

MINI-GOLF COURSE DESIGN

In this activity, students will:

1. Start by sharing any prior knowledge/personal experiences they might playing mini-golf.
2. Explore the history of mini-golf and videos of playing/designing mini-golf.
3. Be introduced to the concepts of STEM through the design of a mini-golf course.
4. Design an 8-hole mini-golf course (each hole will be referred to as a “shape”). Students are encouraged to design various levels of challenging shapes through the use of obstacles.

Objectives

- Use appropriate units of measurement for length and area, determine areas of plane shapes using 1cm^2 grid paper, and calculate perimeter and area of rectangles and squares.
- Develop spatial awareness and visualisation skills.
- Communicate and justify approaches to problem solution, and STEM concepts applied
- Critically question and provide constructive feedback on solution approaches, assumptions made, and concepts ideas applied

Materials

- Student Workbooks:
 - Student Design Workbook (1 per student).

- A3 cardboard sheets
- 1cm² Graph papers
- Scissors
- Strong tape/Masking tape/Glue stick to hold shapes on the A3 cardboard sheet.

Organisation of student work

Students will be using **1cm² graph paper** to design shapes. They will then be provided with **an A3 cardboard sheet** as their mini-golf course. Students will decide on their shape placement on their A3 cardboard sheet in designing their group's mini-golf course. They will develop familiarity with shapes.

Students will record their learning and results in the student design workbooks provided by QUT. Student design workbooks and the A3 cardboard sheets will be collected by QUT at the end of the activity.

Class Time: To be determined.

Additional Teacher Information on mini-golf

- **PowerPoint presentation prepared by QUT (Mini-golf.pptx)**
- [Turn backyard into mini-golf course](#)
- [Kids playing mini-golf](#)
- [Students learn Maths, Science by building a mini Golf course](#)
- [How to play mini-golf Part 1](#)

| Year 5 Year Overview 2019 | | | | | | | |
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| Semester 1 | | | | Semester 2 | | | |
| Term 1 (10 weeks) | | Term 2 (11 weeks) | | Term 3 (10 weeks) | | Term 4 (10 weeks) | |
| English ACARA | ACARA ACHIEVEMENT STANDARDS | | | | | | |
| | <p>Receptive modes (listening, reading and viewing) By the end of Year 5, students explain how text structures assist in understanding the text. They understand how language features, images and vocabulary influence interpretations of characters, settings and events. When reading, they encounter and decode unfamiliar words using phonic, grammatical, semantic and contextual knowledge. They analyse and explain literal and implied information from a variety of texts. They describe how events, characters and settings in texts are depicted and explain their own responses to them. They listen and ask questions to clarify content.</p> <p>Productive modes (speaking, writing and creating) Students use language features to show how ideas can be extended. They develop and explain a point of view about a text, selecting information, ideas and images from a range of resources. Students create imaginative, informative and persuasive texts for different purposes and audiences. They make presentations which include multimodal elements for defined purposes. They contribute actively to class and group discussions, taking into account other perspectives. When writing, they demonstrate understanding of grammar using a variety of sentence types. They select specific vocabulary and use accurate spelling and punctuation. They edit their work for cohesive structure and meaning.</p> | | | | | | |
| English (C2C) | Unit 1: Examining literary texts (fantasy novel) Listen to, read and interpret a novel from the fantasy genre showing understanding of character development in relation to plot and setting. Analyse the development of a main character through a written response. Seven Steps to Writing Success – Persuasive Reading Comprehension Skills | Unit 2: Creating fantasy characters Continue to read and interpret a novel from the fantasy genre showing understanding of character development. In role as the author, they deliver a spoken presentation to language features used to create either a 'good' character or an 'evil' character. Seven Steps to Writing Success – Persuasive Reading Comprehension Skills | Unit 7: Exploring narrative and narrative film Listen to, read and view films and novels with a range of non-stereotypical characters involving flashbacks or shifts in time and create a written comparison of a novel and the film version of the novel. | Unit 5 :Appreciating poetry Listen to, read and view a range of poetry, songs, anthems and odes from different times to create a folio of responses. Analyse authors' use of language and its impact on the messages and ideas of text. | | | |
| | ACARA ACHIEVEMENT STANDARDS | | | | | | |
| Maths ACARA | <p>By the end of Year 5, students solve simple problems involving the four operations using a range of strategies. They check the reasonableness of answers using estimation and rounding. Students identify and describe factors and multiples. They identify and explain strategies for finding unknown quantities in number sentences involving the four operations. They explain plans for simple budgets. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. Students interpret different data sets.</p> <p>Students order decimals and unit fractions and locate them on number lines. They add and subtract fractions with the same denominator. Students continue patterns by adding and subtracting fractions and decimals. They use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. They convert between 12- and 24-hour <u>time</u>. Students use a grid reference system to locate landmarks. They measure and construct different angles. Students list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. Students pose questions to gather data, and construct data displays appropriate for the data.</p> | | | | | | |
| | Unit 1 <input type="checkbox"/> Factors and multiples <input type="checkbox"/> Addition & subtraction <input type="checkbox"/> Fractions and decimals <input type="checkbox"/> Data collection, display and interpretation. | Unit 2 <input type="checkbox"/> Perimeter and area <input type="checkbox"/> Patterns: whole numbers, fractions and decimals <input type="checkbox"/> Time: 12 & 24 hr time | Unit 3 <input type="checkbox"/> Multiplication problems <input type="checkbox"/> Number systems beyond hundredths <input type="checkbox"/> Decimals <input type="checkbox"/> Multiples and factors <input type="checkbox"/> Symmetry <input type="checkbox"/> 3D Shapes | Unit 4 <input type="checkbox"/> Multiplication problems <input type="checkbox"/> systems beyond hundredths <input type="checkbox"/> perimeter & area of rectangles <input type="checkbox"/> 3D shapes & nets | Unit 5 <input type="checkbox"/> Income and expenditure <input type="checkbox"/> Saving plans <input type="checkbox"/> Mapping <input type="checkbox"/> Alphanumeric grids <input type="checkbox"/> Addition and subtraction <input type="checkbox"/> Multiplication and division <input type="checkbox"/> Problem solving <input type="checkbox"/> Symmetry and transformation | Unit 6 <input type="checkbox"/> Units of measurement: length, area, capacity and volume, mass <input type="checkbox"/> Fractions and decimals <input type="checkbox"/> Addition and subtraction patterns <input type="checkbox"/> Multiplication and division | Unit 7 <input type="checkbox"/> Chance <input type="checkbox"/> Data representations and interpretation <input type="checkbox"/> Using units of measurements <input type="checkbox"/> Number and place value |
| Maths (C2C) | | | | | | | |

