



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

GRADE 11

**LIFE SCIENCES
MID-YEAR EXAMINATION
JUNE 2022**

MARKS: 150

Stanmorephysics.com

DURATION: 2½ HOURS

This QUESTION PAPER consists of 18 pages

Life Science Grade 11 Limpopo November 2014

Marcel A. Müller



Life Science Grade 11 Limpopo November 2014:

Getting the books **Life Science Grade 11 Limpopo November 2014** now is not type of inspiring means. You could not isolated going past book collection or library or borrowing from your friends to edit them. This is an extremely easy means to specifically acquire lead by on-line. This online statement Life Science Grade 11 Limpopo November 2014 can be one of the options to accompany you past having supplementary time.

It will not waste your time. admit me, the e-book will very tune you supplementary concern to read. Just invest tiny time to entrance this on-line revelation **Life Science Grade 11 Limpopo November 2014** as skillfully as evaluation them wherever you are now.

https://splashdogs.com/data/virtual-library/index.jsp/Go_Pro_Owners_Manual.pdf

Table of Contents Life Science Grade 11 Limpopo November 2014

1. Understanding the eBook Life Science Grade 11 Limpopo November 2014
 - The Rise of Digital Reading Life Science Grade 11 Limpopo November 2014
 - Advantages of eBooks Over Traditional Books
2. Identifying Life Science Grade 11 Limpopo November 2014
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Life Science Grade 11 Limpopo November 2014
 - User-Friendly Interface
4. Exploring eBook Recommendations from Life Science Grade 11 Limpopo November 2014
 - Personalized Recommendations
 - Life Science Grade 11 Limpopo November 2014 User Reviews and Ratings
 - Life Science Grade 11 Limpopo November 2014 and Bestseller Lists

5. Accessing Life Science Grade 11 Limpopo November 2014 Free and Paid eBooks
 - Life Science Grade 11 Limpopo November 2014 Public Domain eBooks
 - Life Science Grade 11 Limpopo November 2014 eBook Subscription Services
 - Life Science Grade 11 Limpopo November 2014 Budget-Friendly Options
6. Navigating Life Science Grade 11 Limpopo November 2014 eBook Formats
 - ePub, PDF, MOBI, and More
 - Life Science Grade 11 Limpopo November 2014 Compatibility with Devices
 - Life Science Grade 11 Limpopo November 2014 Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Life Science Grade 11 Limpopo November 2014
 - Highlighting and Note-Taking Life Science Grade 11 Limpopo November 2014
 - Interactive Elements Life Science Grade 11 Limpopo November 2014
8. Staying Engaged with Life Science Grade 11 Limpopo November 2014
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Life Science Grade 11 Limpopo November 2014
9. Balancing eBooks and Physical Books Life Science Grade 11 Limpopo November 2014
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Life Science Grade 11 Limpopo November 2014
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Life Science Grade 11 Limpopo November 2014
 - Setting Reading Goals Life Science Grade 11 Limpopo November 2014
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Life Science Grade 11 Limpopo November 2014
 - Fact-Checking eBook Content of Life Science Grade 11 Limpopo November 2014
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

