Teacher(s)	Neil Commons	Subject group and discipline	MYP Science		
Unit title	Car Safety	MYP year	5	Unit duration (hrs)	

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Change	**Movement and consequences**	**scientific and technical innovation -** how humans use their understanding of scientific principles

Statement of inquiry

Sudden changes in motion can have dramatic impacts which technology must harness to make car travel safe

Inquiry questions

Factual — What does an unbalanced force do to an object?

Conceptual— How has technology succeeded in eliminating all risks from car travel?

Debatable— Does speed kill?

Objectives	Summative assessment	
A. Knowing and understanding i. explain scientific knowledge ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations iii. analyse and evaluate information to make scientifically B. Inquiring and designing i. explain a problem or question to be tested by a scientific investigation ii. formulate a testable hypothesis and explain it using scientific reasoning iii. explain how to manipulate the variables, and explain how data will be collected iv. design scientific investigations. C. Processing and evaluating	Outline of summative assessment task(s) including assessment criteria: End of unit test (A) Collisions investigation (BC) Car safety leaflet (D)	Relationship between summative assessment task(s) and statement of inquiry: The end of unit test will require students to explain the impacts of unbalanced forces on an objects movement and apply this knowledge solving problems in familiar and unfamiliar situations, as well as analysing and evaluating statements relating to car safety, distance-time, speed-time and force-time graphs. The collisions investigation will require students design an experiment, use scientific techniques to make measurements and then process and evaluate the collected data The car safety leaflet will require students to explain and evaluate how science is applied to increasing the safety of motor vehicles.

i. present collected and transformed data ii. interpret data and explain results using scientific reasoning iii. evaluate the validity of a hypothesis based on the outcome of the scientific investigation iv. evaluate the validity of the method v. explain improvements or extensions to the method D. Reflecting on the impacts of science i. explain the ways in which science is applied and used to address a specific problem or issue ii. discuss and evaluate the various implications of the use of science and its application in solving a specific problem or issue iii. apply communication modes effectively iv. document the work of others and sources of information used.		

Approaches to learning (ATL)				
IB ATL Category	MYP ATL Cluster	Specific ATL skill	Related Subject Objective	Learning experience **(explicitly taught in bold)**
Thinking	Critical thinking	Analyzing and evaluating issues and ideas	Objective A strand iii Objective B strand iii Objective C strand ii Objective C strand iii Objective C strand iv Objective C strand v Objective D strand ii	Problem solving Investigation analysis and evaluation End of unit test Introduction to course promoting consideration of different contexts Using the scientific method
	Creativity and innovation	The skills of invention – developing things and ideas that never existed before	Objective B strand ii Objective B strand iv	Investigation design
	Transfer	Utilising skills and knowledge in multiple contexts	Objective A strand ii	Problem solving Investigation analysis and evaluation End of unit test
Social	Collaborating	Working effectively with others		Lab skills Forces and Motion conceptual review task with individual, pair share search

				for misconceptions
Communication	Communication	Exchanging thoughts, messages and information effectively through interaction	Objective A strand i Objective B strand i Objective C strand v Objective D strand i Objective D strand iii	Group roblem solving Tables and graphs Investigation planning, analysis and evaluation Comparison of drink driving advert strategies Car safety leaflet
Self-management	Organization	Managing time and tasks effectively		Expected progression during investigation Clearly identified and discussed Using required knowledge checklist Research scaffolding/ Revision checklists
	Reflection	(Re-)considering what has been learned; choosing and using ATL skills		Unit reflection task Re-considering previous investigation task feedback
Research	Information literacy	Finding, interpreting, judging and creating information	Objective A strand iii Objective C strand i Objective D strand iv	Finding supporting evidence: Car safety leaflet content Investigation planning,

				analysis and evaluation Consideration of car safety information sources
	Media literacy	Interacting with media to use and create ideas and information		Suitable online image selection to support notes

Action: Teaching and learning through inquiry

Content	Learning process
Car Safety	**Learning experiences and *teaching strategies*** • Prior knowledge identified with *table then class* discussion on car safety • Guiding question "Does speed kill?" unpacked and pre-unit answers developed • *Videos – Extreme crash, Crash test dummies and Top Gear's Train crash – used to stimulate thought*
	Formative assessment Car Safety KWL (prior Knowledge, Learnt content and Want to learn) Egg-amples experiment
	Differentiation By support (including glossary of key words and related additional notes)
Speed • Calculating speed and velocity • Using distance–time graphs to represent journeys	**Learning experiences and *teaching strategies*** *Highlight key learning points from each activity* *Visual demonstration using animations* • Reflect on speed prior knowledge and the different methods this will be applied (theoretical and practical) • Distinction between distance and displace and also speed and velocity highlighted.

	• Use world record information to introduce distance-time graphs • Practical data collected to be processed into a distance-time graph (*supporting kinaesthetic learners*) • Discussion of task and key knowledge of distance time graph highlighted
	Formative assessment • *Speed questions allocated to verify expected calculation and re-arranging skills (allowing for formative assessment*) • *Groups (pre-selected to mix ability) deduce answers to distance-time graph problems (formative assessment)* • Distance-time graph homework task allows for further formative assessment
	Differentiation By support (including glossary of key words and related additional notes) Worksheet foundation and higher options
Acceleration •Calculating acceleration and deceleration. •Using velocity–time graphs to represent the motion of an object.	**Learning experiences and *teaching strategies*** • Starter – Building on prior knowledge deduction of what a curved distance-time graph shows • Acceleration formula introduced and use modelled. Practice questions set providing opportunity for further formative feedback. Final understanding confirmation task •Discussion of task and key knowledge of velocitye time graph highlighted
	Formative assessment • *Groups deduce answers to velocity-time graph problems (formative assessment)*
	Differentiation By support (including glossary of key words and related additional notes) Worksheet foundation and higher options *Groups (pre-selected to mix ability)*

<table>
<tr>
<td>Kinematic Graphs

•Using distance–time graphs to represent journeys.

