Perfect pricing

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| **Year level****Strand(s)****Lesson length****CD Code** | * Year 9
* Statistics
* 60 mins
* [AC9M9ST05](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY9&content-description-code=AC9M9ST05&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick) [AC9M8N05](https://v9.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/numeracy/slideout?code=NNUnM9&element=0&sub-element=7)
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| **Lesson summary** | In this lesson, students are hotel managers conducting a statistical investigation to help them decide on a model for the perfect pricing structure for a new hotel/holiday resort.  |
| **Learning intention** | * We are learning to conduct a comprehensive statistical investigation.
* We will collect and interpret secondary data.
* We will build a mathematical model to inform the pricing strategy for a hotel.
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| **Success criteria** | By the end of this lesson, students can:* gather, analyse and interpret secondary data
* formulate and justify a pricing model based on the data collected
* prepare a revenue budget calculation.
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| **Why are we learning about this?** | Understanding how to gather and use data in real-world applications, such as determining the pricing structure for a business, equips students with practical skills they can use in many professional scenarios. |
| **Prerequisite student knowledge and language** | Prior to this lesson, it is expected that students can show a basic understanding of data collection and statistical analysis. |
| **Resources** | * Teacher’s slides (PowerPoint)
* Teacher’s notes (Word)
* Perfect pricing instructions (Word)
* Perfect pricing template (Excel)
* Computers/tablets
* Software for data compilation and budget preparation
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Curriculum information

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| **Achievement standard** | [By the end of Year 9, students](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10?detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick) compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of the distributions. They [explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view.](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10?detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)  |
| **Content description(s)** | **Content descriptions*** Students plan and conduct statistical investigations involving the collection and analysis of different kinds of data; report findings and discuss the strength of evidence to support any conclusions. [AC9M9ST05](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY9&content-description-code=AC9M9ST05&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)
* Students use mathematical modelling to solve practical problems involving rational numbers and percentages, including financial contexts; formulate problems, choosing efficient calculation strategies and using digital tools where appropriate; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model. [AC9M8N05](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-8/content-description?subject-identifier=MATMATY8&content-description-code=AC9M8N05&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)

**Related content**Economics and Business, [ACHE9S02](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/economics-and-business-7-10/year-7_year-8_year-9_year-10/content-description?subject-identifier=HASECOY9&content-description-code=AC9HE9S02&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick), [AC9HE9S04](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/economics-and-business-7-10/year-7_year-8_year-9_year-10/content-description?subject-identifier=HASECOY9&content-description-code=AC9HE9S04&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick) |
| **General capabilities****Cross-curriculum priority** | **General capabilities**Numeracy* Interpreting and representing data ([Level 7](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY9&content-description-code=AC9M9ST05&general-capability-code=N&element-code=NS&sub-element-index=0&sub-element-code=NSIRD&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))
* Understanding money ([Level 9](https://v9.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/numeracy/slideout?code=NNUnM9&element=0&sub-element=7))

Digital Literacy* Acquire and collate data ([Level 6](https://v9.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/digital-literacy/slideout?code=DLIB6&element=1&sub-element=1))
* Interpret data ([Level 6](https://v9.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/digital-literacy/slideout?code=DLIC6&element=1&sub-element=2))
* Select and operate tools ([Level 5](https://v9.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/digital-literacy/slideout?code=DLMOC5&element=3&sub-element=2))

Critical and Creative Thinking* Identify, process and evaluate information ([Level 6](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY9&content-description-code=AC9M9ST05&general-capability-code=CCT&element-code=CCTINQ&sub-element-index=1&sub-element-code=CCTINQB&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))
* Draw conclusions and provide reasons ([Level 6](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY9&content-description-code=AC9M9A05&general-capability-code=CCT&element-code=CCTANA&sub-element-index=1&sub-element-code=CCTANAB&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))
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| **Areas of challenge** | * Some students may have difficulty combining and analysing multiple data sources and weighing their importance in the pricing structure. Ask students to think about the relevance of each source and identify a key source upon which to base their pricing structure and then tweak it by analysing each of the other data sets in turn.
* They may not provide sufficient support or linkage to data trends when making pricing decisions. Use questioning and specific examples to illustrate and prompt the required level of detail. (Refer to teacher’s notes.)
* Students lack a foundational understanding of supply and demand and its impact on pricing. Provide a primer in basic economic principles, for instance, talk about buying Christmas wrapping paper on 15 December versus 27 December.
* Students may have difficulty using Excel to create graphs and prepare calculations. Consider doing a whole-class demonstration, or source appropriate instructional videos.
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| **Strategies** | * [Explicit teaching](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/explicit-teaching/)
* [Collaborative learning](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/collaborative-learning/)
* [Mathematics investigation](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/mathematics-investigation/)
* [Questioning](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/questioning/)
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Learning structure