Life Science Grade 11 Limpopo November 2014 Introduction

In this digital age, the convenience of accessing information at our fingertips has become a necessity. Whether its research papers, eBooks, or user manuals, PDF files have become the preferred format for sharing and reading documents. However, the cost associated with purchasing PDF files can sometimes be a barrier for many individuals and organizations. Thankfully, there are numerous websites and platforms that allow users to download free PDF files legally. In this article, we will explore some of the best platforms to download free PDFs. One of the most popular platforms to download free PDF files is Project Gutenberg. This online library offers over 60,000 free eBooks that are in the public domain. From classic literature to historical documents, Project Gutenberg provides a wide range of PDF files that can be downloaded and enjoyed on various devices. The website is user-friendly and allows users to search for specific titles or browse through different categories. Another reliable platform for downloading Life Science Grade 11 Limpopo November 2014 free PDF files is Open Library. With its vast collection of over 1 million eBooks, Open Library has something for every reader. The website offers a seamless experience by providing options to borrow or download PDF files. Users simply need to create a free account to access this treasure trove of knowledge. Open Library also allows users to contribute by uploading and sharing their own PDF files, making it a collaborative platform for book enthusiasts. For those interested in academic resources, there are websites dedicated to providing free PDFs of research papers and scientific articles. One such website is Academia.edu, which allows researchers and scholars to share their work with a global audience. Users can download PDF files of research papers, theses, and dissertations covering a wide range of subjects. Academia.edu also provides a platform for discussions and networking within the academic community. When it comes to downloading Life Science Grade 11 Limpopo November 2014 free PDF files of magazines, brochures, and catalogs, Issuu is a popular choice. This digital publishing platform hosts a vast collection of publications from around the world. Users can search for specific titles or explore various categories and genres. Issuu offers a seamless reading experience with its user-friendly interface and allows users to download PDF files for offline reading. Apart from dedicated platforms, search engines also play a crucial role in finding free PDF files. Google, for instance, has an advanced search feature that allows users to filter results by file type. By specifying the file type as "PDF," users can find websites that offer free PDF downloads on a specific topic. While downloading Life Science Grade 11 Limpopo

November 2014 free PDF files is convenient, its important to note that copyright laws must be respected. Always ensure that the PDF files you download are legally available for free. Many authors and publishers voluntarily provide free PDF versions of their work, but its essential to be cautious and verify the authenticity of the source before downloading Life Science Grade 11 Limpopo November 2014. In conclusion, the internet offers numerous platforms and websites that allow users to download free PDF files legally. Whether its classic literature, research papers, or magazines, there is something for everyone. The platforms mentioned in this article, such as Project Gutenberg, Open Library, Academia.edu, and Issuu, provide access to a vast collection of PDF files. However, users should always be cautious and verify the legality of the source before downloading Life Science Grade 11 Limpopo November 2014 any PDF files. With these platforms, the world of PDF downloads is just a click away.

FAQs About Life Science Grade 11 Limpopo November 2014 Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer webbased readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Life Science Grade 11 Limpopo November 2014 is one of the best book in our library for free trial. We provide copy of Life Science Grade 11 Limpopo November 2014 in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Life Science Grade 11 Limpopo November 2014. Where to download Life Science Grade 11 Limpopo November 2014 online for free? Are you looking for Life Science Grade 11 Limpopo November 2014 PDF? This is definitely going to save you time and cash in something you should think about. If you trying to find then search around for online. Without a doubt there are numerous these available and many of them have the freedom. However without doubt you receive whatever you purchase. An alternate way to get ideas is always to check another Life Science Grade 11 Limpopo November 2014. This method for see exactly what may be included and adopt these ideas to your book. This site will almost certainly help you save time and effort, money and stress. If you are looking for free books then you really should consider finding to assist you try this.

Several of Life Science Grade 11 Limpopo November 2014 are for sale to free while some are payable. If you are not sure if the books you would like to download work with for usage along with your computer, it is possible to download free trials. The free guides make it easy for someone to free access online library for download books to your device. You can get free download on free trial for lots of books categories. Our library is the biggest of these that have literally hundreds of thousands of different products categories represented. You will also see that there are specific sites catered to different product types or categories, brands or niches related with Life Science Grade 11 Limpopo November 2014. So depending on what exactly you are searching, you will be able to choose e books to suit your own need. Need to access completely for Campbell Biology Seventh Edition book? Access Ebook without any digging. And by having access to our ebook online or by storing it on your computer, you have convenient answers with Life Science Grade 11 Limpopo November 2014. To get started finding Life Science Grade 11 Limpopo November 2014, you are right to find our website which has a comprehensive collection of books online. Our library is the biggest of these that have literally hundreds of thousands of different products represented. You will also see that there are specific sites catered to different categories or niches related with Life Science Grade 11 Limpopo November 2014. So depending on what exactly you are searching, you will be able to choose ebook to suit your own need. Thank you for reading Life Science Grade 11 Limpopo November 2014. Maybe you have knowledge that, people have search numerous times for their favorite readings like this Life Science Grade 11 Limpopo November 2014, but end up in harmful downloads. Rather than reading a good book with a cup of coffee in the afternoon, instead they juggled with some harmful bugs inside their laptop. Life Science Grade 11 Limpopo November 2014 is available in our book collection and online access to it is set as public so you can download it instantly. Our digital library spans in multiple locations, allowing you to get the most less latency time to download any of our books like this one. Merely said, Life Science Grade 11 Limpopo November 2014 is universally compatible with any devices to read.

