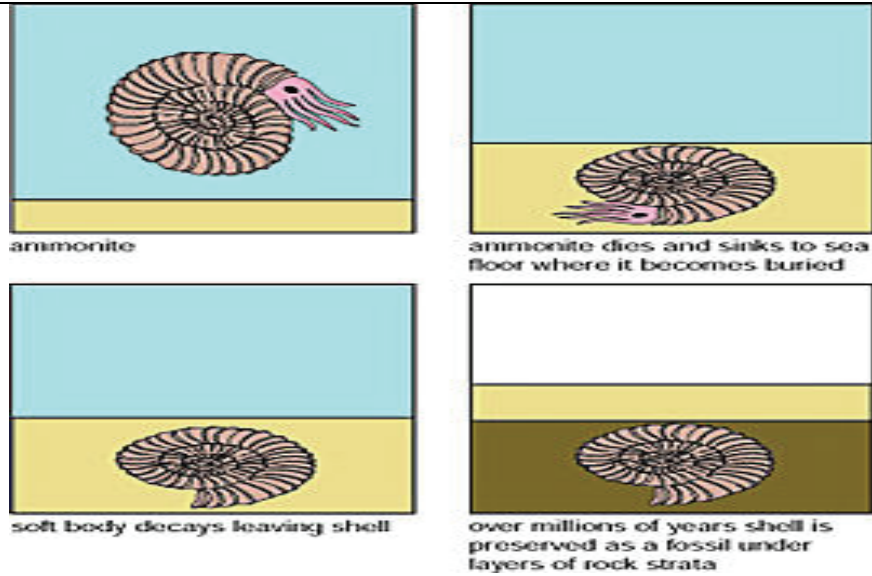
Educator to lead the discussion on fossils after naming and describing the fossils.

A very brief discussion on the following should start the discussion. The educator to mediate the following:

2. Learners to listen , ask and answer questions.

13 min

<p>Law of Uniform Processes, the processes which are changing the earth's surface today are the same processes which acted in the past.</p> <p>Law of Superposition, the oldest rock layer is on the bottom of an undisturbed rock column, and each higher layer is younger.</p> <p>Law of Cross-cutting Relationships: a fault or intrusion is younger than the rock layers it cuts through.</p> <p>Law of Included Fragments: pieces of one rock found in another rock must be older than the rock in which they are found.</p> <p>Teacher asks question: what are Fossils?</p> <p>(Fossils are the mineralized remains of animals or plants or other traces such as footprints.) Educator can elaborate further either by direct discussion or quizzes. All of the fossils and their placement in rock formations and sedimentary layers (strata) is known as the fossil record.</p> <p>The study of fossils is called paleontology.</p> <p>Use the following sets of diagrams to explain how fossils form:</p>	<p>3. Classroom discussion.</p>	<p>15 min</p>	
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3. Conclusion

Recap lesson and get learners to clean and pack their resources away. Also if posters etc were made, it is an ideal opportunity to use some of the learners work on the wall of the classroom.

Bibliography:

www.mysciencebox.org

Evolution and the History of Life (PowerPoint) M. Elizabeth

4. Learners listen, ask and answer questions.

5 min

Name of Teacher:		HOD:	
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GRADE	10	SUBJECT	Life Sciences	WEEK	Week 37 (Lesson 1)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME:
LESSON OBJECTIVES	Content: p. 38 (CAPS) Fossil formation and methods of dating			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> Distinguish between the different methods to date fossils. Explain how relative dating is done Answer questions on dating fossils 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction Practical Discussion Quiz</p> <p>1. Introduction</p> <ul style="list-style-type: none"> Mark and recap previous day's work while learners present their work. Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils 	<p>1. Individual work: learners to answer questions and mark work.</p>	<p>8 min</p>	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences explained 11.</p> <p>Various issues of newspapers, periodicals, magazines.</p>

