



education

Department of
Education
FREE STATE PROVINCE

PHYSICAL SCIENCES PAPER 1 (PHYSICS)

GRADE 12

TERMS & DEFINITIONS, QUESTIONS & ANSWERS PER TOPIC

2021



TABLE OF CONTENTS



HOW TO USE THIS DOCUMENT	2
TERMS AND DEFINITIONS	2
QUESTIONS	7
NEWTON'S LAWS	7
VERTICAL PROJECTILE MOTION	12
MOMENTUM AND IMPULSE	17
WORK, ENERGY AND POWER	23
DOPPLER EFFECT	29
ELECTROSTATICS	34
ELECTRIC CIRCUITS	41
ELECTRICAL MACHINES	51
OPTICAL PHENOMENA AND PROPERTIES OF MATERIALS	56
ANSWERS TO QUESTIONS	63
NEWTON'S LAWS	63
VERTICAL PROJECTILE MOTION	71
MOMENTUM AND IMPULSE	85
WORK, ENERGY AND POWER	90
DOPPLER EFFECT	99
ELECTROSTATICS	104
ELECTRIC CIRCUITS	115
ELECTRICAL MACHINES	125
OPTICAL PHENOMENA AND PROPERTIES OF MATERIALS	132
BIBLIOGRAPHY	139



Physical Science Paper Gr12014 14november

RJ Shavelson



Physical Science Paper Gr12014 14november:

Delve into the emotional tapestry woven by in **Physical Science Paper Gr12014 14november** . This ebook, available for download in a PDF format (PDF Size: *), is more than just words on a page; it's a journey of connection and profound emotion. Immerse yourself in narratives that tug at your heartstrings. Download now to experience the pulse of each page and let your emotions run wild.

https://crm.avenza.com/files/publication/Download_PDFS/Palfinger_5000_Cranes_Manual.pdf

Table of Contents Physical Science Paper Gr12014 14november

1. Understanding the eBook Physical Science Paper Gr12014 14november
 - The Rise of Digital Reading Physical Science Paper Gr12014 14november
 - Advantages of eBooks Over Traditional Books
2. Identifying Physical Science Paper Gr12014 14november
 - 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 Physical Science Paper Gr12014 14november
 - User-Friendly Interface
4. Exploring eBook Recommendations from Physical Science Paper Gr12014 14november
 - Personalized Recommendations
 - Physical Science Paper Gr12014 14november User Reviews and Ratings
 - Physical Science Paper Gr12014 14november and Bestseller Lists
5. Accessing Physical Science Paper Gr12014 14november Free and Paid eBooks
 - Physical Science Paper Gr12014 14november Public Domain eBooks
 - Physical Science Paper Gr12014 14november eBook Subscription Services
 - Physical Science Paper Gr12014 14november Budget-Friendly Options

6. Navigating Physical Science Paper Gr12014 14november eBook Formats
 - ePub, PDF, MOBI, and More
 - Physical Science Paper Gr12014 14november Compatibility with Devices
 - Physical Science Paper Gr12014 14november Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Physical Science Paper Gr12014 14november
 - Highlighting and Note-Taking Physical Science Paper Gr12014 14november
 - Interactive Elements Physical Science Paper Gr12014 14november
8. Staying Engaged with Physical Science Paper Gr12014 14november
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Physical Science Paper Gr12014 14november
9. Balancing eBooks and Physical Books Physical Science Paper Gr12014 14november
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Physical Science Paper Gr12014 14november
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Physical Science Paper Gr12014 14november
 - Setting Reading Goals Physical Science Paper Gr12014 14november
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Physical Science Paper Gr12014 14november
 - Fact-Checking eBook Content of Physical Science Paper Gr12014 14november
 - 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

Physical Science Paper Gr12014 14november Introduction

In the digital age, access to information has become easier than ever before. The ability to download Physical Science Paper Gr12014 14november has revolutionized the way we consume written content. Whether you are a student looking for course material, an avid reader searching for your next favorite book, or a professional seeking research papers, the option to download Physical Science Paper Gr12014 14november has opened up a world of possibilities. Downloading Physical Science Paper Gr12014 14november provides numerous advantages over physical copies of books and documents. Firstly, it is incredibly convenient. Gone are the days of carrying around heavy textbooks or bulky folders filled with papers. With the click of a button, you can gain immediate access to valuable resources on any device. This convenience allows for efficient studying, researching, and reading on the go. Moreover, the cost-effective nature of downloading Physical Science Paper Gr12014 14november has democratized knowledge. Traditional books and academic journals can be expensive, making it difficult for individuals with limited financial resources to access information. By offering free PDF downloads, publishers and authors are enabling a wider audience to benefit from their work. This inclusivity promotes equal opportunities for learning and personal growth. There are numerous websites and platforms where individuals can download Physical Science Paper Gr12014 14november. These websites range from academic databases offering research papers and journals to online libraries with an expansive collection of books from various genres. Many authors and publishers also upload their work to specific websites, granting readers access to their content without any charge. These platforms not only provide access to existing literature but also serve as an excellent platform for undiscovered authors to share their work with the world. However, it is essential to be cautious while downloading Physical Science Paper Gr12014 14november. Some websites may offer pirated or illegally obtained copies of copyrighted material. Engaging in such activities not only violates copyright laws but also undermines the efforts of authors, publishers, and researchers. To ensure ethical downloading, it is advisable to utilize reputable websites that prioritize the legal distribution of content. When downloading Physical Science Paper Gr12014 14november, users should also consider the potential security risks associated with online platforms. Malicious actors may exploit vulnerabilities in unprotected websites to distribute malware or steal personal information. To protect themselves, individuals should ensure their devices have reliable antivirus software installed and validate the legitimacy of the websites they are downloading from. In conclusion, the ability to download Physical Science Paper Gr12014 14november has transformed the way we access information. With the convenience, cost-effectiveness, and accessibility it offers, free PDF downloads have become a popular choice for students, researchers, and book lovers worldwide. However, it is crucial to engage in ethical downloading practices and prioritize personal security when utilizing online platforms. By doing so,

individuals can make the most of the vast array of free PDF resources available and embark on a journey of continuous learning and intellectual growth.

FAQs About Physical Science Paper Gr12014 14november 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 web-based 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. Physical Science Paper Gr12014 14november is one of the best book in our library for free trial. We provide copy of Physical Science Paper Gr12014 14november in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Physical Science Paper Gr12014 14november. Where to download Physical Science Paper Gr12014 14november online for free? Are you looking for Physical Science Paper Gr12014 14november PDF? This is definitely going to save you time and cash in something you should think about.

Find Physical Science Paper Gr12014 14november :

[palfinger 5000 cranes manual](#)

[padi rescue instructor manual](#)

[pacing guide for singapore math 4a](#)

[palm beach county happy hour guide](#)

[paintball field operators guide](#)

[padi rescue final exams](#)

panasonic dishwasher user manual

p44585a math pastpaper answers

[palm centro user manual verizon](#)
[paired passages for 3rd graders](#)
[pa motor vehicle agency](#)
[paccar px 6 manual](#)
[pampered chef california club pizza recipe](#)
[palm coast auto center](#)
[panasonic dmc fh25k manual](#)

Physical Science Paper Gr12014 14november :

restaurant manager opening checklist food service warehouse - Aug 04 2022

web aug 5 2023 restaurant manager opening checklist food service warehouse 1 6 downloaded from uniport edu ng on august 5 2023 by guest restaurant manager opening checklist food service warehouse this is likewise one of the factors by obtaining the soft documents of this restaurant manager opening checklist food

restaurant manager opening checklist food service warehouse - Jan 29 2022

web jun 12 2023 restaurant manager opening checklist food service warehouse and numerous books assortments from fictions to scientific investigationh in any way restaurant manager opening checklist food service warehouse is accessible in