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| **Learning Hook**10 mins | Note: this lesson plan takes approximately 60 minutes; however, you may wish to schedule a further lesson for students to work longer on their investigation.Begin by using the teacher’s slides begin with a slow reveal graph and ask students questions as you move between the slides. * ‘What do you notice?’ ‘What relationships do you see between the bars and the lines?’ ‘What do you wonder?’ Expect responses such as: Expect responses such as: ‘The line go up in the middle, and so do the bars.’ ‘The line and the bars follow a similar pattern.’ ‘There are 9 data points for the line and 12 for the bars.’ ‘There are no headings on the axes, legend or scale to help you understand what this graph is about.’ (slide 2)
* ‘What new information did we just learn?’ ‘What do you think this graph could represent?’ ‘Have you seen a graph like this before?’ Expect responses such as: ‘We now know that the graphs cover a year.’ ‘So, it could be temperature.’ ‘It’s not Australia because this graph show it would be hottest in June to August.’ ‘It’s hard to tell what’s going on without a scale. (slide 3)
* ‘What additional information does having the scales provide?’ ‘Why are there two scales?’ ‘How does this change your view as to what the graph might represent?’ Expect responses such as: ‘If the graphs include temperature that must be the right scale because the numbers are quite small.’ ‘It’s a pretty cold place as the winter temperatures are around –$5℃$.’ ‘I still don’t know what the left-hand scale might be as the numbers are much bigger.’ (slide 4)
* ‘Now you have the full graph what conclusions can you draw?’ ‘Winnipeg, Canada must be in the Northern Hemisphere as the seasons are the reversed of Australia.’ ‘Winnipeg is really rainy but much warmer from June to August. I’m not sure if I want to visit in summer if it rains all the time’ ‘There is no legend, so I still don’t know which graph is which and what they are showing.’ (slide 5)
* Note: this is correct – there should be a legend showing that precipitation is the bar graph and temperature is the line graph.
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| **Explore/investigate** 40 mins | [Explicit teaching](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/explicit-teaching/)* Make the learning intention and success criteria explicit (slide 6).
* Explain the process of conducting a statistical investigation using the five-stage graphic in the Perfect pricing presentation (slide 7): Understand; Plan; Do; Consider; Communicate.
* Hand out the Perfect pricing instructions to the students and explain the task. Refer to the detailed Teacher’s notes for more information.
* Divide students into groups to complete the task. These should ideally be groups of three so that each student has a clear responsibility to collect and analyse a different data set, which they later review as a group when determining the pricing model and revenue calculation.

[Questioning](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/questioning/) * While students are engaged in the task, rotate among the groups to monitor progress and support students in understanding and moving forward in the task.
* Refer to the teacher’s notes for suggested questions.

**Differentiation** (enable): Set the hotel in the local town, make assumptions and set prices on a monthly rather weekly basis. Assume an average occupancy rate throughout the year.**Differentiation** (extend): build a more sophisticated daily model that incorporates higher rates at weekends or for specific events; have greater variability in occupancy rates or different levels of rooms; collect competitor rates from a range of hotels and calculate average competitor rates; choose an overseas location and incorporate currency conversion into the activity. |
| **Summary/reflection**10 mins | * Discuss what students observed during the group work, such as good questions, great insights, or mistakes that led to further learning (celebrating mistakes as learning opportunities).
* Summarise the stages of a statistical investigation and how the users (who?) and purpose (why?) of the data inform the choice as to which data is collected (what?) and how it is represented and analysed (how?).
* Note that in completing the activity, the students built a mathematical model to forecast future revenue. This process, which is used widely in businesses to support financial decision-making, requires simplifications and assumptions. The goal is to have a reasonably accurate but practical and workable model.
* Students complete reflection (slide 8): today’s lesson helped me understand because …
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| **Assessment** | The following opportunity for assessment is given below.Students complete self-assessment or peer assessment using the Assessment rubric.Use the Assessment rubric found in the Teacher’s notes to assess the activity and return to students to provide feedback. |