<p>2. <u>Main Body (Lesson presentation)</u></p> <p>Divide the class into groups of four and five. Ask each group to organize a set of 45 media items (magazines, newspapers, periodicals). Each group must have an exclusive type of media, one group could bring newspapers, the other, magazines, etc. (If possible the group must have items from the same source, i.e. one group will have copies of "The Star", the other group may have "Huisgenoot" etc.</p> <p>Now ask each group to stack the items on the table in such a way that if someone wants to find a particular issue, he/she could find it easily.</p> <p>To add some fun, get the groups to ask other groups for an item from their collection and time how long it takes to find the item, the more organised the method, the faster the service will be. The idea is to get them to put the oldest at the top and the more recent ones at the bottom.</p> <p>Remind them about the basic principles of relative age relationships they learnt in the previous lesson and have a general discussion to explain relative dating and to index fossils, using the text book or transparencies, charts or powerpoint presentation.</p> <p>3. <u>Conclusion</u></p> <p>Recap lesson and get learners to clean and pack their resources away.</p>	<p>2. Learners to listen, follow instructions, complete the task, ask and answer questions.</p> <p>3. Classroom discussion.</p> <p>4. Homework: provide the disadvantages of this method of dating fossils.</p>	<p>15 min</p> <p>15 min</p> <p>7 min</p> <p>15 min</p>	<p>Worksheets/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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GRADE	10	SUBJECT	Life Sciences	WEEK	37 (Lesson 2)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME:
LESSON OBJECTIVES	Content: p. 37 (CAPS) Fossil formation and methods of dating			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain how absolute dating is done • Distinguish between the different types of absolute dating • Answer questions on dating fossils • Practice generate, collect, graph and analyse data • Explain relevant terminology such as half-life, parent, daughter, isotope • Make simple calculations to determine the age of a rock • Identify errors in data they collected and correct it for them 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Practical Discussion Quiz 1. Introduction <ul style="list-style-type: none"> • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils and relative dating. • Mark and recap previous day's work. 	<ol style="list-style-type: none"> 1. Individual work: learners to answer questions and mark work. 2. Learners to listen , follow 	5 min	Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences explained 11. 50 dice per group and a container to keep