daily restaurant management checklists the ultimate guide - Jul 15 2023

web jan 20 2022 a manager s duties can be divided into the three main phases of a restaurant s operations opening and closing checklists for the restaurant and a checklist for your shift change working with a checklist for a restaurant manager will help you immensely

the pre opening restaurant checklist every manager needs - Jun 14 2023

web nov 14 2016 a pre opening shift checklist is just one of many you need to make your restaurant efficient and keep those customers coming through your doors temperature checks one of the first things you will do before opening is checking the temperature of food stored in the fridges and freezers the best way to do this is through a temperature

restaurant manager duties checklist free download - Nov 07 2022

web a restaurant manager duties checklist helps managers stay organized which is essential in a hectic environment like a restaurant our free downloadable checklist lists about a dozen tasks managers need to do during opening and closing shifts each day and on a monthly basis each task comes with a checkbox next to it which managers can mark

[restaurant manager opening checklist food service warehouse](#) - Oct 06 2022

web restaurant manager opening checklist food service warehouse downloaded from dotnbm com by guest ramirez camacho

the restaurant manager's handbook bod books on demand book cd this comprehensive book will show you step by step how to set up operate and manage a financially successful food service operation

[restaurant manager opening checklist pdf restaurants scribd](#) - Mar 11 2023

web restaurant manager's opening checklist opening task initial when complete 1 check building exterior as you approach be on the lookout for broken windows loitering strangers or other signs of burglary as well as any litter or debris 2 unlock doors enter building and disarm the alarm system 3 turn on lights as needed 4

your daily restaurant opening checklists free pdf included - Aug 16 2023

web jun 14 2023 the daily opening checklist makes sure that all the equipment like the oven meat slicer stovetops etc are in working order which helps minimize the risk of injury free restaurant daily opening checklists pdf create your restaurant's opening checklists using our free pdf download the free pdf now

[free restaurant checklist form pdf safetyculture](#) - May 13 2023

web aug 15 2023 restaurant checklists are used by managers or quality inspectors to conduct site audits of all areas of the restaurant use this checklist to prepare the restaurant before opening set dining chairs and tables clean and sanitize the windows and table tops clean dirty floors

restaurant manager opening checklist food service warehouse - Feb 27 2022

web restaurant manager opening checklist food service warehouse 5 5 diagrams and source code with line by line explanation you'll build a completely functional web application and make it available to a wide range of devices cracking the code includes coverage of client access from i mode enabled devices voice enabled devices wap and html

restaurant manager opening checklist food service warehouse - Mar 31 2022

web feb 16 2023 ambition to download and install the restaurant manager opening checklist food service warehouse it is utterly easy then since currently we extend the join to purchase and create bargains to download and install restaurant manager opening checklist food service warehouse correspondingly simple

restaurant manager opening checklist food service warehouse - Jun 02 2022

web restaurant manager opening checklist food service warehouse restaurant requires the balanced coordination of staff vendors and inventory in essence the restaurant's efficient operation is dependent upon its preparedness safer food better business for caterers food standards april 27th 2018 this food safety management pack

[restaurant manager opening checklist template](#) - Jan 09 2023

web download this restaurant manager opening checklist template design in word google docs pdf apple pages format easily editable printable downloadable restaurant managers are the face of any restaurant and perform different numbers of tasks depending on the type of restaurant they're handling

the ultimate restaurant opening and closing checklists lineup ai - Apr 12 2023

web jul 14 2023 a restaurant s daily operations checklist is a list of tasks that the staff and managers need to complete each day both upon opening and closing the restaurant the checklist can be printed out on paper or it can be a digital checklist that s reviewed on a tablet or other device

restaurant manager opening checklist food service warehouse - Sep 05 2022

web jul 28 2023 restaurant manager opening checklist food service warehouse pdf below the restaurant manager s handbook douglas robert brown 2007 book cd this comprehensive book will show you step by step how to set up operate and manage a financially successful food service operation this restaurant manager s handbook

restaurant manager duties checklist free template coast app - Dec 08 2022

web sep 30 2020 a restaurant manager checklist is used to ensure daily operational tasks are being completed use this checklist to ensure that your managers are focused on leading your staff and taking care of the restaurant s operations coast and their collaborators provide this resource as a service to the public coast and their

restaurant manager opening checklist food service warehouse - May 01 2022

web restaurant manager opening checklist food service warehouse is understandable in our digital library an online access to it is set as public as a result you can download it instantly

restaurant manager opening checklist food service warehouse - Jul 03 2022

web restaurant manager opening checklist food service warehouse when people should go to the book stores search commencement by shop shelf by shelf it is in point of fact problematic this is why we provide the books compilations in this website it will categorically ease you to look guide restaurant manager opening checklist food

restaurant manager opening checklist food service warehouse - Dec 28 2021

web jun 25 2023 most present launched it will enormously convenience you to see manual restaurant manager opening checklist food service warehouse as you such as eventually you will categorically discover a supplementary experience and act by spending more cash plainly put the restaurant manager opening checklist food service

restaurant opening checklist download free template fooddocs - Feb 10 2023

web as part of our digital food safety management system features we have come up with several different checklist templates that include a restaurant opening checklist and are all in our template hub our checklist templates are absolutely free and can be easily edited downloaded and printed for your convenience

intelligent power modules utilizing bjts mosfets and igbts - Jul 21 2022

web jul 27 2020 an intelligent power module ipm is a power semiconductor module that integrates into a single package all the circuitry required to operate an igbt it includes the required drive circuitry and the protection functions as well as the

igbts in this way the best possible performance can be achieved from an available igbt technology

fundamentals of mosfet and igbt gate driver circuits - Oct 04 2023

web mosfet is an acronym for metal oxide semiconductor field effect transistor and it is the key component in high frequency high efficiency switching applications across the electronics industry it might be surprising but fet technology was invented in 1930 some 20 years before the bipolar transistor

power electronics manual with theory mosfet igbt - Apr 17 2022

web publication power electronics manual with theory mosfet igbt that you are looking for it will unquestionably squander the time however below following you visit this web page it will be therefore entirely easy to get as with ease as download guide power electronics manual with theory mosfet igbt it will not agree to many era as we accustom

power electronics lecture 4 the mosfet and the igbt - Sep 22 2022

web mosfet igbt the huge differences found in properties in the two devices results form the different structure used with regard to the third electrode drain for mosfet and collector for igbt as soon as electrons enter the p area of the collector region holes will be injected from the collector to the n region

power electronics manual with theory mosfet igbt book - Feb 13 2022

web book power electronics manual with theory mosfet igbt a literary masterpiece that delves deep into the significance of words and their affect our lives published by a renowned author this

power mosfet and igbt renesas electronics corporation - Feb 25 2023

web power mosfet medium voltage power mosfet 250 v vdss 700 v increasing requirements in the range around vdss 600 v are covered by a large variety of products wide range of voltage and current ratings thd and smd package variety excellent efficiency through low r ds on and small gate drain charge qgd new high performance

drive circuits for power mosfets and igbts - Jan 27 2023

web 2 3 mosfet andigbt turn on turn off when turnedon under the same conditions igbts and mosfets behave in exactly the same way and have very similar current rise and voltage fall times see figure 3 however atturn off thewaveformsof theswitched currentaredifferent asshown infigure 4 attheend of theswitching event the igbt has a

insulated gate bipolar transistor wikipedia - Oct 24 2022

web an insulated gate bipolar transistor igbt is a three terminal power semiconductor device primarily forming an electronic switch it was developed to combine high efficiency with fast switching it consists of four alternating layers p n p n that are controlled by a metal oxide semiconductor mos gate structure although the structure of the igbt is

power electronics manual with theory mosfet igbt download only - Mar 29 2023

web solutions manual for mosfet theory and design jan 22 2022 this text presents the theory of the mosfet device catering to

