

EMPIRICAL REASONING

Uses observation, experience and experimentation to explain phenomena and make decisions

Quality Criteria	Reframes inquiry questions on the basis of knowledge and insight	Revises hypotheses on the basis of evidence	Evaluates investigation design in response to constraints	Generalises using patterns and trends	Justifies approaches to investigation	Defends conclusions	Critically evaluates claims and assumptions	5 Students at this level systematically refine hypotheses to develop authoritative knowledge from their investigations. They construct and test hypotheses, employing a flexible approach to their inquiry by exploring alternative or contradictory perspectives and methodologies. They produce robust data from which to draw justifiable conclusions. They reflect on methodologies to refine investigation design. They propose creative and innovative solutions that account for multiple contextual factors. They suspend judgement, ethically evaluating claims with consideration for the potential impacts.
	Poses testable inquiry questions	Develops hypotheses	Modifies procedure to account for variables	Analyses patterns and trends	Analyses strengths/weaknesses of investigation	Evaluates conclusions	Analyses claims using evidence and reasoning	4 Students at this level pose and test hypotheses, applying investigative methods to clarify and explore their new understandings. They formulate testable inquiry questions in response to complex issues and ideas. They develop methodologies to test hypotheses using controls and isolating variables. They make specific suggestions for improving investigations and reducing error. They propose one or more solutions articulating feasibility and impacts. Their explanations are consistent with the data, and they identify the scope and limitations of their findings. They evaluate claims to develop an informed position taking into account the validity and reliability of evidence.
		Explains predictions		*Recognises patterns in data		Explains conclusions drawing on data	Reviews the reasonableness of the claims	3 Students at this level develop inquiry questions related to their interests and conduct investigations to test their predictions. They take account of the main variables when designing their investigations, collecting and organising data from repeated tests. They identify patterns or themes within the data and use this evidence to draw conclusions. They notice errors in their own processes and suggest improvements. They ask questions to clarify the reasonableness of others' claims.
	Asks questions based on observations		Designs a process to gather data		Explains cause and effect	States conclusion based on findings	Questions unrealistic claims in familiar contexts	2 Students at this level ask questions and plan and undertake processes to explore their areas of interest. On the basis of their observations, they can design and carry out processes that show they recognise causal relationships. They collect and record data in order to share their findings and make decisions. They question some assumptions and viewpoints within a claim.
	Explores observations	Makes predictions		Describes what is observed	Lists what worked and what didn't			1 Students at this level notice and explore phenomena and ideas, making connections to their own experience. They are curious about the world around them. They make predictions based on their observations and use strategies such as trial and error to check them.
	Not yet evident	Not yet evident	Not yet evident	Not yet evident	Not yet evident	Not yet evident	Not yet evident	Progression
Indicators	Asks questions	Makes predictions	Designs investigation	Makes sense of data	Evaluates process	Draws conclusions	Evaluates claims	
Capabilities	Explores		Investigates			Evaluates		