ACTIVITY

1. Inform students that they will be designing a mini-golf course. Hand out the *Mini-Golf Course design Workbook* (herein referred to as the *Design Workbook*) to the students.

Individual task: Background information

2. Begin by getting the students to turn to page 2 and **individually** write **prior knowledge/experiences** they have regarding mini-golf. Some students might be unaware of mini-golf, or aware but have never played, so they should answer accordingly (see *Design Workbook*, page 2, parts (i) – (ii)). *“As individuals, turn your Design Workbooks to pages 2 and detail your personal knowledge and experiences about mini-golf”*.

Individual task: Your observations

3. Introduce the class to the history of mini-golf using the PowerPoint provided by QUT, i.e. **Mini-golf.pptx**
4. Play the following YouTube videos for the students:
 - i. [Turn backyard into mini-golf course](#)
 - ii. [Kids playing mini-golf](#)
 - iii. [Students learn Maths, Science by building a mini Golf course](#)
 - iv. [How to play Mini-Golf Part 1](#)
5. ***Individually***, get students to turn to page 3 and write down any important observations they made after watching the YouTube videos (see *Design*

Workbook, page 6, question 1). *“As individuals, turn to page 6 of your Design Workbook and detail some important observations you have made regarding mini-golf courses”.*

The Mini-Golf Competition

6. Get students to turn to page 4, and introduce the class to the Mini-Golf competition organised by the *Put Put Mini-Golf Association of Australia* (see *Design Workbook*, pages 4). Key points to emphasise here are:
 - a. Each group will be provided with an A3 cardboard sheet. They will design a mini-golf course on the A3 cardboard sheet. *At this point, show the class an A3 cardboard sheet and point out the area on the A3 cardboard sheet where groups will be sticking their shapes to create their mini-golf course.*
 - b. Each group will be provided with some sheets of 1cm^2 graph paper. They will be creating shapes on these graph papers. The mini-golf course consists of placing the 8 shapes on the A3 cardboard sheet. These shapes must be numbered 1 to 8. *Show the class a 1cm^2 graph paper and explain that it will be used to create shapes that will then be cut out of the graph paper, and placed onto the A3 cardboard sheet with glue.*
 - c. Each shape should show a tee (■), a golf hole (O), and different levels of difficulty. *Prompt the students to discuss what a “tee” and a “hole” is in golfing terms. Ask the class how they can make the shape more challenging. Mention that challenging is a criteria for the mini-golf course design set by the Put Put Mini-*

Golf Association of Australia. Groups will be working to define their own criteria sometime in the project.