•Using velocity–time graphs to represent the motion of an object.</td>
<td><u>Learning experiences</u> and teaching strategies

Highlight key learning points from each activity

Starter – Building on prior knowledge deduction of what displayed velocity-time graph shows (200m World Record)

<u>Distance and Velocity data paired collection task allowing for comparison and key features to be highlighted in both graphs (formative feedback opportunity)</u>

Extension work using Marion Jones race analysis</td>
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<td>Formative assessment

Distance-time and Velocity-time graph problems (formative feedback opportunity)

Molarirty worksheet</td>
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<td>Differentiation

By support (including glossary of key words and related additional notes)

Extension work using Marion Jones race analysis</td>
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<td>Forces

•How unbalanced forces affect the movement of an object (Newton’s 1st law).

•The relationship between force, mass and acceleration (Newton’s Second Law)</td>
<td><u>Learning experiences</u> and teaching strategies

• Reflect upon prior knowledge (in year 9 F=ma is introduced)

• <u>Force questions allocated</u> to practice expected calculation and re-arranging skills (allowing for formative assessment) with culminating task

• Groups with no formal teaching develop diagrams showing forces of 4 situations (falling ball, book on table, fish at constant speed and accelerating bike) to <u>identify understanding and misconceptions</u>

• <u>Correct diagrams are modelled and resultant forces introduced</u></td>
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<td>Formative assessment

Forces aty work</td>
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	Differentiation By support (including glossary of key words and related additional notes)
Forces (Resultat) • Drawing Free Body Diagrams (FDBs) showing forces • Resolve the resultant force	**<u>Learning experiences</u> and *teaching strategies*** *Highlight key learning points from each activity* • *Forces and motion conceptual review considers conceptual understanding without a mathematical requirement. The individual, pair, table completion identifies misconceptions and promotes scientific discussion.*
	Formative assessment • Group resultant force task used to clarify understanding before problems to build individual confidence (formative assessment opportunity)
	Differentiation • By support (including glossary of key words and related additional notes) • Newton's 2nd law Challenge provides *practical problem solving extension* • Extension: Vector analysis including non-right angle forces
Forces (N3) • Describe the impacts of Newton's 3rd Law • Identify Newton's pairs (Newton's 3rd law)	**<u>Learning experiences</u> and *teaching strategies*** <u>Newton's third law thought experiments</u> *Link between equal and opposite forces and ability to calculate forces applied onto cars in crashes*
	Formative assessment • Newton's third law problems and newton's pairs identification
	Differentiation By support (including glossary of key words and related additional notes)

<table>
<tr><td></td><td></td></tr>
<tr><td rowspan="3">Forces review
•How unbalanced forces affect the movement of an object (Newton's 1st law).
•The relationship between force, mass and acceleration (Newton's Second Law)
•Drawing Free Body Diagrams (FDBs) showing forces
•Resolve the resultant force
•Describe the impacts of Newton's 3rd Law
•Identify Newton's pairs (Newton's 3rd law)</td><td><u>Learning experiences</u> and teaching strategies
Highlight key learning points from each activity</td></tr>
<tr><td>Formative assessment
• Forces on a trolley in different situations to encourage hands on application
•Problem solving reviewing all 3 laws</td></tr>
<tr><td>Differentiation
By support (including glossary of key words and related additional notes)</td></tr>
<tr><td rowspan="3">Ticker-tape</td><td><u>Learning experiences</u> and teaching strategies
Highlight key learning points from each activity</td></tr>
<tr><td>Formative assessment
• Group problem solving task using prior knowledge to calculate acceleration of a trolley using a ticker tape machine and a ruler (formative feedback opportunity)
•Further problems relating to ticker tape</td></tr>
<tr><td>Differentiation
By support (including glossary of key words and related additional notes)</td></tr>
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<td>Braking Distances
• Identify factors which effect thinking distances
• Identify factors which effect friction for braking
• Use the equations of motion
• The relationship between thinking, braking and stopping distances</td>
<td><u>Learning experiences</u> and teaching strategies
Highlight key learning points from each activity
i) Equations of motion
• Related reading and group problem followed by questions and answers
ii) Friction
• Related reading followed by questions
iii) Drink Driving
• Consideration of 3 videos to consider cultural differences and graphical research task also relating to cultural differences.

Plenary task evaluates understanding from all 3 bases.</td>
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<td>Formative assessment
Equations of motion and friction questions
Plennary questions</td>
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<td>Differentiation
By support (including glossary of key words and related additional notes)</td>
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<td>Terminal Velocity and unit revision
Describe Terminal velocity.</td>
<td><u>Learning experiences</u> and teaching strategies
Highlight key learning points from each activity
Visual demonstration using animations
Unit knowledge check sheet is offered to support revision</td>
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<td>Formative assessment
Group task designed to encourage reflection of prior knowledge relating to resultant forces, distance-time graphs and velocity-time graphs of a parachute jump.</td>
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	Differentiation By support (including glossary of key words and related additional notes) Student choose revision tasks with advised

Resources
Egg-amples – Eggs, paper, string, selotape Distance-time task – Stop watches, measuring tape Forces activity – hanging masses, string, pully, block Ticker timer – Kinematics cart and ticker tape machine

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit