**CHINESE INVENTIONS**

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| **OBJECTIVES** | | | | |
| **Achievement Objectives:**  **Technological Practice**  Students will:  Outcome development and evaluation   * Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity.   **Technological Knowledge**  Students will:  Technological modelling   * Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development.   **Nature of Technology**  Students will:  Characteristics of technology   * Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function. | | | **Year Level:** Year 5 and 6  **Curriculum level:** 3  **Unit Duration**: 10 weeks | |
| **INTEGRATION INTO OTHER LEARNING AREA** | | | | |
| **MATHS**  Statistical investigation   * Conduct investigations using the statistical enquiry cycle: * gathering, sorting, and displaying multivariate category and whole number data and simple time-series data to answer questions; * identifying patterns and trends in context, within and between data sets; * communicating findings, using data displays.   **ENGLISH – SPEAKING, WRITING, PRESENTING**  Purposes and audiences   * Show a developing understanding of how to shape texts for different purposes and audiences.   indicators:   * constructs texts that show a growing awareness of purpose and audience through careful choice of content, language, and text form; * conveys and sustains personal voice where appropriate.   Ideas   * Select, form, and communicate ideas on a range of topics.   indicators:   * forms and expresses ideas and information with increased clarity, drawing on a range of sources; * adds or changes details and comments to support ideas, showing some selectivity in the process; * ideas suggest awareness of a range of dimensions or viewpoints.   **HEALTH & PE**  Students will:  Relationships   * Identify and compare ways of establishing relationships and managing changing relationships.   Identity, sensitivity, and respect   * Identify ways in which people discriminate and ways to act responsibly to support themselves and other people.   Interpersonal skills   * Identify the pressures that can influence interactions with other people and demonstrate basic assertiveness strategies to manage these.   **VISUAL ART**  Students will:   * Investigate the purpose of objects and images from past and present cultures and identify the contexts in which they were or are made, viewed, and valued.   **DANCE**  Students will:   * Explore and describe dances from a variety of cultures.   **MUSIC**  Students will:   * Identify and describe the characteristics of music associated with a range of sound environments, in relation to historical, social, and cultural contexts. * Explore ideas about how music serves a variety of purposes and functions in their lives and in their communities. | | | | |
| **Values:**  Excellence  Innovation, inquiry, and curiosity  Diversity  Equity  Community and participation  Ecological sustainability  Integrity  Respect | | **Key Competencies:**  [Thinking](http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Key-competencies#thinking)  [Using language, symbols, and texts](http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Key-competencies#language)  [Managing self](http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Key-competencies#managing)  [Relating to others](http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Key-competencies#relating)  [Participating and contributing](http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Key-competencies#participating) | | **Principles:**  [**High expectations**](http://nzcurriculum.tki.org.nz/Principles/High-expectations)   [**Treaty of Waitangi**](http://nzcurriculum.tki.org.nz/Principles/Treaty-of-Waitangi) [**Cultural diversity**](http://nzcurriculum.tki.org.nz/Principles/Cultural-diversity) [**Inclusion**](http://nzcurriculum.tki.org.nz/Principles/Inclusion)   [Learning to learn](http://nzcurriculum.tki.org.nz/Principles/Learning-to-learn) [Community engagement](http://nzcurriculum.tki.org.nz/Principles/Community-engagement) [Coherence](http://nzcurriculum.tki.org.nz/Principles/Coherence)  [**Future focus**](http://nzcurriculum.tki.org.nz/Principles/Future-focus) |
| **Assessment Opportunities:**  After each stage of the technology process, the teacher conferences with each student which provides the teacher with information for both formative and summative assessment. | | | | |
| **Unit Focus:**  In this unit the students work together in groups or individually to create their own invention as many famous Chinese people have previously done.  Throughout the unit the lessons are designed to provide students with a deeper understanding and appreciation of China and its culture.  This unit develops higher order thinking skills as it progresses and is intended to be taught as the students are also conducting their own inquiry about an invention. Some of the lessons may run over several learning sessions and while the lessons are ordered, this does not equate to the timing of how long it will take. | | | **Context:**  The unit has two research components to it.  The first research component has a literacy skills focus. Students work together in groups imagining that they are an advertising agency that has been hired to convince people to buy one of the major inventions of Ancient China. The group must prepare an advertising campaign that "sells" the class their Ancient Chinese invention.  The main component of the unit follows the technology process. Students work through the process to design and create an invention that helps make life easier.  The unit concludes with students hosting an “Invention Convention”.  It is expected that the theme of China will be integrated into other curriculum areas particularly in maths and literacy as this will make the learning more authentic for students. | |
| **LESSON 1** | | | | |
| **Curriculum achievement objectives** | Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function. | | | |
| **Learning Intention** | WALT name things that were invented by the Chinese. | | | |
| Set the students a challenge. They can work in pairs for this with one device between them. Tell them that you are going to write 3 names of people on the board and that the winning pair will find at least two things that each of the 3 people have in common. The names are   * Tao-Yue – the Chinese inventor of porcelain * Cai Lun – the Chinese inventor of paper * Chuko Liang – the Chinese inventor of the wheelbarrow   Give students a minute to see how many other things they can find that the Chinese invented. List these on the board. Ask students to choose one of the inventions and get them to brainstorm what it would be like if that thing had never been invented.  Tell students that there are two parts to this unit. For part of the unit they will have the opportunity to investigate an invention of their own and then present it at their own “Invention Convention”.  For the second part of the unit they will imagine that they are a part of an advertising agency who have been hired to convince people to buy one of the major inventions of Ancient China. They will work with a group to prepare an advertising campaign that “sells” their Ancient Chinese invention. | | | | |

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| **LESSON 2** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT define what an invention is. |
| Ask the students “What is an invention?”  Have them discuss and share their ideas. Record a class definition.  Ideas may include   * An invention can solve a problem * Inventions can make the world a better place * Inventions can be ideas (e.g., a new transport system) as well as things (e.g., a lunch box). * An invention can make something better even if it is not better than what existed before.   Tell students that inventors come from all around the world and that every day new things are being invented.  Divide the class in half. One half of the class has 5 minutes to research and find as many inventions as they can that came from New Zealand. The other half of the class researchers Chinese inventions.  Ask students to predict which country they think would have invented the most and ask for reasons why. Key idea that China has a long history and that New Zealand is a relatively new country.  Watch [Top Ten Chinese Inventions](https://www.youtube.com/watch?v=lmHkOHs00Bo). Students list each of the 10 inventions. | |

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| **LESSON 3** | |
| **Curriculum achievement objectives** | Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function. |
| **Learning Intention** | WALT describe why there are patents. |
| Ask the students why it can be difficult to know exactly who invented what and where they were from.  Explain that there is always a possibility that older models of early inventions may be discovered in different parts of the world.  The compass is an example of this. Scholars have found a clear description of a Sinan (navigational device) in a Chinese text dating back more than two thousand years. While no actual models of this invention have been found as yet, the description in this ancient text leads scholars to believe that this ancient form as compass was invented as early as 2400 years ago in China.  In modern times patents help us to determine when, where and by whom an invention was invented.  Tell students that they will need to work in pairs to search the New Zealand Intellectual Property Office website <http://www.iponz.govt.nz/cms/patents> to become experts on patents.  Students are given a questions sheet to complete - Copy Master 1: Questions about Patents  When each pair has finished, match them up with another pair to check their answers. If they do not agree, they need to go back to the website to check. | |
| **LESSON 4** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT identify problems that could be solved. |
| Tell students that are some problems that you have noticed in the classroom that you would like them to come up with solutions for. The process that they are going to work through together will be similar to the process that they will later work through as a group.  A possible problem may include:   * The classroom devices are often not charged over night * Pencils often are missing or get broken * In Winter the students’ shoes make the carpet dirty   As a class, select one of the problems over (or create your own) for the class to solve. Work through the following steps:   1. Analyse the situation. 2. Think of many, varied, and unusual ways of solving the problem. List the possibilities. Be sure to allow even the silliest possible solution, as creative thinking must have a positive, accepting environment in order to flourish. 3. Select one or more possible solutions to work on. You may want to divide into groups if the class elects to work on several of the ideas. 4. Improve and refine the idea(s). 5. Share the class or individual solution. | |

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| **LESSON 5** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT investigate inventions. |
| Investigate other inventions and consider what you like about them. Encourage students to think of something in their lives that they use that makes their life easier. Students share with a buddy the invention that they like and discuss questions such as what is it about the object that is clever? Is it a new invention or old?  Display a list of objects for students. See Copy Master 2: Objects. Ask:   * Can this existing invention be developed and improved on any more? * Can I target this to another audience? * What are its limitations?   In groups students use the thinking tool, SCAMPER. Ask students to combine the objects in Copy Master 2 in different ways to create a new product.  Substitute  Remove some part of the accepted situation, thing, or concept and replace it with something else.  Combine  Combine two products so they work together for a purpose can result in a great new invention.  Join, or force together two or more elements of your subject matter and consider new combinations.  Adapt  Change some part of your problem so that it works where it did not before. What else is like this? What other idea does this suggest? What could I copy?    Modify  Consider many of the attribute of the thing you're working on and change them. Attributes include: size, shape, other dimensions, texture, colour, attitude, position, history etc  Put to New Uses  Modify the intention of the subject. Think about why it exists, what it is used for, what it's supposed to do. Challenge all of these assumptions and suggest new and unusual purposes. New ways to use as is? Other uses if modified? Other places to use? Other people to reach?  Eliminate  Remove any or all elements of your subject, simplify, reduce to core functionality. What to subtract? Smaller? Condensed? Miniature? Lower? Shorter? Lighter? Omit? Streamline? Understate? Interchange components? Other pattern?  Reverse  Change the direction or orientation. Turn it upside-down, inside-out, or make it go backwards, against the direction it was intended to go or be used.  Rearrange  Modify the order of operations or any other hierarchy involved. Other layout? Other sequence? Transpose cause and effect? Change pace? Transpose positive and negative? How about opposites? Turn it backward? Turn it upside down? Reverse roles? | |
| **LESSON 6** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT find things that we could improve. |
| Watch the movie ‘[Invention convention’](https://www.youtube.com/watch?v=urichkR0HN8&feature=fvw). Discuss how the students in the movie came up with their ideas.  In small groups students brainstorm a “Bug list” of situations or objects that “bug” them in our daily lives. Students present their ideas to the class and create one class list. This can go on the wall so that it can be added to at any time as students come up with new ideas.  Hand out each student an “Invention journal”. Explain that they will be working through this at the own pace. Talk through the process and allow students to decide on their group members. Some students may choose to work independently while others may work in a pair, three or four. | |

***Please note:***

*Although lessons are outlined as a linear sequence after this point, it is expected that students will complete the various stages in their own time and that the teacher will guide each group through the process and provide support when it is needed. Although each step of the process is written into one lesson, it is expected that many of the steps will take several lessons.*

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| **LESSON 7** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT identify things that need to be improved. |
| Discuss that there can be annoying problems all around us. They can be in our home, classroom, playground, supermarket and the road etc. Encourage students to think of problems that are all around them. They may refer to the class brainstorm. Encourage students to share these with each other as this may facilitate a variety of ideas.    Record as many ideas as possible. Students may like to get ideas from adults around the school, students outside of their own classroom and from others at home. | |
| **LESSON 8** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT come up with different ideas about ways to solve challenges. |
| Students select two problems that they think would be suitable to investigate. Ensure that each group is solving a different problem and that there is variability between ideas.  When students are discussing solutions to the problems, encourage them to be creative and to think outside of the box. Talk with students about accepting everyone’s ideas as sometimes the best ideas come from what at first might seem crazy! | |