- d. After completing their design, they will:
 - i. Individually respond to questions regarding their design
 - ii. As a Group, respond back to the *Putt Putt Mini-Golf Association of Australia* regarding their design
7. Get students to turn to page 5. Discuss the “Your Task” section with the class so that the students are aware of the flow of this activity, and their individual & group responsibilities.

Individual task: Fun with shapes

8. *Individually*, get the students to turn to page 6 and read the details of the “*Fun with Shapes*” individual task. Once they have read through the task, go through the task with them so that they understand that they, as individuals, are required to create two shapes, namely a rectangle shape and a square shape. *Get the students to discuss their understanding of rectangles and squares*. The shapes they create should contain a tee and a hole. *Prompt the students to discuss what a tee and a hole is in golfing terms*. Discuss the challenging criteria with the class. *Discuss why it is important to make the shape challenging*. Inform the class that they are to calculate the perimeter and area for each of their shapes, and write the results in their workbook. *Discuss with them what is perimeter and what is area*. Stress the fact that the graph papers on pages 6 and 8 are there for practice purposes, and students should not to cut out the shapes from these pages.

Group task: Theme and criteria

9. In *Groups*, get students to turn to page 10. **Get the students to discuss their understanding of the terms “theme” and “criteria”**. Remind students that one criteria has already been set by the *Put Put Mini-Golf Association of Australia*, namely that the designed mini-golf course must be **challenging**. Inform the groups that they are to discuss and decide on a theme and three (3) criteria for their group’s mini-golf course. After the group-work has completed, students are required to detail their group’s theme and 3 criteria into their Design Workbooks, questions 1 and 2 on page 10.

Group task: Shape sketching

10. In *Groups*, get students to turn to page 12 of their Design Workbooks and read the details of the “*Shape sketching*” group task. Once they have read through, go through the task with them so that they understand that they, as a group, have to create shapes for their mini-golf course design. Inform them that 2 of the 8 shapes must consist of a square and a rectangle. The remaining 6 must be created using a combination of squares and rectangles. **Prompt them for their understanding of creating shapes using a combination of squares and rectangles**. The groups need to be reminded of the requirements for their shapes, namely each shape having a tee, hole and obstacles. They need to also consider their group **theme** and **criteria** when creating their shapes. They can use any of their group members 1cm² graph papers on pages 12 to 14, but they must be reminded that they must calculate the perimeter and area for each and every shape sketched. These perimeter and area values must be detailed

next to each shape. After they have decided on their 8 shapes, they need to *individually* answer question (a) on page 14.

Group task: Mini-golf design proposals

11. In *Groups*, get students to turn to page 16 of their Design Workbook and read the details of the “*Mini-golf design proposals*” group task. Once they have read through, go through the task with them so that they understand that they, as a group, have to discuss how they wish to position their 8 shapes for their mini-golf course design. **Prompt them to discuss (in their groups) what makes up mini-golf courses, besides shapes.** After they have decided on their shape placement, they must number each shape so that a mini-golf player can keep track of each shape played. Students are then required to individually respond to question 1 in page 17.

Group task: Build your mini-golf course

12. In *Groups*, get students to turn to page 18 of their Design Workbook and read the details of the “*Mini-golf design proposals*” group task. Once they have read through, go through the task with them so that they understand that they, as a group, will now be given an A3 cardboard sheet and some 1cm² graph paper, and will be designing their actual mini-golf course, taking into consideration the allocated mini-golf course size as defined by the A3 cardboard sheet. **Prompt them to consider how players will move from one shape to another.** Remind them that their shapes should reflect their theme and criteria. After they have completed their 8 shapes designed to scale, they need to cut them out using scissors and paste them onto their A3 cardboard sheet to create their final mini-golf

course design. Students are then required to *individually* respond to questions (a) thru (e) in pages 18 to 20.

Individual task: Design evaluation

13.*Individually*, get students to turn to pages 22 and 23, and read through the questions there. Inform them that these questions are to reflect on how they individually felt their design went. This is an opportunity for them to provide feedback on improvements they would make to further improve their design. Encourage them to explain how they used maths and science in developing their mini-golf course.

Group task: Our Fact sheet

14.In *Groups*, get students to turn to page 24. Inform them that they are to respond to the *Put Put Mini-Golf Association of Australia*. *Get them to discuss their response to the Put Put Mini-Golf Association of Australia and write their response down.*