<p>2. <u>Main Body (Lesson presentation)</u></p> <p>Background information:</p> <p>Matter is made of minute particles called atoms, and atoms are composed of even smaller components. These components have measurable properties, such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and electrons holds the atom together.</p> <p>The atom's nucleus is composed of protons and neutrons, which are much bigger than the electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.</p> <p>Radioactive isotopes are unstable and undergo spontaneous nuclear reactions, emitting particles and/or wavelike radiation. The decay of any one nucleus cannot be predicted, but a large group of identical nuclei decay at a predictable rate. This predictability can be used to estimate the age of materials that contain radioactive isotopes.</p> <p>Geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations. Current methods include using the known decay rates of radioactive isotopes present in rocks to measure the time since the rock was formed.</p> <p>Divide the class into groups of three to five learners.</p> <p>1. Collecting the data. To create the decay curve, you will first need to collect data. Work in groups of 3-5. Start with a container of 50 atoms of Cascadium (represented by dice). We will assume that at time = 0, all atoms in the container are parent isotopes). Follow these steps:</p>	<p>instructions, complete the task and ask and answer questions.</p> <p>3. Group work: learners to follow instructions and complete task.</p>	<p>5 min</p> <p>15 min</p>	<p>them in. Graph paper.</p> <p>Worksheets/instruction sheets. Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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<p>a) Shake the container and empty it onto a nearby tabletop or floor.</p> <p>b) Assume that any atom showing a one (1) is “Olympium”, the daughter isotope of Cascadium. Remove the daughter isotopes, count them, and record the amount on the Decay Curve Data Sheet.</p> <p>c) Subtract the number of daughter isotopes removed from the number of parents remaining.</p> <p>d) Replace the Cascadium parent atoms in the container, shake and roll again.</p> <p>e) Repeat this process for 20 rolls or until there are no dice remaining in the container. Be sure to record the number of parent atoms remaining after each episode of shaking.</p> <p>2. Create the decay curve. Plot your data on a piece of graph paper. Graph paper is provided at the end of your lab manual.</p> <p>a) For the horizontal (x) axis, you will plot the time in years. Assume time starts at 0 and each shake represents 2000 years.</p> <p>b) For the vertical article axis, you will plot the number of parent isotopes remaining. At time = 0, there will be fifty (50) parents.</p> <p>c) Be sure to label your axes and title your graph.</p> <p>d) After plotting the data, carefully draw a smooth, best-fit curve for the data.</p> <p>3. Answer the questions that follow. (Answers will vary from group to group).</p> <p>Using the decay curve you created, provide the answers to the following questions. Show any calculations you need to do and always, always, always include units on your final answer.</p> <p>1. Find the half-life of Cascadium from your graph.</p> <p>2. You have just found an unusual igneous rock and you want to know its age. You take the rock to an isotope lab for analysis. You are told that the</p>		15 min	
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<p>rock contains only 16% of the original amount of Cascadium. The original amount was 50 atoms.</p> <p>a) Using your decay curve, find the age of this unusual rock.</p> <p>b) How many atoms of Olympium (the daughter isotope) are in the rock at the time of analysis?</p> <p>3. Analysis of a different rock shows that the ratio of parent to daughter isotope in the rock is 1/8 Cascadium to 7/8 Olympium. Calculate the age of this rock sample using the half-life determined in 1.</p> <p>4. If the rock in question 3 originally contained 14,000 atoms of Cascadium, how many are remaining after 4 half-lives have passed? How many Olympium atoms are there after 4 half-lives?</p> <p>Hand in your work (data table, decay curve, questions and additional problems) the next day.</p> <p>3. Conclusion</p> <p>Recap lesson and get learners to clean and pack their resources away.</p> <p>Bibliography:</p> <p>www.indiana.edu</p> <p>www.evolution.berkeley.edu</p>	<p>4. Homework: provide the disadvantages of this method of dating fossils.</p>	<p>5 min</p> <p>15 min</p>	
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GRADE	10	SUBJECT	Life Sciences	WEEK	37 (Lesson 3)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR:	DATE STARTED:	DATE COMPLETED:	TIME:
LESSON OBJECTIVES	<p>Content: p. 36 (CAPS) Research 'missing link' between dinosaurs and birds e.g. <i>Archaeopteryx</i></p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain the "missing link" between dinosaurs and birds • Answer questions on the above topic • Collect, analyse and present research information • Provide bibliography for their research assignment 		

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction Research Assignment Discussion</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils, relative dating. • Mark and recap previous day's work. <p>2. Main Body (Lesson presentation)</p> <p>Teacher can divide class into groups for the research part. Learners to research on internet (GOL) or school internet/library or teacher could download information, print and make documents available to class/text books as a group. They then separate and complete their assignments individually. Teacher could also use SBA document to</p>	<p>1. Individual work: learners to answer questions and mark work.</p> <p>2. Learners to listen, follow instructions, research, record, complete the task and ask and answer</p>	<p>5 min</p> <p>40 min</p>	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences Explained 11.</p> <p>Internet access. Reference material/books.</p>

<p>explain or remind learners about proper referencing. The activity can be found and used from the following text books:</p> <p>Shuter's Top Class Life Sciences 10 p. 241, activity 11.3</p> <p>Understanding Life Sciences 10 p. 308, activity 4.2.6</p> <p>Focus Life Sciences 10 p. 27, activity 8</p> <p>3. Conclusion</p> <p>Learners to hand in research assignment.</p>	<p>questions.</p>		<p>Worksheets/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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GRADE	10	SUBJECT	Life Sciences	WEEK	37 (Lesson 4)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME:	
LESSON OBJECTIVES	<p>Content: p. 36 (CAPS) Coelacanth as an example of a "living" fossil found off the coast of South Africa</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain what is meant by the term <i>living fossils</i> • Provide possible reasons why these fossils have survived • Form a hypothesis and use scientific data to determine whether the hypothesis is accurate 				

