**Stage 2 Scientific Studies Program: Amusement Parks**

**This is a 20-credit program for students studying Stage 2 Scientific Studies.**

**Number of lessons equivalent to 120 hrs per semester, including 50–60 hrs of practical activities.**

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| **Week** | **Science Inquiry Skills/Possible Contexts** | **Activities/Teaching strategies** | **SHE** | **Summative Assessment** |
| Term 1  1 | Brainstorming: Science of Amusement Parks: What factors need to be considered when analysing an amusement park ride?  How do you find information required to answer questions and solve problems? (Introduction to deconstruction of a problem) | Watch Video of Amusement Park rides: from simple to complex  Discussion Protocol for Brainstorming Ideas in Groups- the science of these rides  Class Discussion of the Science involved  Research Task on the Science (Physics) of amusement park rides. | What has influenced the development of amusement park rides over the past 25 years? |  |
| 2 | Fair Testing  Accurate measurements  Significant Figures | Discuss the elements of fair testing.  Practical activity: Measurement- accuracy, resolution. Use of data loggers and apps (if available)  Use ticker timers or data logger to measure the speed of a car on a track. |  |  |
| 3 | Data Analysis  Types of Data  Representation of data  Trends, Patterns and making meaning of data | Use the data obtained from the trials and experiment from week 2- look at different ways of analysing the data.  How can the data be presented? Tables- format, conventions  Graphs- types, appropriate for what type of data. |  | SIS: Task 1 |
| 4 | Safety  Designing Experiments | Design an experiment.  Which recycled material will make the best spinning toy? |  |  |
| 5 | Some Science Understanding to consider:  Motion, Acceleration etc. | Physics Lessons, with activities and demonstrations. |  | SIS Task 2 |
| 6 | Engineering Design  Safety  Ethical considerations | How is the engineering design process different to scientific method? What are the similarities? |  |  |
| 7 | Investigate design challenges –review examples, lucky discoveries- how are the design fit for purpose  Introduction of the SHE Task | Analysis the following designs and consideration of why they are appropriate for their function.  Simple designs: under sink bins, mop and bucket- with water extraction, food pouches, 3D printers, post it notes, coffee pod machines etc…  SHE Task- recognising the key concepts and how they show the interaction between science and society.  Use articles or videos to develop students understanding of the key concepts.  Give scenarios and have students write responses for how the SHE shows the interaction between science and society. | CCDIAL: how have the designs been developed? Who was involved? | Begin SHE Investigation |
| 8 | Investigate design challenges:  Evaluating Methods  Sources of Error | Provide students with different methods- discuss the elements of the method- which are appropriate?  Provide sets of data- and discuss the evidence that error has affected this data. |  | SHE Investigation |
| 9 | Mini-Experiments: hypothesis/question, method, data collection, analysis, evaluation (random and systematic error) | Using the scientific method or engineering design process.  Design a way to better organise the cords on a lectern so that they cannot be seen but still able to be used easily- when connecting a computer and other devices.  Investigate if a Frisbee or boomerang will travel further when thrown in a straight line. |  | SHE Investigation |
| 10 | Mathematical relationships  Justified Conclusions  Limitations  Practice Report Writing. | Use the data from the investigations above to write practical reports.  What conclusions can be drawn from the data obtained? How is it limited? Can the conclusion be justified based on the data obtained? |  | SHE Investigation |
| Term 2  1 | Practical Investigation: Circular Motion | Practical -: Test F= mv2/R  Practise report with focus on data, conclusions | How do physics concepts and formulas become accepted by scientists? |  |
| 2 | Practical Investigation | Practical: Penny on a Turntable (factors speed of the turning, materials on the turntable etc.)  Practise report with focus on variables, factors that cannot be controlled, data and sources of uncertainty. |  | SHE Investigation-submit |
| 3 | Background Research and Teaching for Collaborative Inquiry  Deconstruct a problem | Revisit deconstruct a problem.  Deconstruct a problem as a class  Give examples for students to individually or collaboratively deconstruct.  e.g. Can a vegetable or fruit be used as a boat? |  | SIS Task 3 |
| 4 | Background Research and Teaching for Collaborative Inquiry  Deconstruct a problem | Discussion on factors that determine successful collaboration. Ways to evaluate the effectiveness of collaboration.  Group to discuss how they will effectively collaborate. Rules, guidelines?  Individuals to consider how they will evaluate the collaboration of their group in their journal (for inclusion in their recorded presentation). |  |  |
| 5 | Collaborative Inquiry: Design | Group works together to deconstruct the problem.  Consider factors that will affect the design of the rollercoaster. | How are designs developed? What influences the designs?  How do ideas become available to society? | Collaborative Inquiry: Design- Begin |
| 6 | Collaborative Inquiry: Design | Group works together to design the rollercoasters- this involve research and development of ideas. |  |  |
| 7 | Collaborative Inquiry: Testing and Trialling | Group works together to trial different designs and make alterations as required. Come up with a design to experiment with. |  |  |
| 8 | Collaborative Inquiry: Experimentation and Data collection | Prototype verification- is the design effective. |  |  |
| 9 | Collaborative Inquiry: Experimentation and Data collection | Prototype verification- is the design effective.  Does the design work as needed  How could it be improved- how could it be changed?  Limitation of the design. |  |  |
| 10 | Individual Inquiry Design- Proposal | Class discussion- requirements of the individual inquiry |  | Individual Inquiry Design- Proposal: Begin |
| Term 3  1 | Individual Inquiry Design- Proposal | Research  Teacher verification of inquiry topic  Write the proposal |  |  |
| 2 | Preliminary Trials/Testing  Finalise Proposal | Individual testing of concept for the inquiry.  Proposal- continue to develop |  | Individual Inquiry Design- Proposal: Continue |
| 3 | Submit Proposal for marking and feedback | Individual testing of concept for the inquiry. |  |  |
| 4 | Re-consider proposal and make changes.  New testing. | Individual testing of concept for the inquiry. |  | Individual Inquiry Design- Proposal: Submit Final |
| 5 | Individual Inquiry- experimentation, draft report | Inquiry: experiment, data collection, etc. |  |  |
| 6 | Individual Inquiry- experimentation, draft report | Inquiry: experiment, data collection, etc. |  |  |
| 7 | Individual Inquiry- experimentation, draft report | Inquiry: experiment, data collection, etc. |  |  |
| 8 | Individual Inquiry- experimentation, draft report | Inquiry: experiment, data collection, etc. |  |  |
| 9 | Individual Inquiry- experimentation, draft report | Inquiry: experiment, data collection, etc. |  |  |
| 10 | Individual Inquiry- complete | Finalise the individual inquiry report. |  | Individual Inquiry- submitted |
| Term 4  1 | Collaborative Inquiry- complete and prepare recorded presentation | Complete journal and individual recorded presentation |  |  |
| 2 | Collaborative Inquiry- complete and prepare recorded presentation | Complete journal and individual recorded presentation |  |  |
| 3 | Collaborative Inquiry- recorded presentation presented negotiated format with students | Complete journal and individual recorded presentation |  | Collaborative Inquiry- submitted |