BOWLAND MATHS
an introduction

Case Study comparison charts

Examples of mathematical activities

Alien invasion	Locate spaceships using clues to estimate and calculate distances and directions. Interpret graphs and maps to plan an escape; crack a code to escape from a cell. General problem solving.
Crash test	Control variables systematically (e.g. speeds, design of cars, barrier types). Make hypotheses and test them by observing the effects in crash test experiments. Present findings to the class.
DigiDesign	Design a toy character for a 60 by 80 pixel display. Scale proportionately for different types of display. Conduct market research into the design.
Explorers	Plan a route in space, bearing in mind fuel, food reserves and distance. Trade between planets using fantasy units of currency. Use algebraic functions to decide where explosive charges should be placed to destroy asteroids.
Highway link design	Propose the location of a by-pass, using data tables and graphs from the Highways Agency. Find ways to satisfy constraints (minimum radii of curvature, verge clearance, cambers etc). Cost and present proposed solutions.
How risky is life?	Compare perceptions of the causes of death with the actual statistics. Interpret very large and very small probabilities. Decide what these say about behaviour and attitudes. Explore random variation.
In or out?	Use photographic and slow motion evidence to decide qualitatively, then quantitatively, whether a batsman (in cricket) is 'in' or 'out'. Select variables, make estimates of distances, times and speeds and use algebraic models.
Keeping the pizza hot	Choose packaging for a pizza. Measure temperatures as the pizza cools. Use data logging software. Fit a graphical model to the cooling of a pizza. Calculate the longest reasonable travel time before a pizza becomes too cold to eat.
Mega_Bank	Examine a crime scene and collect evidence. Use proportional reasoning and other data to solve a crime. Prepare a case and present it convincingly.

My music	Describe the characteristics of individual genres of music. Use the tempo of music and other variables to illustrate compound measures, eg beats per minute.
Mystery tours	Plan a 5-day trip to satisfy money/time constraints and to keep happy three sets of tourists with different requirements. Convert currencies, satisfy baggage allowances etc.
Outbreak	Use coordinate clues to locate infected people. Mix ingredients in proportions to create an antidote. Use resources optimally to design a vaccination programme.
PointZero	Solve number, spatial and logic puzzles to progress in an escape adventure game. Use number sequences to escape from a building. Use rotation and reflection to recreate a given pattern. Use codes and loci to escape from underground tunnels.
Product wars	Design a questionnaire and conducting market research for a new drink. Mix ingredients to obtain nutritional value and taste; design packaging for the drink.
Reducing road accidents	Explore a town's accident database. Control variables to decide on the most effective allocation of a given sum of money to provide safety measures. Prepare a case and present it convincingly.
Save a baby kangaroo	Determine the age and species of a 'Joey' from tail and foot measurements and graphs of growth data. Devise an appropriate nutrition regime from tables of nutrient data. Present and justify this regime.
Speed cameras	Explore perceptions of randomness and relate this to the perceived effectiveness of speed cameras. Simulate the effects of different sitings.
Sundials	Design, examining the maths and then construct a sundial, using symmetry, angles, nets, origami, graphs and charts.
Velletri Scrolls	Solve number, spatial and logic puzzles in an adventure game. Interpret maps (bearings and scales), crack a code, make plans with timetables and graphs (climate). Interpret algebraic representations.
Water availability	Analyse a complex decision faced by a water aid agency; Devise and use a compound measure (eg per capita) to decide on a 'fair' distribution of resources.
You reckon?	Break a problem into its component parts; combine everyday knowledge to create chains of reasoning that result in reasonable estimates of useful quantities.

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Problem types & practicalities