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
<p>Teacher direct instruction</p> <p>Group work</p> <p>Discussion</p> <p>Quiz</p> <p>1. Introduction</p> <ul style="list-style-type: none"> • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils, relative dating and absolute dating. <p>Begin the lesson by asking students if they know of any animals that have been living on Earth since the time of the dinosaurs. Once you've discussed several examples, write the following animals on the board:</p> <ol style="list-style-type: none"> Coelacanths Crocodiles Horseshoe crabs Cockroaches 	<ol style="list-style-type: none"> Individual work: learners to listen, pay attention, ask and answer questions. 	10 min	<p>Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences explained 11.</p> <p>Computers with Internet access (optional but very helpful). Pens and paper.</p>

<p>Discuss how long ago each of these animals first appeared. The coelacanth lived 410 million years ago Cockroach, 350 mya Horseshoe crab, 250 mya Crocodile, 200 mya. <i>Coelacanths</i> are fish that date from 410 million years ago, but of the original 120 species, only one survived the event that killed the dinosaurs 65 million years ago. The surviving species few in number; ate cuttlefish, squids, snipe eels, small sharks, and other fish; and was dark blue, much like the colour of its ocean habitat. Point out that these animals lived at the same time as the dinosaurs, yet unlike the dinosaurs, they have survived. Tell students that scientists are still debating why these animals have survived.</p> <p>2. Main Body (Lesson presentation)</p> <p>Divide learners into groups of four or five. Ask them to research the coelacanth has survived. Before beginning the research, have students develop a hypothesis about why their animal did not become extinct. They should write their hypothesis in their notebooks. Revise the concept of a hypothesis is. Learners should base their hypotheses on the facts discussed during the introduction, as well as the discussion about why dinosaurs became extinct. Have learners conduct research at the web sites below or in the library or research material you provide, to find evidence to support or refute their hypotheses. Give learners time to work on this project in class and then have them finish their work for homework. They may discuss ideas with each other in the group, but each learner should answer the questions on his or her own. Have them explain whether their hypothesis was correct. Some ideas learners must address in their report: Describe the characteristics that might make an animal species likely to survive during a time when many other species are becoming extinct. Hypothesize the pros and cons of an animal species being a specialist, tolerating only a very narrow range of habitats or food. Under what circumstances might this species be more or less likely than others to survive a period of mass extinction? Alternative activity: Understanding Life Sciences 10 p. 306, activity 4.2.5/Exploring Life Sciences 10 p. 274, activity 7/Shuter's Life Sciences 10 p. 240, activity 11.2.</p>	<p>2. Learners to listen, follow instructions, formulate and test hypotheses, research, record, complete the task and ask and answer questions.</p> <p>Homework: Explain the purpose of developing a hypothesis before conducting scientific investigation. Distinguish between the terms: aim, result and conclusion. Hypothesis and Theory.</p>	<p>30 min</p> <p>5 min</p> <p>25 min</p>	<p>Reference material.</p> <p>Worksheets/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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<p>3. Conclusion Recap using questions.</p> <p>Bibliography:</p> <p>www.discoveryeducation.com; www.dinofish.com; www.aqua.org/animals/species/prhcrab.html; www.beachnet.com/horseshoe/Bayhorsecrab.html; www.pbs.org/wgbh/nova/crocs; www.insectia.com/beta/e/iv_c202015.html</p>			
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GRADE	10	SUBJECT	Life Sciences	WEEK	37 (Lesson 5)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME:	
LESSON OBJECTIVES	<p>Content: p. 37 (CAPS) Map the Key fossil sites on a map of South Africa Evidence from South Africa for Key Events in the History of Life</p> <p>The learners must be able to:</p> <ul style="list-style-type: none"> • Use a map of South Africa to indicate sites where fossils were found • Provide evidence found in South Africa relating to the History of Life • Answer question relating to the above 				

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Group work Discussion Quiz <ol style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils, relative dating and absolute dating. 2. Main Body (Lesson presentation) Have a brief discussion on South Africa's contribution of evidence in relation to Life's History	<ol style="list-style-type: none"> 1. Individual work: Learners to listen, pay attention, ask and answer questions and mark work. 2. Learners follow instructions and complete the task. 	10 min 7 min	Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences Explained 11. Computers with Internet access (optional but very helpful). Pens and paper. Reference material. Maps of South Africa.