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| **LESSON 9** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity.  Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development. |
| **Learning Intention** | WALT think through our ideas. |
| Students draw and label two of their ideas. These drawings should be as realistic as possible. Question what students have done and why they have made the choices they have made.  Students need to spend time researching the various components of what they intend to make. They need to become experts in the field to know what has already been designed. If their idea has already been invented, they can make modifications to improve this invention. They also may choose to select another idea to work through.  *Students should spend several lessons researching each of their ideas and the components that will go into them.* | |

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| **LESSON 10** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT seek the input of others about our idea. |
| Students survey their classmates and possibly students outside the class or school if necessary. This depends on who they indent to use their invention.  Students should be open to listening to the feedback that they are given about their ideas. Encourage them to question each other and to listen carefully to what others are saying. This is an important part of the design process.  At this stage students may need to make amendments to their design based on any feedback that they are given. | |

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| **LESSON 11** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT seek the input of others about our idea. |
| Students share their design with another group of students. This may be within or outside of the classroom. The aim of this is to listen carefully to what is said so that they can make changes that will improve their design. Students will need to be in agreement about the answer to the following questions before they present their design to others.   * Is your idea practical? * Is it easily made? * Is your design as simple as possible? * Is it safe? * Will it cost too much to make or to use? * Is your idea really new? * Will it break easily? * Is your idea similar to something else? | |
| **LESSON 12** | |
| **Curriculum achievement objectives** | Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development. |
| **Learning Intention** | WALHT list what we will need. |
| Students research where each of the materials they will need will come from and the price.  The teacher might like to select certain shops that students can shop at so that they are not running around all over town!!  Each item must be checked off by the teacher to ensure that students have considered the availability of each product as well as the cost.  Students must be able to share how much in total their idea will cost to make. | |

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| **LESSON 13** | |
| **Curriculum achievement objectives** | Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development. |
| **Learning Intention** | WALHT outline the steps of the building process. |
| Students must come up with a catchy name for their invention. Students need to draw or write each step that they will take to create their prototype.  This needs to be clear so that others are able to recreate their invention. They need to make sure that they have listed all the materials that they will need so that they can complete their invention. | |

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| **LESSON 14** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT build our invention. |
| Students build their prototype following the building process that they have outlined. They need to make amendments to their plan where necessary. | |

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| **LESSON 15** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT test the ‘product’ with a group of users. |
| Students present their prototype to their peers. They seek and then record information about the good things about their invention and what could be improved. | |

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| **LESSON 16** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT summarise user feedback. |
| Students discuss suggestions that have been made and use a PMI chart to help them think through the suggestions they have been given. | |

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| **LESSON 17** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALT state areas for modification and or improvement. |
| Students use the feedback to make amendments to the original design. | |
| **LESSON 18** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALHT present our invention. |
| Students make final presentation at the “Invention Convention”.  Invite parents, teachers and other students to celebrate the inventions with students. | |

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| **LESSON 19** | |
| **Curriculum achievement objectives** | Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity. |
| **Learning Intention** | WALHT reflect on the technology process. |
| Students reflect on what worked well, what didn’t work well and what they could do next time to make their invention work better. | |

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| **ADDITIONAL RESOURCES** |
| **Copy Masters 1 and 2**  **Hăo!** An introduction to Chinese  Technology Interventions Booklet  Chinese Inventions Booklet |

**Copy Master 1**: Questions about Patents

What 3 things can you patent?

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What may cause you patent to be declined?

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When does a patent have to be renewed and how much does it cost?

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Finish this sentence “A New Zealand patent gives protection ­­­­

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Name the title of one invention that the patent was granted for last Monday.

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The website suggests 5 reasons why it is a good idea to search for existing patents. Name one of these.

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**Copy Master 2**: Objects

belt camera book wheels

light key clock computer

bicycle calendar cell phone