Find Life Science Grade 11 Limpopo November 2014 :

~~go pro owners manual~~

gnu c library reference manual

gmc 6000 repair manual

going back forward the dark ages of modern society

golden guide class 7

go grammar workbook 3rd ed collins

gm shop repair manual blazer

~~goat and sheep fattening technique in nigeria~~

gmc w4500 liftgate manual
gm truck manual transmission identification
go math florida standard practice grade 3
golden guide social science class9 history
go with microsoft office 2013 volume 2
golden guide sample papers class 9
gold book classic car pricing guide

Life Science Grade 11 Limpopo November 2014 :

the great war for civilisation the conquest of the middle east - Sep 27 2021

pdf robert fisk the great war for civilization the - Nov 10 2022

the great war for civilisation the conquest of the middle east robert fisk google books british foreign correspondent fisk has been based in the middle east for the last 25 years

the great war for civilisation the conquest of the middle east - May 16 2023

language links are at the top of the page across from the title

the great war for civilisation the conquest of the middle east - Sep 20 2023

mar 3 2021 a sweeping and dramatic history of the last half century of conflict in the middle east from an award winning journalist who has covered the region for over forty years the great war for civilisation unflinchingly chronicles the tragedy of the region from the algerian civil war to

the great war for civilisation the conquest of the middle east - May 04 2022

oct 11 2023 total war pharaoh releases on october 11 2023 on pc and the game takes place during the 12th century bc as egypt and other great civilisations face the looming threat

the great war for civilisation wikipedia - Jul 18 2023

jun 5 2014 bibtex endnote refman robert fisk s bestselling eyewitness account of the events that have shaped the middle east is alive with vivid reporting and incisive historical

the great war for civilisation the conquest of the middle east - Dec 11 2022

sep 1 2006 the great war for civilisation the conquest of the middle east the world is flat a brief history of the twenty first century why globalization works ramez maluf

the great war for civilisation the conquest of the - Jun 17 2023

sep 26 2013 a sweeping and dramatic history of the last half century of conflict in the middle east from an award winning journalist who has covered the region for over thirty years the

the great war for civilisation the conquest of the middle east - Jan 12 2023

he lays open the role of the west in the seemingly endless strife and warfare in the region traces the growth of the west s involvement and influence there over the past one hundred years and

the great war for civilisation the conquest of the middle east - Aug 27 2021

what s the israel palestinian conflict about and how did it start - Nov 29 2021

the great war for civilisation the conquest of the middle east - Mar 02 2022

the great war for civilisation the conquest of th getting the books the great war for civilisation the conquest of th now is not type of inspiring means you could not single

the great war for civilisation the conquest of the - Aug 19 2023

the great war for civilisation the conquest of the middle east is a book published in 2005 by the english journalist robert fisk the book is based on many of the articles fisk wrote when he was serving as a correspondent in the middle east for the times and the independent the book revolves around several key themes regarding the history of the modern middle east the arab israeli conflict

the great war for civilisation the conquest of the middle east - Oct 09 2022

a sweeping and dramatic history of the last half century of conflict in the middle east from an award winning journalist who has covered the region for over forty years the great war for

the great war for civilisation the conquest of the middle east - Apr 03 2022

oct 10 2023 in 1967 israel made a pre emptive strike against egypt and syria launching the six day war israel has occupied the west bank arab east jerusalem which it captured from

the great war for civilisation the conquest of the middle east - Jun 05 2022

oct 15 2023 the history of gaza in 2 minutes 02 11 source cnn cnn israel is gearing up for the next stage of its war on hamas following the palestinian militant group s brutal

the great war for civilisation the conquest of the middle east - Apr 15 2023

english xxiv 1368 pages 20 cm decorated british foreign correspondent robert fisk has been based in the middle east for the last 25 years reporting from the world s worst trouble spots

the great war for civilisation the conquest of the middle east - Feb 13 2023

the great war for civilisation the conquest of the middle east kitap açıklaması robert fisk s bestselling eyewitness account of the events that have shaped the middle east is alive with

the great war for civilisation the conquest of the middle east - Mar 14 2023

discussed in biography in robert fisk nation lebanon at war 2001 the great war for civilisation the conquest of the middle east 2005 and the age of the warrior selected

the great war for civilisation the conquest of the middle east - Aug 07 2022

jan 1 2006 the horrors of saddam hussein s rule the brutal algerian civil war of the 1990s hafiz al assad s 1982 destruction of hama and the many other examples of obscene cruelty

the great war for civilisation the conquest of th christoph - Oct 29 2021

why total war pharaoh is a fresh trip to ancient egypt - Dec 31 2021

nov 8 2005 a scribe at britain s the independent english born robert fisk 1946 ph d political science ll d et al has resided in beirut lebanon since 1976 his compassionate

the great war for civilisation the conquest of the middle east - Sep 08 2022

buy the great war for civilisation the conquest of the middle east vintage reprint by fisk robert isbn 9781400075171 from amazon s book store everyday low prices and free

the great war for civilisation the conquest of the - Jul 06 2022

robert fisk the great war for civilisation the conquest of the middle east uk ed edition kindle edition by robert fisk author format kindle edition 4 6 1 149 ratings see all formats

gaza explained what to know about the enclave cnn - Feb 01 2022

english xxvi 1366 pages 24 cm british foreign correspondent fisk has been based in the middle east for the last 25 years reporting from the world s worst trouble spots this is his

banbury impex case study answers 2022 mucho goldenpalace - Jul 26 2022

web impex kitchen appliances case study solutions banbury impex case study answers s2 kora com banbury gcse geography case study wodongapodiatry com solved hello here i have four questions for mini case mini case banbury impex ftik usm ac id 3rd grade math act aspire practice banbury impex case study

banbury impex india ppt slideshare - May 04 2023

web apr 16 2014 in 2010 banbury impex pvt ltd would close with a small growth in sales and a small drop in profits two problems 1 negotiating a short term prospective sale to a turkish company 2 increasing overall profitability in a long term two price forces 1 rapid rise in the price of cotton 2 the rising value of the indian rupee inp against the u s

banbury impex case study answers uniport edu - May 24 2022

web jun 11 2023 the banbury impex case study answers it is unquestionably easy then past currently we extend the colleague to buy and make bargains to download and install banbury impex case study answers as a result simple patents act 1990 australia 2018 edition the law the law library 2018 05 31

hello i have a question about the case chegg com - Dec 31 2022

web question hello i have a question about the case banbury impex india link chegg com homework help questions and answers canbury impex india

banbury impex case study answers pdf uniport edu - Sep 27 2022

web aug 19 2023 banbury impex case study answers 1 9 downloaded from uniport edu ng on august 19 2023 by guest banbury impex case study answers when somebody should go to the book stores search initiation by shop shelf by shelf it is in fact problematic this is why we provide the books compilations in this website

banbury impex case study answers best writing service - Feb 18 2022

web jul 7 2023 banbury impex case study answers id 11550 100 success rate 7 customer reviews 4240 orders prepared 296 customer reviews nursing business and economics management healthcare 84 535 finished papers got my paper 1087 finished papers essay research paper coursework powerpoint presentation

banburyimpexindiamini casestudy 1 banbury impex india mini case study - Jun 05 2023

web banbury impex india mini case study 1 which factor do you think is more threatening to banbury s profitability cotton prices or the rising value of the rupee while the rising cotton prices are certainly threatening to banbury s profitability at a 75 increase within the past 12 months the rising value of the rupee is much more

solution e commerce b com hons studypool - Feb 01 2023

web lynn university banbury impex transaction exposure case study questions read case and answer to questions there are 4 questions that needs to be answered after reading the cas

banbury impex by suzanna yu prezi - Sep 08 2023

web mar 6 2014 1 rapid rose in the price of cotton 2 the rising value of the indian rupee inp against the u s dollar after 2005 the government had hoped for textile exports to hit usd 50million by 2010 they were only usd 22million challenges competition from china and other asian countries

solution lynn university banbury impex transaction exposure case study - Aug 07 2023

web transaction exposure mini case banbury impex india as november 2010 came to a close ceo aadesh lapura of banbury impex private limited a textile company in india sat in his office in solitude looking over his com pany s financial statements it looked like 2010 would close with a small growth in sales and a small drop in profits

banbury impex case study answers uniport edu - Apr 22 2022

web banbury impex case study answers 1 5 downloaded from uniport edu ng on may 17 2023 by guest banbury impex case study answers when somebody should go to the books stores search initiation by shop shelf by shelf it is truly problematic this is why we present the book compilations in this website it will totally ease you to see

solved according to the banbury impex case that can easily - Oct 09 2023

web question according to the banbury impex case that can easily be found online please answer the following a which factor do you think is more threatening to banbury s profitability cotton prices or the rising value of the rupee b do you think that lapura should hedge his cotton costs with cotton futures what would you recommend c which

banbury case study docx international business finance - Apr 03 2023

web introduction in the given case study banbury impex private limited is an indian textile company found in 1997 it is experiencing both a small growth in sales and small drop in profits the return on sales is also not satisfactory and needs to be improved

banbury impex mini case presentation mini case study - Jul 06 2023

web 1 mini case study banbury impex by rewal alonso case background introduction banbury impex private limited founded in 1997 is a manufacturer and exporter of apparel fabrics the company s expected sales in 2010 is inr 25 6 crores or usd 5 4 million

banbury impex case study answers pdf pdf pdf - Aug 27 2022

web sep 23 2023 banbury impex case study answers pdf pdf yeah reviewing a book banbury impex case study answers pdf pdf could mount up your near connections listings this is just one of the solutions for you to be successful as understood achievement does not suggest that you have wonderful points

case banbury impex india assignment for course real - Nov 29 2022

web banbury case study docx st xaviers college mba 1 fin4102 group assignment3 docx luis cedenon01680074 mini case banbury impex india 1 which factor do you think is more threatening to banbury s profitability please refer to the attachment to answer this question this question was created from lab 5 collision and momentum docx

solved hello here i have four questions for mini case chegg - Mar 02 2023

web hello here i have four questions for mini case banbury impex india a which factor do you think is more threatening to banbury s profitability cotton prices or the rising value of the rupee b do you think that lapura should hedge his cotton costs with cotton futures what would you recommend c

slideplayer com - Jun 24 2022

web we would like to show you a description here but the site won t allow us

banbury impex case study answers fast service - Mar 22 2022

web banbury impex case study answers best cost strategy essay best phd essay ghostwriters service for university scientific research and essays journal impact factor integrated essay practice problems good topic write argument essay if you re struggling to get started try the write what you know strategy

read online banbury impex case study answers free - Oct 29 2022

web how to answer questions relating to case studies 1 read the case study carefully case studies will run up to many lines so do not think twice about spending time on reading the question read it the second time if o haven t understood clearly

nonlinear system identification vitalsource - Dec 04 2021

web mar 15 2021 nonlinear system identification signal processing computational neuroscience causality analysis functional connectivity eeg introduction the human