its position in microelectronics technology

lendi institute of engineering technology - May 31 2023

web power electronics lab electrical electronics engineering liet 6 1 study of characteristics of scr mosfet and igt aim to plot the v i characteristics of scr mosfet and igt apparatus s no components range 1 scr mosfet igt characteristic kit module 2 cro with probes 20mhz 3 multi

power electronics igt online tutorials library - Apr 29 2023

web igt symbol the amplification of an igt is computed by the ratio of its output signal to its input signal in conventional bjts the degree of gain β is equal to the ratio of its output current to the input current igt has a very low value of on state resistance r_{on} than a mosfet

powerelectronicsmanualwiththeorymosfetigt chat dataflowkit - Mar 17 2022

web power electronics in energy conversion systems crc press this book relates the recent developments in several key electrical engineering r d labs concentrating on power electronics switches and their use the first sections deal with key power electronics technologies mosfets and igts including series and parallel associations the next

power devices bjt mosfet and igt video lecture by prof - Aug 22 2022

web feb 2 2019 the course discusses power processing electronic circuits like rectifiers ac voltage controllers frequency converters dc dc converters and inverters apart from introducing the basics of power semiconductor devices

mosfet igt drivers theory and applications - Aug 02 2023

web mosfet igt drivers theory and applications by abhijit d pathak 2001 ixys corporation ixan0010 1 introduction 1 1 mosfet and igt technology 1 2 mosfet models and critical parameters 1 3 turn on and turn off phenomenon and their explanations 1 4 power losses in drivers 2 types of drivers 2 1 ic gate drivers 2 2

power electronics manual with theory mosfet igt - Nov 24 2022

web power electronics manual with theory mosfet igt insulated gate bipolar transistor wikipedia may 8th 2018 an insulated gate bipolar transistor igt is a three terminal power semiconductor device primarily used as an electronic switch which as it was developed came to

igt basic know how infineon technologies - Jul 01 2023

web an igt and a mosfet what advantages does an igt offer and how does it work in technical communities focusing on power electronics questions like this one regularly arise i have to design an h bridge to control a motor voltage is 320 v the current is 2 a switching frequency is 30 khz to remain on the

power electronics lab manual nee 551 - Sep 03 2023

web 8 to study triggering of i igt ii mosfet iii power transistor 9 to study operation of igt mosfet chopper circuit 10 to study

mosfet igbt based single phase series resonant inverter 11 to study mosfet igbt based single phase bridge inverter

power electronics manual with theory mosfet igbt book - May 19 2022

web mar 24 2023 power electronics manual with theory mosfet igbt is easy to use in our digital library an online entrance to it is set as public therefore you can download it instantly

study and handling methods of power igbt module failures in power - Dec 26 2022

web dec 4 2014 power electronics plays an important role in a wide range of applications in order to achieve high efficiency and performance increasing efforts are being made to improve the reliability of power electronics systems to ensure compliance with more stringent constraints on cost safety and availability in different applications this paper

powerelectronicsman ualwiththeorymosfet igbt - Jun 19 2022

web electronics lab manual volume 2 power electronics and motor drive systems fet technology and application power electronics insulated gate bipolar transistor igbt theory and design advanced power electronics converters the igbt device neural and fuzzy logic control of drives and power systems publications publications

free questionnaire template for word google docs hubspot - Mar 02 2023

web get a questionnaire template with all the key components the intro multiple choice questions open ended questions and rating scales add your survey objectives so respondents can understand what the questionnaire is about customize the questionnaire with your own branding logo and layout preferences

400 questionnaire templates examples jotform - Mar 22 2022

web 400 questionnaire templates examples 404 templates ask the right questions with jotform whether you re conducting research or gathering feedback our free questionnaire templates will help you get the answers you need customize your online questionnaire with our drag and drop form builder

30 questionnaire templates word  *templatelab* - Sep 08 2023

web we have several excel questionnaire templates available for download on this page as well as questionnaire templates for word they re free to help you get started or alternatively keep reading to learn more about how to put these templates to best use