Grade 10 Life Science Lesson Plans

<p>Divide learners into groups of four or five. Provide each group with a map of South Africa. Refer learners to the relevant text relating to the above information. Each group must be tasked with looking up one piece of evidence, plotting its site on the map, providing an annotation next to it and explaining that piece of evidence.</p> <p>Each group must present their findings to the class. The others must take information down and complete their maps as the presentations continue.</p> <p>Alternative activity: Understanding Life Sciences 10 p. 324, activity 4.2.14/Exploring Life Sciences 10 p. 281, activity 11/Shuter's Life Sciences 10 p. 255, activity 11.6.</p> <p>3. Conclusion Recap using questions, filling in gaps the groups may have left out.</p>	<p>3. Learners present while others pay attention, take down information and complete work</p> <p>Homework: Understanding Life Sciences 10 p. 323, activity 4.2.13. Exploring Life Sciences 10 p. 282, Case Study.</p>	<p>13 min</p> <p>15 min</p> <p>5 min</p> <p>25 min</p>	<p>Worksheets/instruction sheets.</p> <p>Transparencies/chalkboard/PowerPoint presentation could also be used.</p>
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GRADE	10	SUBJECT	Life Sciences	WEEK	37 (Lesson 6)	TOPIC	History of Life on Earth
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LESSON SUMMARY FOR: DATE STARTED:		DATE COMPLETED:		TIME: 75 MIN
LESSON OBJECTIVES	<p>Content: p. 37 (CAPS) The impact of humans on biodiversity and the natural environment. Fossil Tourism Fossil tourism is a source of income and employment in some localities.</p>			
	<p>The learners must be able to:</p> <ul style="list-style-type: none"> • Explain the impact humans have on biodiversity and the environment • Explain what fossil tourism is and how it impacts on the economy • Answer question relating to the above 			

TEACHER ACTIVITIES	LEARNER ACTIVITIES	TIMING	RESOURCES NEEDED
Teacher direct instruction Discussion Quiz 1. Introduction <ul style="list-style-type: none"> • Pre-knowledge: History of Life on Earth, Geological Timescale, some knowledge on sedimentary rock and fossils, making fossils, types of fossils, formation of fossils, relative dating, absolute dating. 	1. Individual work: learners to listen, pay attention, ask and answer questions and mark work.	10 min 15 min	Understanding Life Sciences Grade 11; Focus on Life Science 11; Life Sciences for all 11; Life Sciences

<p>2. <u>Main Body (Lesson presentation)</u></p> <p>Ask the following questions: What impact do we (humans) have on the environment? Is our contribution positive or negative? What are the consequences of our impact? Learners' responses will vary and could lead to a healthy debate. (Alternatively a stimulating DVD could be shown for a few min at the start to stimulate learners after which the discussion could be held)</p> <p>Explain what fossil tourism is and provide a few examples in South Africa, e.g. Cradle of Humankind – Maropeng (Gauteng); West Coast Fossil Park – Langebaan (Western Cape); Kitching Fossil Exploration Centre – Nieu Bethesda (Eastern Cape) A follow up activity could be to plan an excursion to Maropeng to show learners Fossil tourism in action. Thereafter stimulate class discussion about the need for Fossil Tourism and its impact on the economy of the country.</p> <p>Alternative activity: Exploring Life Sciences 10 p. 284, activity 13.</p> <p>3. <u>Conclusion</u> Recap using questions.</p>	<p>2. Learners to listen, pay attention, ask and answer questions and discuss their opinions.</p> <p>3. Learners to listen, pay attention, ask and answer questions and discuss their opinions.</p>	<p>15 min</p> <p>5 min</p>	<p>Explained 11.</p> <p>Worksheets/instruction sheets. Transparencies/chalk board/PowerPoint presentation could also be used.</p>
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