nonlinear system identification from classical - Mar 19 2023

web jan 1 2001 from classical approaches to neural networks and fuzzy models the book covers the most common and important approaches for the identification of nonlinear

nonlinear system identification from classical approaches to - Jun 22 2023

web nonlinear system identification from classical approaches to neural networks fuzzy models and gaussian processes responsibility oliver nelles edition 2nd ed imprint

pdf classical system identification researchgate - Jan 05 2022

web nonlinear system identification from classical approaches to neural networks and fuzzy models is written by oliver nelles and published by springer the digital and

nonlinear system identification from classical approaches to - Jul 11 2022

web sep 9 2020 oliver nelles nonlinear system identification from classical approaches to neural networks fuzzy models and gaussian processes 2nd edition kindle edition

nonlinear system identification from classical approaches to - Feb 06 2022

web may 1 2022 volterra series approximate a broad range of nonlinear systems their identification is challenging due to the curse of dimensionality the number of model

nonlinear system identification of neural systems from - Nov 03 2021

open access nonlinear system identification from classical - Apr 08 2022

web sep 1 2020 this paper compares radial basis function networks for identification of nonlinear dynamic systems with classical methods derived from the volterra series

[nonlinear system identification from classical approaches to](#) - Oct 14 2022

web buy nonlinear system identification from classical approaches to neural networks fuzzy models and gaussian processes
2nd ed 2020 by nelles oliver isbn

[nonlinear system identification from classical](#) - Jul 23 2023

web sep 9 2020 in the past nonlinear system identification was a field characterized by a variety of ad hoc approaches each applicable only to a very limited class of systems

nonlinear system identification of neural systems from - Jan 17 2023

web mar 3 2021 nonlinear behaviours in neural systems are thought to be associated with various neural functions including neuronal encoding neural processing of synaptic

nonlinear system identification from classical approaches to - Apr 20 2023

web 3 reviews reviews aren t verified but google checks for and removes fake content when it s identified the goal of this book is to provide engineers and scientists in academia and

nonlinear system identification from multiple model networks to - Aug 12 2022

web the book covers the most common and important approaches for the identification of nonlinear static and dynamic systems additionally it provides the reader with the

nonlinear system identification from classical approaches to - Sep 13 2022

web oct 1 2008 in this review we highlight recent advances in nonlinear system identification of neural systems corresponding time and frequency domain analysis

[nonlinear dynamic system identification springerlink](#) - May 09 2022

web nov 5 2000 nonlinear system identification from classical approaches to neural networks and fuzzy models oliver nelles
05 nov 2000 tl dr this chapter discusses

[nonlinear system identification from classical approaches to](#) - May 21 2023

web jan 1 2020 to identify the nonlinear properties of the mechanical system at hand the nonlinear arx model is studied as the identification method the nonlinear arx

[nonlinear system identification from classical approaches to](#) - Aug 24 2023

web this book provides engineers and scientists in academia and industry with a thorough understanding of the underlying principles of nonlinear system identification it equips them to apply the models and methods discussed to real problems with confidence while

nonlinear system identification wikipedia - Nov 15 2022

web nov 6 2000 this chapter discusses optimization techniques which focuses on the development of static models and

applications which focus on the application of

nonlinear system identification from classical - Feb 18 2023

web mar 15 2021 in this review we highlight recent advances in nonlinear system identification of neural systems

corresponding time and frequency domain analysis

nonlinear system identification of neural systems from - Dec 16 2022

web nonlinear system identification system identification is a method of identifying or measuring the mathematical model of a system from measurements of the system

nonlinear system identification from classical approaches to - Jun 10 2022

web may 19 2022 oliver nelles2 chapter first online 19 may 2022 2908 accesses 5 citations abstract this chapter addresses many fundamental issues arising when transitioning

nonlinear dynamic system identification request pdf - Mar 07 2022

web for librarians lib ugent be catalog ebk01 4100000011435794 nonlinear system identification electronic resource from classical approaches to neural networks