	Problem type						Time needed (1-hour lessons)	Age/Ability									Resources needed		
	Planning and organising	Designing and making	Discovering relationships	Modelling	Interpreting and estimating	Solving logic puzzles		Year 7			Year 8			Year 9			Pupil PCs (usually 1 per pair or small group)	Data projector or Interactive whiteboard	Other materials/equipment: check details in Case Study
								l	m	h	l	m	h	l	m	h			
Alien invasion	◑		●	○	○	●	4-6	✓			✓	✓		✓	✓			●	◑
Crash test	◑	◑	○		○		3-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	◑	◑	
Explorers	●		◑		○	●	3-5	✓			✓	✓		✓	✓		◑	○	
Highway link design	◑	●	○	◑	◑		4-5	✓			✓	✓		✓	✓	✓	○	○	○
How risky is life?			◑	○	●		3-5				✓	✓		✓	✓	✓	○	◑	
In or out?	◑		○	●	◑		5-7	✓			✓			✓	✓		◑	◑	◑
Keeping the pizza hot	◑	○	◑	●	◑		4-6		✓		✓	✓		✓	✓	✓	◑	◑	○
My music	○		◑	○	●		3-6	✓	✓	✓	✓	✓	✓	✓	✓		○	○	●
Mystery tours	●		◑		◑	◑	3		✓	✓		✓	✓		✓	✓	◑	○	
Outbreak	◑				◑	○	3		✓	✓	✓	✓	✓	✓	✓		●	○	
PointZero	○		○			●	3		✓	✓	✓	✓	✓	✓	✓		●	○	
Product wars	◑	◑			○		3	✓	✓	✓	✓	✓	✓	✓	✓		◑	●	○
Reducing road accidents	◑				●		4-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	◑	○	○
Save a baby kangaroo	◑		◑		●		5-7		✓		✓	✓		✓	✓		○	◑	○
Speed cameras	●	○	●	◑	◑		4-6				✓	✓		✓	✓	✓	◑	○	
Sundials	◑	●	◑	◑	●	◑	3-10		✓	✓	✓	✓	✓	✓	✓	✓	○	◑	●
Water availability	○			●	●		2-4	✓	✓	✓	✓	✓					◑	◑	○
You reckon?				●	●		2-5		✓			✓	✓	✓	✓	✓		○	

○ Minor role
◑ Significant role
● Major role

○ Optional
◑ Some lessons
● Most/all lessons

Note: These charts are intended to indicate the *coverage* of each Case Study and are *not* an assessment of relative "quality". They reflect the diverse nature of the Case Studies: some focus on a specific topic or activity type while others cover a wider domain.

Please check the individual case study documents for detailed ICT and other resource requirements well in advance of the lesson – the above is just a general guide.

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Links to the Key Stage 3 Programme of Study

	Key concepts				Key processes					Content Areas			Curriculum opportunities						
	Competence	Creativity	Applications and implications of maths	Critical understanding	Representing	Analysing (reasoning)	Analysing (procedures)	Interpreting and evaluating	Communicating and reflecting	Number and Algebra	Geometry and Measure	Statistics	Develop confidence in an increasing range of methods	Work on more challenging mixes of contexts and mathematics	Work on open and closed tasks in real and abstract contexts	Tackle problems from other subjects and from outside school	Link different concepts, processes and techniques	Work collaboratively and independently	Select from a range of resources, inc ICT
Alien invasion	●	◑	◑	●	○	●	◑	◑	◑	●	◑	○	●	◑	◑	◑	○	●	
Crash test	◑	◑	◑	◑	●	●	◑	◑	◑	○	○	●	○		○	◑	◑	◑	◑
Explorers	◑	◑	○	◑	○	◑	●	●	◑	◑	◑	●	◑	◑	◑		◑	◑	○
Highway link design	◑	●	◑	◑	◑	◑	◑	●	◑	●	◑	◑	◑	◑	◑	◑	◑	●	◑
How risky is life?	○	◑	●	◑	◑	◑	◑	◑	◑	◑	○	●	○	◑	○	●	○	◑	◑
In or out?	◑	◑	◑	◑	○	◑	●	●	○	●	○	◑	○	◑	◑	●	◑	●	◑
Keeping the pizza hot	●	◑	◑	●	●	●	◑	●	◑	●	○		◑	●	◑	◑	◑	◑	●
My music	◑	◑	◑	◑	◑	○	◑	◑	◑	◑	◑	◑	○	○	◑	◑	◑	●	◑
Mystery tours	◑	◑	◑		◑	◑	◑	◑	◑	◑	○	◑	○		◑	◑	◑	◑	◑
Outbreak	○	◑	○	○	○	◑	◑	○	◑	◑	◑		○	◑	○	◑	○	○	○
PointZero	○	◑	○	○	○	◑	◑	○	◑	○	◑		○	◑	◑	○	◑	●	○
Product wars	○	◑	◑	○	○		◑	◑	◑	○	○	◑	○	◑	◑	●	○	◑	○
Reducing road accidents	◑	●	○	◑	●	●	◑	◑	●	◑	○	◑	●	●	●	●	○	◑	◑
Save a baby kangaroo	◑	○	◑	◑	◑	◑	◑	◑	◑	◑	○	●	○	◑	◑	●	◑	◑	◑
Speed cameras	◑	●	◑	◑	◑	◑	◑	◑	◑			●	●	●	●	◑	○	●	◑
Sundials	●	◑	●	◑	◑	◑	●	◑	◑	◑	●		◑	●	○	●	●	◑	◑
Water availability	◑	◑	◑	◑	◑	◑	●	●	●	●	◑	○	◑	◑	◑	●	◑	●	○
You reckon?	◑	●	◑	●	○	●	◑	●	◑	●	○		●	●	●	◑	◑	●	○

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