19 best free questionnaire microsoft word templates 2022 - Sep 27 2022

web aug 17 2022 this free question template will help you find out a questionnaire template is a reliable tool in order to gather standardized data from high numbers of populace it provides you insight on your spectators or customers questionnaires are usually used via the federal to 19 blank questionnaire templates

surveys design templates microsoft create - Jun 05 2023

web discover customizable survey templates to help you get the feedback you need to improve your business products or

events there are a variety of survey templates available here use a website feedback survey template to fix issues on your website

free questionnaire word template download template net - Jul 26 2022

web questionnaire in word look no further than template net s editable and printable questionnaire word templates collection you can choose from our professional customer satisfaction survey training evaluation business and customer service survey exam student research document and financial questionnaire templates keep calm

how to create a basic survey in microsoft word how to geek - May 04 2023

web aug 8 2022 third party survey templates for word create your own survey in word while you can create a questionnaire in microsoft forms word might be your application of choice if you want to make a basic survey microsoft word has the tools you need plus you can use a template if you prefer

create forms that users complete or print in word - Aug 07 2023

web to create a form in word that others can fill out start with a template or document and add content controls content controls include things like check boxes text boxes date pickers and drop down lists if you re familiar with databases these content controls can

19 best free questionnaire microsoft word templates 2023 - Oct 09 2023

web 19 best free questionnaire microsoft word templates to download 2023 let s help get you started on your questionnaire design here are some of the best premium question templates for word from envato elements then we ll take a look at some free items

questionnaire template free word templates - Feb 18 2022

web download the questionnaire template for free find free blank samples in microsoft word form excel charts spreadsheets and pdf format

30 sample survey templates in microsoft word hloom com - Feb 01 2023

web 30 free editable questionnaire templates to help create your ideal survey if you want to obtain unique and valuable insights about your target population a survey questionnaire is a powerful way to accomplish this

32 questionnaire templates in word format - Oct 29 2022

web write a survey or research question and answer form efficiently with our blank example questionnaire templates help a student or anyone prepare questions or feedback quickly through our free sample doc layout and content available for download in word google docs and pdf format

design templates for forms microsoft create - Nov 29 2022

web 1 find the perfect forms template search forms by type or topic or take a look around by browsing the catalog select the

template that fits you best whether it s a survey quiz or another type of form 2 customize your creation use

creating a questionnaire free templates samples word pdf - Apr 22 2022

web we understand that coming up with a questionnaire for your research may be hard especially if it is your first time developing one to make your work much easier we have compiled several questionnaire templates that you can download and use anytime for your survey download now and get started today

free questionnaire template download in word google - Aug 27 2022

web questionnaire templates easily create professional questionnaire documents online with template net s free questionnaire templates choose from editable samples that you can fill in details including the introduction of researcher purpose of the questionnaire confidentiality statement and voluntary participation

30 questionnaire templates and designs in ms word - Dec 31 2022

web choosing your questions free questionnaire examples a questionnaire is a series of questions used to gather information from respondents the questions are used for audience analysis and they are meant to create an understanding of the target audience s feelings perceptions needs and beliefs about a company event or group

create a quiz with microsoft forms microsoft support - Jun 24 2022

web add questions select add new to add a new question to your quiz choose what kind of question you want to add such as choice text rating or date questions select more question types for ranking likert file upload or net promoter score question types

19 best free questionnaire microsoft word templates 2022 - May 24 2022

web aug 17 2022 check out these questionnaire templates you ca download to get started skip to gratified design design view all design start learning software software

how to create a questionnaire in word for windows and mac wikihow - Apr 03 2023

web may 30 2023 this wikihow will teach you how to create a questionnaire in word on windows and mac computers you cannot create forms that others can fill out using the web version but you can create check boxes text controls date pickers and drop down lists from a computer method 1 using windows download article 1

17 free questionnaire templates examples word - Jul 06 2023

web we ve curated a selection of questionnaire examples in word and pdf formats to provide you with a comprehensive understanding of effective questionnaire design these examples which embody best practices in questionnaire creation serve as valuable references when developing your own tool